

GOVERNMENT POLYTECHNIC, AURANGABAD.
(An Autonomous Institute of Govt. of Maharashtra)



Curriculum for Diploma in Civil Engineering



Sixth Revision (2017-2018)

Based on Outcome Based Education Philosophy

PREFACE

Government Polytechnic, Aurangabad, is premier technical institute in Maharashtra was established in the year 1955-56. Over the period of time the institute, through its untiring efforts has created its own niche and has been functioning as a Lead Technical Institute in the State of Maharashtra to serve the Industry and Society by producing excellent technical manpower.

Government Polytechnic, Aurangabad has expanded quantitatively from an intake of 180 in 1955 with three programmes to 720 intakes of eight programmes. The Institute has been striving relentlessly for achievement of excellence in technical education. Government Polytechnic, Aurangabad has been functioning with ‘the Autonomous Institute status’, since 1994. It is presently functioning in three shifts, by running Diploma Programmes in I Shift (Regular), II shift and Part Time Diploma programmes in evening shift. I am proud to share that, the Institute has been ably rewarded with three state level awards for its best performance in the state of Maharashtra.

Institute has revised the curricula five times in the past and the sixth revision which was due, was initiated in the year 2015 and finally, the revised (sixth) curricula which is the outcome of, search conference under the guidance of NITTTR, Bhopal, several workshops and deliberations, has been implemented with effect from 2017-18 with the approval of Programme wise Board of Studies (PBOS) Board of Studies (BOS) and consent of Governing Body.

The hallmark of sixth revision is, adopting ‘Outcome Based Education Philosophy’ as the basis for Curriculum Design and Development process. The ‘Vision & Mission’ of Institute and programme offering Departments, and with programme Educational Objectives (PEOs), Programme Outcomes as mandated by National Board of Accreditation (NBA) have been considered as points of reference for curriculum revision. Taking into account the need/ demand of industry and society, the courses such as ‘Vocational Training (Industrial/ In-plant Training), Seminar and Development of Life Skills for all the programmes have been introduced as compulsory. To accommodate these additional courses and other requirements, the credits of each programme have been enhanced from 184 to 194.

‘Skill India’, ‘Digital India’ and ‘Make in India’ the flagship programmes/ initiatives of Government of India and State of Maharashtra have been the basic considerations in the curriculum revision process.

I deem this is as an opportune moment to recall the following proverb/quote which I view as highly relevant, on the occasion of writing the preface.

"If you are planning for a year, sow rice; if you are planning for a decade, plant trees; if you are planning for a lifetime, educate people." –Chinese proverb &

As the Indian Education Commission of 1964-66, also known as the *Kothari Commission*, it is stated that

"The destiny of our country is being shaped in our classrooms".

I take great pride in appreciating the efforts of Faculty of all Departments. All faculty have taken determined efforts under the guidance of NITTTR Bhopal, Industry experts, Academicians and Curriculum Development & Implementation Cell (CDIC) in the revision of curricula. I appreciate the contribution of alumni, students and faculty by making valuable suggestions / feedback for the revision of curricula.

I wish to assure, that the curriculum of all programmes will be implemented in true spirit to achieve the intended educational objectives of the programme.

(Prof. F. A. Khan)
Principal
Government Polytechnic, Aurangabad.

Vision of the Institute

To be the internationally accredited institute that contributes in the development of competent professionals and entrepreneurs on the platform of technology based systems blended learning through highly qualified and trained staff.

Mission of the Institute

To educate and train the students for making globally competent individuals, professionals, technicians and skilled human resources through world-class curriculum, student centric academic systems, team of committed, trained faculty and staff contributing to the student's successful employment and entrepreneurship with a spirit of patriotism and concern for environment.

Vision of the Department

To be a centre for excellence to meet global standards satisfying dynamic demands of civil engineering industry incorporating relevant social concerns, encouraging lifelong learning, technological innovations and developing competent professionals through highly qualified, committed and trained staff.

Mission of the Department

To educate the globally competent Civil Engineering Diploma graduates through excellent education system for creating synergy for socio-economic development of nation, with focus on development of social values, human ethics, employment and self-employment spirit and lifelong learning skills.

CERTIFICATE

This is to certify that the curriculum of Diploma in Civil Engineering Programme of Government Polytechnic (An Autonomous Institute of Government of Maharashtra) which has been revised and to be implemented from academic year 2017-18. The outcome based curriculum is hereby granted as per the suggestion given by the members of **Programme wise Board of Studies (PBOS)**.

Member Secretary/Coordinator
Programme wise Board of Studies

Chairman
Programme wise Board of Studies


Principal
Government Polytechnic,
Aurangabad.


CERTIFICATE OF EQUIVALENCE

This is to certify that the Curriculum of Diploma in Civil Engineering Programme of Govt. Polytechnic Aurangabad (An Autonomous Institute of Govt. of Maharashtra) ,which has been implemented with effect from 2017-18 academic year, is equivalent to Diploma in Civil Engineering Programme Implemented by Maharashtra State Board of Technical Education, therefore Equivalence is hereby granted as below.

Sr.No.	Name of the Full time Programme Offered by Govt. Poly., Aurangabad	Name of the Equivalent Course of MSBTE
1.	DIPLOMA IN CIVIL ENGINEERING	DIPLOMA IN CIVIL ENGINEERING
2.	DIPLOMA IN MECHANICAL ENGINEERING	DIPLOMA IN MECHANICAL ENGINEERING
3.	DIPLOMA IN ELECTRICAL ENGINEERING	DIPLOMA IN ELECTRICAL ENGINEERING
4.	DIPLOMA IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	DIPLOMA IN ELECTRONICS & TELECOMMUNICATION ENGINEERING
5.	DIPLOMA IN COMPUTER ENGINEERING	DIPLOMA IN COMPUTER ENGINEERING
6.	DIPLOMA IN INFORMATION TECHNOLOGY	DIPLOMA IN INFORMATION TECHNOLOGY
7.	DIPLOMA IN AUTOMOBILE ENGINEERING	DIPLOMA IN AUTOMOBILE ENGINEERING
8.	DIPLOMA IN DRESS DESIGN & GARMENT MANUFACTURING	DIPLOMA IN DRESS DESIGN & GARMENT MANUFACTURING

The Academic Equivalence granted to above programmes with the respective MSBTE courses is valid for the Academic Year 2017-18 to 2019-20.




 Director

No. MSBTE/D-53/Auro. Poly./GPA'badEqv. 2017-20/2018/3280
Dated: 18 MAY 2018

SIXTH REVISION OF CURRICULUM (OBE)**DIPLOMA IN CIVIL ENGINEERING PROGRAMME - YEAR 2017-18****INDEX**

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**REVISION OF CURRICULUM OF
DIPLOMA IN CIVIL ENGINEERING PROGRAMME
YEAR 2017-18**

1. SCOPE OF DIPLOMA IN CIVIL ENGINEERING

The diploma programme in Civil Engineering which is a six-semester (Three Years) in regular and eight semester (Four Years) for part time. This programme is integrated with various courses theory, experiments, practical experiences and visits.

The Civil Engineer is responsible for the planning, execution, construction and maintenance of innumerable projects in field such as building construction, road construction, bridge and dam construction, water supply and sewage systems etc.

Today's Civil Engineering students should attempt to work professionally and competent in all possible areas of professional work. Hence the institute has adopted the Competency Based approach for Curriculum design. The unique structure of the institute's degree programme guides students to concentrate their studies on area of special emphasis through the applied diversified courses. However, students desiring in-depth studies, which offers a broader base of Civil Engineering knowledge may choose to focus on general engineering and ensure themselves a greater choice of career opportunity.

2. AREA OF EMPLOYMENT:

Civil Engineer normally works in private industry. The civil engineers working in industry are often responsible for construction planning, preparation and supervision. Planning task involves drawing work, cost calculation site matters. In the actual construction stage the civil engineer functions as a site supervisor. Additional responsibilities include organize the deployment of resources.

The career opportunities for Diploma Civil Engineer are

- Buildings/civil works Site Supervisor
- Transportation system work Engineer
- Maintenance Engineer
- Material Supplier /Manufacturer
- Building Services
- Architectural assistance / Practice Consulting Engineer /Contractor/ Builder

3. JOB FUNCTIONS

Diploma Civil Engineer is generally employed as a Site Engineer, a Surveyor, Supervisor of various processes, an assistant to Designer/Consultant , Valuer, as a planner etc. Below stated are the Job Functions of a Diploma Civil Engineer.

- Collects data for planning of a project.

- Prepares Drawings based on the data collected for the projects.
- Assists Designer in the Designing process and prepares drawings as per the results of Designing process.
- Prepares Estimates and proposals for Projects.
- Assists the senior Engineer in Project Planning, Implementation and Monitoring of project.
- Prepares job lay out , and executes various activities as per plans/schedules and specifications.
- Plans and executes for various services in Building.
- Supervises & controls the site activities to ensure the quality standards.
- Supervises the maintenance & repairs of works to ensure proper services of structures.
- Records the progress of work, and prepares bills for payment.

4. LIST OF INDUSTRIES VISITED

Following different Work places are visited to identify the different Job functions

- Deven Realities LLP, Aurangabad
- Progressive Expert consulting Pvt, Ltd, Aurangabad
- Disha Construction ,Osmanpura Aurangabad
- Water & Land Management Institute (WALMI) Kanchanwadi,, Aurangabad
- Command Area Development Authority (CADA),Aurangabad.
- Ideal Cement Product , MIDC Waluj, Aurangabad
- Water Recourse Department, Jayakwadi Project Division Paithan
- Public Works Department Div.2 ,Aurangabad.
- Maharashtra JeevanPradhikaran, Nagsenwan , Aurangabad
- Works Division (Civil), ZillaParishad , Aurangabad
- Chief Engineer Office, M.S.R.D.C., BandhkamBhawan,Aurangabad
- DILASA , NGO, Aurangabad.
- Eco Need Foundation, Aurangabad.
- Maharashtra Industrial Development Corporation Div. Office (M.I.D.C.) Aurangabad.
- CIDCO, Town Planning Department, Aurangabad.

5. IDENTIFIED SKILLS REQUIRED BY CIVIL ENGG. TECHNICIAN:

- Plan, construction and erect all types of building, houses, Industrial plants, Bridges, Roads, Waterways, water reservoir, Railway and urban planning.
- Repair of civil engineering works

- Gathering and processing of geographical data.
- Prepare contour maps & study topo sheets.
- Set out, plan, organize and supervise work on site.
- Read, interpret and produce sketches and drawing (Architectural, structural, working and services Drawings) related to civil engineering works.
- Plan and design of two storied building and industrial shed.
- Selection, testing of soil and construction material.
- Deployment of construction equipment, machinery and resources.
- Prepare estimates for buildings, roads and other civil engineering structures.
- Use B. I. S. codes, and National Building code for planning, designing and supervising the civil engineering works.
- Use computers and computer software for analyzing, designing of civil engineering structure and communicating.
- Use Total Quality Management practice on control on civil engineering work (procedures, materials, manpower, economy).
- Prepare project report and legal contract and tender documents.
- Management of time, material, manpower, economy.
- Communicate with labor, designer, contractor, material suppliers, and clients effectively.
- Organize and manage civil engineering project.
- Life long learning and ability to acquire new knowledge and skills on self learning basis, Use Diagnostic skills.
- Solve civil engineering problem
- Use regulation, bylaws, civic, government laws, for preparing plans and execution of work.
- Concern for quality, reliability, safety, productivity and environmental issues in the context of international competitiveness.
- Proficient in multi skills, information collection and processing.
- Use and develop application software.
- Entrepreneurial skills.
- Ability to work in multi disciplinary and multinational teams.
- Supervise the civil engineering construction.
- Use of innovative, recycled materials

6. CURRICULUM DESIGN & DEVELOPMENT

Curriculum development is a dynamic process, which is governed by the contemporary needs of the user-system. All the activities in any academic institution are guided by the curricula operating in the institution. Design of curricula and their implementation therefore requires utmost attention of one and all for its effectiveness.

It was felt that design, review/revision should be based on scientific principles of educational technology and theories of learning and it must reflect the needs, expectations and aspirations of stakeholders/ clients in the technician education system. These needs of user system mainly fall in the following four domains namely

- Personal development domain
- Social development domain
- Continued learning skills domain
- ‘Earning to live’ or ‘Professional Skills’ development domain

Curriculum is designed on competency based. All competencies needed for Civil diploma holder is first listed. Based on this structure of curriculum is prepared. Attempts have been made in this document to address to the expectations of the user system from the Diploma pass outs. If implemented in right spirit, it would pay much better dividends, it is hoped.

An Approach to Curriculum Design and Development Based upon Outcome Based Education (OBE) Philosophy as adopted for Sixth Revision of Curriculum of Government Polytechnic Aurangabad.

6.1 Introduction:

After conferring academic autonomy to Government Polytechnics during Second Technician World Bank Assisted Project (Tech Ed II) implemented from 1992 to 1999 the curriculum revision process is being carried out after every 4-5 years. Our Institute, being Academically Autonomous since 1994, has been following the same practice and hence this sixth revision of curriculum for all programmes.

Curriculum, as per Colombo Plan Staff College Manila (1984), means *‘an educational programme designed, developed and implemented to attain predetermined educational objectives.’* Therefore curriculum ought to be designed for achieving purpose, objectives, outcomes that are decided well in advance. More over curriculum at any level, let it be at unit, at course, at course category or at programme level at the top, comprises of (Ralph Tylor 1949) rationale, objectives/ outcomes, content, Learning -Teaching strategies (LTS) and finally student’s assessment and evaluation.

We are in the era where technical manpower in general and engineering technicians in particular are required to solve or assist in solving engineering problems from nano – micro level to mega level (Jeff Lohmann 2009). It is expected from him/ her in that case to use knowledge of not only technology but also natural sciences (animate, inanimate and psycho socio sciences) and mathematics. Moreover he/ she is required to use advance IT based tools and techniques in diagnosing faults and carry out maintenance. Further technical manpower should have ability to work in team, communicate effectively, and remain updated of technologies they are expected to deal with.

As per research on curriculum in engineering and technology, education carried out in different parts of world it is concluded that philosophy, framework, approach and model that

is to be used for developing technical manpower with such profile should be Interdisciplinary – integrated curriculum.

Therefore, the philosophy of curriculum development used in revising sixth curriculum has been Integrated – interdisciplinary in nature to achieve outcome based technical education . Even though all prevailing & necessary apt theories of curriculum design are used in the curriculum development process the existing curriculum has been questioned for its ability to provide clearly stated learning outcomes and therefore it is right time that the revised curricula requires that it should give enough clarity as regards intended learning outcomes to all concerned – first to the student, then to the teachers and the industry, followed by all the other stakeholders. This meant that the curriculum should explicitly state as to what are the observable and measurable ‘competencies’ expected by the industry. Such ‘competencies’ comprising of measurable ‘Course outcomes’ in the ‘cognitive domain’, measureable associated practical outcomes in the form of practical exercises in the ‘psychomotor domain’ and measurable social skills related to the ‘affective domain’ will help the students and teachers in knowing the ‘length, breadth and depth’ of the course necessary to achieve the competency.

Therefore, Curriculum should be outcome-based, where program outcomes and course outcomes are measurable. We are in the era of accords viz. Washington, Sidney, Dublin Accords in which gradation of any engineering and technology programme is carried out using outcome based criteria in signatory countries. It was the outcome based criteria, which was devised for the first time by Accreditation Board for Engineering and Technology (ABET), that is being followed in USA for grading programmes for their quality since 1998. It is the industry which made educational institutes to go for outcome based criteria popularly known as EC 2000 where main emphasis is over outcomes – what he/ she knows and what he/ she is able to do.

National Board of Accreditation (NBA) has been practicing outcome based criteria in grading educational programmes of institutes awarding diploma and degree in engineering and technology. In that case the board empowered to undertake exercise of accrediting programmes has developed indigenous criteria for diploma programmes as follows: -

- i. Vision, mission and programme educational objectives
- ii. Programme outcomes
- iii. Programme curriculum
- iv. Students performance
- v. Faculty
- vi. Facilities and technical support
- vii. Academic support unit and teaching learning process.
- viii. Governance
- ix. Institutional support and finance resources
- x. Continuous improvement

As All India Council for Technical Education (AICTE) has made it mandatory to institutions to follow curricular processes for extending Outcome Based Technical Education and get programme accredited from NBA.

6.2 Philosophy for Sixth Revision of Curriculum adopted at Government

Polytechnic, Aurangabad :

Sixth revision of Curriculum uses model, approach, philosophy evolved over the years in other part of the world and accepted by our nation through National Board of Accreditation (NBA). being signatory of Washington Accord. It is the curriculum development philosophy that will enable institutes to impart Outcome based education (OBE). It is essential in that case to design a programme curriculum, develop resources for implementing it, implement it and undertake student's assessment and evaluation to impart OBE.

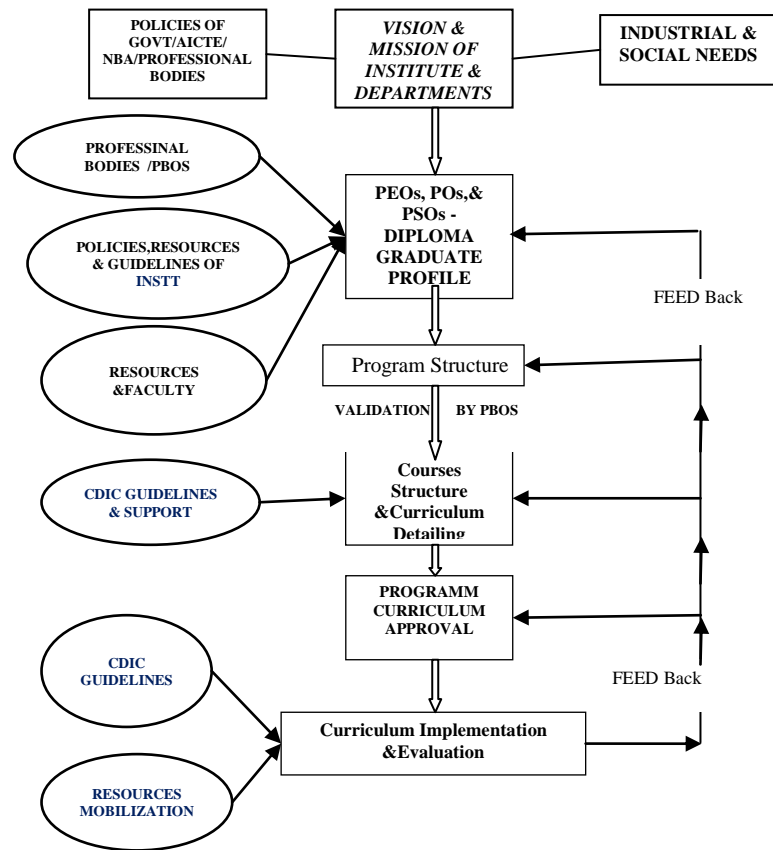
As regards, sixth revision of curriculum, which is based primarily on Outcome Based Education philosophy, follows the following stages.

1. Occupation analysis.
2. Formulation of Vision & Mission of Institute/Department.
3. Formulation of Diploma graduate attributes and Programme Educational Objectives.
4. Evolve Program Structure.
5. Evolve Course structure, Course Competencies, Course Outcomes & Curriculum detailing
6. of each course.
7. Approval of Curriculum
8. Implementation of Curriculum.

6.3 Approach to Curriculum Design and Development for Sixth Revision of Curriculum based upon above stages has been elaborated and depicted schematically as below.

In line with above stages, the institute ,under the guidance of NITTTR Bhopal organized the search conference/workshop involving industry personnel from several industries in the region covering all sectors related to 8 programmes run in the institute . This led to occupation analysis, knowing industry and society expectations as regards diploma graduate / engineer to arrive at profile of diploma engineers.

Institute also carried meetings and deliberations with stake holders to formulate the renewed Vision & Mission of Institute and departments as well. The Vision & Mission so formulated have been considered as the terms of references in curriculum revision process.



CURRICULUM DEVELOPMENT APPROACH

Programme Educational Objectives (PEOs) – Programme educational objectives which are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve are formulated.

Programme Outcomes (POs) - As Mandated by NBA, following Programme Outcomes have been also the basis for curriculum revision. These Programme outcomes state the attainment of students' abilities, which the Department has to ensure that the stated outcomes are achieved before they are allowed to graduates.

1. **Basic knowledge:** An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
2. **Discipline knowledge:** An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
3. **Experiments and practice:** An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
4. **Engineering Tools:** Apply appropriate technologies and tools with an understanding of the limitations.
5. **The engineer and society:** Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

6. **Environment and sustainability:** Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
8. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
9. **Communication:** An ability to communicate effectively.
10. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

In the next stage following steps have been followed:

- a. Identification & validation of Programme Structure
- b. Validation of programme structure
- c. Detailing of course curricula
- d. Vetting of programme curriculum
- e. Implementation and student's evaluation

Under the guidance of Programme wise Board of Studies (PBOS) , Course areas, levels, programme structure are worked and validated. In line with this structure, course structure, Teaching & Examination schemes are formulated. For each course, course rationale, course competency, course outcomes, content detailing, specification table, practical experiences along with instructional strategies/methods & student activities are also identified and validated by the PBOS.

Curricula of respective programme are presented before Board of Studies (BOS) for the final approval before it is implemented.

Implementation of curriculum involves , orienting faculty & staff for implementation, development lab manuals, learning resources , model question papers and training faculty for expertise in course areas (if required).

Mapping – Mapping is the process of representing, preferably in matrix form, the correlation among the parameters. It may be done for one to many, many to one, and many to many parameters. In curriculum development process COs are mapped with POs & PSOs to establish the correlation between COs & POs/PSOs.

7.SALIENT FEATURES OF CURRICULUM:

Curriculum of each programme comprises of 40 -45 courses with 194 credits at five levels viz. foundation courses, basic technology courses, allied courses, applied technology courses and diversified technology courses to be taught over three years of any diploma

programme offered. It is outcomes at five tiers viz. International & Professional (after 3—5 years of graduation) registration, programme outcomes, course outcomes and major learning outcome of each unit are used to establish not only intra course and inter courses integration but also the programme outcome is getting linked to international and professional registration of diploma graduates.

The levels as stated above are defined as follows:

1. Foundation – This course level contains courses that remains foundation to learn not only basic technology but also technology courses of advance and diversified levels. Natural sciences and Mathematics (NS&M) are the subject areas from which these courses are designed.
2. Basic Technology - This level represents set of courses that are derived from foundation courses. These courses link foundation courses with applied and diversified technology courses.
3. Allied - The courses related to Humanities and Social Sciences (H&SS) are a part of this level. They play a role of developing and human and social dimensions of personality of engineers.
4. Applied technology - This level contains courses related to title of the programme viz. Civil engineering, Mechanical engineering etc. Every programme represents a sector of an economy and it prepares manpower that deals with design, production, and maintenance of entities related to the programme i.e. Civil engineering deals with building, roads, and automobile engineering related to motor vehicles as the entities
5. Diversified technology - This is fifth level of curriculum in which types of courses are from diversified technology are included. This level exposes students to latest development in the field of study.

8. PROGRAMME OUTCOMES (PO)

PO1: Basic knowledge (Building foundation): Apply knowledge of basic mathematics, science and engineering to solve the Civil Engineering related problems.

PO2: Discipline knowledge (Disc. Specific knowledge): Apply discipline - specific knowledge to solve core and/or applied problems.

PO3: Experiments and practice (Hands on experience): Plan to perform experiments and practices and to use the results to solve problems.

PO4: Engineering tools (Tools and Technology): Apply appropriate technologies and tools with an understanding of the limitations

PO5: The engineer and society (societal needs): Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to practice in field of Civil Engineering.

PO6: Environment and sustainability (Sustainability and env. Concern): Apply engineering solutions for sustainable development practices in societal and environmental contexts.

PO7: Ethics (Morale and ethics) : Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice in field of Civil Engineering.

PO8: Individual and team work (Team building) : Function effectively as a leader and team member in diverse/ multidisciplinary teams.

PO9: Communication: Communicate effectively in oral and written form.

PO10: Life-long learning (Continuing education): Engage in independent and life-long learning in the context of technological changes.

9.PROGRAM EDUCATIONAL OBJECTIVE(PEOs)

The Civil Engineering diploma graduates should.....

PEO1 -be proficient in fundamentals of engineering, science, technological competencies and quantitative reasoning.
PEO2 -be able to apply these skills in developing sustainable, economical and feasible solutions to Civil engineering problems.
PEO3 -grows professionally in their careers through continued development of technical and management skills.
PEO4 - be able to pursue higher education and perform efficiently on civil engineering field.

CORRELATION OF PROGRAM SPECIFIC OUTCOME (PSO) AND COURSES:

Program Specific Outcome (PSO)	Courses
Advance Technology Usage: Use advance technology based /hitech/modern/materials process/equipments, machinery, and software.	Entrepreneurship Development Basic Survey Hydraulics Building Drawing AutoCAD for Civil Engineering Railway Bridge and Tunnel Engineering Road Engineering Irrigation Engineering Water Supply and Sanitary Engineering Contracts Account and Valuation Civil Engineering Project Advanced Construction Methods and Techniques Design of Steel Structures Estimating and Costing Building Services Precast and Prestressed Concrete Structures Water Conservation Engineering Building Construction

	Professional Practices Implant Training and Seminar Basic Computer System Workshop Practice Management
Manage the construction process: Manage the construction process by proper selection and scheduling of suitable and adequate resources	Entrepreneurship Development Applied mechanics Concrete technology Basic Survey Hydraulics Building Drawing Railway Bridge and Tunnel Engineering Road Engineering Irrigation Engineering Contracts Account and Valuation Civil Engineering Project Advanced Construction Methods and Techniques Estimating and Costing Precast and Prestressed Concrete Structures Water Conservation Engineering Building Construction Professional Practices Implant Training and Seminar Workshop Practice, Management

10. PROGRAMME SPECIFIC OUTCOME

- 1. Advance Technology usage:** Use advance technology based on Hi-Tech /modern/materials/process/equipments, machinery, and software.
- 2. Manage the construction process:** Manage the construction process by proper selection and scheduling of suitable and adequate resources.

11. ESTABLISH THE CONSISTENCY OF PEOS WITH MISSION OF THE DEPARTMENT

Mission of Department: To educate the globally competent Civil Engineering Diploma graduates through excellent education system for creating synergy for socio-economic development of nation, with focus on development of social values, human ethics, employment and self-employment spirit and lifelong learning skills.

Components of Mission Statement are...

M1: Global Excellent education system.

M2: Synergy for Socio-economic development.

M3: Concern to human ethics.

M4: Employment spirit and lifelong learning skills.

PEO statement	M1	M2	M3	M4
PEO1	3	--	---	2
PEO2	---	3	1	2
PEO3	---	--	3	3
PEO4	3	2	--	3

PEO 1 is proficiency in fundamentals of Engineering science, technological competencies and quantitative reasoning. First component of Mission statement is global excellent education system. Therefore qualitative relevance is given by numerical weightage of 3. Similarly mapping is done by conducting meeting of all faculty members.

Mission – PEO Justification :	
MAPPING	JUSTIFICATION
PEO 1 with M1 and M4	Global excellent education system through outcome based curriculum enable students to achieve proficiency in fundamentals of engineering sciences and lifelong learning. Hence mapping strength is assigned to mission component 1 with weightage 3 and component 4 with weightage 2.
PEO 2 with M2, M3 and M4	Industry–Institute interaction leads to socioeconomic development, concern to society employment and lifelong learning skills, so PEO2 is mapped with M2, M3 and M4.
PEO 3 with M3 and M4	Students grow professionally in their careers through concern to human ethics and lifelong learning skills. Hence PEO 3 is mapped with M3 and M4.
PEO 4 with M1, M2 and M4	Global excellent education system, industry institute interaction makes students able to pursue higher education as well as work efficiently on Civil Engineering field. Hence PEO4 is mapped with M1, M2 and M3 with weightage 3, 2, 3 respectively.

12. MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES AND PROGRAMME OUTCOMES

Sr. No.	Programme Educational Objectives (PEOs)	Programme Outcomes (POs)
1	PEO1 -be proficient in fundamentals of engineering, science, technological competencies and quantitative reasoning.	PO1, PO2, PO3, PO4, PO10
2	PEO2 -be able to apply these skills in developing sustainable, economical and feasible solutions to Civil engineering problems.	PO4, PO6, PO9, PO10
3	PEO3 -grows professionally in their careers through continued development of technical and management skills.	PO1, PO2, PO3, PO4, PO8, PO10
4	PEO4 - be able to pursue higher education and perform efficiently on civil engineering field.	PO5, PO6, PO7, PO8

13. MAPPING OF PROGRAMME OUTCOME AND COURSES

SR NO	PROGRAMME OUTCOMES	COURSES
1.	PO1. Basic knowledge (Building foundation): Apply knowledge of basic mathematics, science and engineering to solve the Civil Engineering related problems.	Basic Math, Engg. Chemistry, Graphics,WorkshopPractices,Basic ofcomputers,English,AutoCAD for Civil Engineering,Water supply Sanitary Engg,Engg. Math,Engg. physics,Communicationskills,Engg.Mechanics,Development of life skills,EntrepreneurshipDevelopment, Contract, Accounts & Valuation
2.	PO2. Discipline knowledge (Disc. Specific knowledge): Apply discipline - specific knowledge to solve core and/or applied problems.	Basic Math,EnggMaths. Engg.Graphics,WorkshopPractices,Basic of computers,English,Elements of Civil Engineering, Construction Material, Building Construction,AutoCAD for Civil Engineering,Water Supply & SanitaryEnggMath,Enggphysics,Communication skills,Engg.Mechanics,Development of life skills, EntrepreneurshipDevelopment, Basic Surveying, Advance Surveying ,Hydraulics, Building Drawing, Concrete Technology, Engineering Mechanics, Mechanics of Structures,Theory of structures, Geotechnical Engineering, Railway and Bridge Engineering, Road Engineering, Irrigation Engineering, Building Services, Contract, Accounts & Valuation, Estimating & Costing, Design of Reinforced Concrete Structures, Design of Steel Structures,
3.	PO3. Experiments and practice (Hands on experience): Plan to perform experiments and practices and to use the results to solve problems.	Basic Math,Engg. Chemistry, Engg.Graphics,Workshop Practices,Basic of computers,English,Construction Material, AutoCAD for Civil Engineering, Water supply Sanitary Engg, EnggMath,Enggphysics,Communicationskills,Engg.Mechanics,Development of life skills,Basic Surveying,Advance Surveying,Hydraulics,

		Building Drawing, Seminar. Concrete Technology, Engineering Mechanics, Mechanics of Structures, Geotechnical Engineering, Irrigation Engineering, Building Services, Estimating & Costing, Design of Steel Structures, Structural Design & Drawing, Major Project
4.	PO4. Engineering tools (Tools and Technology): Apply appropriate technologies and tools with an understanding of the limitations	Engg. Chemistry, Engg. Graphics, Workshop Practices, Basic of computers, English, Engg Math, Engg physics, Communication skills, Engg. Mechanics, Development of life skills, Elements of Civil Engineering, Building Construction, Basic Surveying, Advance Surveying, Hydraulics, Entrepreneurship Development, Building Drawing, Seminar. Concrete Technology, Engineering Mechanics, Mechanics of Structures, Geotechnical Engineering, Road Engineering, Irrigation Engineering, Estimating & Costing, Design of Reinforced Concrete Structures, Major Project, Vocational Training
5.	PO5. The engineer and society (societal needs): Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to practice in field of Civil Engineering.	Engg. Chemistry, Computer aided drafting, Workshop Practices, English, Engg Math, Communication skills, Development of life skills, Construction Material, Railway and Bridge Engineering, Building Services, Contract, Accounts & Valuation, Major Project,
6.	PO6. Environment and sustainability (Sustainability and env. Concern): Apply engineering solutions for sustainable development practices in societal and environmental contexts.	Engg. Chemistry, English, Construction Material, Water supply Sanitary Engg, Engg physics, Communication skills, Building Construction, Geotechnical Engineering, Irrigation Engineering, Major Project
7.	PO7. Ethics (Morale and ethics): Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice in field of Civil Engineering.	English, workshop practices, communication skills, Development of life skills, entrepreneurship development, Computer aided drafting Engg physics, Contract, Accounts & Valuation, Vocational Training
8.	PO8. Individual and team work	Workshop Practices, English, Computer aided

	(Team building) : Function effectively as a leader and team member in diverse/multidisciplinary teams.	drafting, Building drawing, Communication skills, Development of life skills, Building Construction, Basic Surveying, Major Project, Vocational Training,
9.	PO9. Communication: Communicate effectively in oral and written form.	Engg. Graphics, Workshop Practice, English, AutoCAD for Civil Engineering, Engg. Water supply Sanitary Engg, Communication skills, Development of life skills, Building Drawing, Structural Design & Drawing, Major Project, Vocational Training
10.	PO10. Life-long learning (Continuing education): Engage in independent and life-long learning in the context of technological changes.	Engg. Graphics, Workshop Practice, Basic of computers, English, AutoCAD for Civil Engineering, Engg Math, Engg physics, Communication skills, Development of life skills, Construction Material, Building Construction, Basic Surveying, Advance Surveying, Building Drawing, Theory of structures, Geotechnical Engineering, Contract, Accounts & Valuation, Estimating & Costing, Design of Reinforced Concrete Structures, Design of Steel Structures, Structural Design & Drawing, Major Project, Vocational Training,

14. PROGRAMME LEVELWISE STRUCTURE:

DIPLOMA CIVIL ENGINEERING PROGRAMME STRUCTURE

Sr. No	Levels	Compulsory Courses	Optional Courses	Total Courses	Credits Comp.+ Optional	Marking Scheme		
						Compulsory Courses	Optional Courses	Total
1	Foundation	04	--	04	18	500	--	500
2	Basic	12	--	12	56	1300	--	1300
3	Allied	05	02*(NE)	07	22	425	--	425
4	Applied	14	--	14	73	1925	--	1900
5	Diversified	03	03**	06	25	325	450	775
	TOTAL	38	05	43	194	4450	450	4900

Elective courses

*Non Exam(NE)-02 and Exam** 3 out of 12

OVERALL SCHEME AT A GLANCE:

- Number of compulsory courses : 38
- Number of Elective courses : 03+2(NE)=05
- Total courses to be completed : 39+5 = 43
- Total Marks : 4900

15. LEVEL WISE CURRICULUM STRUCTURE OF COURSES
PROGRAMME: DIPLOMA IN CIVIL ENGINEERING

Sr. no.	Semester	Course Code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)						
				TH	PR	TU	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours
LEVEL : I (FOUNDATION COURSES)														
1	I	6G101	Basic Mathematics	3	--	1	4	20	80	--	--	--	100	3
2	II	6G102	Engineering Mathematics	3	--	1	4	20	80	--	--	--	100	3
3	II	6G103	Engineering Physics	3	2	--	5	20	80	25@	--	25	150	2
4	I	6G104	Engineering Chemistry	3	2	--	5	20	80	25@	--	25	150	2
				12	4	2	18	80	320	50	--	50	500	
LEVEL :II (BASIC TECHNOLOGY COURSES)														
5	I	6G201	Engineering Graphics	2	2	--	4	--	--	50@	--	50	100	--
6	I	6G202	Workshop Practice	0	3	--	3	--	--	--	--	50	50	--
7	I	6G203	Basics of Computer System	0	2	--	2	--	--	25@	--	25	50	--
8	II	6C201	Elements of Civil Engineering	2	2	--	4	--	--	--	25@	25	50	--
9	II	6C202	Construction Material	2	2	--	4	--	--	--	25@	25	50	--
10	III	6C203	Building Construction	3	2	--	5	20	80	--	25#	25	150	3
11	III	6C204	Basic Surveying	3	4	--	7	20	80	25#	--	25	150	3
12	IV	6C205	Hydraulics	4	2	--	6	20	80	25#	--	25	150	3
13	III	6C206	Building Drawing	1	4	--	5	20	80	--	--	25	125	4
14	III	6C207	Concrete Technology	3	2	--	5	20	80	--	25#	25	150	3
15	II	6Q201	Engineering Mechanics	4	2	--	6	20	80	--	--	25	125	3

16	III	6C208	Mechanics of Structures	3	2	--	5	20	80	--	25@	25	150	3
				27	29	--	56	140	560	125	125	350	1300	
LEVEL :III (ALLIED COURSES)														
17	I	6G301	English	2	2	--	4	20	80	--	--	25	125	3
18	II	6G302	Communication Skills	1	2	--	3	--	--	--	25@	50	75	--
19	I	6G303	Development of Life Skills	0	2	--	2	--	--	--	25@	25	50	--
20	VI	6G305	Industrial Organisation and Management	3	2	--	5	20	80~	--	--	25	125	3
21	V	6G306	Entrepreneurship Development	2	2	--	4	--	--	--	25@	25	50	--
22	II	6G311 to onwards	*Non Exam Credits	--	2	--	2	--	--	--	--	--	--	--
23	III	6G311 to onwards	**Non Exam Credits	--	2	--	2	--	--	--	--	--	--	--
				8	14	--	22	40	160	--	75	150	425	--
LEVEL :IV (APPLIED COURSES)														
24	IV	6C401	Theory of structures	4	--	--	4	20	80	--	--	--	100	4
25	IV	6C402	Geotechnical Engineering	3	2	--	5	20	80	--	25#	25	150	3
26	IV	6C403	Advance Surveying	3	4	--	7	20	80	25#	--	25	150	3
27	IV	6C404	AutoCAD for Civil Engineering	0	4	--	4	--	--	50#	--	50	100	2
28	IV	6C405	Railway and Bridge Engineering	3	2	--	5	20	80	--	0	25	125	3
29	III	6C406	Road Engineering	3	2	--	5	20	80	--	25#	25	150	3
30	V	6C407	Irrigation Engineering	3	2	--	5	20	80	--	25#	25	150	3
31	IV	6C408	Water Supply & Sanitary Engineering	4	2	--	6	20	80	--	25#	25	150	3
32	V	6C409	Building Services	3	2	--	5	20	80	--	25#	25	150	3
33	VI	6C410	Contract, Accounts & Valuation	3	2	--	5	20	80	--	25#	25	150	3
34	V	6C411	Estimating & Costing	3	4	--	7	20	80	--	25#	25	150	4

35	V	6C412	Design of Reinforced Concrete Structures	4	2	--	6	20	80	--	--	50	150	4
36	VI	6C413	Design of Steel Structures	3	2	--	5	20	80	--	25#	25	150	4
37	VI	6C414	Structural Design & Drawing	0	4	--	4	--	--	--	25#	50	75	3
				39	34	--	73	240	960	100	250	700	1900	
LEVEL :V (DIVERSIFIED COURSES)														
38	V	6C501	Seminar	0	2		2	--	--	--	25@	50	75	--
39	VI	6C502	Major Project	0	4		4	--	--	--	50#	100	150	--
40	VI	6C503	Vocational Training	0	4		4	--	--	--	50#	50	100	--
				0	10		10	--	--		125	200	325	
Elective Course -1 (One Course from Selected Group A/B/C/D) in V th Semester														
41	A	6C505	Town Planning and Municiple Engineering	3	2	--	5	20	80	--	25#	25	150	3
42	B	6C506	Environmental Pollution and Control	3	2	--	5	20	80	--	25#	25	150	3
43	C	6C507	Micro Irrigation Engineering	3	2	--	5	20	80	--	25#	25	150	3
44	D	6C508	Earthquake Resistant Building	3	2	--	5	20	80	--	25#	25	150	3
Elective Course -2 (One Course from Selected Group A/B/C/D) in VI th Semester														
45	A	6C509	Disaster Management	3	2	--	5	20	80	--	25#	25	150	3
46	B	6C510	Solid Waste Management	3	2	--	5	20	80	--	25#	25	150	3
47	C	6C511	Water Conservation Engineering	3	2	--	5	20	80	--	25#	25	150	3
48	D	6C512	Precast and Pre-stressed Concrete Structures	3	2	--	5	20	80	--	25#	25	150	3
Elective Course -3 (One Course from Selected Group A/B/C/D) in VI th Semester														
49	A	6C513	Advance Construction Methods & Equipments	3	2	--	5	20	80	--	25#	25	150	3
50	B	6C514	Energy Efficient Building	3	2	--	5	20	80	--	25#	25	150	3
51	C	6C515	Hydraulic Structures and Maintenance	3	2	--	5	20	80	--	25#	25	150	3

52	D	6C516	Repairs and Rehabilitation of Structures	3	2	--	5	20	80	--	25#	25	150	3
				9	6		15	60	240		200	275	775	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal Examination, ~ Online Examination

Note: If any student find any difficulty in any group of electives as per PBOS member suggestions, he/she may change elective group with permission of Head of Civil Engineering Department.

16.TERM-WISE SAMPLE PATH OF OFFERED COURSES FOR 3 YEARS**DIPLOMA IN CIVIL ENGINEERING(2017-18)**

ODD	EVEN	ODD	EVEN	ODD	EVEN
Basic Mathematics	Engineering Mathematics	Building Construction.	Hydraulics	Entrepreneurship Development	Industrial Organisation and Management
6G101	6G102	6C203	6C205	6G306	6G305
4(3+1T)	4(3+1T)	5(3+2)	6(4+2)	4 (2+2)	5(3+2)
Engineering Chemistry	Engineering Physics	Basic Surveying	Theory of Structure	Irrigation Engineering.	Contract, Accounts & Valuation
6G104	6G103	6C204	6C401	6C407	6C410
5(3+2)	5(3+2)	7(3+4)	4(4+0)	5(3+2)	5 (3+2)
Engineering Graphics	Elements of Civil Engineering	Building Drawing	Geotechnical Engineering.	Building Services	Design of Steel Structure
6G201	6C201	6C206	6C402	6C409	6C413
4(2+2)	4 (2+2)	5(1+4)	5(3+2)	5(3+2)	5(3+2)
Workshop Practice	Construction Material	Concrete Technology	Advance Surveying	Estimating & Costing	Structural Design & Drawing
6G202	6C202	6C207	6C403	6C411	6C414
3 (0+3)	4(2+2)	5(3+2)	7 (3+4)	7(3+4)	4 (0+4)
Basic of Computer System	Engineering Mechanics	Road Engineering	AutoCAD for Civil Engineering	Design of Reinforced Concrete Structures	Major Project
6G203	6Q201	6C406	6C404	6C412	6C502
2(0+2)	6(4+2)	5(3+2)	4(0+4)	6(4+2)	4 (0+4)
English	Communication Skills	Mechanics of Structure	Railway and Bridge Engineering	Seminar	Vocational Training
6G301	6G302	6C208	6C405	6C501	6C503
4(2+2)	3(1+2)	5(3+2)	5(3+2)	2(0+2)	4(0+4)
Development of Life Skill	Non Exam	Non Exam	Water Supply & Sanitary Engineering	Elective-I	Elective-II
6G303	6G311 to onwards	6G311 to onwards	6C408	6C505-6C508	6C509-6C512
2(0+2)	2(0+2)	2(0+2)	6(4+2)	5(3+2)	5(3+2)
					Elective-III
					6C513-6C516
					5(3+2)
Total Credits-24	28	34	37	34	37
Cumulative Total	52	86	123	157	194

**17. TERM-WISE SAMPLE PATH OF OFFERED COURSES FOR 4 YEARS
DIPLOMA IN CIVIL ENGINEERING(2017-18)**

ODD	EVEN	ODD	EVEN	ODD	EVEN	ODD	EVEN
I-Semester	II-Semester	III-Semester	IV-Semester	V-Semester	VI-Semester	VII-Semester	VIII-Semester
Basic Mathematics	Engineering Mathematics	Basic Surveying	Building Construction	Hydraulics	Irrigation Engineering.	Entrepreneurship Development	Industrial Organisation and Management
6G101	6G102	6C204	6C203	6C205	6C407	6G306	6G305
4(3+1T)	4(3+1T)	7(3+4)	5(3+2)	6(4+2)	5(3+2)	4 (2+2)	5(3+2)
Engineering Chemistry	Engineering Physics	Building Drawing	Advance Surveying	Theory of Structure	Water Supply & Sanitary Engineering	Estimating & Costing	Contract, Accounts & Valuation
6G104	6G103	6C206	6C403	6C401	6C408	6C411	6C410
5(3+2)	5(3+2)	5(1+4)	7 (3+4)	4(4+0)	6(4+2)	7(3+4)	5 (3+2)
Engineering Graphics	Elements of Civil Engineering	Concrete Technology	Mechanics of Structure	Geotechnical Engineering.	Building Services	Design of Steel Structure	Vocational Training
6G201	6C201	6C207	6C208	6C402	6C409	6C413	6C503
4(2+2)	4 (2+2)	5(3+2)	5(3+2)	5(3+2)	5(3+2)	5(3+2)	4(0+4)
Workshop Practice	Communication Skills	Engineering Mechanics	AutoCAD for Civil Engineering	Road Engineering	Design of Reinforced Concrete Structures	Elective-I	Structural Design & Drawing
6G202	6G302	6Q201	6C404	6C406	6C412	6C505-6C508	6C414
3 (0+3)	3(1+2)	6(4+2)	4(0+4)	5(3+2)	6(4+2)	5(3+2)	4 (0+4)
Basic of Computer System	Construction Material	Non Exam	Non Exam	Railway and Bridge Engineering	Seminar	Elective-II	Major Project
6G203	6C202	6G311 to onwards	6G311 to onwards	6C405	6C501	6C509-6C512	6C502
2(0+2)	4(2+2)	2(0+2)	2(0+2)	5(3+2)	2(0+2)	5(3+2)	4 (0+4)
English	Development of Life Skill						Elective-III
6G301	6G303						6C513-6C516
4(2+2)	2(0+2)						5(3+2)
22	22	24	25	25	23	26	27
Cumulative Total	44	68	93	118	141	167	194

Note: Exemption for Non Exam, Workshop Practice and Vocational Training to Part time students

18.SIXTH CURRICULUM REVISION (2017-18)
DIPLOMA IN CIVIL ENGINEERING
LIST OF DIPLOMA AWARDED COURSES

DIPLOMA AWARD COURSES		COURSE CODE	CREDITS	MARKS	REMARK
Applied & Diversified Level Courses	Road Engineering	6C406	5	150	Compulsory Courses
	Irrigation Engineering	6C407	5	150	
	Water Supply & Sanitary Engineering	6C408	6	150	
	Building Services	6C409	5	150	
	Contracts,Accounts& Valuation	6C410	5	150	
	Estimating & Costing	6C411	7	150	
	Design of RCC	6C412	6	150	
	Design of Steel Structures	6C413	5	150	
	Seminar	6C501	2	75	
	Major Project	6C502	4	100	
Elective Courses	Town Planning and Municipal Engineering	6C505	5	150	Elective Course -1 Any one from First group
	Environmental Pollution and Control	6C506			
	Micro Irrigation Engineering	6C507			
	Earthquake Resistant Building	6C508			
	Disaster Management	6C509	5	150	Elective Course -2 Any one from Second group
	Solid Waste Management	6C510			
	Water Conservation Engineering	6C511			
	Precast and Pre-stressed Concrete Structures	6C512			
	Advance Construction Methods &Equipments	6C513	5	150	Elective Course -3 Any one from Third group
	Energy Efficient Building	6C514			
	Hydraulic Structures and Maintenance	6C515			
	Repairs and Rehabilitisation of Structures	6C516			
		Total	65	1825	

Chairman
 Programmewise Board of Studies (PBOS) /
 Head of Department of Civil Engineering

DIPLOMA IN CIVIL ENGINEERING**19. Equivalent Courses of Revised Curriculum 6th & 5th Revision Courses**

Sr. No.	Curricula of 5 th Revision			Curricula of 6 th Revision			Remark
	C.Code	Course Name	Semester	C.Code	Course Name	Semester	
1	5G101	Basic Mathematics	I	6G101	Basic Mathematics	I	
2	5G102	Engineering Mathematics	II	6G102	Engineering Mathematics	II	
3	5G103	Engineering Physics	I	6G103	Engineering Physics	I	
4	5G104	Engineering Chemistry	II	6G104	Engineering Chemistry	II	
5	5G106	Engineering Graphics	II	6G201	Engineering Graphics	II	
6	5G105	Workshop Practice	I	6G202	Workshop Practice	I	
7	5G107	Basics of Computer System	I	6G203	Basics of Computer System	I	
9	5Q201	Applied Mechanics	II	6Q201	Engineering Mechanics	II	
10	5C202	Concrete Technology	III	6C207	Concrete Technology	III	
11	5C203	Building Construction	III	6C203	Building Construction	III	
12	5C204	Basic Surveying	II	6C204	Basic Surveying	III	
13	5C205	Hydraulics	III	6C205	Hydraulics	IV	
14	5C206	Building Drawing	III	6C206	Building Drawing	III	
15	5C207	Fundamentals of Civil Engineering	II	6C201	Elements of Civil Engineering	II	
16	5G301	English	I	6G301	English	I	
17	5G302	Communication Skills	II	6G302	Communication Skills	II	
18	5G303	Entrepreneurship Development	IV	6G306	Entrepreneurship Development	IV	
19	5G305	Management	VI	6G305	Industrial Management and Organisation	VI	
20	5Q202	Strength of Material	III	6C208	Mechanics of structure	III	

21	5G311 to onwards	Non Exam Credits	II	6G311 to onwards	Non Exam Credits	II	
22	5G311 to onwards	Non Exam Credits	III	6G311 to onwards	Non Exam Credits	III	
23	5C401	Theory of structures	V	6C401	Theory of structures	V	
24	5C402	Soil Engineering	IV	6C402	Geotechnical Engineering	IV	
25	5C403	Surveying	IV	6C403	Advance Surveying	IV	
26	5C404	AutoCAD for Civil Engineering	IV	6C404	AutoCAD for Civil Engineering	IV	
27	5C405	Railway and Bridge Engineering	IV	6C405	Railway and Bridge Engineering	IV	
28	5C406	Road Engineering	IV	6C406	Road Engineering	III	
29	5C407	Irrigation Engineering	IV	6C407	Irrigation Engineering	IV	
30	5C408	Water Supply & Sanitary Engineering	IV	6C408	Water Supply & Sanitary Engineering	IV	
31	5C409	Contract, Accounts & Valuation	VI	6C410	Contract, Accounts & Valuation	VI	
32	5C410	Project	V	6C502	Major Project	VI	
33	5C411	In plant Training & Seminar	V	6C503	Vocational Training	IV	
34	5C412	Structural Design & Drawing	VI	6C414	Structural Design & Drawing	VI	
35	5C413	Professional Practice	VI	6G303	Development of Life Skills	I	
36	5C414	Advance Concrete Structures and Design	V	6C516	None(Elective Course Not Opted by students)	V	Not opted
37	5C415	Plumbing Services	V	—	None(Elective Course Not Opted by students)	V	Not opted
38	5C416	Advance Construction Methods and Equipments	VI	6C513	Advance Construction Methods & Equipments	VI	

39	5C417	Micro Irrigation Engineering	VI	6C507	Micro Irrigation Engineering	V	
40	5C418	Advance Surveying	VI	—	None(Elective Course Not Opted by students)	VI	Not opted
41	5C419	Airport Engineering	VI	—	None(Elective Course Not Opted by students)	VI	Not opted
42	5C501	Design of Reinforced Concrete Structures	VI	6C412	Design of Reinforced Concrete Structures	VI	
43	5C502	Design of Steel Structures	VI	6C413	Design of Steel Structures	VI	
44	5C503	Estimating & Costing	V	6C411	Estimating & Costing	V	
45	5C504	Building Services	VI	6C409	Building Services	VI	
46	5C505	Precast and Pre-stressed Concrete Structures	VI	6C512	Precast and Pre-stressed Concrete Structures	VI	
47	5C506	Water Conservation Engineering	VI	6C511	Water Conservation Engineering	VI	
48	5C507	Town Planning and Munciple Engineering	V	6C505	Town Planning and Munciple Engineering	V	
49	5C508	Earthquake Engineering	VI	6C508	None(Elective Course Not Opted by students)	VI	Not opted
51	5C509	Hydraulic Structures	VI	6C515	None(Elective Course Not Opted by students)	VI	Not opted
52	5C510	Architectural Practice & Interior Design	VI	—	None(Elective Course Not Opted by students)	VI	Not opted

Head of Department
Department of Civil Engineering

20. Curriculum Structure (Teaching and Examination Scheme-2017-18)

Name of Programme : **DIPLOMA IN CIVIL ENGINEERING**

First Semester Courses

Sr. no.	Sem-ester	Course code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/ Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	I	6G101	Basic Mathematics	3	--	1	4	20	80	--	--	--	100	3	Compulsory
2	I	6G104	Engineering Chemistry	3	2	--	5	20~	80~	25@	--	25	150	2	Compulsory
3	I	6G201	Engineering Graphics	2	2	--	4	--	--	50@	--	50	100	--	Compulsory
4	I	6G202	Workshop Practice	--	3	--	3	--	--	--	--	50	50	--	Compulsory
5	I	6G203	Basics of Computer System	--	2	--	2	--	--	25@	--	25	50	--	Compulsory
6	I	6G301	English	2	2	--	4	20	80	--	--	25	125	3	Compulsory
7	I	6G303	Development of Life Skills	--	2	--	2	--	--	--	25@	25	50	--	Compulsory
				10	13	1	24	60	240	100	25	200	625		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination , ~ Online Examination.

Curriculum Structure (Teaching and Examination Scheme-2017-18)**Name of Programme : DIPLOMA IN CIVIL ENGINEERING****Second Semester Courses**

Sr. no.	Sem-ester	Course code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/ Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	II	6G102	Engineering Mathematics	3	--	1	4	20	80	--	--	--	100	3	Compulsory
2	II	6G103	Engineering Physics	3	2	--	5	20~	80~	25@	--	25	150	2	Compulsory
3	II	6C201	Elements of Civil Engineering	2	2	--	4	--	--	--	25@	25	50	--	Compulsory
4	II	6C202	Construction Material	2	2	--	4	--	--	--	25@	25	50	--	Compulsory
5	II	6Q201	Engineering Mechanics	4	2	--	6	20	80	--	--	25	125	3	Compulsory
6	II	6G302	Communication Skills	1	2	--	3	--	--	--	25@	50	75	--	Compulsory
7	II	6G311 to onwards	**Non Exam Credits	--	2	--	2	--	--	--	--	--	--	--	Optional
				15	12	1	28	60	240	25	75	150	550	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal Examination, ~ Online Examination.

Curriculum Structure (Teaching and Examination Scheme-2017-18)

Name of Programme : **DIPLOMA IN CIVIL ENGINEERING**

Third Semester Courses

Sr. no.	Sem-ester	Course code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/ Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	III	6C203	Building Construction.	3	2	--	5	20	80	--	25#	25	150	3	Compulsory
2	III	6C204	Basic Surveying	3	4	--	7	20	80	25#	--	25	150	3	Compulsory
3	III	6C206	Building Drawing	1	4	--	5	20	80	--	--	25	125	4	Compulsory
4	III	6C207	Concrete Technology	3	2	--	5	20	80	--	25#	25	150	3	Compulsory
5	III	6C208	Mechanics of Structures	3	2	--	5	20	80	--	25@	25	150	3	Compulsory
6	III	6C406	Road Engineering	3	2	--	5	20	80	--	25#	25	150	3	Compulsory
7	III	6G311 Onwards	Non Exam	--	2	--	2	--	--	--	0	--	--	--	Optional
				16	18	0	34	120	480	25	100	150	875		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal Examination, ~ Online Examination.

Curriculum Structure(Teaching and Examination Scheme-2017-18)Name of Programme : **DIPLOMA IN CIVIL ENGINEERING****Fourth Semester Courses**

Sr. no.	Sem-ester	Course code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/ Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	IV	6C205	Hydraulics	4	2	--	6	20	80	25#	--	25	150	3	Compulsory
2	IV	6C401	Theory of Structure	4	--	--	4	20	80	--	--	--	100	4	Compulsory
3	IV	6C402	Geotechnical Engineering.	3	2	0	5	20	80	--	25#	25	150	3	Compulsory
4	IV	6C403	Advance Surveying	3	4	--	7	20	80	25#	--	25	150	3	Compulsory
5	IV	6C404	AutoCAD for Civil Engineering	0	4	--	4	--	--	50#	--	50	100	2	Compulsory
6	IV	6C405	Railway and Bridge Engineering	3	2	--	5	20	80	--	--	25	125	3	Compulsory
7	IV	6C408	Water Supply & Sanitary Engineering	4	2	--	6	20	80	--	25#	25	150	3	Compulsory
				21	16	0	37	120	480	100	50	175	925		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal Examination, ~ Online Examination.

Curriculum Structure (Teaching and Examination Scheme-2017-18)**Name of Programme : DIPLOMA IN CIVIL ENGINEERING****Fifth Semester Courses**

Sr. no.	Sem-ester	Course code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/ Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	V	6G306	Entrepreneurship Development	2	2	--	4	--	--	--	--	50	50	--	Compulsory
2	V	6C407	Irrigation Engineering.	3	2	--	5	20	80	--	25#	25	150	3	Compulsory
3	V	6C409	Building Services	3	2	--	5	20	80	--	25#	25	150	3	Compulsory
4	V	6C411	Estimating & Costing	3	4	--	7	20	80	--	25#	25	150	4	Compulsory
5	V	6C412	Design of Reinforced Concrete Structures	4	2	--	6	20	80	--	--	50	150	4	Compulsory
6	V	6C501	Seminar	0	2		2	--	--	--	25@	50	75	--	Compulsory
7	V	6C505-6C508	Elective I (One course from selected Group)	3	2	--	5	20	80	--	25#	25	150	3	Optional
				18	16	0	34	100	400	0	125	250	875		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal Examination, ~ Online Examination.

Curriculum Structure(Teaching and Examination Scheme-2017-18)**Name of Programme : DIPLOMA IN CIVIL ENGINEERING****Sixth Semester Courses**

Sr. no.	Sem-ester	Course code	Course Name	Teaching Scheme/Credits				Examination Scheme (Maximum Marks)							Compulsory/ Optional
				Theory	Practical	Tutorial	Total Credit	PT	TH	PR	OR	PA (TW)	Total	Theory Exam Hours	
1	VI	6G305	Industrial Org. & Management	3	2	--	5	20	80~	--	--	25	125	3	Compulsory
2	VI	6C410	Contract, Accounts & Valuation	3	2	--	5	20	80	--	25#	25	150	3	Compulsory
3	VI	6C413	Design of Steel Structure	3	2	--	5	20	80	--	25#	25	150	4	Compulsory
4	VI	6C414	Structural Design & Drawing	--	4	--	4	--	--	--	25#	50	75	--	Compulsory
6	VI	6C502	Major Project	--	4	--	4	--	--	--	50#	100	150	--	Compulsory
6	VI	6C503	Vocational Training	--	4	--	4	--	--	--	50@	50	100	--	Compulsory
7	VI	6C509-6C512	Elective II (Second course from selected Group)	3	2	--	5	20	80	--	25#	25	150	3	Optional
8	VI	6C513-6C516	Elective III (Third course from selected Group)	3	2	--	5	20	80	--	25#	25	150	3	Optional
				15	22	0	37	100	400	0	225	325	1050		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal Examination, ~ Online Examination.

Semester-wise Curriculums

COURSE TITLE**BASIC MATHEMATICS****COURSE CODE****6G101**

Diploma Programme in which this course is offered	Semester in which offered
CE/ME/EE/ET/IT/CO/AE	First Semester

1 RATIONALE

This course is classified under foundation level courses and intends to teach students basic facts, concepts and principles of mathematics, as a tool to analyse engineering problems. Diploma engineers have to solve the problems in engineering.

Basic mathematics is an attempt to initiate the multi-dimensional logical thinking and reasoning capabilities of the students.

2 COMPETENCY

At the end of studying this course students will be able to

“Solve engineering problems by using analytical and systematic approach.”

3 COURSE OUTCOMES

Students will be able to

Apply rules of Logarithms in solving simple engineering problems

1. Solve simultaneous equations using concepts of Determinants and Matrices
2. Solve simple engineering problems using concepts of Partial Fractions
3. Solve simple engineering problems by applying formulae of trigonometry.
4. Solve simple engineering problem of function using the different definition of Function
5. Solve simple engineering problem of function using the rules of Limits.

4 TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PT	ESE	PA	
03	01	--	04	80	20	--	--	100
Exam Duration				03 Hrs.	01 Hr.	---		

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice(batch-wise); P - Practical; C – Credit, ESE - End Semester Examination; PT - Progressive Test; OR-Oral examination

5 COURSE DETAILS:-

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit I Revision	1a.To recall/know the basic concept of Logarithms and Determinant of order 2and3	1.1 Logarithms 1.2 Definition natural and common logarithms. 1.3 Laws of logarithm . 1.4 Definition of Determinant, Order of Determinant. 1.5 Expansion of Determinant of order 2 and 3. 1.6 Properties of Determinant.
Unit II Determinant And Matrices	2a.Students will be able to Solve simultaneous equations using concepts of Determinants and Matrices	2.1 Cramer's Rule. (solution of simultaneous equations in two and three unknowns) 2.1 Definition of matrix: Type of matrix: viz.- null, row, column, Square, diagonal, scalar, unit, Triangular. 2.2 Algebra of matrices –addition, subtraction and multiplication . 2.3 Transpose of a matrix. 2.4 adjoint of a matrix Relation. 2.5 Inverse of matrix by adjoint method. 2.6 Solution of simultaneous equations in two and three Unknowns using Inverse of matrix method .
Unit III Partial Fractions	3a.Students will be able to solve simple problems Using concepts of Partial Fractions	3.1 Definition of Partial fraction, proper and improper fractions, rational fractions. 3.2 To resolve given rational fraction into partial fractions. 3.3 Denominator containing non repeated linear factors. 3.4 Denominator containing repeated linear factors. 3.5 Denominator containing irreducible non-repeated quadratic factors. 3.6 Different types of examples.
Unit IV Trigonometry	4a.Students will be able to Solve simple problems by applying using concepts of trigonometry.	4.1 Trigonometric ratios of allied, compound and multiple angles. 4.2 Trigonometric Ratios of allied angles. 4.3 Trigonometric Ratios of compound angles. 4.4 Trigonometric Ratios of multiple angle Product, sum and difference formulae. 4.5 Sub-multiple angles. 4.6 Definition of inverse trigonometric, ratios.

		4.7 Principal value of inverse trigonometric ratios. Relation between inverse trigonometric ratios. 4.8 Examples on inverse circular functions.
Unit V Function	5a. Students will be able to Solve the problem of function using the concept of Function	5.1 Cartesian products of sets. 5.2 Definition of relation, definition of function, real value. Function, domain, co-domain of a function. 5.3 Types of Functions. 5.4 Value of the function at given point . 5.5 Composite function. 5.6 Different types of examples on functions.
Unit VI Limits	6a. Students will be able to Solve the problem of function using the concept of Limit	6.1 Definition and concept of limit, limits of algebraic functions. 6.2 Limits of trigonometric functions. 6.3 Limits of exponential functions. 6.4 Limits of logarithmic functions.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Revision	02	0	0	0	0
2	Determinants and Matrices	12	04	08	12	24
3	Partial Fractions	06	00	04	04	08
4	Trigonometry	14	04	08	12	24
5	Function	04	02	02	04	08
6	Limits	10	04	04	08	16
TOTAL		48	14	26	40	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICAL/TUTORIAL

- 1) The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills so that students are able to acquire the competencies.
- 2) Form a batch of 20 students and at least 10 problems should be given to get necessary exercise.

Sr. No.	Title/Topic	Exercises/Tutorial	Approx. hours
1	Determinants and Matrices	Solving problems on cramer's rule Examples on Matrix Addition/Subtraction and Product Co-factors, Ad joint and Inverse of Matrix Solution of Simultaneous Equation using 3X3 Matrix and its Applications	02 02 02
2	Partial Fractions	Examples related Definition and cases	02
3	Trigonometry	Practice Examples: Allied & Compound Angles. Examples related inverse trigonometric ratios	04
4	Function	Examples related Definition and Rules.	02
5	Limits	Examples related to different types of function.	02

8. SUGGESTED STUDENT ACTIVITIES

-----N.A.-----

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- 1 Chalk-board method.
- 2 Projector method.
- 3 Tutorial method.

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Mathematics for polytechnic students for first year	S.P.Deshpande	Pune vidhyarti gruh prakshan Pune
2	Mathematics for polytechnic students for first year	G.V.Kumbhojkar	Phadke prakashan Kholapur
3	Mathematics for polytechnics	TTTI Bhopal	TTTI Bhopal

11 Major Equipment/ Instrument with Broad Specifications

Sr.NO.	Name of the Equipment	Specification
	NA	

12. Software/Learning Websites

13. POs and PSOs assignment and its strength of assignment with each CO of the Course

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	To able the basic concept of Logarithms and Determinant of order 2 and 3	1	1	0	0	0	0	0	0	0	0	-	-	-
CO2	Students will be able to Solve simultaneous equations using concepts of Determinants and Matrices	3	1	1	0	0	0	0	0	0	0	-	-	-
CO3	Students will be able to solve simple problems Using concepts of Partial Fractions	1	1	1	0	0	0	0	0	0	0	-	-	-
CO4	Students will be able to Solve simple problems by applying using concepts of trigonometry.	3	2	1	0	0	0	0	0	0	0	-	-	-
CO5	Students will be able to Solve the problem of function using the concept of Function	1	1	0	0	0	0	0	0	0	0	-	-	-
CO6	Students will be able to Solve the problem of function using the concept of Limits	1	3	0	0	0	0	0	0	0	0	-	-	-

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Sr. No	Name of the faculty member	Designation and Institute
1	Mr. M.A. Ali	Lecturer in Mathematics, Government Polytechnic Aurangabad
2	Mr. R.B. Borulkar	Lecturer in Mathematics, Government Polytechnic Aurangabad
3	Mrs. H.H. Bhumkar	Lecturer in Mathematics, Government Polytechnic Aurangabad

Member Secretary PBOS

Chairman PBOS

Co-coordinator
science and Humanities

COURSE TITLE ENGINEERING CHEMISTRY
COURSE CODE 6G104

Diploma Programme in which this course is offered	Semester in which offered
ME/CE/EE//ET/CO/IT/AE	First

1. RATIONALE:

Chemistry is a basic science subject which is essential to all engineering courses. It gives knowledge of engineering materials, their properties, related applications and selection of materials for specific engineering applications/work/job.

Due to technological progress, there are hazardous effects of chemicals, waste water and sewage water on environment & human life. The core knowledge of environmental effects will bring awareness; generate curiosity in students about the precautions & preventions to be taken to carry out further development resultantly to reduce the ill effects.

2. COMPETENCY:

At the end of studying this course students will be able to

“Apply basic knowledge and principles of chemistry to solve different industrial problems.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
L	T	P		Theory Marks		Practical Marks	Term work	Total Marks
			C	ESE	PT	ESE	PA	TOTAL MARKS
3	0	2	5	80~	20~	25@	25	150
Examination Duration				2Hrs	1/2Hr	2Hrs	--	--

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, ESE - End Semester Examination; PT - Progressive Test; OR-Oral examination; PA - Progressive Assessment(PR); ~Online Multiple choice examination. @ Internal Examination

3. COURSE OUTCOMES:

After providing classroom teaching and laboratory experiences related to this course, students will be able to

1. Draw the orbital configuration of different elements.
2. Represent the formation of molecules schematically.
3. Compare and use different types of cells.
4. Identify the properties of metals & alloys related to engineering applications.
5. Identify the properties of nonmetallic materials, related to engineering applications.
6. Select a proper material for specific purpose.
7. Select and use the lubricants at proper/ specific conditions of machines.

4. COURSE DETAILS:

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT-I Electronic Theory Of Valency & Molecule Formation	1a. Identification of structure and nature of atom, element and molecule.	Atomic no, atomic mass no. numerical problems on it , orbit & orbitals. Electronic configuration, electronic configuration of first 30 elements. Molecule formation: Valency, types of valency, electrovalency and covalency with suitable examples. Study of Formation of Electrovalent compounds e.g. NaCl, CaCl ₂ & MgCl ₂ and formation of Covalent Compounds examples H ₂ O, Cl ₂ , CO ₂ , N ₂
UNIT-II Electrochemistry	2a. Verify Principle, construction, working and applications of different cells.	Arrhenius Theory of Ionization, Degree of ionization. Basic concepts of Conductors, Insulators, Dielectrics, Electrolyte, Non Electrolyte Electrolysis, Electrolytic Cell, Electrodes. Electrolysis of CuSO ₄ Solution by using Cu Electrode & Platinum Electrode Faraday's first law of Electrolysis & numerical problems on it Application of Electrolysis such as Electroplating. Electrochemical Cells & Batteries Types of cell Primary & secondary cell construction And Working of Dry cell & Lead – Acid Storage.

<p>NIT III Metals and Alloys</p>	<p>3a. Identify different mechanical properties and extraction methods of pure metal, Correlate properties, composition and applications of alloys with metal.</p>	<p>Definition of Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Occurrence of Metals. Mechanical Properties of metals such as hardness, Toughness, ductility, malleability, tensile strength. Stages of Extraction of Metals from its Ores in detail i.e. its flow sheet Crushing, Concentration, methods of concentration (physical and chemical). Reduction of iron in blast furnace with chemical reactions, Reactions in zone of reduction. Alloys Definition of Alloy, Purposes of Making alloy. Methods of Preparation of alloy such as fusion method & compression method Classification of Alloys, Ferrous alloys & Non Ferrous alloys, their examples. Composition, Properties & Applications of some common alloys such as Alnico, Duralumin, Wood's Metal</p>
<p>UNIT-IV Corrosion of Metals And its Application</p>	<p>4a. Classify corrosion from action of surrounding environment and its protection methods.</p>	<p>Definition of corrosion Atmospheric corrosion or dry Corrosion, corrosion due to oxygen , different types of film formation. Electrochemical Corrosion Hydrogen evolution mechanism. Applying protective Coatings like metal coating by galvanising, tinning</p>
<p>UNIT-V Water</p>	<p>5a. Recognize ill effect of hard water and methods for purification of water.</p>	<p>Hard water & soft water, types of hardness, causes of hardness Effects of hard water in different industries (such as paper , sugar , dying and textile industries) and domestic purposes. Softening of hard water by Permutit process and ion exchange process,. Potable water & its condition for pot-ability. Different methods of purification of water for drinking purposes chlorination and ozonation pH – value of water its applications Numericals on pH values.</p>

<p>UNIT-VI Non Metallic Materials</p>	<p>6a. Identification of types , preparation, properties and applications of plastic, rubber and thermal insulating material.</p>	<p>Plastics Definition of Plastic, Formation of Plastic by Addition Polymerisation with examples Polyethylene & PVC. Formation of Plastic by Condensation Polymerisation with suitable example as Nylon 6, 6; Bakelite plastic. Types of Plastics, thermo softening & Thermosetting Plastic & difference between them. Engineering properties of plastic and its related uses. RUBBER Natural rubber its extraction from latex, drawbacks of natural rubber. Synthetic Rubber its examples Vulcanisation of rubber with chemical reaction. Properties of rubber such as elasticity, tack, resistant to abrasion, rebound capacity. Engineering Applications of rubber based on its properties. 6.9 Thermal insulating materials Definition & characteristics of ideal thermal insulator. Glass wool preparation, properties & applications. Thermocole properties and its applications.</p>
<p>Unit-VII Lubricants</p>	<p>7a. Select proper lubricant for different types of machineries.</p>	<p>7.1 Definition of lubricant and Lubrication. 7.2 Functions of lubricants. 7.3 Classification of lubricants with examples, 7.4 Mechanism of Lubrication by Fluid Film, Boundary & Extreme Pressure, 7.5 Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, Cloud & Pour Point. 7.6 Selection of proper Lubricants for Various types of machines.</p>

5. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Electronic Theory of Valency and Molecular Formatin	8	2	6	4	12
II	Electrochemistry	6	2	8	2	12
III	Metals and Alloys	8	2	8	4	14
IV	Corrosion of Metals and it's Applications	6	2	4	2	8
V	Water	7	2	2	6	10
VI	Non Metallic Materials	7	4	8	4	16
VII	Lubricants	6	2	4	2	8
Total		48	16	40	24	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

6. SUGGESTED EXERCISES/PRACTICALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and psychomotor skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

(Any TEN from following)

Sr. No.	Unit No.	Practical Exercises	Approx. Hrs. required
1	1	Write Orbital electronic configuration of different elements (First 30 elements)	2
2	2	Verify Faraday's first Law of electrolysis.	2
3	7	Find the normality & strength in grams per liter of the given solution (NaOH) with the help of standard hydrochloric acid.	2
4	5	Determine pH value of given solutions, water samples, by using, universal indicator and pH meter.	2
5	7	Determine the normality & strength of given hydrochloric acid solution by titrating it against standard potassium hydroxide solution.	2
6	3	Determine percentage of iron from steel by titration method.	2
7	5	Determine the hardness of potable water and boiler feeding water.	2
8	5	Determine the chloride content potable water and boiler feeding water.	2
9	6	Prepare phenol formaldehyde resin.	2
10	7	Determine the acid value of oil sample by neutralization method.	2
11	2	Qualitative analysis of given salt solutions, i.e. to determine one acidic	For each

		and one basic radical from given salt solution. (At least 05 salt solutions.)	salt solution 2
Micro Project (Any one of following will be opted by a group of 5-6 students)			
Sr. No.	Unit No.	Practical Exercises	
1	1	Prepare power point presentation to show/demonstrate covalent bond, ionic bond.	
2	4	Effect of acid or alkali on rate of corrosion for different metals.	
3	5	Study of hard and soft water of different samples of water	
4	2	Study of mechanism and working of different batteries.	
5	2	Preparation of small scale batteries/ Galvanic cells. Collect chemicals and material from lab and household and prepare working model of cell.	
6	6	Collect different polymers and prepare the chart on the basis of its type, properties and uses.	

7. SUGGESTED STUDENT ACTIVITIES

- Verify the properties of different types of compounds used in day to day life.
- Differentiate properties and uses of different metals.
- Differentiate composition, properties and application of different alloys.
- Co-relate the effect of acidic environment with neutral environment.
- Library survey regarding engineering chemistry topics regarding curriculum.
- Animated Power point presentation containing current research development related to topics mentioned in curriculum.

8. SPECIAL INSTRUCTIONAL STRATEGIES

- Search various sites to teach various topics/sub topics.
- Instead of the traditional lecture method, use different types of teaching methods such as improved lecture method, question answer method, laboratory method to attained specific outcome.
- Some topics are relatively simpler in nature is to be given to the students for self- learning by seminar or by classroom presentations
- Teachers provide theme to create multiple choice questions.
- Provide super visionary assistance for completion of micro-projects.

9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Engineering Chemistry	Jain & Jain	Dhanpat Rai and Sons Co. ISBN 9789352160006
2	Engineering Chemistry	S. S. Dara	S. Chand Publication ISBN 8121903599
3	Chemistry of Engineering Materials	S.N. Narkhede	Nirali Prakashan

10. MAJOR EQUIPMENTS/ INSTRUMENTS WITH BROAD SPECIFICATIONS

Sr. No.	Name of the Equipment	Specification
1	pH meter	Digital ,Range 0 to 14 with Sensitive Glass electrode
2	Distilled water plant	S.S. plant with 15 lit capacity with 2Kv heating coil
3	Kipps's Apparatus	Airtight three section apparatus
4	Electrolytic cell for verification of Faraday's first law	Battery 24V and 5 Ampere , Rheostat 1000 Ohm, Wire, Ammeter 0 to 5 Ampere, Copper plate 3" x 6" inch

11. E-LEARNING RESOURCES

(Please mention complete URL of the E- resource CO wise)

Sr. No.	Web Address
1	http://www.webelements.com
2	http://www.chemtutor.com
3	http://www.cheml.com
4	https://phet.colorado.edu
5	www.visionlearning.com
6	www.onlinelibrary.wiley.com
7	www.rsc.org
8	www.chemcollective.org

12. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

CO. No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Draw the orbital configuration of different elements.	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	Represent the formation of molecules schematically.	3	2	2	1	-	-	-	-	-	-	-	-	-
CO3	Compare and use different types of cells.	3	3	-	1	-	-	-	-	-	-	-	-	-
CO4	Identify the properties of metals & alloys related to engineering applications.	3	3	2	1	-	-	-	-	-	-	-	-	-
CO5	Identify the properties of nonmetallic materials, related to engineering applications.	3	3	1	2	-	2	-	-	-	-	-	-	-
CO6	Select a proper material for specific purpose.	2	2	2	1	1	1	-	-	-	-	-	-	-
CO7	Select and use the lubricants at proper/ specific conditions of machines.	2	2	2	1	1	1	-	-	-	-	-	-	-

13. COURSE CURRICULUM DESIGN COMMITTEE

No	Name of the faculty member	Designation and Institute
1	Dr. H.R. Shaikh	Lecturer in Chemistry, Government Polytechnic, Aurangabad
2	Dr. Devdatta V. Saraf	Lecturer in Chemistry, Government Polytechnic, Aurangabad
3	Mrs. R.A. Nemade	Lecturer in Chemistry, Government Polytechnic, Aurangabad
4	Mr. P.K. Shewalkar	Lecturer in Chemistry, Government Polytechnic, Jalna

Member Secretary PBOS

Chairman PBOS

Co-coordinator
science and Humanities

COURSE TITLE ENGINEERING GRAPHICS.

COURSE CODE 6G201

DIPLOMA PROGRAMME IN WHICH THIS COURSE IS OFFERED	SEMESTER
ME, CE, EE, E&TC, AE	First

1. RATIONALE:

Engineering Drawing is the language of engineers and technicians. Always the engineers come across different types of drawings. It is therefore very important to understand the fundamentals and basic concepts involved in drawing.

It describes the scientific facts, concepts, principles and techniques of drawings in any engineering field to express the ideas, conveying the instructions, which are used to carry out jobs in engineering fields. The course aim for building foundation for the further course in drawing and other allied subjects.

It covers knowledge & application of drawing instruments & also familiarizes the learner about Bureau of Indian standards. The curriculum aims at developing the ability to draw and read various drawings, curves and projections.

2. COMPETENCY:

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies:

“Prepare engineering drawings manually with given geometrical dimensions using prevailing drawing standards and drafting instruments.”

“Draw orthographic views and isometric views.”

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PT	ESE (PR)	PA	
2	--	2	4	--	--	50@	50	100
Exam duration						02 hrs		

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination , ~ Online Examination.

4. COURSE OUTCOMES (COs):

1. Draw geometrical figures and scales.
2. Drawing of various engineering curves.
3. Draw orthographic views of given component.
4. Draw isometric view of given component.
5. Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.

5. COURSE DETAILS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics (Containing POs and PSOs assignment in each Sub-topic)
Unit – I Introduction	1 Use drawing equipments and instrumentseffectively. 2 Draw and prepare simple drawings. 3 Follow andapply standard practice as per bureau of I.S. forplanning andlayout. 4 Chooseappropriate scale factor for thedrawing.	1.1 Drawing Instruments and their uses 1.2 Letters and numbers (single stroke vertical) for main title, sub-title and normal use. 1.3 Different types of lines, Convention of lines and their applications. 1.4 Scale (reduced, enlarged & full size), Plain scale and Diagonal scale. 1.5 Sheet sizes and layout, Geometrical Constructions. 1.6 Dimensioning, its methods, parallel and chain dimensioning, radius and diameter dimensioning, leader and itsuse, dimension with text.
Unit – II Simple Drawing Practices	1 Select line types and divide given line, circle into equal number of parts. 2 Draw different regular polygons and circle.	2.1 Drawing of different circles with thin, thick, center line use, dividing circle into number of equal parts, dividing line into equal parts. 2.2 Drawing pentagon, hexagon and rhombus, drawing correct arrows to dimension lines, drawing tangent to circle from given point
Unit – III Engineering Curves	1 Drawengineeringcurves withproficiency andspeed as pergivendimensions. 2 Draw curves with uniform thickness and darkness, dimensioning as per IS.	3.1To draw ellipse by – <ul style="list-style-type: none"> • Arcs of circle method • Concentric circle method • Oblong method 3.2 To draw parabola by – <ul style="list-style-type: none"> • Directrix focus method

		<ul style="list-style-type: none"> • Rectangle method 3.3 To draw hyperbola by – <ul style="list-style-type: none"> • Transverse axis & focus method. • Passing through a given point. (Rectangular hyperbola) 3.4 To draw involute of square, Pentagon, hexagon and circle. 3.5 To draw cycloid, epicycloid, hypocycloid.
Unit – IV Orthographic Projections	1 Draw the orthographic views of object. 2 Interpret given orthographic views and imagine the actual shape of the component.	4.1 Converting pictorial view into Orthographic views. (pictorial view of components with holes, cylinders, ribs, plates, slots) 4.2 Sectional orthographic Projection of simple objects. (Use First angle method of Projection).
Unit – V Isometric Projections	1 Draw isometric view of given object. 2 Draw isometric scale.	5.1 Isometric projection of simple objects 5.2 Isometric projection of objects having circular holes, slots on sloping surface.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS :
 (End semester examination)

Unit	Unit Title	Teaching Hours	Distribution of practical examination marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	4	2	2	2	6
II	Simple Drawing Practices	4	2	2	2	6
III	Engineering Curves	8	4	4	6	14
IV	Orthographic Projections	8	2	4	8	14
V	Isometric Projections	8	2	4	4	10
Total		32	12	16	22	50

Legends: R = Remembrance; U = Understanding; A = Application and above levels

7. LIST OF EXERCISES/PRACTICALS :

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/ programme outcomes.

A3 size sketch book should be used by the students. It is necessary to draw all the sheet problems in sketch book first and then redrawn on the sheets

S. No.	Unit Number	Practical Exercises	Hrs. required
1	I	1. Drawing of lines of different types, lettering and numbers.	2
		2. Drawing of plain and diagonal scale.	2
		3. Redraw any 2D drawing with circles, slots and curves. Show dimensions on it. (Drawing on sketchbook.)	2
2	II	1. Drawing of regular pentagon, hexagon with standard procedure. Measure internal and external angles. 2. Divide line, circle, and angles in equal number of parts. (Drawing on sketchbook.)	2
2	III	Sheet 1: Drawing of engineering curves. (3 problems) each on ellipse, parabola and hyperbola.	4
		Sheet 2: Drawing of Engineering curves. (3 problems) each on scale, involute and cycloid.)	4
3	IV	Drawing of Orthographic views from given pictorial view. (Minimum 2 objects on sketchbook)	4
		Sheet 3: Drawing orthographic views from pictorial view. (2 objects) Use of first angle method only	4
4	V	Drawing of Isometric views of simple Objects. (Minimum 2 objects on sketch book).	4
		Sheet 4: Drawing of Isometric views of simple objects (any 2 objects).	4
Total			32

Notes:

a: Use one side of sheet.

b: Theory & practice should be in first angle projections and IS codes should be followed wherever applicable.

c: The dimensions of line, distances, angle, side of polygon, diameter, etc. may be different for different batches.

- d: The sketchbook has to contain data of all problems, solutions of all problems and student activities performed. Students activities are compulsory to be performed.
- e: A hand out containing applicable standards from IS codes including title block as per IS standard should be given to each student by concerned teacher.
- f: For ESE Practical examination, students are to be assessed for competencies achieved. Students are to be given data for practical ESE to prepare drawings.
- g: At the end of term practical examination of 50 marks of 2 Hours duration is compulsory to all students. External and Internal Examiners should set and assess the Question paper jointly as per following guidelines
- Engineering curves and geometric construction (three problems) 24 marks
 - Simple Orthographic projection (One Problem) 16 marks
 - Isometric projection with slots and holes (One Problem) 10 marks

8. LIST OF STUDENT ACTIVITIES :

Sr. No.	Activities
1	Sketch the combinations of set squares to draw angles in step of 15 degrees. (15° , 30° , 45° , 60° , 75° , 90° , 105° , 120° , 135° , 150° , 165° , 180°).
2	List the shapes you are observing around you in real life with place/item. (For ellipse, parabola and hyperbola).
3	Draw free hand isometric and orthographic views of any components
4	Observe and draw the locus/path of a point on circumference of a rolling wheel.
5	Prepare cuttings of circle and polygons using cardboard/drawing sheet.

9. SPECIAL INSTRUCTIONAL STRATEGIES :

Sr. no.	Unit no	Unit name	Strategy
1	I	Introduction	Conventional black board method, Use of models. Use of software.
2	II	Simple Drawing Practices	Conventional black board method, Use of models.
3	III	Engineering Curves	Planes made of sheet, cardboard.
4	IV	Orthographic Projections	Models, Use of software.
5	V	Isometric Projections	Models and cut section.

10. LEARNING RESOURCES:

S.N.	Title of Book	Author and Publication
1	Elementary Engineering Drawing	N.D.Bhatt , Charotar Publishing House
2	Engineering Drawing	Mali , Chaudhari, Vrinda Publication
3	Engineering Drawing	SidheswarShastri , Tata McGraw Hill
4	Engineering Graphics	Arunodaykumar, Techmax publications, Pune
5	Engineering Drawing for schools and colleges	IS CODE SP- 46

11. LIST OF MAJOR EQUIPMENT/ INSTRUMENT WITH BROADSPECIFICATIONS:

S.N.	Major equipment/ Instrument with Broad Specification	Quantity
1	Models- full and cut. (wooden and acrylic)	12
2	Drawing equipments and instruments for class room teaching-large size.	1
3	Drawing board-half imperial size.	100
4	T-square or drafter (Drafting Machine).	1

MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS:

Sr.No.	Name of the Equipment	Specification
1	Various models of standard solids such as pyramid, prism, cone, cylinder etc.	
2.	Different objects or machine elements.	

12.E-LEARNING RECOURSES:

List of Software/Learning Websites.

- <http://www.slideshare.net/sahilsahil992/conic-section-1819818>
- <http://www.technologystudent.com/designpro/drawdex.htm>
- http://www.engineeringdrawing.org/engg_curves/problem-3-8-engineering-curves/490/
- <http://web.iitd.ac.in/~hirani/mel110-part3.pdf>
- <http://www.studyvilla.com/ed.aspx>
- http://www.youtube.com/watch?v=a703_xNeDao
- E-learning package from KOROS.
- E-learning package from Cognifront.

13 POS AND PSOS ASSIGNMENT AND ITS STRENGTH OF ASSIGNMENT WITH EACH CO OF THE COURSE.

CO. NO.	Course Outcome	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P S O 1	P S O 2
CO1	Draw geometrical figures and scales.	3	3	2	3	-	-	-	-	3	2	2	2
CO2	Drawing of various engineering curves.	3	3	2	3	-	-	-	-	3	2	2	2
CO3	Draw orthographic views of given components.	3	3	2	3	-	-	-	-	3	2	2	2
CO4	Draw isometric views of given component.	3	3	2	3	-	-	-	-	3	2	2	-
CO5	Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.	3	3	2	3	-	-	-	-	3	2	2	-

Name and Designation of Course Designer :

- 1 Prof. Aher S M
- 2 Prof. Dhirbassi G D

Member Secretary PBOS

Chairman PBOS

COURSE TITLE WORKSHOP PRACTICE**COURSE CODE** 6G202**PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
Common to all branches CE/ME/AE/EE/ET/IT/CO	First

1. RATIONALE :

Workshop Practice is a basic engineering course. Diploma Engineers while working at worksites / in industries, supervises various skilled man power during industrial / site related process. He is required to be conversant with various skills. These basic skills are imparted in basic shops like wood working, fitting, welding, plumbing and sheet metal shop is essential for technician to perform his/her duties in industries. Students are able to perform various operations using hand tool equipment and machineries in various shops. Working in workshop develops the attitude of group working and safety awareness. This course provides industrial environment in the educational institute.

2. COMPETENCY :

“Prepare simple jobs on the shop floor of the engineering workshop.”

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PT	ESE(OR)	PA	
--	--	03	03	--	--	--	50	50

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination , ~ Online Examination.

4. COURSE OUTCOMES :

At the end of this course, students would be able to –

1. Select tools and machinery according to job.
2. Use hand tools in different shops for performing different operation.
3. Operate equipment and machinery in different shops.
4. Prepare job according to drawing.
5. Maintain workshop related tools, equipment and machineries.

5. DETAILED COURSE CONTENTS :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I General Workshop Practice	1a. Follow safety practices. 1b. Explain the procedure for extinguishing fire 1c. Use firefighting equipment 1d. Locate various machines and equipment in workshop 1e. Follow good housekeeping.	1.1 Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols. 1.2 First Aid 1.3 Fire, Causes of Fire, Basic ways of extinguishing the fire Classification of fire, Class A, B,C, D, Firefighting equipment, fire extinguishers, and their types . 1.4 Workshop Layout 1.5 Issue and return system of tools, equipment and consumables.
Unit– II Fitting	2a. Identify fitting tools. 2b. Explain operation of fitting shop machines 2c. Use hand tools 2d. Operate machineries. 2e. Perform fitting operations 2f. Maintain tools, equipment and machineries.	2.1 Fitting hand tools bench vice, hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block , steel rule, twist drills, reamers, tap set, die set and their Specifications 2.2 Operation of fitting shops machineries - Drilling machine, Power saw, grinder their specifications and maintenance. 2.3 Basic process chipping, filling, scraping, grinding, marking, sawing, drilling, tapping, dieing, reaming etc.
Unit– III Plumbing	3a. Identify plumbing tools. 3b. Explain operation of fitting shop machines 3c. Use hand tools 3d. Operate machineries. 3e. Perform plumbing operations 3f. Maintain tools, equipment and machineries.	3.1 Plumbing hand tools pipe vice, pipe bending equipment, pipe wrenches, dies and their Specifications 3.2 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple and their Specifications 3.3 Operation of Machineries in plumbing shops- pipe bending machine their specifications and maintenance. 3.4 Basic process cutting, threading.
Unit– IV Metal Joining	4a. Identify metal joining tools. 4b. Explain gas and arc welding procedure 4c. Use hand tools. 4d. Perform welding, soldering, brazing	4.1 Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter and their Specifications 4.2 Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications

	operations 4e. Maintain tools, equipment and machineries.	4.3 Operation of machineries in welding shops- arc welding transformer their specifications and maintenance. 4.4 Welding Electrode, filler rod, fluxes, and solders. 4.5 Basic process welding, brazing and soldering.
Unit- V Furniture Making	5a. Select wood working tools as per job/ requirement. 5b. Explain operation of wood working machines 5c. Use hand tools 5d. Operate machineries. 5e. Perform wood working operations 5f. Maintain tools, equipment and machineries.	5.1 Types of artificial woods such as plywood, block board, hardboard, laminated boards, Veneer, fiber Boards and their applications. 5.2 Wood working hand tools carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares, and their specifications 5.3 Operation of wood working machineries - Wood turning lathe, circular saw, their specifications and maintenance. 5.4 Basic process- marking, sawing, planing, chiseling, turning, grooving, boring.
Unit-VI Sheet Metal	6a. Identify sheet metal tools. 6b. Explain operation of sheet metal machineries. 6c. Use hand tools 6d. Operate sheet metal machineries. 6e. Perform bending operations 6f. Maintain tools, equipment and machineries.	6.1 Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications 6.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance. 6.3 Basic process-marking, bending, folding, edging, seaming, staking, riveting.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (Practical)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	General Workshop Practice	03	01	01	03	05
II	Fitting	12	-	03	06	09

III	Plumbing	06	-	02	07	09
IV	Metal Joining	09	01	02	06	09
V	Furniture Making	09	-	02	07	09
VI	Sheet Metal	09	-	02	07	09
	Total	48	02	12	36	50

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS :

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs.required
1	I	Perform mock drill session in group of minimum 10 students for extinguishing fire.	03
2	II	Prepare job involving marking, punching, sawing, chamfering, drilling, tapping operations as per given drawing. (simple job individually)	09
3	III	Prepare plumbing job as per given drawing (individually)	06
4	III	Prepare black smithy job involving cutting, bending, drawing/ upsetting operations as per drawing (individually)	06
5	IV	Prepare lap joint/butt joint using arc welding as per given drawing (individually)	06
6	IV & V	Prepare utility job/ different working joints involving wood work as per given drawing (in group of 4 to 5 students)	12
7	VI	Prepare sheet cutting, bending, edging, end curling, lancing, soldering and riveting operations. (in group of 4 to 5 students)	06
Total			48

8. SUGGESTED STUDENT ACTIVITIES :

Following is the list of proposed student activities like:

1. Prepare work diary based on practical performed in workshop. Work diary consist of job drawing, operations to be perform, required raw materials, tools, equipments, date of performance with teacher signature.
2. Prepare journals consist of free hand sketches of tools and equipments in each shop, detail specification and precautions to be observed while using tools and equipment.
3. Prepare/Download a specifications of followings:
 - a) Various tools and equipment in various shops.
 - b) Precision equipment in workshop
 - c) Various machineries in workshop
4. Undertake a market survey of local dealers for procurement of workshop tools, equipment machineries and raw material.
5. Visit any fabrication/wood working/sheet metal workshop and prepare a report.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES (if any) :

1. Demonstration

10. SUGGESTED LEARNING RESOURCES

S.N.	Title of Book	Author	Publication
1.	Workshop Practice	Bawa, H.S.	McGraw Hill Education,Noida; ISBN-10: 0070671192 ISBN-13: 978-0070671195
2.	A Textbook of Manufacturing Process (Workshop Tech.)	Gupta, J.K.;Khurmi,R.S.	S.Chandand Co. New DelhiISBN:81-219-3092-8
3.	Workshop Practice Manual For Engineering Diploma & ITI Students	Hegde, R.K.	Sapna Book House, 2012, ISBN:13: 9798128005830
4.	Introduction to Basic Manufacturing Process &Workshop Technology	Singh, Rajender	New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7

11. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

S. No.	Equipment Name with Broad Specifications	Experiment S.No.
1	Fire buckets with stand of medium size	I, II, III, IV, V, VI
2	Fire extinguisher A,B and C types	I, II, III, IV, V, VI

3	Wood Turning Lathe Machine, Height of Centre: 200mm, Distance between Centers: 1200mm, Spindle Bore: 20mm with Taper, Range of Speeds: 425 to 2800 with suitable Motor Drive. with all accessories	II
4	Circular Saw Machine, Diameter of saw blade 200 mm, Maximum Depth of Cut 50 mm, Table Size -350 x 450 mm, Table Tilting - 45 ⁰	II
5	Wood working tools- marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares,	II
6	Carpentry Vice 200 mm	II
7	Work Benches- size:1800 x 900 x 750 mm	III
8	Bench Drilling machine (up to 13 mm drill cap.) with ½ H.P. Motor 1000 mm. Height.	III
9	Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories.	III
10	Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor.	III
11	Vernier height Gauge 450 mm	III
12	Surface Plate 600 x 900 mm Grade I	III
13	Angle Plate 450 x 450 mm	III
14	Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder	IV
15	Oxygen and acetylene gas welding and cutting kit with cylinders and regulators.	IV
16	Pipe Bending Machine	IV
17	Pipe Vice – 100 mm	IV
18	Pipe Cutter- 50 mm	IV
19	Bench Vice 100 mm	II,III,IV,V,VI
20	Portable Hammer Drill Machine 0-13 mm A.C. 230 V, 2.5Amp, Pistol type, having different types of bits	II, III, IV,V, VI
21	Sheet Bending Machine	VI
22	Sheet Cutting Machine	VI
23	Brazing Equipment	VI
24	Fitting tools - hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set.	III
25	Plumbing tools-pipe vice, pipe bending equipment, pipe wrenches dies.	IV
26	Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter	V
27	Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush.	V
28	Sheet metal hand tools-snip, shears, sheet gauge, straight edge, L square, scribe, divider, trammel, punches, pliers, stakes, groovers, limit set	VI

12. LEARNINGWEB SITES AND SOFTWARES

(Please mention complete URL of the E- recourse CO wise)

1. <http://www.asnu.com.au>
2. <http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf>
3. <http://www.weldingtechnology.org>
4. <http://www.newagepublishers.com/samplechapter/001469.pdf>
5. <http://www.youtube.com/watch?v=TeBX6cKKHWY>
6. <http://www.youtube.com/watch?v=QHF0sNHttw&feature=related>
7. <http://www.youtube.com/watch?v=Kv1zo9CAxt4&feature=relmfu>
8. <http://www.piehtoolco.com>
9. <http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/>
10. https://www.youtube.com/watch?v=9_cnkaAbtCM

APPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

CO. NO.	Course Outcome	P	P	P	P	P	P	P	P	P	P	PS	PS
		O	O	O	O	O	O	O	O	O	O	O	O
		1	2	3	4	5	6	7	8	9	10	1	2
CO 1	Select tools and machinery according to job	1	2	3	3	1	-	1	2	2	2	2	-
CO 2	Use hand tools in different shop for performing different operation.	1	2	3	3	1	-	1	2	2	2	-	3
CO 3	Operate equipment and machinery in different shops	1	2	3	3	1	-	1	2	2	2	3	3
CO 4	Prepare job according to drawing	1	2	3	3	1	-	1	2	2	2	-	-
CO 5	Maintain workshop related tools, equipment and machineries	1	2	3	3	1	-	1	2	2	2	3	-

Sr. No.	Name of the faculty members	Designation and Institute
1	D.V.Tammewar	Workshop Superintendent
2	Dr.U.V.Pise	Head of Mechanical Engineering

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- **BASICS OF COMPUTER SYSTEM**
COURSE CODE **6G203**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Common to all branches (CE/ME/EE/ET/CO/IT/AE/DDGM)	FIRST SEMESTER

1. RATIONALE

This course pertains to basic technology level. It aims to developing fundamentals of Computer and its Applications in students of various programs. This will enable students in using application software's such as word processor, spreadsheets, and power point presentations in their professional fields. Further it will enable students to be lifelong learner.

2. COMPETENCY

“Use of computer and software application proficiently”.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	50
-	-	2	2	--	--	25@	25	
Duration of the Examination (Hrs)				--	--	--	--	

Legends : **L**-Lecture; **T**-Tutorial/Teacher Guided Theory Practice ; **P**- Practical; **C**- Credits;
ESE- End Semester Examination; **PT** – **Progressive Test**, **PA**- Progressive Assessment, **OR**
 –Oral Examination, **TW** - Term Work, # External, @ Internal

4. COURSE OUTCOMES

On successful completion of the course, the students will be able to:

1. Connect and operationalize computer system with its peripheral devices.
2. Create and Format documents in Microsoft Word.
3. Create spreadsheets in Microsoft Excel by using formulae.
4. Create and edit basic power point presentations in Microsoft PowerPoint.

5. Use internet for creating email-id, receive and send email with attachment & search information on internet.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit- 1 Basics of Computer System	<p>1a. Describe computer hardware and software</p> <p>1b. Identify & use of I/O devices</p> <p>1c. Describe functioning of CU ALU and memory unit</p> <p>1d. Differentiate various types of printers</p> <p>1e. Explain use of OS</p> <p>1f. Demonstrate various file handling operations</p>	<p>1.1 Concept of Hardware and Software</p> <p>1.2 Computer block diagram and its component like CPU, Control Unit, Arithmetic logic Unit (ALU) & Memory Unit</p> <p>1.3 Input Output Devices: Keyboard, Mouse, Scanner, Monitor, Printers: Dot matrix, Laser, Inkjet, Plotters.</p> <p>1.4 System software and Application Software</p> <p>1.5 Operating system concepts, purpose and functions</p> <p>1.6 Operations of Windows OS.</p> <p>1.7 Creating and naming of file and folders</p> <p>1.8 Copying file, renaming and deleting of files and folders,</p> <p>1.9 Searching files and folders, installation application, creating shortcut of application on the desktop</p> <p>1.10 Overview of control Panel, Taskbar.</p>
Unit-2 Word Processor	<p>2a. Create, edit and save word document using basic text formatting features, page setup options & print options.</p> <p>2b. Apply spell check & grammatical check in the created document.</p> <p>2c. Insert graphics/clipart/smart art/shapes/charts in the document.</p> <p>2d. Create tables, insert, delete rows and columns and apply different table properties.</p>	<p>2.1 Overview of Word processor</p> <p>2.2 Basics of Font type, size, colour</p> <p>2.3 Effects like Bold, italic, underline, Subscript and superscript,</p> <p>2.4 Case changing options,</p> <p>2.5 Inserting, deleting, undo and redo, Copy and Moving (cutting) text within a document,</p> <p>2.6 Formatting Paragraphs and Lists</p> <p>2.7 Setting line spacing; single, multiple</p> <p>2.8 Page settings and margins including header and footer</p> <p>2.9 Spelling and Grammatical checks</p> <p>2.10 Table and its options, Inserting rows or columns, merging and splitting cells.</p> <p>2.11 Insert Picture, Clipart, shapes, smart art & charts.</p> <p>2.12 Working with pictures, Inserting Pictures from Files, Wrapping it with image.</p> <p>2.13 Finding & replacing text.</p> <p>2.14 Using Drawings and WordArt; Lines and Shapes, Modifying Drawn Objects.</p>

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
		2.15 Printing: print preview, select printer & appropriate print options.
Unit- 3 Excel (Spreadsheets)	3a. Create, open, save and print worksheet with page setup and print options. 3b. Enter data and insert, delete and format cells, rows and columns. Use formula and functions 3c. Insert formulas, functions and named ranges in worksheet. 3d. Create chart of different types.	3.1 Introduction to Excel, 3.2 Introduction to data, Cell address, Excel Data Types, Concept of hyperlink 3.3 Introduction to formatting number, text and date. 3.4 Concept of worksheet and workbook. 3.5 Understanding formulas, Operators in Excel, Operators Precedence, Understanding Functions, Common Excel Functions such as sum, average, min, max, date, sqrt, power, upper, lower, count, countif, roundup, sin, cos. 3.6 Introduction to charts, overview of different types of charts available with Excel. 3.7 Hide, unhide rows and columns. 3.8 Concept of print area, margins, header, footer and other page setup options.
Unit- 4 Power Point Presentation	4a. Create a simple text slide using formatting, selecting a slide layout and insert pictures & backgrounds. 4b. Use different design templates for creating slides. 4c. Apply slide transitions and slide timings and animation effect for slide show. 4d. Insert hyperlink in the created slides.	4.1 Outline of an effective presentations 4.2 Starting a New Presentation Files, Saving work, 4.3 Creating new Slides, Working with textboxes. 4.4 Changing a slides Layout, Applying a theme, Changing Colours, fonts and effects, Creating and managing custom Colour & font theme, Changing the background. 4.5 Use of design template and auto content wizard. 4.6 Apply animation and transition to slides with timing effect. 4.7 Slideshow: from beginning slideshow, from current slideshow, custom slideshow. 4.8 Creating hyperlinks, Using action buttons
Unit- 5 Introduction to Internet	5a. Know different terms related to internet and browsers. 5b. Understand need & duty of ISP & List out different ISP in city. 5c. Use internet for	5.1 What is the Internet? 5.2 Web pages, Home Pages. 5.3 Use of web sites 5.4 ISP: need & duties of ISP, different ISP in city 5.5 Browsers 5.6 Universal resource locators (URL)

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
	searching information and create, receive & send email with attachment.	5.7 Browsing or surfing the web 5.8 Search engines 5.9 E-mail and Creation of E-mail ID. Sending & Receiving email with attachment. 5.10 Chatting & Video Conferencing tools: Skype and GTalk 5.11 Applications of the Internet

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Practical Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Basics of Computer System	08				NA
2	Word Processing	08				NA
3	Spreadsheet	06				NA
4	Presentation	06				NA
5	Introduction to Internet	04				NA
6						NA

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Connect the peripherals to a computer system. Get the information about the manufacturers and prices of various components of a PC and laptop.	2
2	1	Start and shutdown of windows, starting different applications. Use of accessories like calculator, paint, notepad & WordPad, Use of system tools like Disk Cleaner, Disk defragmenter, System Information, System Restore & Control panel.	4
3	1	Perform file management operations such as copying, deleting, renaming, creating folders, renaming folders using My computer, Windows Explorer, searching files and folders.	2
4	1	Change windows format such as wall paper, date & time,	2

		installing printer, installing and removing programs by using add/remove programs.	
5	2	Prepare a sample doc files such as resume, application, time table etc. using all word processor tools from menu bar.	6
6	3	Prepare sample spreadsheets such as sample result sheet, salary sheet of employees using all MS-Excel tools from menu bar. (applying excel formulae/functions)	6
7	4	Prepare sample power point presentation by applying MS-Power Point tools such as design template, background, transition and animation effect to slides.	6
8	5	Search information on internet .Use Internet to create email account, send email with attachment, receive email and management of email account.	2
9	5	Use of E-commerce sites, Mobile apps for various online transactions.	2
			32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like: assignments based on MS-Office, teacher guided self learning activities and lab based mini-projects on MS-Word, MS-Excel and MS-PowerPoint. These could be individual or group-based.

- a. Visit institute website.
- b. Manage files and folder using Windows.
- c. Prepare letter and project report using word processor
- d. Create result sheet by inserting student marks and show it in chart form on the same worksheet using Excel spreadsheet.
- e. Develop effective presentation of project report using PowerPoint Presentation.
- f. Use open source software like openoffice.org (latest version).

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Group based.
- b. Q & A technique.
- c. Individual based.
- d. Activity based learning

e. Self Line learning.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Fundamentals of computers	P.K.Sinha	BPB Publication
2.	Computer course	R.Taxali	TMGH Publication
3.	MS-Office for Dummies	Wallace Wang	Wiley India, New Delhi
4.	Basic Computer Engineering	Dr. Shailendra Singh, Pawan Thakur, Anurag Jain	SatyaPrakashan, New Delhi, India.
5.	Microsoft Office	Ron Mansfield	BPB Publication
6.	Fundamentals of computers	P.K.Sinha	BPB Publication

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S.No.	Name of equipment	Brief specification
1.	Computer System with latest configuration along with Windows Operating System and latest MS-Office.	Desktop Computer/Personal Computer (Windows OS Prof. Edition/Academic edition) with preloaded operating systems windows 7/windows 8 (academic Lic)
2.	PROJECTOR	Multimedia Projector with wireless connectivity between PC and Projector
3.	PRINTER	HP 1022n laser printer
4.	SCANNER	HPscanner ,Color Scan Method: Color, Flatbed, Mirror Moving Scanner Optical Resolution: 800 x 1600 dpi Maximum Scanning Area 304.8 x 431.8 mm (12x17 inch)
5.	Computer System with latest configuration along with Windows Operating System and latest MS-Office.	Desktop Computer/Personal Computer (Windows OS Prof. Edition/Academic edition) with preloaded operating systems windows 7/windows 8 (academic Lic)
6.	PROJECTOR	Multimedia Projector with wireless connectivity between PC and Projector

12. LEARNING WEBSITE & SOFTWARE

(Please mention complete URL of the E- resource CO wise)

- <https://www.youtube.com/watch?v=cXBVMYKQ3ZY>
- <http://www.gcflearnfree.org/computerbasics/>
- http://www.homeandlearn.co.uk/word2007_2010/Word-2007-2010.html
- <http://www.homeandlearn.co.uk/excel2007/Excel2007.html>
- <https://support.office.com/>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Connect and operationalize computer system with its peripheral devices.	2	2	2	0	0	0	0	0	0	2	0	0
2	Create and Format documents in Microsoft Word.	3	0	3	3	0	0	0	0	0	3	0	0
3	Create spreadsheets in Microsoft Excel by using formulae.	3	0	3	3	0	0	0	0	0	3	0	0
4	Create and edit basic power point presentations in Microsoft PowerPoint.	3	0	3	3	0	0	0	0	0	3	0	0
5	Use internet for creating email-id, receive and send email with attachment & search information on internet.	1	1	1	1	0	0	0	0	0	1	0	0

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	R.T.Aghao	Sr.Lecturer in APM Dept. , Govt. Polytechnic, Aurangabad
2	O.R.Varma	Lecturer in IT Dept., Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE ENGLISH
COURSE CODE 6G301

Diploma Programme in which this course is offered	Semester in which offered
Common to all programmes	First

1. RATIONALE

English language has become a supreme necessity to pick up a solid core of knowledge. It has a power of linking us with the outside world. Competency in English is also important in business matters like transactions including e-mails, memos, reports and contracts in writing not only for Indian industry, but also worldwide. Students having proficiency in reading, writing and speaking English has become a prospect of employment in the industry. Hence, this course is designed to help the students to communicate in English effectively.

2. COMPETENCY

At the end of studying this course students will be able to
“Communicate in English language in spoken and written form.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme			
L	T	P	C	Theory Marks ESE	Practical Marks PT	Total Marks ESE	PA
2	-	2	4	80	20	-	25*
Exam Duration				3 Hrs	1 Hr	-	-
							125

(*): Out of 25 marks, 05 marks -micro-project assessment; 20 marks-progressive assessment.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, ESE -End Semester Examination; PT- Progressive Test; OR-Oral Examination; PA- Progressive Assessment

4. COURSE OUTCOMES

1. Interpret the meaning of new words from the text.
2. Formulate grammatically correct sentences using new words.
3. Prepare resume in proper format.
4. Use relevant vocabulary to construct sentences.

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
UNIT-I Comprehension	1a. Understanding meaning of new words from the text. 1b. Write summary of the text 1c. Responding to the questions from the text 1d. Express ideas and views on	Text from the book & Vocabulary Building 1.1. Man Versus Machine— M..K..Gandhi 1.2. Say No to Plastic Bags 1.3. Interview of

	learned topics	Dr.A.P.J.AbdulKalam 1.4. Dare to Dream- N.R.Narayan Murthy 1.5. The History Maker—MaltiHolla
UNIT-II Functional Grammar	2a. Apply correct verbs in given sentences 2b. Use of correct structures in writing 2c. Identify different types of sentences 2d. Apply correct auxiliaries 2e. Use appropriate connectors in the given sentences 2f. Use appropriate prepositions in the given sentences 2g. Apply correct and exact rules and structures to transform the sentences 2h. Use of correct punctuations in writing	Functional Grammar 2.1.Tenses & Time 2.2. Sentence Patterns 2.3. Types of Sentences 2.4. Modal Auxiliaries 2.5. Connectors 2. 6. Prepositions 2.7. Voice, Degree and Reported Speech 2.8. Punctuation Marks
UNIT-III Craft of writing	3a. Writing a paragraph effectively 3b. Writing e-mail in proper formats 3c. Prepare resume in suitable format	3.1.Paragraph Writing 3.2.E-mail writing 3.3. Resume Writing
UNIT-IV Listening & Speaking Skills	4a. Formulate sentences using new words 4b. Enrich vocabulary through reading and listening 4c. Follow correct pronunciations, intonations & accents in communication	4.1. Importance of effective listening 4.2.Barriers in listening and how to overcome them 4.3Problems in speaking English faced by Indian Students

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Text from the book & Vocabulary Building	12	08	12	10	30
II	Functional Grammar	12	05	08	13	26

III	Craft of Writing	06	04	04	08	16
IV	Listening & Speaking Skills	02	02	02	04	08
	Total	32	19	26	35	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from the above table.

7. SUGGESTED EXERCISES/PRACTICALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1.	I	Make Sentences Using Correct Collocations	04
2.	II	Frame Sentences Using Appropriate Preposition/Conjunction	04
3.	III	Make Sentences Using Correct Tenses	04
4.	IV	Make Sentences Using Seven Basic Sentence Patterns	04
5.	V	Transform Sentences in Reported Speech	04
6.	VI	Prepare an Effective Resume in a Proper Format	04
7.	VII	Draft Formal E-mails	04
8.	VIII	Listen a Paragraph/Speech/Story and Make a Summary	04
Total			32

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- a. Read newspapers daily.
- b. Solve exercises on lexical items.
- c. Use apps for practice.
- d. Use pocket dictionary to increase vocabulary.
- e. Listen the news bulletin on radio.
- f. Play different word games to improve vocabulary.
- g. Write different articles & posts.
- h. Practice role-playing.
- i. Write a story of own experiences.
- j. Practice listening comprehension.
- k. Collect articles from newspapers & make a collection.
- l. Practice paragraph writing.
- m. Collect different business letters.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- a. Arrange different competitions to solve various grammatical items.
- b. Motivate students to listen, speak, read and write English in their day-to-day life.
- c. Student centered methods and techniques of teaching and learning e.g. group discussion, role-play, individual and group assignments should be used so as to make the students actively participate in the teaching-learning process.

10. SUGGESTED TITLES FOR MICRO-PROJECTS

A *micro-project* is planned to be undertaken by a student. He/she ought to submit it by the end of the semester to develop the industry oriented COs. The micro-project could be industry application-based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

- a. The use of English language in the user manual of electronic appliances used at home.
- b. Prepare an advertisement for five daily used products using contextual vocabulary.
- c. Observe environmental problems in your locality and frame at least ten slogans to create awareness.
- d. Take an interview of any successful person in your locality in context with his life journey, inspiration, social contribution, role model and keys to success.
- e. Prepare a leaflet giving information about your institute.
- f. Write a review of your favourite movie/drama/novel.
- g. Find out the difficulties in speaking English faced by the students from rural areas.

11. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	English Grammar & Composition	R. C. Jain	Macmillan
2	Business Letters & E-mails	JyotiNandedkar	Saket Pub.
3	Business Correspondence and Report writing	R. C. Sharma & Krishna Mohan	Tata McGraw Hill
4	Contemporary English Grammar	David Green	Macmillan
5	A Communicative Grammar of English	Geofray Leech & Jansvartvik	Pearson Education
6	*Spectrum- A Text Book on English	-	MSBTE
7	* A Text Book on English	-	MSBTE

12. MAJOR EQUIPMENTS/ INSTRUMENTS WITH BROAD SPECIFICATIONS

Sr.No.	Name of the Equipment	Specification
1	Digital English Language Laboratory	
2	Computers and Headphones	
3	Magazines,Articles,Journals in Lab.	

13. E-LEARNING RESOURCES

(Please mention complete URL of the E- resources CO wise)

1	https://www.nptel.ac.in/courses
2	https://www.k12reader.com
3	https://www.eduaction.com
4	https://www.k5learning.com
5	https://www.english4u.com

14.POS AND PSOS ASSIGNMENT AND ITS STRENGTH OF ASSIGNMENT WITH EACH CO OF THE COURSE

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Interpret the meaning of new words from the text.	3	1	1	1	1	1	1	1	3	1	-	-	-
CO2	Formulate grammatically correct sentences using new words.	3	1	1	1	1	1	1	1	3	1	-	-	-
CO3	Prepare resume in proper format.	1	1	2	1	3	3	2	3	3	3	-	-	-
CO4	Use relevant vocabulary to construct sentences.	1	1	1	1	1	1	1	1	2	1	-	-	-

Sr. No	Name of the faculty member	Designation and Institute
1	Mrs. P.Y. Kamble	Lecturer in English, Government Polytechnic, Aurangabad
2	Mrs. M.S. Ban	Lecturer in English, Government Polytechnic, Aurangabad
3	Mr. P.V. Deshmukh	Lecturer in English, Government Polytechnic, Aurangabad
4	Mr. R.L. Korde	Lecturer in English, Government Polytechnic, Aurangabad
5	Mr. D.D. Gangthade	Lecturer in English, Government Polytechnic, Aurangabad
6	Mr. A.P. Jagtap	Lecturer in English, Government Polytechnic, Osmanabad

Member Secretary PBOS

Chairman PBOS

Co-coordinator
science and Humanities

COURSE TITLE DEVELOPMENT OF LIFE SKILLS

COURSE CODE 6G303

PROGRAMME & SEMESTER

Diploma Program in which this course is offered	Semester in which course is offered
CE/ME/ETX/EE/AE/DDGM/CO/IT	First

1. RATIONALE

The generic skills are lifelong skills which need to be developed continuously. These skills are necessary for diploma engineers for their professional career. This course aims to develop interpersonal skills, problem solving, decision making, Professionalism with etiquettes, ethics and value system. This course also aims at developing an engineer as a team leader, effective member of the team and to become sound personality. It will develop the abilities and skills to perform at highest degree of quality as an individual.

2. COMPETENCY

“Develop life skills to enhance personal effectiveness, professionalism and optimal use of resources.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme(Marks)				
L	T	P		Theory Marks		Practical Marks	Total Marks	
			C	ESE	PT	ESE (OR)	PA	
--	--	2	2	--	--	25@	25	50

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, PR- Practical Examination, OR – Oral Examination, TW - Term Work, # External, @ Internal examination , ~ Online Examination.

4. COURSE OUTCOMES

1. Develop interpersonal communication skills corporate etiquettes and professionalism.
2. Enhance personal effectiveness, body language and presentation skills.
3. Practice time management, group discussion and goal setting technique.
4. Manage Stress at workplaces with problem solving techniques.

5 DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Self Analysis	<p>1a. Identify Strengths and weaknesses of an individual</p> <p>1b. Identify opportunities, threats in different situations.</p> <p>1c. Describe principle of Need Base Theory</p>	<p>Self-Analysis</p> <p>1.1 Strength, weaknesses, opportunities and threats</p> <p>1.2 Techniques of self-control</p> <p>1.3 Understanding Need base Theory — Attitude, aptitude, assertiveness, self-esteem, Confidence</p> <p>1.4 Understanding Self</p>
Unit– II Communication Skills & Presentation Skills	<p>2a. Identify techniques of communications.</p> <p>2b. Describe Body language techniques.</p> <p>2c. Understand the principle Eye contact and facial expression.</p> <p>2d. Develop appropriate presentation Skills.</p> <p>2e. Use multimedia tools and technology for effective presentation.</p> <p>2f. Conduct Group and Interviews.</p>	<p>Communication Skills & Presentation Skills</p> <p>2.1 Techniques of communication skills,</p> <p>2.2 Body language, Dress like the audience, Posture, Gestures, Eye contact and facial expression.</p> <p>2.3 Presentation Skill –Stage fright, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech.</p> <p>2.4 Group discussion and Interview technique, Use of aids –OHP, LCD projector, white board</p>
Unit III Interpersonal communication and Corporate and Etiquettes	<p>3a. exhibit/apply inter personal skills in different situations.</p> <p>3b. Practice manners and Etiquettes.</p>	<p>Interpersonal communication and Corporate and Etiquettes</p> <p>3.1 Interpersonal communication. Through Self Development and change.</p> <p>3.2 Polished personal habits</p> <p>3.3 Ethics & Etiquettes: a</p>

		<p>way of life, what are ethics, how ethics help to ensure positive interpersonal relations,</p> <p>3.4 Personal value system, Personal Attire & Grooming</p> <p>3.5 Cell phone manners</p>
<p>Unit IV</p> <p>Time Management and goal setting.</p>	<p>4a. Understand importance of time management.</p> <p>4b. Apply time management skills.</p> <p>4c. Set the goals for career growth.</p>	<p>Time management and Goal Setting</p> <p>4.1 Time management skills in groups for completion of project</p> <p>4.2 Factors that lead to time loss and how they can be avoided</p> <p>4.3 Time matrix & urgent versus, Important jobs</p> <p>4.4 Importance of goal setting</p> <p>4.5 How to set SMART goals.</p>
<p>Unit V</p> <p>Health and Stress Management</p>	<p>5a. Manage health for personal efficiency.</p> <p>5b. Describe Stress Management,</p> <p>5c. Use strategies to overcome stress</p> <p>5d Understand emotions</p>	<p>Health and Stress Management</p> <p>5.1 Importance of health management,</p> <p>5.2 Relevance of it,</p> <p>5.3 Tips to maintain good health</p> <p>5.4 Strategies to overcome stress, understanding importance of good health to avoid stress.</p> <p>5.5 Stresses in groups, understand and identify emotions, how to control emotions, emotional intelligence.</p>
<p>Unit VI</p> <p>Problem Solving Techniques and Creativity</p>	<p>6a. participate in technical Quizzes and puzzles.</p> <p>6b. Use problem solving techniques</p> <p>6c. Describe factors enhancing creativity</p>	<p>Problem Solving Techniques and Creativity</p> <p>6.1 definition of problem and types</p> <p>6.2 solving Puzzles and technical quizzes.</p> <p>6.3 Reducing conflict by preventing problems in the classroom.</p> <p>6.4 Creativity concept, Tips and ways to increase creativity, importance of creativity.</p>

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Self-Analysis	4	NA	NA	NA	NA
II	Communication Skills & Presentation Skills	6	NA	NA	NA	NA
III	Interpersonal communication and Corporate and Etiquettes	6	NA	NA	NA	NA
IV	Time management and Goal Setting	6	NA	NA	NA	NA
V	Health and Stress Management	6	NA	NA	NA	NA
VI	Problem Solving Techniques and Creativity	4	NA	NA	NA	NA
	Total	32	-	-	-	-

Legends: R = Remembrance; U= Understanding; A= Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS:

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Analyze self with SWOT techniques.	04
2	II	Present a topic (related to technical advancement should be given to a group of five to six students. Group should search the necessary information from various sources and prepare a systematic power point presentation. All such presentations should be delivered in front of class by groups. Presentations are to be evaluated by teacher).	04
3	II	Deliver extempore (Topic will be given to the individual for a	04

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		speech of 5 to 8 minutes. Here the individual speeches of students will be conducted and evaluated by group of students.)	
4	II	Participate in Group Discussion (Teacher should form group of six to eight students and give topics for group discussion. Group discussions should be carried out and evaluated by teacher)	04
5	III	Exhibit Etiquettes in five different situations. (Visit to any one place like office/firm/development sites etc. and observe the communication and etiquettes.)	04
6	IV	Prepare your individual time table for a week - a) List down your daily activities. b) Decide priorities to be given according to the urgency and importance of the activities. c) Find out your time wasters and mention the corrective measures. d) Set short term and long term goal for PT/TEE/Gymkhana -sport/gathering event etc.	04
7	V	Demonstrate simple Yoga postures / meditation lectures and other stress relieving techniques by professional persons and narrate his/ her experiences.	04
8	VI	Participate / develop Quizzes, puzzle- solving and educational games and narrate his/her experiences.	04
Total			32

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

Following activities will be undertaken as per their convenience. Students are advice to submit their report about participation in activities.

- a. Case studies to be discussed in a group and presentation of the same by group /group leader.
- b. Carry out Field exercises and prepare reports. (e.g. interact with supplier/trader and discuss about techno commercial specifications of product)
- c. Role play by individual/group leader.
- d. Sharing of self -experiences in a group.
- e. Brain storming sessions in a group
- f. Questionnaire -filling & discussing results of the same in a group.

9. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- a. Motivate students to use internet and collect information about various generic skills
- b. Arrange expert lecture on various topics on (two/three) SWOT analysis/Time management/Etiquette / stress management/health management.etc.

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Pearson Education Asia	Organizational Behavior	Tata McGraw Hill
2	Marshall Cooks	Adams Time management	Viva Books
3	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
4	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.
5	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
6	You can win	Mr. Shiv Khera	Macmillan ,India Ltd.
7	Wings of Fire	Mr .Abdul Kalam	Universities Press
8	Prabhavi Vyaktimatwa	SEEMA GUPTA	SAKET PUBLICATION
9	Yoga Dipika	Mr. Iyyengar	Rohan prakashan
10	Tan Tanavache Niyojan (Marathi)	Dr. Anand Nadkarni	Majestic Publishing House
11	Tandrust Raha ,Mast Jaga.(Marathi)	Dr. Rajiv Sharangpani	Continental Prakashan

11. LEARNING WEBSITE & SOFTWARE

- a. [https:// swotanalysis.com](https://swotanalysis.com)
- b. [https:/ softskill.com](https://softskill.com)
- c. [https:/ corporate etiquettes .com](https://corporateetiquettes.com)
- d. [https:/ timemanagement.com](https://timemanagement.com)
- e. [https:/ stressmanagement.com](https://stressmanagement.com)

12. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

CO. NO.	Course Outcome	PO 1	PO 2	PO 3	PO 4	P O 5	P O 6	P O 7	P O 8	PO 9	PO 10	PS O1	PS O 2
CO 1	Develop interpersonal communication skills corporate etiquettes and professionalism.		1			2		2	2	3	2		
CO 2	Enhance personal effectiveness, body language and presentation skills.		1	1				1	2	3	2		
CO 3	Practice time management, group discussion and goal setting technique.	2		1			1	1	2	2	2		
CO 4	Manage Stress at workplaces with problem solving techniques.		2			2			2	2	2		

12. COURSE CURRICULUM DESIGN COMMITTEE

Sr No	Name of the faculty members	Designation and Institute
1	Dr. Uday V. Pise	Head of Department , Mechanical Engg. Govt. Polytechnic, Aurangabad
2	Prof. R. T. Aghao	Lecturer in Applied Mechanics., Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE**ENGINEERING MATHEMATICS****COURSE CODE****6G102**

Diploma program in which course is offered	Semester in which course is offered
CE/ME/EE/ET/IT/CO/AE	Second Semester

1. RATIONALE:

Engineering Mathematics forms foundation to understand basic principles of Engineering Mathematics to solve engineering problems. This subject is an extension of Basic Mathematics which deals with calculus, differentiation, integration, differential equations etc. which have applications in several engineering courses of various programmes. This course aims at multi-dimensional logical thinking and reasoning capabilities of the students.

2. COMPETENCY STATEMENT:

At the end of studying this course students will be able to

“Solve engineering problems using the principles of applied mathematics.”

3. COURSE OUTCOMES

Students will be able to

1. Differentiate the various function using different rules
2. Apply rules of derivatives to solve engineering problems.
3. Apply rules of integration to solve engineering problems.
4. Solve the various types of differential equations.
5. Apply principles of central tendencies for quality assurance in engineering field

4. TEACHING AND EXAMINATION SCHEME

Teaching scheme (In hours)			Total credits (L+T+P)	Examination scheme				
				Theory Marks		Practical marks		Total Marks
L	T	P	C	ESE	PT	ESE	PA	
03	01	00	04	80	20	--	--	100
Exam Duration				3 Hrs	1 Hr.			

Legends:

L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice(batch-wise); **P** Practical;

C – Credit; **ESE** -End Semester Examination; **PT** - Progressive Test.

5. CORSE DETAIL.

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT I Derivatives	1a. Differentiate various engineering functions	1.1 Definition of derivative, notation. 1.2 Derivative of standard functions. 1.3 Rules of Differentiation (without proof) such as sum, difference, product and quotient. 1.4 Derivative of composite functions. 1.5 Derivative of inverse trigonometric functions. 1.6 Derivative of implicit functions. 1.7 Derivative of parametric functions. 1.8 Logarithmic differentiation. 1.9 Second order derivatives.
UNIT II Applications of derivative	2a. Apply derivatives to find Velocity, Acceleration and Maxima & Minima	2.1 Tangent & normal. 2.2 Maxima & minima. 2.3 Radius of curvature.
UNIT III Integration	3a. Integrate various Functions using appropriate methods.	3.1 Definition of integration. 3.2 Integration of standard function. 3.3 Rules of Integration: sum, difference & multiplication. 3.4 Methods of Integration 3.4.1 Integration by substitution. 3.4.2 Integration by partial fraction. 3.4.3 Integration by parts. 3.5 Definition of Definite integral. 3.6 Simple problems on definite integral
UNIT IV Differential Equations	4a. Solve various types of differential equations.	4.1 Definition of differential equation, order & degree. 4.2 Formation of differential equation. 4.3 Solution of Diff. equation. 4.4.1 variable separable. 4.4.2 Homogeneous equation. 4.4.3 Exact diff. equation. 4.4.4 Linear diff. equation.
UNIT V Statistics	5a. Measure Central Tendencies 5b. Measure Dispersion for given data.	5.1 Graphical representation: Histogram & o-give curve to find Mode and median. 5.2 Measures of dispersion : Range, mean deviation and Standard deviation.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Sr,no	Title/Topic	Teaching Hours	Distribution of Theory Marks			
			Remembrance levels	Understanding levels	Application levels	Total
1	Derivative	12	2	08	08	18
2	Applications of derivative	04	00	04	08	12
3	Integration	16	06	08	12	26
4	Differential Equations	10	04	04	08	16
5	Statistics	06	02	02	04	08
TOTAL		48	14	26	40	80

7. SUGGESTED LIST OF TUTORIAL

- 1) The exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency
- 2) Form a batch of 20 students and at least **ten** problems should be given to get necessary exercise.
- 3) Course faculty will provide programme related problems.

Sr. No.	Title/Topic	Exercises/Tutorial	Approx. hours
1	Derivative	Solve problems related to various methods/techniques of differentiations	03
2	Applications of derivative	Calculate Engineering Applications of Tangent, normal, maxima, minima and Radius of curvature from respective programmes.	03
3	Integration	Solve problems Related to Various Methods/Techniques of integration	04
4	Differential Equations	Solve problems Related to Various Methods/Techniques of Differential equation.	04
5	Statistics	Solve examples of Comparative data. Plot different types of graph.	02

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

Other than the classroom learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

- a. Collect the mathematical derivation based on curriculum from respective programme.
- b. Identify mathematical problems related to respective programme and get them solved.
- c. Find graphical software using internet and list them.

- d. Identify problems based on applications of differential equations and solve these problems.
- e. Prepare a seminar on any relevant topic based on curriculum.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course

- a. Use open resources available on internet to teach Engineering Mathematics.
- b. Apply the mathematical concepts learnt in this course to branch specific problems.
- c. Use different instructional strategies in classroom teaching.

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1.	Mathematics for polytechnic students for second Year	S. P. Deshpande	Pune vidhyarti gruh prakshan Pune
2.	Applied Mathematics	By Patel & Rawal	Nirali prakashan Mumbai
3	Mathematics for polytechnic students for second year	G.V.Kumbhojkar	Phadke prakashan Kholapur

11. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

Sr. No.	Name of the Equipment	Specification
1	NA	

12. SOFTWARE/LEARNING WEBSITES

13. POS AND PSOS ASSIGNMENT AND ITS STRENGTH OF ASSIGNMENT WITH EACH CO OF THE COURSE

CO. No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Students will be able to differentiate the various function using different rules	2	3	1	-	-	-	-	-	-	-	-	-	-
CO2	Students will be able to apply the differentiation to Velocity, Acceleration and Maxima & Minima	-	-	1	-	1	-	-	-	-	-	-	-	-
CO3	Students will be able to so Integrate the various Function using different methods	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	Students will be able to solve the various types of differential equation using different methods.	1	1	3	-	-	-	-	-	-	-	-	-	-
CO5	Students will be able to Measure Central tendency and Measure Dispersion in given data	-	1	1	-	1	-	-	-	-	-	-	-	-

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Sr. No.	Name of the faculty member	Designation and Institute
1	Mr. M.A. Ali	Lecturer in Mathematics, Government Polytechnic, Aurangabad
2	Mr. R.B. Borulkar	Lecturer in Mathematics, Government Polytechnic, Aurangabad
3	Mrs. H.H. Bhumkar	Lecturer in Mathematics, Government Polytechnic, Aurangabad

Member Secretary PBOS

Chairman PBOS

Co-ordinator science and
Humanities

COURSE TITLE	ENGINEERING PHYSICS
COURSE CODE	6G103

Diploma Programmes in which this course is offered	Semester in which offered
ME/CE/ET/EE/CO/IT/AE	First/Second Semester

1. RATIONALE

Engineering Physics represents foundation level of courses. It is considered as the mother of all engineering programmes. The principles, laws, hypothesis, concepts, ideas which are acquired by students through this course help in reinforcing the knowledge of technology and solving engineering problems.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies...

- I. Apply facts, concepts and principles of Physics for solving various Engineering Problems
- II. Observe, describe, interpret and interact with physical and engineering world through concepts and principles of physics.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Total Credits (L+T+P)	Examination Scheme				
(In Hours)				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PT	ESE	PA	150
3	0	2	5	80~	20~	25@	25	
Exam Duration				2 Hrs.	1 Hr.	2 Hrs.		

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – credit; ESE - End Semester Examination; PA - Progressive Assessment; PT- Progressive Test; ~ - Multiple choice Online Examination
@ Internal Examination

4. COURSE OUTCOMES:

Students will able to

1. Determine relevant physical properties of a given material.
2. Analyze thermal, optical and acoustical system using properties of heat, light and sound.
3. Apply fundamentals electrical laws.
4. Select different type of semiconductors, x-ray and optical fibre application.

5. COURSE DETAILS:-

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT-I Genral Propertis of Matter	1a. Measure Strength parameter. 1b. Measure automization and lubricity of given liquid.	<p>Elasticity:</p> <p>1.1 Definitions of deforming force, restoring force, elasticity, plasticity, Factors affecting elasticity.</p> <p>1.2 Stress Tensile, Compressive, Volumetric and Shear stress, Strain: Tensile, Volumetric and Shear strain.</p> <p>1.3 Elastic limit, Hooke's law. Elastic co-efficient- Young's modulus, bulk modulus, modulus of rigidity and relation between them</p> <p>Viscosity</p> <p>1.4 Viscous force, definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its SI unit.</p> <p>1.5 Streamline and turbulent flow with examples, critical velocity, Reynold's number and its significance.</p> <p>Surface tension</p> <p>1.6 Cohesive and adhesive force, Laplace's molecular theory of surface tension, Surface Tension: definition and unit,</p> <p>1.7 effect of temperature and impurity on surface tension. Angle of contact, Capillarity and examples of capillary action</p> <p>1.8 derivation of expression for surface tension by capillary rise method, applications of surface tension.</p>
UNIT-II Heat Light And Sound	2a. Analyze thermal system. 2b. Analyze optical system. 2c. Analyze acoustic system.	<p>Heat :</p> <p>2.1 Three modes of transistor of heat , conduction convection Radiation , law of thermal conductivity</p> <p>2.2 Coefficient of thermal conductivity , , expansion of solid and coefficient of linear , aerial and cubical expansion & relation between them</p> <p>LIGHT :</p> <p>2.3 Introduction to reflection and refraction of light, Snell's Law,</p> <p>2.4 Dispersion. Total internal reflection of light. Critical angle, Simple problems.</p> <p>Properties of sound :</p> <p>2.5 Wave motion transverse & longitudinal</p>

		<p>wave</p> <p>2.6 Free & forced vibration , Resonance formula calculate velocity of sound by resonance tube method</p>
UNIT-III Electrostatics And Current Electricity	3a. Analyze electrical system.	<p>3.1 Electric charge, Coulomb's Law of Charges, Unit charge, field, intensity of electric field, electric lines of forces (Properties) Electric Flux, Flux Density.</p> <p>3.2 Concept of resistance, Specific resistance, Whetstone's network, meter bridge, balancing condition of meter bridge, measurement of unknown resistance using meter bridge. Problems.</p> <p>3.3 Potential , Potential drop along the length of wire, Principle of Potentiometer, Potential gradient, E.M.F. Unit, Comparison of EMF using potentiometer</p>
UNIT-IV Modern Physics	4a. Use modern materials 4b. Use X-ray	<p>Semiconductor –</p> <p>4.1 Classification of solids on the basis of band theory: forbidden energy gap, conductor, insulator semiconductor</p> <p>4.2 intrinsic, extrinsic, semiconductor doping , P and n type semiconductor electrical conduction through p and n semiconductor .P-N junction diode semiconductor metal and insulator.</p> <p>4.3 Optical fibre: principle, structure of optical fibre, propagation of light wave through optical fibre, derivation of numerical aperture and acceptance angle</p> <p>X-rays:</p> <p>4.4 Origin of X-rays, production of X-rays using Coolidge's X-ray tube</p> <p>4.5. Minimum wavelength of X-ray derivation, properties of X-rays, applications of X- rays: engineering, medical and scientific</p>

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R	U	A	Total
			Level	Level	Level	
1	GENERAL PROPERTIES OF MATTER	12	6	7	7	20
2	HEAT LIGHT AND SOUND	12	6	7	7	20
3	ELECTRICITY	12	6	7	7	20
4	MODERN PHYSICS	12	6	7	7	20
TOTAL		48	24	28	28	80

Legends:

R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

7. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency.

Following is the list of exercises/practical/experiments for guidance.

Sr. No.	Unit No.	Experiment /Practical Exercises	Approximate Hours
1	1	Know your Physics Laboratory and use of scientific calculator & interpretation of graph.	2
2	2	Measure the dimensions of given objects using vernier caliper.	2
3	3	. Determine Young's modulus of elasticity of metal wire by using Searle's apparatus	2
4	4	Measurement of unknown temperature using platinum resistance thermometer.	2
5	5	To determine critical angle using glass block	2
6	6	. Determine coefficient of viscosity of given liquid using Stoke's Method	2
7	7	To determine specific resistance of given wire using Ohm's Law	2
8	8	To verify the Law of Resistance in series by Meter bridge.	2
9	9	To study the forward characteristics of P-N junction diode	2
10	10	To understand the concept of resonance and determine the velocity of sound in air.	2
11	11	Comparison of EMF of two cells using Potentiometer	2
Micro Project (Any one of following will be opted by a group of 5-6 students)			
1	Survey of different diodes, resistances and capacitance		
2	Prepare current and voltage rating of home appliances		
3	To make the telescope using lenses		
4	Analyse the different toys and watch on the basis of property of Elasticity		
5	Analyse the different liquidator on the basis of property of surface tension		
6	To collect the information from internet regarding distribution of sound at Gowalkonda fort		
7	To collect the information from internet regarding distribution of sound at Golghumut at Vaijapur		

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities

- Calculate acoustics of given class room.
- Prepare a chart of applications of optical fibre in different fields.
- Demonstrate different types of capacitors.
- Seminar by student on any relevant topic.

9. SPECIAL INSTRUCTIONAL STRATEGIES

- Search various sites to teach various topics/sub topics.
- Instead of the traditional lecture method, use different types of teaching methods such as improved lecture method, question answer method, laboratory method to attained specific outcome.
- Some topics are relatively simpler in nature is to be given to the students for self-learning by seminar or by classroom presentations
- Teachers provide theme to create multiple choice questions.
- Provide super visionary assistance for completion of micro-projects.

10. HOURS DISTRIBUTION FOR PHYSICS EXPERIMENTS :

Sr. No.	Description	Hours
1	An introduction to Physics laboratory and its experiments (for the set of first four experiments)	02
2	Set of first four experiments	08
3	An introduction to experiments (for the set of next four experiments)	02
4	Set of next four experiments	08
5	An introduction to experiments (for the set of next three experiments)	02
6	Set of next three experiments	06

11. SUGGESTED LEARNING RESOURCES LIST OF BOOKS

Sr No.	Title of Books	Author	Publication
1	Basic Science Physics	Pawar and Sutar	Nirali Publication
2	Applied Physics	B.G. Bhandarkar	Vrunda Publication
3	Engineering Physics	R.K. Gupta and S.L Gupta	Dhanpat Rai Publication
4	Applied Physics	Pawar, Umrani and Joshi	Nirali Publication
5	Basic Physics	B.G. Bhandarkar, S.N. Jumde	Vrunda Publication
6	Physics Text Book Part -1 for Class - 12	NCERT	NCERT; 2014 edition ISBN-13: 978-8174506313

7	Physics Text Book Part -2 for Class - 12	NCERT	NCERT; 2014 edition ISBN-13: 978-8174506719
8	A text book of applied physics		S Chand Publication

12. LIST OF MAJOR EQUIPMENT/ INSTRUMENT

1. Platinum resistance thermometer
2. Thermocouple
3. Meter bridge
4. Potentiometer

13. E-LEARNING RESOURCES

1. www.physicsclassroom.com for unit II and unit III
2. www.fearofphysics.com for unit III
3. www.sciencejoywagon.com/physicszone for unit III and IV
4. www.science.howstuffworks.com
5. <https://phet.colorado.edu/en/simulations/category/physics> for unit I, II, III and IV

POS AND PSOS ASSIGNMENT AND ITS STRENGTH OF ASSIGNMENT WITH EACH CO OF THE COURSE

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Student will able to calculate young's modulus ,surface tension and viscosity of different material	3	3	3	2	0	1	0	0	0	2	-	-	-
CO2	Student will able to demonstrate different properties of heat ,light and sound	3	3	2	2	0	2	0	0	0	1	-	-	-
CO3	Student will able to demonstrate different laws of electric field, charge resistance and capacitance	3	3	3	3	0	2	1	0	0	1	-	-	-
CO4	Student will able to demonstrate different type of semiconductors, x-ray and optical fiber knowledge and application	3	3	3	3	0	3	0	0	0	0	-	-	-

14. NAME AND DESIGNATION OF COURSE DESIGNER

Sr. No	Name of the faculty member	Designation and Institute
1	Mr. V.S Deshmukh	Lecturer in Physics, Government Polytechnic Aurangabad
2	Mrs. S.B.Kale	Lecturer in Physics, Government Polytechnic Aurangabad
3	Mrs. Z.F.Siddiqui	Lecturer in Physics, Government Polytechnic Aurangabad

Member Secretary PBOS

Chairman PBOS

Co-coordinator
science and Humanities

COURSE TITLE- ELEMENTS OF CIVIL ENGINEERING

COURSE CODE 6C201

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Second

1. RATIONALE

Civil Engineering, being one of the oldest engineering fields, provide requisite infrastructure to engineering fields and society. It comprises of areas, viz. Construction of Buildings, Road & Railway, Water Supply and Sanitary schemes, Irrigation structures etc.

This basic technology course enables students to understand various areas of civil engineering profession.

2. COMPETENCY

“Identify various areas of Civil Engineering field”.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE@ (OR)	PA (TW)	
02	-	2	04	--	--	25	25	50
Duration of the Examination (Hrs)				--	--	--	--	---

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Enlist the job functions of diploma civil engineer.
2. Classify types of structures.
3. Identify component parts sub- structure & superstructure of a building.
4. Identify different areas and scope of civil engineering departments.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Role & Responsibility of Civil construction Agencies	1a. Outline present status & major areas of construction industry. 1b. Identify agencies involved in construction process of building. 1c. Identify manpower (skilled & semi-skilled, Unskilled manpower) required for construction activity.	1.1 Present status of construction industry in India. 1.2 Major areas of construction industry. 1.3 Role & responsibilities of Architect 1.4 Consulting Engineer- Role & Responsibility 1.5 Structural Engineer, Plumbing Engineer, Electrical Engineer, Water proofing Consultant & their functions 1.6 Contractor- Site supervisor, Store keeper, Watch man, Skilled labour, Semi-skilled labour Unskilled labour
Unit - II Types of Building Structures	2a. Explain different types of Structures with examples. 2b. Compare different types of structures.	2.1. Load bearing Structures Meaning, its use & sketch 2.2 Framed structures- Definition & sketch 2.3. Composite structures- Meaning & sketch 2.4. Comparisons between Load bearing structures & Framed structures
Unit - III Building Components and their function	3a. Differentiate between substructure & super structure 3b. Explain foundation and its necessity 3c. Describe each component parts with its function. 3d. Draw a c/s plan to know various components parts & their location	3.1 Sub structure 3.1.1 Foundation - Definition, necessity 3.1.2. Plinth- necessity 3.2 Super structures 3.3 Wall, Sill, Lintel, floor, Roof --- meaning & function 3.4 Beams, Column, Slab- Meaning & function
Unit - IV Superstructure	4a. Identify location for openings. 4b. Select paints for different surfaces. 4c. Identify appropriate types	4.1 Doors & Windows 4.1.1 Technical Terms, necessity, location 4.1.2 Types of Doors & Windows 4.1.3 Components parts & common

	of roof & its roofing material	sizes of doors & windows 4.2. Painting 4.2.1 Necessity & Requirement of good paints 4.2.2 Types of paint 4.3 Roofs 4.3.1 Types of roofs & its comparisons 4.3.2 Roofing material
Unit - V Scope of Civil engineering areas	5a. Identify various works of Government and Non-Government organizations 5b. Prepare organizations structure of PWD/Irrigation/MGP 5c. Identify importance of water conservation.	5.1 List of various Government and Non-Government organizations such as Building construction, Transportation engineering, Irrigation Engineering etc. with their function and organizational structures. & their function 5.2 Sources and importance of Water, Resources of water-Surface water Sub surface. Need of Roof Rain water harvesting.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Role & Responsibility of Civil construction Agencies	6	NA	NA	NA	NA
2	Types of structures	6	NA	NA	NA	NA
3	Building Components and their function	8	NA	NA	NA	NA
4	Superstructure	6	NA	NA	NA	NA
5	Scope of Civil engineering areas	6	NA	NA	NA	NA
6	Total	32	NA	NA	NA	NA

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	II	Identify parts of building of a Load bearing structure (through Site visit)&show various parts by preparing asketch cross section of a load bearing wall(not to scale).	4
2	II	Identify parts of building of a Framed Structure (through Site visit) & show various parts by preparing asketch cross section of a Framed Structure (not to scale).	4
3	II	Prepare a sketch to show stairs (plan& elevation).	2
4	IV	Prepare sketches ofdifferent types ofdoors&window.	2
5	IV	Prepare sketches ofpitched roofs/ flat RCC roof.	2
6	II	Prepara line of plan /elevation of a two room building(not to scale).	4
7	V	List out various roles& responsibilities of Site Engineer in various Government and Non-Governmentorganizations.	4
8	V	Prepare sketches of models of various civil engineering structures.	4
9	V	Collection and literature study of any Irrigation project/ Rural water supply scheme/Roads/Bridges mentioning its salient features.	6
	Total		32

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricularstudent's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Internet Survey of various elevation of residential/public building
- b. Field survey of various construction site
- c. Explore various agencies/ government department involved in construction activity
- d. Organization social awareness for promotion of rain water conservation

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods
- b. Q & A technique.
- c. Demonstration

- d. Seminars
- e. Activity based learning

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Elements of Civil Engineering	Dr. I.K. Pateria & Dr. K. A. Patil	ShriLaxmiPrakashan, Aurangabad
2.	Building Construction	Pooja D. Pawar	Tech- Max Publication, Pune
3	Building Construction	SushilKumar	Standard Publication
4	Building Construction	Bindra & Arora	DhanpatRai Publication

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S.No.	Name of equipment	Brief specification
1.	Elevation and C/s building model- models.	Wooden
2.	Transportation model- models.	Wooden
3	Irrigation model- Dams canals models.	Wooden

12. LEARNING WEBSITE & SOFTWARE

- a. <http://www.construction> agencies.com
- b. <http://www>. Component parts of building .com
- c. <https://Express highway> .com/
- d. <http://www>. <https://www>. Jayakwadi project.

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Enlist the job functions of diploma civil engineer.					03						03		
2	Classify types of structures	01	03											
3	Identify component parts sub structure & superstructure of a building.	01	03											
4	Identify different areas and scope of civil engineering departments.		03		03								01	

Course Curriculum Design Committee

Sr. No	Name of the faculty members	Designation and Institute
1	Dr. R.S Bang	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2	S.S. Ragle	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- CONSTRUCTION MATERIALS**COURSE CODE** 6C202**PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Second

1. RATIONALE

The primary job of a civil engineer is to design, construct, supervise and maintain structures such as Buildings, Bridges, Dams, and Canals, waterTanks, Roads etc. Construction of these structures involves use of different and large quantity of construction material. Selection of suitable construction materials required for construction and finishing of various parts of structures is one of the important roles of Civil Engineer. Proper selection of materials ensures structure to be strong, durable and cost effective.

This Course enables diploma graduates to acquire knowledge for identification of suitable construction materials with required properties in construction of various structures.

With the advancement in technology, new materials are emerging as better alternatives to traditional materials. Knowledge of new material is also essential for its identification in appropriate situation.

2. COMPETENCY

At the end of studying this course students will be able to

“Select suitable construction materials required in the construction of civil engineering structures”.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE@ (OR)	PA (TW)	50
2	0	2	4	--	--	25	25	
Duration of the Examination (Hrs)				--	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Identify characteristic requirements of various construction materials.
2. Identify suitable traditional/ common construction materials.
3. Conduct Field tests to ascertain the fitness of construction material.
4. Identify new/ special construction materials.
5. Identify suitable construction materials for finishing of civil engineering structures.

5. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit –I Types of of Construction Materials.	1a. Classify various construction materials. 1b. Describe the criteria to select the materials for given situation.	1.1 Broad classification of materials – Natural, Artificial, Special, Finishing and Recycled construction materials. 1.2 Criteria for Selection of construction materials on the basis of carrying prescribed load, serviceability,
Unit– II Natural Construction Materials	2a. Classify various Natural construction materials 2b. Select appropriate naturally available construction materials based on properties of materials and requirement of various items of construction.	2.1 Stone – Physical Classification of rocks; Requirements of good building stone, characteristics of stone, Quarrying and dressing of stone. 2.2 Timber – Timber as construction material, structure of timber, properties of good timber, seasoning of timber, defects in timber 2.3 Bituminous materials and mixtures- Terminology, different types of asphalt, bitumen, tar used in Civil Engineering works, their properties and uses 2.4 Lime – Manufacture of lime, classification, field slaking of lime and properties of lime 2.5 Soil –Terminology- sand, silt, clay and their suitability in construction work.
Unit– III Artificial Construction Materials	3a. Classify various artificial construction materials 3b. Identify/select appropriate artificial construction materials based on properties of materials and requirement of various	3.1 Bricks – Brick earth and its constituents. Conventional bricks and Standard bricks. 3.2 Characteristics of good brick, Classification of burnt clay bricks and their suitability. 3.3 Tiles–flooring & roofing tiles. Characteristic of good tiles. different types of tiles depending upon material used, sizes of tiles, uses of tiles, wall

	items of construction.	<p>cladding</p> <p>3.4 Materials for making concrete-</p> <p>3.5 Cement – definition, types of cements – ordinary Portland, white cement color cement and their suitability. Different brand name of cement, common field tests on cement- lumps visible, color, hand feeling , water float test</p> <p>3.6 Artificial sand – properties and advantages, suitability</p> <p>3.7 Pre cast concrete products – concrete blocks- hollow, solid concrete blocks, pavement blocks, balustrades, their properties and uses.</p> <p>3.8 Plywood, particle board and veneers their properties and uses.</p> <p>3.9 Glass – properties- thickness and weight, thermal conductivity, light and heat translation, durability sound insulation, types of glass- soda lime glass, lead glass and borosilicate glass. Glass used for cladding.</p>
Unit– IV Special Construction Materials	<p>4a. Classify various special type of construction materials</p> <p>4b. Identify/select appropriate special type of construction materials based on properties of materials and requirement of various items of construction.</p>	<p>4.1 Water proofing and damp proofing materials – Brand names, packing available properties and uses.</p> <p>4.2 Termite proofing materials -need ,names and uses</p> <p>4.3 Thermal insulating materials- properties, names and situations where used.</p> <p>4.4 Sound insulating materials- properties, names and situations where used</p> <p>4.5 Fibers – Types –Jute, Coir, Steel Fibers, Carbon Fibers, Glass Fibers, Plastic Fibers, Asbestos Fibers properties and uses</p> <p>4.6 Miscellaneous materials – artificial timber, ferrocete, adhesives, epoxy and Geosynthetic materials, ceramic materials -properties and uses.</p>
Unit – V Finishing Materials	<p>5a. Classify various type of finishing construction materials</p> <p>5b. Identify/select appropriate finishing materials</p>	<p>5.1 Plastering Materials – Mortars: Lime Mortar, Cement Mortar,</p> <p>5.2 Special Mortars – Properties, proportion, situations where used Plaster of Paris – Constituents, properties and uses POP finishing boards, sizes, purpose.</p>

		<p>5.3 Paints, Distempers and Varnishes – types, properties and uses.</p> <p>5.4 Cladding materials – properties, names of different cladding materials and uses.</p> <p>5.5 Linoleum- properties, sizes, use, method of fixings to floor</p>
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Types of of Construction Materials.	4	---	---	---	---
II	Natural Construction Materials	8	---	---	---	---
III	Artificial Construction Materials	8	---	---	---	---
IV	Special Construction Materials	6	---	---	---	---
V	Finishing Construction Materials	6	---	---	---	---
		32				

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	II	Identify natural and artificial construction materials used in building construction through observation of substructure/superstructure, and enumerate the characteristic properties of the identified materials.	4
2	III	Conduct Field tests on Bricks and enumerate physical & Engineering properties of Bricks.	2
3	III	Conduct field test on Fine aggregate (sand) and enumerate physical & engineering properties of sand.	2
4	III	Conduct field tests on Cement and enumerate physical & engineering properties of cement.	2
5	II	Assess the quality of different types of timber and timber products (Arrange to visit nearby saw mill or timber mart)	4
6	V	Identify finishing construction materials used in building construction through observation of substructure/superstructure, and enumerate the characteristic properties of the identified materials.	4
7	II/III	Collect samples Natural and Special Construction Materials’ samples , and prepare report regarding its need, suitability/use , its physical properties & cost	6

8	III/IV	Undertake a micro project identifying all types of materials used in a building and submit a report on the same. (Micro Project)	8
			32

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course.

- Prepare a list of natural / artificial construction materials available in market
- Collect catalogue of various construction materials during leisure time.
- Collect various construction materials available in nearby vicinity.
- Prepare price list of natural / artificial construction materials.
- Collect catalogue of various special / new construction materials.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- Guided Market Surveys
- Collection of materials under guidance of Course faculty.
- Guidance to prepare reports of visits.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Construction Materials D. N. Ghose Tata McGraw – Hill	Construction Materials D. N. Ghose Tata McGraw – Hill	Construction Materials D. N. Ghose Tata McGraw – Hill
2.	Civil Engineering Materials	Shan Somayaji	Pearson
3	Construction Materials	Rangwala	Charotar

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S.No.	Name of equipment	Brief specification
1.	Display unit for display of Naturally available construction materials.	A Show case for Display of size approx 5'X3'X1'with with glass on top
2.	Display unit for display of artificial construction materials.	A Show case for Display of size approx 5'X3'X1'with with glass on top
4	Display unit for display of finishing construction materials.	A Show case for Display of size approx 5'X3'X1'with glass on top

12. LEARNING WEBSITE & SOFTWARE

13. SOFTWARE/LEARNING WEBSITES.

The world's leading construction website: www.building.co.u

Wikipedia : <https://en.wikipedia.org/wiki/Construction>

14. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

POs and PSOs assignment and its strength of assignment with each COs of the Course

CO. NO.	Course Outcome	Programme Outcomes										Pr.Sp. Outcomes	
		1	2	3	4	5	6	7	8	9	10	1	2
CO1	Identify characteristic requirements of various construction materials.	--	2	--	--	1	--	--	2	3	--	1	--
CO2	Identify suitable traditional /common construction materials.	1	1	--	--	1	2	--	3	3	1	--	1
CO3	Conduct Field tests to ascertain the fitness of construction material.	2	2	2	1	1	--	--	2	2	--	--	1
CO4	Identify new/ special construction materials.	--	2	--	--	2	2	--	3	3	1	--	1
CO5	Identify suitable construction materials for finishing of civil engineering structures.	1	2	-	--	1	2	--	3	3	1	1	1

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	S.S.Ragte	Lecturer in Civil Engineering
2	K.S.Borde	Lecturer in Civil Engineering

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : ENGINEERING MECHANICS

COURSE CODE : 6Q201

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil/Mechanical/Automobile Engineering	Second

1. RATIONALE:

Engineering Mechanics is basic technology course. The purpose of this course is to predict physical phenomena which lay the foundations for engineering applications. By applying Principles of mechanics, Diploma engineers shall be able to analyze the behavior of structural/machine components under the action of various forces. Analysis of components will form basis for design. The Course intends to provide basic understanding about the different types of forces, moments and their effects on structural/machine components. It develops basic analytical abilities.

2. COMPETENCY:

At the end of studying this course students will be able to,

“Use principles of engineering mechanics to analyze structural/machine components”

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE@ (PR/OR)	PA (TW)	
4	-	2	6	80	20	--	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course students will be able to: -

1. Determine resultant of different system of forces.
2. Calculate velocity ratio and efficiency of different lifting machine by studying their working principles.
3. Apply laws and principles of mechanics to check stability of simple engineering systems.

4. Calculate the Centroid/Centre of gravity of components of engineering systems.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Fundamental Concepts	1a. Explain concepts of given terms 1b. Classify the given quantities 1c. Use Newton's laws of motion in given situations 1d. Use law of transmissibility in given situations	1.1 Definitions of Mechanics, Applied Mechanics, statics, dynamics, kinematics, kinetics. 1.2 Concept of space, time, mass, particle, rigid body. 1.3 Scalar and vector quantities with examples, 1.4 Newton's laws of motion. 1.5 Concept of force, definition, S.I. unit, representation of force as a vector, Bow's notation. Characteristics and effects of forces, Law of transmissibility of force.
Unit – II Simple lifting machines	2a. Suggest appropriate simple lifting machine for the given purpose along with justification 2b. Determine effort required for the load lifted by the given simple lifting machine 2c. Determine the V.R. and efficiency and law of given simple lifting machines. 2d. Draw and interpret the graphs for given data.	2.1 Definition of simple lifting machine, load, effort, mechanical advantages, velocity ratio, input of a machine, output of a machine, efficiency, and relation between MA, VR and efficiency. Ideal machine, ideal effort, ideal load, friction in machine, effort lost in friction, load lost in friction. 2.2 Law of simple machine, maximum mechanical advantage, and efficiency, reversibility of machine, condition for reversibility of machine, self-locking machine. 2.3 Velocity ratio (No derivation) for Worm and worm wheel, differential axle and wheel, Single/double purchase crab, Simple screw jack, Two and three sheave pulley block, Weston's differential pulley block. 2.4 Numerical problems based on the above machines as mentioned in article 2.3 2.5 Graphs of Load V_S Effort, Load V_S ideal effort, Load V_S Effort lost in friction, Load V_S M.A., Load V_S Efficiency
Unit - III Resolution and composition of coplanar forces	3a. Resolve the given single force. 3b. Determine analytically resultant of given force system. 3c. Determine graphically resultant of the given force system.	3.1 Concept of system of forces: Coplanar, Noncoplanar, collinear, concurrent, non-concurrent, parallel (like & unlike). 3.2 Resolution of a force – Orthogonal and non orthogonal components 3.3 Composition of forces, definition of resultant, Law of parallelogram of forces and Law of polygon of forces. 3.4 Determination of resultant of collinear and

		<p>concurrent force system analytically.</p> <p>3.5 Moment of a force, magnitude, lever arm, types and sign convention,. Law of moment, Varignon's theorem, Couple, characteristics of couple with examples.</p> <p>3.6 Resultant of parallel force system and non-concurrent, non-parallel force system by analytical method.</p> <p>3.7 Resultant of parallel and concurrent coplanar force system by graphical method</p>
Unit - IV Equilibrium of coplanar forces	<p>4a. Draw free body diagram (F.B.D.) of a rigid body / object for the given situation.</p> <p>4b. Use Lami's theorem in given situation.</p> <p>4c. Determine analytically reactions for the given type of beam.</p> <p>4d. Determine graphically reactions for the given simply supported beam.</p>	<p>4.1 Equilibrium and equilibrant, relation between resultant and equilibrant.</p> <p>4.2 Concept of free body, free body diagram, Conditions of equilibrium for collinear, concurrent, parallel & non concurrent non parallel force systems.</p> <p>4.3 Lami's Theorem and its applications such as cables. Lami's theorem problems with two unknowns only.</p> <p>4.4 Beam-Definition, types of beam: cantilever, simply supported, over hanging, continuous, fixed beams. Types of supports: simple, fixed, hinged and roller. Types of load- point load (vertical and incline), uniformly distributed load, couple.</p> <p>4.5 Beam reactions for cantilever, simply supported beam with or without overhang- subjected to combination of point load and U.D.L. or vertical point load and couple.</p> <p>4.6 Using graphical method determine beam reactions for the simply supported beam (without overhang) subjected to vertical load and U.D.L.</p>
Unit - V Friction	<p>5a. Determine frictional force, coefficient of friction and unknown forces acting on body(s) for the given situation.</p> <p>5b. Determine frictional force, coefficient of friction unknown forces acting on ladder in given situation.</p>	<p>5.1 Concept and definition of friction, Advantages and disadvantages of friction. Types of friction (static, dynamic, rolling, sliding), laws of friction, Definition of co-efficient of friction, angle of friction, angle of repose and relation between angle of friction and angle of repose.</p> <p>5.2 Equilibrium of bodies on level plane subjected horizontal & incline force (pull and push).</p> <p>5.3 Equilibrium of bodies on inclined plane subjected to parallel & incline force (pull and push).</p> <p>5.4 Ladder friction. (With one surface smooth)</p>

Unit - VI Centriod and Center of gravity	6a. Determine centroid of the given composite lamina. 6b. Determine center of gravity of the given composite solids.	6.1 Centroid-Definition, Centroid of geometrical plane figures- triangle, square, rectangle, circle, semicircle, quarter circle. 6.2 Determination of centroid of composite figures composed of not more than three geometrical regular figures. 6.3 Center of gravity- Definition, C.G. of simple regular solids- cube, cylinder, cone, sphere, hemisphere 6.4 Determination of C.G. of composite solid composed of not more than two regular solids
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Fundamental Concepts	02	04	---	---	04
II	Simple lifting machine	12	02	04	06	12
III	Resolution and composition of coplanar forces	14	04	08	06	18
IV	Equilibrium of coplanar forces	14	04	06	08	18
V	Friction	12	04	04	08	16
VI	Centroid and center of gravity	10	02	04	06	12
	Total	64	20	26	34	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS :

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
	Practical	performance on any three lifting machines from 1 to 5	
1	II	Use differential axle and wheel to establish law of machine and find maximum efficiency	04
2	II	Use simple screw jack to establish law of machine and find maximum efficiency	04
3	II	Use single or double purchase crab to establish law of machine and find maximum efficiency	04
4	II	Use two sheave or three sheave pulley block to establish law of machine and find maximum efficiency	04
5	II	Use Weston's differential pulley to establish law of machine and find maximum efficiency	04
6	III	Use force table to determine resultant of coplanar concurrent force system applying law of polygon of forces	04
7	III	Use law of moment apparatus to determine unknown forces.	02
8	IV	Use force table to find unknown forces by applying Lami's theorem.	02
9	IV	Use beam reaction apparatus to check equilibrium of parallel forces.	02
10	V	Use friction apparatus to determine coefficient of friction for motion on horizontal plane (for two pairs of different contact surfaces)	04
11	V	Use friction apparatus to determine coefficient of friction for motion on incline plane (for two pairs of different contact surfaces)	04
12	VI	Determine centroid of geometrical plane figures	02
TOTAL			32

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Collect photographs of concurrent ,Parallel, general force system in equilibrium
2	Illustrate practical situations where friction is essential and not essential
3	For given situations(three) suggest appropriate simple lifting machine
4	Collect photographs where hinge, roller and fixed supports are used.
5	Prepare model of irregular geometrical figure and locate it's centroid

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- f. Use of video, animation films to explain concepts, facts and applications of mechanics.

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Applied Mechanics	R. S. Khurmi	Dhanpat Rai & Sons, Delhi.
2	Engineering Mechanics	S. S. Bhavikatti	I. K. International Publishing House Pvt. Ltd., New Delhi
3	Engineering Mechanics (Static and Dynamics)	A. Nelson	Tata McGraw Hill Co., Delhi.
4	Fundamental of Applied Mechanics (SI Version)	Dadhe, Jamdar, Walavalkar	Sarita Prakashan, Pune
5	Engineering Mechanics	Dr.S. M. Dumne	Nikita Publication, Latur.
6	Engineering Mechanics	Dr.Abhishek Jain	Invincible Publishers
7	Engineering Mechanics	Dr.R.K.Bansal	Laxmi Publication, ISBN-978-81-318-0078-2

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr.No.	Name of equipment	Brief specification
1	Universal Force Table	A circular 40 cm diameter aluminum disc, graduated into 360 degrees. Leveling screws clamping devices to fix the table to desired angle, six sliding clamp pulleys, control ring, string and six sets of iron nickel slotted weigh
2	Law of moment apparatus	A stainless steel graduated beam 12.5 mm square in section, 1m long, pivoted at center. The top of beam is provided with notches at the interval of 10mm for carrying hanger weights with spirit bubble level tube with necessary slotted weights, hanger
3	Beam reaction apparatus	Two circular dial type 10 kg, extension spring balances or tube in tube type. Complete with suitable stands, a wooden beam with scale and slots at regular intervals, four stirrups with hooks and necessary slotted weights, hanger
4	Friction apparatus	Base to which a sector with graduated arc and vertical scale is provided. The plane may be clamped at any angle up to 45 degrees. A 5 cm diameter friction less pulley is attached to the end by means of a clamp adjustable to any necessary position. Two weight boxes 01 of 5 gm, 01 of 10 gm, 02 of 20 gm, 02 of 50 gm, 02 of 100 gm weight, Boxes each weighing 300 gm with 8 mm ply case and bottom of different surfaces.
5	Simple screw jack	Screw of pitch of 5mm carrying a double flanged turn table 20 cm diameter fitted on steel base and two adjustable pulleys, cords and hooks.
6	Worm and worm wheel	Threaded spindle, load drum, effort wheel; necessary slotted weights, hanger and thread
7	Weston's differential pulley	Two pulleys; one bigger and other smaller. Both pulleys are rigidly fixed to each other with same center and mounted on same shaft. They have cogs around periphery and having continuous chain passing around these pulleys along with snatch block.
8	Differential axle and wheel	A wheel of 40 cm diameter and axles are of different diameter 20 cm and 10 cm giving a ratio of 1:2:4 ; with common axis and supported on ball bearings in iron brackets, necessary slotted weights, hanger and thread.

9	Single purchase winch crab	Effort wheel of C.I. material having 25 cm diameter mounted on a shaft of about 40mm diameter on the same shaft, a geared wheel of 15 cm diameter is mounted. The teeth of pinion wheel shall mesh with spur toothed wheel of 30 cm diameter is mounted on another axle to which load drum of about 7.5 cm diameter, necessary slotted weights, hanger and thread)
10	Double purchase winch crab	A winch having assembly same as that of single purchase crab winch except an additional set of gearing arrangement.
11	Two sheave and three sheave pulley blocks	Double sheave pulley blocks of diameter 65-205 mm, rope diameter 10-40 mm and carrying maximum safe working load 500kg Triple sheave pulley blocks of diameter 65-205 mm, rope diameter 10-40 mm and carrying maximum safe load 3600kg

12. LEARNING WEBSITE & SOFTWARE:

- i. www.youtube.com(www.youtube.com/watch?v=TkXAJHitPAY,www.youtube.com/channel/UChqgQknjcmAsjosqac1uLqA,www.youtube.com/watch?v=4Vlhh6sGkrl,www.youtube.com/watch?v=r3Ru1zZjvu,www.youtube.com/watch?v=Vs3XfnhyGHc)for videos regarding simple lifting machines and friction
- ii. www.nptel.ac.in:for learning materials with audio and video in technical education
- iii. www.discoveryforengineers.com

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Determine resultant of different system of forces.	3	2	1	1	-	-	-	-	-	-	-	-
2	Determine resultant of different system of forces.	2	2	3	2	-	-	-	-	-	-	-	-
3	Apply laws and principles of mechanics to check stability of simple engineering systems.	2	3	2	1	-	-	-	-	-	-	-	-
4	Calculate the Centroid/ Centre of gravity of components of engineering systems.	2	3	2	1	-	-	-	-	-	-	-	-

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	MadhuriGanor	Head of Applied Mechanics Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	Rajesh Aghav	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
4	Dr.ShivajiDumne	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : COMMUNICATION SKILLS
COURSE CODE : 6G302

Diploma Programme in which this course is offered	Semester in which offered
All Branches of Diploma in Engineering and Technology	Second Semester

1. RATIONALE

Proficiency in communication skills is one of the prime needs of diploma engineer/ technician who has to communicate all the time with peers, superiors, sub-ordinates and clients in his professional life. The need of acquiring effective communication skills is more essential. As the world is shrinking into a global village with the new technologies, technically sound diploma holders may be a quality human resource, if their communicative abilities are shaped properly. Therefore, this course is designed to develop the ability of students to stand as a skilled and effective communicator with employability skills.

2. COMPETENCY

At the end of studying this course students will be able to

“Communicate effectively at workplaces.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PT	ESE(OR)	PA	TOTAL MARKS
1	0	2	3	-	-	25	50*	75
Exam Duration				-	-	-	-	

(*): Out of 50 marks, 10 marks -micro-project assessment; 40 marks-progressive assessments

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, ESE -End Semester Examination; PA - Progressive Test; OR-Oral examination

4. COURSE OUTCOMES

- Express new ideas effectively.
- Select suitable type of communication in different situations.
- Avoid communication barriers for effective communication.
- Use appropriate body language to communicate effectively.
- Formulate various ways to face interview effectively.
- Draft different types of business letters, notices, memoranda and E-mails using correct formats.

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
UNIT-I Introduction to communication	1a. Describe significance of Communication. 1b. Describe the elements of communication. 1c. Explain the cycle & process of communication. 1d. Identify the various communication situations.	1.1. Definition, importance 1.2. Communication cycle / process 1.3. Elements of Communication
UNIT-II Types of communication	2a. Identify the types of communication. 2b. Explain the types of communication.	2.1. Verbal-nonverbal , formal-informal, upward-downward, horizontal-diagonal communication
UNIT -III Principles of effective communication	3a. Explain the principles of communication. 3b. Illustrate principles of effective communication. 3c. Describe communication barriers. 3d. Identify the types of communication barriers. 3e. Select ways to overcome communication barriers.	3.1. Effective Communication 3.2. Barriers to communication & ways to overcome them
UNIT-IV Non -Verbal Communication	4a. Understanding non-verbal communication. 4b. Know the uses of body language. 4c. Uses of pictorial representations.	4.1. Non-verbal codes 4.2. Aspects of body language 4.3. Pictorial representation
UNIT –V Interview Techniques	5a. Listening & comprehending the passage. 5b. Having presence of mind. 5c. Managing stress. 5d. Facing viva.	5.1. Listening skills 5.2. Stress management 5.3. Facing oral communication
UNIT-VI Formal Written Skills	6a. Correct format with correct language. 6b. Identify the types of letters. 6c. Applying different techniques of drafting letters.	6.1. Business Letters: Enquiry, Order, Complaint, Adjustment, Seeking Permission etc.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Communication	03	NA	NA	NA	NA
II	Types of communication	02	NA	NA	NA	NA
III	Principles of Effective Communication	03	NA	NA	NA	NA
IV	Non-verbal communication	03	NA	NA	NA	NA
V	Interview Techniques	02	NA	NA	NA	NA
VI	Formal written skills	03	NA	NA	NA	NA
	Total	16	NA	NA	NA	NA

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I & II	Identify the elements of communication cycle with three Suitable examples.	04
2	II	Deliver two short and long prepared speeches.	04
3	III	Present a role-play.	04
4	III	Form a group of four students and make a group discussion on current issues and summarize it.	04
5	II&IV	Prepare a power point presentation on any one technical topic.	04
6	III	Demonstrate any assigned activity using appropriate body language.	04
7	III	Face a mock-interview.	04
8	IV	Write two formal letters in correct format.	04
Total			32

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities:

- a. List the different communication situations.
- b. Use audio visual aids to learn different skills in communication.
- c. Conversations –formal/informal.
- d. Read newspaper.
- e. Collect different audio clips.
- f. SWOT analysis.
- g. Deliver welcome/farewell speeches in various programmes.
- h. Use of graphics in technical writings.
- i. Interviewing common people.
- j. Debating practices.
- k. Summarizing discussions.
- l. Practicing interviews

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- a. Arrange various debate/elocution competitions to develop spoken communication skills.
- b. Show audio/video clips to develop listening skills.
- c. Collect various pictures/charts to demonstrate body language.
- d. Prepare and give oral presentations.
- e. Guide micro-projects in groups as well as individually.

10. SUGGESTED TITLES OF MICRO PROJECTS

A *micro-project* is planned to be undertaken by a student. He/she ought to submit it by the end of the semester to develop the industry oriented COs. The micro-project could be industry application-based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

- a. Find out five communication events from day to day life and explain them in the form of communication process.
- b. Find out various reasons of communication gap in certain official situations.
- c. Identify various types of communication situations in student's life.
- d. Study various barriers occurring in communication among diploma students.
- e. Find out the remedies to overcome psychological barriers in communication.
- f. Collect different types of letters and analyze the language and format used in it.
- g. Prepare a review on the listened story/news/discussion/meeting.

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1.	Business Communication	R.C.Bhatiya	Ane Books India, New Delhi.
2.	Developing Communication Skills	Krishna Mohan & Meera Banerjee	Macmillan
3.	Power Point Presentation	Adam B Cooper	Macmillan
4.	Group Discussions & Interviews	Dr.B.R.Kishor & D. S.Paul	Vee Kumar
5.	Body Language	Allan Pease	Sheldon Press, London.

12. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

Sr.No.	Name of the Equipment	Specification
1	Digital English Language Laboratory	
2	Computers and Headphones	
3	Magazines,Articles,Journals in Lab.	

13. E-LEARNING RESOURCES

(Please mention complete URL of the E- resources CO wise)

1	https://www.nptel.ac.in/courses
2	https://www.k12reader.com
3.	https://www.education.com
4.	https://www.k5learning.com
5.	https://www.english4u.com

POS AND PSOS ASSIGNMENT AND ITS STRENGTH OF ASSIGNMENT WITH EACH CO OF THE COURSE

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Develop the habit to express new ideas properly.	1	1	3	-	1	-	-	-	1	1	-	-	-
CO2	Select correct type of communication in different situations.	-	-	1	-	1	-	1	1	1	1	-	-	-
CO3	Avoid communication barriers for effective communication.	-	-	2	-	2	2	2	2	2	2	-	-	-
CO4	Use appropriate body language to	-	-	1	-	2	2	2	3	3	3	-	-	-

	communicate effectively													
CO5	Formulate various ways to face interview effectively.	-	-	2	-	3	2	2	3	3	3	-	-	-
CO6	Draft different types of business letters, notices, memoranda and E-mails using correct formats.	-	-	1	-	1	-	-	1	1	1	-	-	-

Course Curriculum Design Committee

Sr. No	Name of the faculty member	Designation and Institute
1	Mrs. P.Y. Kamble	Lecturer in English, Government Polytechnic, Aurangabad
2	Mrs. M.S. Ban	Lecturer in English, Government Polytechnic, Aurangabad
3	Mr. P.V. Deshmukh	Lecturer in English, Government Polytechnic, Aurangabad
4	Mr. R.L. Korde	Lecturer in English, Government Polytechnic, Aurangabad
5	Mr. D.D. Gangthade	Lecturer in English, Government Polytechnic, Aurangabad
6	Mr. A.P. Jagtap	Lecturer in English, Government Polytechnic, Osmanabad

Member Secretary PBOS

Co-coordinator
Science and Humanities

Chairman PBOS

COURSE TITLE- BUILDING CONSTRUCTION

COURSE CODE – 6C203

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Third

1. RATIONALE

This course essentially aims at developing Diploma students for supervision of various construction processes in building construction. Students are developed to assure and ensure quality in the construction of various parts of building. They are also imparted necessary skills to maintain and repair the buildings to serve the users for the designed life period.

2. COMPETENCY

At the end of studying this course students will be able to

“Supervise the construction processes in a building construction & Maintenance of buildings.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE# (OR)	PA (TW)	150
3	0	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Prepare Job Layout & give mark out for a new building Project.
2. Identify appropriate building components of superstructure
3. Supervise construction processes & Assure quality in supervision
4. Supervise the Repairs and maintenance of buildings.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit –I Mark out and Foundation	1a .Set out layout of building structure on ground. 1b. Give mark out 1c. Select appropriate type of foundation.	1.1 Site clearance, preparing job layout 1.2 Center line plan, foundation plan &Mark out 1.3 Excavation, Dewatering, Strutting of trenches for foundation. 1.4 Importance & function of foundation 1.5 Types of foundation, foundation , Definition, Functions of foundation, requirements of god foundation. 1.6 Shallow Foundation-Wall footing, isolated & combined column footing, stepped foundation & raft foundation. 1.5Deep foundations – Pile foundation, Well foundation & Caisson. 1.7 Foundation in Black Cotton soil & precautions to be taken. 1.8 Bearing capacity, factors affecting Bearing Capacity
Unit– II Construction of Super Structure	2a.Select Appropriate type of Masonry for superstructure construction 2b.Identify tools required for construction 2c.Supervise quality masonry construction	2.1 Stone Masonry - Glossary of terms, Types of Masonry- Rubble and Ashlar Masonry 2.2 Requirements of good stone masonry. 2.3 Brick Masonry: Glossary of terms. Types –English Bond , Flemish bonds, 2.4 Comparison between English & Flemish Bond. 2.5 Tools required for construction of stone masonry and brick masonry

<p>Unit– III</p> <p>Construction of Doors & Windows</p>	<p>3a. Select Appropriate type of opening in superstructure construction.</p> <p>3b. Supervise fixing of frames and shutters in openings.</p> <p>3c. Identify Fixture and Fastening for openings.</p>	<p>3.1 Doors – Terminology,</p> <p>3.2 Location of doors, Size of Door, Types of doors: Batten Ledge braced framed door, panelled, glazed, flush, collapsible, revolving doors, rolling shutters.</p> <p>3.3 Windows -Types of windows: Panelled, Steel, Aluminum, Sliding, louvered window, Ventilators.</p> <p>3.4 Procedure of fixing Door Frame & Door Shutter</p> <p>3.5 Fixture and Fastening for doors, windows Sill,</p>
<p>Unit– IV</p> <p>Construction for Vertical Communication</p>	<p>4a. Select Appropriate type of stair in a building.</p> <p>4b. Supervise construction of stair</p>	<p>4.1 Means of vertical communications: Stairs, lift/ Elevators, Escalators, Ramp.</p> <p>4.2 .Terms used in stair</p> <p>4.3 Types of Stairs</p> <p>4.4 Requirements of Good Stair</p> <p>4.5 Thumb Rules for stair design</p> <p>4.6 Procedure for construction of staircase</p>
<p>Unit – V</p> <p>Construction of Floors & Roofs</p>	<p>5a. Select Appropriate type of floor for a building.</p> <p>5b. Supervise construction of floor and floor finish.</p> <p>5c. Select Appropriate type of roof and roof covering.</p> <p>5d. Supervise roof construction</p>	<p>5.1 Types of floors – Mud floor, wood floor, stone floor, concrete floor (construction and suitability).</p> <p>5.2 Types of floor finishes- Shahabad, Kota, marble, granite, kaddappa, ceramic, vitrified, marbonite, (construction procedure).</p> <p>5.3 Mezzanine Floors, location and use.</p> <p>5.4 Types of roofs -Pitched roofs and Flat roof : Terms used, lean to roof, king post truss, queen post truss,</p> <p>5.5 Roof Covering: roofing tiles, their types and their suitability</p>
<p>Unit – VI</p> <p>Finishing Works</p>	<p>6a. Select Appropriate type of finishing work.</p> <p>6b. Supervise finishing work.</p> <p>6c. Identify suitable paint finishing on finished wall surfaces.</p>	<p>6.1 Plastering: Necessity, pre-construction preparation, single coat, double coat, rough finish, sponge finish, neeru finish,</p> <p>6.2 Special plasters, pebble finish and stucco plaster. Precautions to be taken while plastering.</p> <p>6.3 Defects in plastering.</p> <p>6.4 Pointing : Necessity, types and procedure of pointing</p> <p>6.5 Painting: Necessity, Surface preparation for painting to wall, timber, steel. Types of painting white</p>

		wash, colour wash, oil bound, distemper, plastic emulsion, oil paint, cement paint. 6.6 Procedure for repainting after repairs.
Unit – VII Allied Construction processes & Maintenance of Building	7a. Identify materials for waterproofing works. 7b. Supervise water proofing work. 7c. Maintain the buildings for ensuring its utility & services. 7d Repair the buildings for ensuring its utility & services.	7.1 Form work and centering – Meaning of different terms, Necessity, materials used in form work and centering. 7.2 Centering for beam, columns and slab. Requirements of goods form work. 7.3 Water proofing – necessity and importance, water proofing procedure for RCC slab and sanitary blocks, 7.4 Building maintenance -Cause and types of cracks in masonry walls, plaster, concrete slabs, beams, columns, staircases, identification and repairs of cracks 7.5 Plinth protection – necessity and material used

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Mark out and Foundation	08	04	06	02	12
II	Construction of Super Structure	10	04	06	04	14
III	Construction of Doors & Window	06	02	06	04	12
IV	Construction for Vertical Communication	06	02	06	04	12
V	Construction of Floors & Roofs	06	02	04	02	08
VI	Finishing Works	06	02	06	04	12
VII	Allied Construction processes & Maintenance of Building	06	02	08	00	10
	Total	48	18	42	20	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	To set out Foundation Plan on ground for load bearing structure.	04
2	I	To set out Foundation Plan on ground for framed structure.	04
3	I	To supervise construction of foundation(Through observation) by visiting site of construction & prepare report.	04
4	II	To Supervise construction of Brick Masonry (only a small part of construction through observation.)	06
5	III	To Check the accuracy of fixing of Door/ Window frame and Door/ window shutter (through observation ,measurement , using plumb bob etc)	06
6	V	To Supervise floor finishing (only a small part of floor tile laying through observation.)	04
7	VI	To Supervise Plastering (only a small part of plastering through observation.)	04
	Total		32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities:

1. Identify the components of building.
2. Supervise construction process for various building components
3. Identify defects in building construction.
4. Identify defects in plastering
5. Prepare appropriate visit report.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

1. Hands on experiences on field.
2. Observation of processes.

10 SUGGESTED LEARNING RESOURCE

Sr.No.	Name of Book	Author	Publication
1.	Building Construction	Sushil Kumar	Standard, New Delhi
2.	Building Construction	Bindra&Arora	Dhanpatrai& Sons
3	Building Construction	Rangwala	Charotar
4	National Building Code	Year 2005	New Delhi

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Models for following: For various foundations, bonds in brickwork, different types of stairs, formwork, etc.
Tools used in Masonry construction
Tools used in Finishing
Fixtures & Fastenings

12. LEARNING WEBSITE & SOFTWARE

- <http://www.constructionknowledge.net/>
- <http://houseconstructiontips.com/>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Prepare Job Layout & give mark out for a new building Project.	01	01	02	01	--	--	--	03	03	01	---	---
CO2	Identify appropriate building components of superstructure	01	02	--	01	--	01	--	--	--	01	---	---
CO3	Supervise construction processes & Assure quality in supervision	01	02	02	02	01	--	--	01	--	01	--	01
CO4	Supervise the Repairs and maintenance of buildings.	01	02	02	02	01	--	--	01	--	01	--	01

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	S.S.Ragte	Sr.Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	K.S. Borde	Sr.Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE **BASIC SURVEYING (BAS)**

COURSE CODE **6C204**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Third

1. RATIONALE

Every civil project involves collection, presentation and interpretation of data for execution of works. Diploma civil engineer should acquire competencies to undertake linear measurements, and angular measurements and levels to plot maps necessary for execution of works efficiently. This basic technology level course aims at imparting skills in identifying and making use of basic survey instruments to undertake survey works required for different civil engineering projects.

2. COMPETENCY

At the end of studying this course students will be able to:-

“Undertake linear & angular measurement using the skills of operating various basic survey equipments for preparing maps for execution of civil engineering project.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (PR)	PA (TW)	150
3	--	4	7	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Select suitable instruments for linear measurement with suitable method for ranging.
2. Determine the area of irregular fields with chain, cross staff survey by selecting survey stations.
3. Find local attraction and plot traverse with compass survey.
4. Use suitable method of Plane Table Survey for different situations.

5. Perform leveling operation with different instruments and plot L-section and Cross sections.

5. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes (cognitive domain only)	Topics and Sub-topics
Unit –I Basic concepts	1a.Explain object, principle and uses of surveying. 1b. Classify surveys.	1.1 Definition of Surveying & leveling, Object of survey, Uses of survey 1.2 Classification of survey- Primary and secondary, Principles of surveying. 1.3 Scale, Representative fraction.
Unit– II Linear measurements.	2a. Explain the methods of linear measurement. 2b.Describe the direct and indirect ranging. 2c. .Explain the chaining on plain and stepping ground. 2d. Determine the error in chaining and applying the correction for accurate length.	2.1 Methods of linear measurement- By pacing, by passometer, by speedometer, by digital distance meter, by chaining. 2.2 Instruments for chaining- Metric chain, Tape and its types, Ranging rods, arrow, peg. Direct ranging & Indirect ranging. Code of signals. 2.3 Chaining on plain ground. Duties of leader and follower, Chaining on sloping ground by stepping method ,Degree of accuracy in chaining, Errors in chaining Precautions against errors and mistakes . Correction to measured length and area due to incorrect length of chain.
Unit– III Chain & Cross Staff Surveying	3a. Find the area of filed by chain triangulation. 3b. Draw the surveying lines and conventional symbols in map. 3c.Explain the method of setting right angles.	3.1Chain triangulation, Survey stations, types and their selections, Survey lines and types, Conventional symbols in survey map. 3.2 Instruments for setting right angles open cross staff, optical square. Setting right angle by open cross staff, optical square and by tape. Offset perpendicular & oblique. 3.3 Field Book- single line &double line, Locating features in field book. Location sketches Obstacles in chaining, Cross staff survey and calculation of areas from recorded observations.

Unit	Major Learning Outcomes (cognitive domain only)	Topics and Sub-topics
Unit– IV Compass Surveying	4a.Explain Bearings of line. 4b.Explain the procedure of determining the bearing of line by prismatic compass. 4e. Calculation of corrected bearing and included angles of traverse. 4f. Plotting of traverse by graphical adjustment of errors in compass survey	4.1 True Meridian, Magnetic Meridian, Arbitrary meridian, Bearings of line- whole Circle and quadrantal systems/reduced bearing, fore and back bearings, Conversion of bearings Construction and use of prismatic compass, magnetic declination, Dip of the needle. 4.2 Open and closed traverse – Methods of traversing Local attraction, Calculation of corrected bearing and included angles, Numerical problems on calculation of bearings and angles. 4.3 Plotting of traverse, Graphical adjustment of closing error Errors in compass survey.
Unit– V Plane Table Surveying	5a.Explain the principal , of plane table survey, 5b. Explain the uses of different accessories of plane table survey. 5c..Describe the different methods of Plane table surveying.	5.1 Introduction, Principal Accessories of plane table survey, use of telescopic alidade. 5.2 Temporary adjustments. Orientation, Methods of Plane table surveying - radiation, intersection, Traversing, merits and demerits of plane tables survey.
Unit– VI Leveling	6a.Explain the Temporary adjustments of dumpy level and modern tilting level, auto level, 6b. Explain fundamental axes of leveling instrument and their relationship. 6c. Classify leveling. 6d. Find the reduce levels (RL) by height of collimation and rise and fall methods	6.1Definitions of technical terms, Bench Mark & its types, Types of levels. Temporary adjustments of dumpy level and modern tilting level, auto level, Fundamental axes of leveling instrument and their relationship, Study of 4m leveling staff telescopic. 6.2 Classification of leveling- simple leveling. differential leveling, fly leveling , check Leveling, profile leveling and cross sectioning .Mistakes in leveling and precautions 6.3 Systems of reducing levels, Arithmetical check and inverted staff

Unit	Major Learning Outcomes (cognitive domain only)	Topics and Sub-topics
		readings, Example on Height of collimation and Rise and fall methods, Computation of missing readings, Examples on leveling

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basic concepts	4	04	02	02	08
II	Linear measurements.	6	04	06	02	12
III	Chain & Cross Staff Surveying	8	02	04	06	12
IV	Compass Surveying	11	04	06	06	16
V	Plane Table Surveying	05	02	04	04	10
VI	Leveling	14	06	08	08	22
	Total	48	22	30	28	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	II	Folding and unfolding of a chain .Reading chain, metallic and steel tape. Measurement of distance with chain and tape on plain ground with necessary direct ranging.	02
2	II	Setting out boundaries of a rectangular plot of size 15m x 20m using cross staff and optical square	02
3	III	Measurement of area of a open land of irregular shape using chain and cross staff survey.	04
4	IV	To find included angles using prismatic compass.	02
5	IV	Measuring F-B/B-B of 4-5 sided polygon, identifying the station affected by local attractions & calculation of corrected	04

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		bearing.	
6	V	Locating objects by method of radiation.	02
7	V	Locating objects by method of Intersection.	04
8	V	Running a traverse by plane table.	04
9	VI	Finding RL of various points using dumpy level by simple leveling method.	04
10	VI	Carry out differential leveling by tilting level and finding RL of various points	04
11	VI	Carry out fly leveling & check leveling by auto level.	04
12	VI	Carry out profile leveling for 30m length & cross sectioning at 10 intervals on centre line and cross section of 20m length with spot level at 5m interval.	04
13	IV	Mini Project on Compass Traverse survey: Prepare the layout of given building by carrying out the compass traverse survey.	06
14	V	Mini Project on plane Table Traverse survey: Prepare the layout of given building by carrying out the plane table traverse survey.	06
15	VI	Mini Project on profile leveling for roadway: A) Carry out profile leveling for a road length of 510 m. Cross sections at 30m interval on centre line with spot levels at 5m, 10m, 15m on left and right side of centerline on an undulated terrain. B) Draw plan, longitudinal section and different six cross sections on two full imperial size sheets.	12
Total			64

8. SUGGESTED STUDENT ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Prepare filed book based on practical exercises.
- b. Draw the various sketches related to surveying equipment.
- c. Analyze the observation for preparation of maps and calculation necessary data..
- d. Understand the operation of various survey equipments and develop the skill to carry the field work.

9. SUGGESTED SPECIFIC STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. To overcome on practical difficulties arising during the actual field measurement by apply the skill and knowledge of surveying.
- b. Surveying practical it is team work so while performing the practical team leader should maintain the team sprit, sincerity in group as well as take care of survey equipments and group members.
- c. While performing the practical's Observation should be accurately taken by cross verification and applying necessary checks on filed itself.
- d. Sr. no.13, 14, 15 practicals should be conducted on accessible and safe open land near to city. One additional faculty per batch and supportive staff should be deputed to guide and monitor students along with course teacher.

10. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Surveying &levelling-28 th edition	N. N. Basak	Tata Mc Graw
2	Surveying I&II- 11th Edition	Dr. B.C. Punmia	Laxmi Publication
3	Surveying& levelling I&II- 23 rd Edition	T.P. Kanetkar	Pune Vidhyarthi Gruh Prakashan
4	Surveying I&II	S.K. Duggal	Tata Mc Graw
5	Surveying-5 th edition	V. S. Gajare	Nirali Prakashan

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED

1. Tape, chain, ranging rods ,arrows ,pegs, hammer ,optical square , open cross staff
2. Prismatic compass, Plane table , Dumpy level, Tilting level ,Auto level etc.

12. LEARNING WEBSITE & SOFTWARE

- a. <https://www.youtube.com/> chain & cross staff survey for civil engineering projects.
- b. <https://www.youtube.com/> plane survey for civil engineering projects.
- c. <https://www.youtube.com/> profile leveling survey using dumpy level.
- d. <https://www.youtube.com/> auto level survey for civil engineering projects.
- e. <https://www.youtube.com/> fly leveling operation in survey for civil engineering

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

S. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Select suitable instruments for linear measurement with suitable method for ranging.		1	1	2							1	
2	Determine the area of irregular fields with chain, cross staff survey by selecting survey stations.		1	1	2							1	
3	Find local attraction and plot traverse with compass survey.		1	1	2							1	
4	Use suitable method of Plane Table Survey for different situations.		2	1	3							1	
5	Perform leveling operation with different instruments and plot L-section and Cross sections.		2	1	3							1	

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	P. K. Agale	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	K. S. Borde	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- BUILDING DRAWING**COURSE CODE 6C206****PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Third

1. RATIONALE

Drawing is language of communication between the engineer and architect planner, structural Engineer, quantity surveyor, supervisor and skilled worker for different types of civil engineering construction activities. Diploma Civil engineer should be able to read, interpret execute and prepare a plan of buildings. He/She should be able to prepare submission drawings of small residential building as per the functional utility and requirements of client deriving benefits of nature bylaws stipulated by local authority. He /She should prepare a presentation drawing and read working drawings of civil engineering construction for execution of work. This is basic course and useful for building construction, estimating & costing, design of structure, surveying, projects etc.

2. COMPETENCY

At the end of studying this course students will be able to

“Interpret and prepare the submission drawings, working drawings of buildings”.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE	PA (TW)	
1	0	4	5	80	20	00	25	125
Duration of the Examination (Hrs)				4	75min	--	--	---

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Practice and use of BIS symbol convention's in preparation of building drawing.
2. Apply development control rules and regulations of buildings.
3. Prepare submission and working drawing of residential/commercial building.
4. Develop perspective view of building/blocks/steps.
5. Plan and design small residential block as per principles along with detailed drawings.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit I Introduction	1a. Draw different types of Lines used in building drawing. 1b. Categorise different types of drawings and their scales.	1.1 Concepts of B I S symbols and notations / conventions as per IS codes used 962. 1.2 Lines – visible, hidden, centre line, sectional lines, break line, importance of these lines. 1.3 Symbols- building material, sanitary fittings, electrification, doors, windows. 1.4 Different types of building drawings, their scales and uses.
Unit– II Rules and Regulations	2a. Explain importance of development control Rules and byelaws for building. 2b. Describe different technical terms of building drawing. 2c. List minimum dimensions of various units of residential and public building .	2.1 Importance of development control Rules and byelaws for building. 2.2 Different technical terms- plot area, side margin, FSI Built up area, carpet area, plinth area, saleable/super built up area different heights of building, plinth height, total height, open space etc. 2.3 ventilation requirements, minimum sizerequiredfor residential and public building.
Unit– III Planning of residential & public building	3a. Explain different principles of planning. 3b. Explain Planning of residential building with general requirements. 3c. Explain planning of public building.	3.1 Principles of planning - Aspect, prospect, privacy, circulation, grouping, roominess, furniture arrangement, sanitation, elegance, economy, etc. 3.2 Planning of residential building from given data- site plan, plot size, types of rooms, size of rooms, sanitary block requirements, staircase, passage, verandah, balcony, minimum requirement, doors windows sizes and placement. Area calculations. 3.3 Planning of public building –general requirement, list of different types of units, their size, grouping of different units, buildings for school, library, banks, post office, hostel,.

Unit– IV Preparation of drawings	4a. Prepare submission drawing of residential building. 4b. Prepare working drawing of residential building. 4c. Prepare line plan of public building.	4.1 Preparation of submission drawings -Plans, elevation, sections, site plan, block plan, location plan, construction notes, schedule of door and windows, area statement. 4.2 Preparation of working drawings of a small residential building - plans, elevation & section. Stair- case details, doors and windows details. 4.3 Preparation of drawing line plans of Library, Post office, Primary health centre, Bank, Primary / Secondary school building, Hostel
Unit– V Perspective view	5a.Explain different terms in perspective drawing. 5b.Explain concept of one point and two point perspective drawing. 5c.Draw perspective view.	5.1 Introduction, different terms, 5.2 concept and method of drawing of one point perspective & two point perspective and its applications to simple small objects like stair block, pedestal, etc.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introductions	01	00	04	06	10
2	Rules and Regulations	02	04	04	02	10
3	Planning of residential & public building	06	04	08	03	15
4	Preparation of drawings	05	05	15	15	35
5	Perspective view	02	04	04	02	10
	Total	16	17	35	28	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Free hand sketches of - letters, numbers, title, sub titles main titles in 2 mm, 4mm, & 6 mm sizes, 10 civil engineering technical words of each size in condensed or extended font type, any 10 symbols used in building drawing on a full size graph paper.	06
2	I,II,III	Collect submission or working or presentation drawings of bungalow /row house/ apartment/public building and interpret its different features.	04
3	II	Drawing the Line plans of four public buildings on full imperial size graph sheet with suitable scale.	12
4	I,II,III	Preparation of measured drawing of small single storied building with scale (1:50): Plan, elevation, one section, site plan, construction notes, schedule of openings, area statement.	14
5	I, II, III ,IV.	Preparation submission drawing of a small two storied residential building (Framed structure) with scale (1:100)-Plans, elevation, one section through stair case, site plan, block plan , location plan, construction notes, area statement, schedule of openings.	14
6	V	Perspective view of small two objects related to civil engineering of Two point perspective drawing method.	08
7	I TO V	Micro Project.* consist a sketch book containing 10 to 15 sketches of different plans, layouts, furniture arrangements, elevations, etc collected from internet with special features.	06
Total			64

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Prepare drawings based on practical performed in drawing hall.
- b. Interact with department persons and understand facts and maintenance problems.
- c. Collect and interpret working, presentation drawing of bungalow /row house/ apartment from architect ,consultant office.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

1. Arrange visits to an existing building and study plan and elevation of building to prepare measured drawing.
2. Motivate students to visit different buildings and collect name, addresses, area, rates of construction, specifications of materials, sizes of rooms, etc.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	IS code -962	--	BIS New Delhi
2.	Building Construction	S.P. Arrora&Bindra	DhanpatRai& sons, Delhi
3	Building Drawing	Kale, Shaha, Patki	DhanpatRai& sons, Delhi
4.	Building Planning and Drawing	Y. S. Sane	

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S.No.	Name of equipment	Brief specification
1.	Elevation and C/s building model- models.	Wooden

12. LEARNING WEBSITE & SOFTWARE

- a) <http://www.construction agencies.com>
- b) <http://www. Component parts of building .com>
- c) <https://Express highway .com/>
- d) <https://floorplanner.com>
- e) <https://www.pinterest.com>
- f) www.conceptdraw.com
- g) www.smartdraw.com
- h) www.greatbuildings.com

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No.	Course Outcome	POs										PSOs			
		1	2	3	4	5	6	7	8	9	10	01	02		
1	Practice and use of BIS symbol convention's in preparation of building drawing		1									1		3	
2	Apply development control rules and regulations of buildings.			1											1
3	Prepare submission and working drawing of residential/commercial building							3						3	
4	Develop perspective view of building/blocks/steps.					3								3	
5	Plan and design small residential block as per principles along with detailed drawings.				1									3	

Course Curriculum Design Committee

Sr. Name of the Designation and Institute

No faculty members

1

K.S.Borde

Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

2

V.V.Palsingankar

Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : CONCRETE TECHNOLOGY**COURSE CODE : 6C207****PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	THIRD

1. RATIONALE:

Cement concrete is versatile material used for construction of various residential, public, commercial and industrial structures. Concrete is generally a site-made material of construction and as such can vary to a great extent in its quality, properties and performance. The content of course is focused on facts, concepts and principles of concreting. It will also provide guidelines for effective supervision and quality control before, during and after concreting work. Diploma technician with good knowledge of concrete ingredients and concreting operations can obtain concrete of desired workability with required strength and can make useful contribution in construction and development work.

2. COMPETENCY:

The aim of this course is to help the student to attain the following competencies through various teaching learning experiences:

- Determine properties of ingredients of concrete with respect to Civil Engineering construction applications.
- Evaluate properties of concrete by appropriate supervision prior to, during and after concreting operations to ensure quality construction of various engineering structures.

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE#(OR)	PA (TW)	
3	-	2	5	80	20	25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

The theory, practical experiences should be taught and implemented in such a manner that students will be able to acquire following course out comes:

1. Suggest suitability of concrete ingredients as per relevant I.S.
2. Comprehend properties of concrete in various state of concrete
3. Judge and rectify concreting operations for quality concrete and special weather concretes

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit –I CEMENT	1a Explain chemical constituents of OPC and their effects. 1b Explain significance of various physical properties of cement. 1c Carryout different field and laboratory tests on cement. 1d Suggest various types of cement as per requirement.	1.1 Constituents of cement, Bogue's compound. 1.2 Hydration of cement, physical properties of cement –fineness, standard consistency, Initial and final setting times, compressive strength and soundness, different grades of OPC and their specification of physical properties as per relevant. I.S.codes. 1.3 Adulteration of cement (field test), storing cement at site, effect of storage of cement on properties of cement 1.4 Types of cement, Physical properties, specification as per relevant IS codes and field application of the following cements- Rapid hardening cement, Low heat cement, Pozolana Portland cement, Sulphate resisting cement, Blast furnace slag cement, White cement.
Unit– II AGGREGATE	2.a Classify aggregates. 2.b Carry out various tests on the fine aggregates and coarse aggregates. 2.c Apply appropriate correction to concrete mix as per the grading of aggregates.	2.1 Requirements of good aggregates, Classification according to source, size and shape 2.2 Fine aggregates: Concept of size, shape surface texture, specific gravity, bulk density, water absorption, surface moisture, impurities. Introduction to crush source & specification as per IS. 2.3 Determination of fineness modulus, grading zone of sand, determination of silt content in sand and their specification as per IS, Bulking of sand phenomenon of bulking, its effects on concrete mix proportion. Introduction to crush sand-It's source and specifications as per IS 2.4 Coarse aggregates: Concept of size, shape texture, water absorption, soundness, specific gravity and bulk

		<p>density, strength.</p> <p>2.5 Determination of fineness modulus of coarse aggregate by sieve analysis, grading of coarse aggregates, Determination of crushing value, impact value and abrasion index of coarse aggregate and their specification.</p>
<p>Unit– III</p> <p>CONCRETE</p>	<p>3.a Explain process diagram of concrete</p> <p>3.b Explain W/C ratio and its significance.</p> <p>3.c Describe properties of fresh and hardened concrete</p> <p>3.d Measure workability of fresh concrete by slump cone test & compaction factor test</p>	<p>3.1 Concrete: Definition, Process diagram of concrete, necessity of supervision for concreting operation, grades of concrete as per IS-456-2000, durability of concrete, Factors affecting durability.</p> <p>3.2 Water cement ratio, Definition of w/c ratio, Duff Abraham w/c law, significance of w/c ratio, selection of w/c ratio for different grades of concrete prepared from different grades of OPC as per graphs specified in IS 10262-2009, minimum grade of concrete, minimum cement content, maximum w/c ratio for different exposure conditions.</p> <p>3.3 Properties of fresh concrete:workability, segregation, bleeding, honey combing and harshness.Definition of workability, factors affecting workability of concrete. Determination of workability of concrete by slump cone test and compaction factor test, Workability requirement for different types of concrete works.</p> <p>3.4 Properties of hardened concrete-, strength, durability, impermeability, fire resistance.Elastic properties of concrete, modulus of elasticity of concrete. Creep, factors affecting creeps, shrinkage, factors affecting shrinkage.</p>
<p>Unit– IV</p> <p>CONCRETE MIX DESIGN AND TESTING OF CONCRETE</p>	<p>4.a Describe procedural steps of mix design as per I.S. 10262-2009</p> <p>4.b Measure compressive strength, split tensile & flexural strength of hardened concrete.</p> <p>4.c Apply NDT techniques (Rebound hammer and ultrasonic tester) to assess compressive strength of hardened concrete</p>	<p>4.1 Concrete mix design, Objectives of mix design, list of different method of mix design, study of mix design procedure by I.S. method as per I.S.10262-2009 (No problem), yield of concrete.</p> <p>4.2 Significance of testing, determination of compressive strength of concrete cubes at different ages, split tensile test, flexural test</p> <p>4.3 Non-destructive testing (NDT) of concrete, Importance of NDT, methods of NDT, rebound hammer test and ultrasonic pulse velocity test, working principle and factors affecting the test results</p>

<p>Unit- V</p> <p>QUALITY CONTROL OF CONCRETE</p>	<p>5.a Describe precautions to check quality of concrete during concreting operations.</p> <p>5.b Explain types of concrete mixers</p> <p>5.c Identify quality parameters to be observed in controlling quality of concrete during concreting operations</p> <p>5.d Explain joints and their importance in concrete construction.</p> <p>5.e Adopt suitable formwork and stripping time as per site requirement.</p>	<p>5.1 Batching, weight batching, volume batching for designed concrete mix,</p> <p>5.2 Types of mixers (tilting and non-tilting types) mixing of concrete mixing time</p> <p>5.3 Modes of transportation of concrete, precautions to be taken during transportation and placing of concrete in formwork.</p> <p>5.4 Compaction of concrete, methods of compaction, Types of vibrator, care to be taken during compaction</p> <p>5.5 Finishing of concrete, types of finishing methods of finishing (Surface treatment, expose aggregate finish, applied finish colored finish), requirement of good finish</p> <p>5.6 Curing of concrete, definition of curing, necessity of curing, different methods of curing (spraying water, membrane curing, steam curing, curing by wet gunny bags, ponding methods, chemical curing</p> <p>5.7 Joints in concrete construction and its Importance</p> <p>5.8 Formwork for concrete works-Types, stripping time.</p> <p>5.9 Water proofing –need, importance & methods.</p>
<p>Unit- VI</p> <p>ADMIXTURE, EXTREME WEATHER CONCRETING & SPECIAL CONCRETE</p>	<p>6.a Explain the purpose and justification of using admixtures in concrete with examples.</p> <p>6.b Describe various special Concrete and their uses.</p> <p>6.c Explain effect of cold weather and hot weather on concreting work with example.</p> <p>6.d Describe various precautions to be taken while concreting in hot and cold weather conditions.</p>	<p>6.1 Type of admixtures and trade names-Plasticizers, Super plasticizers, Retarders, Accelerators, Air entraining agents, Water proofing admixtures.</p> <p>6.2 Cold weather concreting, effect of cold weather on concrete, general precautions.</p> <p>6.3 Hot weather concreting, problems encountered, general precautions.</p> <p>6.4 Ready Mix Concrete, Self compacting concrete, Fiber reinforced concrete, High performance concrete.</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN:

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Cement	05	02	04	04	10
II	Aggregates	06	02	06	04	12
III	Concrete	12	04	08	06	18
IV	Concrete mix design & Testing of concrete	10	04	06	06	16
V	Quality control of concrete	10	02	06	06	14
VI	Admixtures, Extreme weather concreting & Special concrete	05	02	04	04	10
	Total	48	16	34	30	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS:

Sr.No.	Unit	Practical Exercises	Hours
		Instruction: Perform any TEN experiments from the list. (Experiments marked with ‘*’ are compulsory)	
1	I	Determine fineness of cement by Blaine’s air permeability apparatus or by dry sieving.	02*
2	I	Determine standard consistency of OPC.	02*
3	I	Determine initial and final setting times of OPC and Soundness of cement	02
4	I	Determine compressive strength of ordinary Portland cement.	02*
5	II	Determine silt content in sand by volume.	02
6	II	Determine bulking of sand.	02
7	II	Determine bulk density of fine and coarse aggregates.	02*

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8	II	Determine water absorption of fine and coarse aggregates.	02
9	II	Determine of specific gravity of fine aggregates using Pycnometer bottle.	02*
10	II	Determine of specific gravity of coarse aggregates using density basket.	02
11	II	Determine Fineness modulus of fine aggregate by sieve analysis.	02
12	II	Determine Fineness modulus of coarse aggregate by sieve analysis.	02
13	II	Determine aggregate impact value or abrasion value.	02*
14	II	Determine aggregate elongation index and flakiness index.	02
15	III	Determine workability of concrete by slump cone test or by compaction factor test	04*
16	III	Determine compressive strength of concrete for 7 days using different W. C. ratio	04
17	IV	Determine compressive strength of concrete by rebound hammer or ultrasonic pulse velocity meter.	04
TOTAL			32

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

- a. Follow safety practices.
- b. Practice good housekeeping.
- c. Demonstrate working as a leader/a team member.
- d. Maintain tools and equipment.
- e. Follow ethical Practices.

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Survey the market and prepare list of various type of cement.
2	Visit construction sites and observe various concreting operation.
3	Visit nearby ready mix concrete plant and observe the preparation of concrete.
4	Collect at least three Course question papers (MSBTE or Institute) and their model answers.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Demonstration.
- b. Activity based learning.
- c. Use of Video clips on concrete tests – NPTEL, NITTTR - Bhopal ,NITTTR – Chandigarh

10. SUGGESTED LEARNING RESOURCES:

S.No.	Name of Book	Author	Publication
1	Concrete Technology	M. L. Gambhir	Tata McGraw Hill Publishing Co. Ltd., New Delhi
2	Concrete Technology	M. S. Shetty	S. Chand and Co. Pvt. Ltd., Ram Nagar, New Delhi-110055
3	Concrete Technology	A. R. Santhakumar	Oxford University Press
4	Concrete Technology	A. M. Neville and J. J. Brooks	Pearson Education Pvt. Ltd., New Delhi
5	Concrete Technology	Dr. K.T. Krishna swami	Dhanpatrai & sons
6	Concrete Technology	R.S. Varshney	Oxford & IBH Publishing co, Bombay

LIST OF RECOMMENDED I.S. PUBLICATIONS:

1	I.S. 269	Specifications for O.P.C.
2	IS.12269	Specifications for O.P.C.53 Grade
3	I.S. 383	Specifications for coarse and fine aggregates
4	I.S. 516	Methods of tests for strength of concrete
5	I.S. 2386 Part I to VIII	Methods of tests for aggregate for concrete
6	I.S.456	Code of practice for plain and R.C.C.
7	I.S. 2340	Methods for sampling of aggregates for concrete
8	Sp 23	Handbook for concrete Mix Design
9	I.S. 13311	Methods of non-destructive testing of concrete
10	I.S. 1199	Methods of sampling and analysis of concrete
11	I.S. 10262- 2009	Recommended guidelines for concrete mix design

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S. No.	Equipment Name with Broad Specifications
1	Blaine's air permeability apparatus as per IS: 4031 (part 1)-1999, and sieve no. IS 90 micron - IS Brass Sieve (200 mm dia), 90 Micron size.
2	Vicats apparatus- VICAT mould of dia. 80 mm & 40 mm high glass base plate, initial needle, final needle. Consistency plunger M.S. base plate (non porous) of weight 300 gm. Vicatmould split type with camping ring.
3	Compression testing machine-2000 kN capacity, Cement mortar cube vibrator-, moulds size 50 cm ² (7.07 cm x 7.07 cm)
4	Measuring Cylinder of 1000 ml capacity
5	Measuring Cylinder 1000 ml capacity
6	Density basket as per IS specification
7	I S sieve set (sizes- 80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 μ, 300 μ. 150 μ and pan) , sieve shaker with adaptors
8	Aggregate impact testing m/c with mould, Los Angeles abrasion testing m/c
9	Elongation gauge and thickness gauge.
10	Slump cone(top dia.100mm, bottom dia.200mm, Height 300mm) Compaction factor test apparatus
11	Compression testing machine, Table vibrator, moulds(150mm x150mmx 150mm),aggregate crushing mould
12	NDT apparatus – rebound hammer, ultrasonic pulse velocity tester
13	Digital weighing balance (5Kg & 10Kg)
14	Compaction factor test apparatus
15	Le-chatliers flask & water bath (Maintaining constant temperature)

12. LEARNING WEBSITE & SOFTWARE:

- i. <http://nptel.ac.in>
- ii. www.w3schools.com
- iii. www.issnge.org
- iv. www.springer.com
- v. www.britannica.com
- vi. www.trb.org

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Suggest suitability of concrete ingredients as per relevant I.S.	-	3	3	-	-	-	-	2	-	-	-	-
2	Comprehend properties of concrete in various state of concrete	-	2	3	-	-	-	-	2	-	-	-	-
3	Judge and rectify concreting operations for quality concrete and special weather concretes	-	2	3	-	-	-	-	2	-	-	-	-

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Madhuri Ganorkar	Head of Applied Mechanics Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	Rajesh Aghav	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
4	Dr. Shivaji Dumne	Lecturers in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : MECHANICS OF STRUCTURES**COURSE CODE : 6C 208****PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Third

1. RATIONALE: Analysis and design of structure and its components, needs the basic understanding and application of mechanical properties of material and their behavior under different loading and stress conditions. Civil Engineer should be able to analyze behavior of materials and structures under various types of loads. This course enables to understand different types of loads and corresponding effects on materials and structural elements under various loading conditions so that appropriate material of suitable strength can be selected for the structural components. The experiments to be conducted in the laboratory will integrate knowledge and desired skills as regards to the structural behavior of components and materials are concerned.

2. COMPETENCY:

At the end of studying this course students will be able to,

1. Analyze structural components using different methods.
2. Investigate various structural properties of materials by conducting tests under different loading conditions.

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE@ (OR)	PA (TW)	150
3	-	2	5	80	20	25@	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – **Progressive Test**, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course students will be able to: -

1. Calculate types of stresses and strains due to various types of actions.
2. Suggest suitability of engineering materials as per BIS standards
3. Draw shear force diagram and bending moment diagram for statically determinate beams for given loading.
4. Calculate M.I., bending and shear stresses in beams for given loading and draw stress distribution diagrams.
5. Calculate direct and bending stresses for given loading situation and draw resultant stress distribution.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit –I Stress and Strain	<p>1a. Evaluate material properties under longitudinal, lateral, shear loads.</p> <p>1b. Describe the concept of composite section and analyze it under direct load.</p> <p>1c. Explain concept of various types of shear with examples.</p> <p>1d. Describe the concept of elastic constants with their relations.</p> <p>1e. Describe concept of types of load and corresponding stress.</p>	<p>1.1 Definition of rigid, elastic and plastic bodies. Definition of stress, strain, elasticity, Hook's law, elastic limit, modulus of elasticity. SI units.</p> <p>1.2 Standard Stress-strain curve for mild steel and HYSD bar, Yield stress/ Proof stress, Ultimate stress, breaking stress and percentage elongation, working stress.</p> <p>1.3 Deformation of bars of uniform and stepped cross sections under axial load/ forces applied at intermediate sections</p> <p>1.4 Composite sections under axial load, modular ratio, equivalent area.</p> <p>1.5 Longitudinal and Lateral strain, Poisson's ratio, biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus.</p> <p>1.6 Shear stress and strain, modulus of rigidity, simple and complementary shear stress. Concept of single shear and double shear, punching shear</p> <p>1.7 Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation)</p> <p>1.8 Concept of gradual, sudden and impact load and corresponding stress development. (No derivation and no numericals)</p> <p>1.9 Temperature stress and strain for bodies of homogenous material with uniform cross sections, deformation fully prevented</p>
Unit–II Moment of Inertia	<p>2.a Compute Moment of Inertia, polar moment of inertia, section modulus of symmetrical and unsymmetrical sections.</p>	<p>2.1 Definition, moment of inertia (M.I.) of plane lamina, radius of gyration, section modulus, parallel and perpendicular axes theorems (without derivation), Formulae for M.I. of rectangle, circle, semi circle, quarter circle and triangle section (without derivation).</p> <p>2.2 M.I. of symmetrical and Unsymmetrical I-section, channel section, T-section, angle section & Hollow sections and built up section consisting of I section, channel sections, Angle sections with cover plates about centroidal axes and/or about any other reference axis.</p>

		2.3 Polar Moment of Inertia of solid circular sections.
Unit– IIIShear force and bending moment diagram	3.a Calculate shear force and bending moment at desired points in statically determinate beam. 3.b Draw Shear Force & Bending Moment Diagram for statically determinate beams, locating point of contra shear and contra flexure.	3.1 Statically determinate beams like Cantilever , Simply Supported & Over Hang Beam 3.2 Shear Force and Bending Moment, Relation between load, shear force and bending moment(without derivation) 3.3 Sagging & Hogging Bending Moment and their importance. 3.4 Point of Contra-shear, point of contra-flexure & their importance. 3.5 S.F & B.M Diagrams for Cantilever, Simply Supported & over hang beams subjected point loads, uniformly distributed loads and couple (combination of any two types of loading). Position of point of contra shear, point of contra flexure.
Unit– IVBending and Shear Stresses in beams	4.a Apply bending theory. 4.b Identify nature of bending stresses;determine bending stresses and shear stresses at various locations in the beam. 4.c Plot bending stress and shear stress distribution diagrams for beam sections. 4.d Design section of beam from flexural strength and shear strength.	4.1 Concept of pure bending, Bending of different types of beams (elastic curves) and development of bending stresses and their nature, neutral axis. 4.2 Theory of simple bending, assumptions, flexural formula with meaning of all terms, section modulus, bending stress distribution diagram, moment of resistance. 4.3 Application of theory of bending to symmetrical and unsymmetrical c/s sections of beam viz. rectangular, hollow rectangular, circular, hollow circular, I- section, T-section, angle section, channel section. 4.4 Shear stress equation (without derivation), Meaning of terms used in equation, Relation between maximum and average shear stresses for solid rectangular and solid circular beam sections. 4.5 Shear stress distribution for solid and hollow square and rectangular sections and for solid circular sections, Angle Section, Channel section, I-Section, T section. Simple numerical problems based on shear equation.
Unit– VDirect and Bending Stresses	5.a Describe concept of eccentric load and its effect. 5.b Determine resultant stresses due to eccentric load. 5.c Plot resultant stress distribution for eccentric load	5.1 Concept of direct & eccentric loads, effects of eccentric load. 5.2 Short compression members subjected to eccentric load with eccentricity about one principle axis only, maximum and minimum stress, resultant stress distribution diagram. 5.3 Condition for no tension, middle third rule, core of the section and limit of eccentricities for rectangular and circular sections. 5.4 Determination of resultant stresses for dam with upstream face vertical. Conditions of stability of dam section.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Stress and strain	14	04	04	12	20
II	Moment of Inertia	08	02	04	08	14
III	Shear force and bending moment diagram	10	02	02	12	16
IV	Bending and shear stresses in beam	08	02	06	08	16
V	Direct and bending stresses	08	02	04	08	14
	Total	48	12	20	48	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:

Any Ten practical from following list (*marked practical are compulsory)

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Demonstrate the operation of universal testing machine and compression testing machine by taking trial on sample test pieces.	02*
2	I	Perform tension test on mild steel as per IS432-1:1982	04*
3	I	Perform tension test on Tor steel as per IS-1608,IS-1139	02
4	I	Conduct Izod and Charpy Impact test on three metals. e.g. mild steel/ brass/aluminum/ copper /cast iron etc as per IS1757(Charpy),1598(Izod)	04*
5	IV	Conduct Flexural test on timber beam on rectangular section in both orientation as per IS2408:1963	02
6	IV	Conduct Flexure test on floor tiles or roofing tiles as per IS654:1992(roofing tiles),IS1237:1980(flooring tiles)	02
7	I	Perform Single Shear and double shear test on any two metals eg. Mild steel/ brass/aluminum/copper / cast iron etc as per IS 5242:1979	02
8	I	Find out Water Absorption of bricks or flooring tiles as per IS 3495 (part II):1992	02
9	I	Find out Compressive strength of dry and wet bricks as per IS3495(partI)	02

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10	V	Carry out Compression test on timber section along the grain and across the grain as per IS2408:1963	02
11	I	Carry out Abrasion Test on flooring tiles (Mosaic tiles, Ceramic Tiles as per IS13630(part7):2006 OR Cement Tile as per IS1237:2012	02
12	III	Draw Shear force and Bending Moment diagrams of cantilever, simply supported and overhanging beams for different types of loads two problems on each type of beam	06*
TOTAL			32

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Compare stability of different geometric shapes.
2	Survey the market and prepare list of various type of structural steel sections commonly used.
3	Collect the data of beams from field situations and correlate it with SFD and BMD numerical.
4	Collect at least three Course question papers (MSBTE or Institute) and their model answers.
5	Draw SFD and BMD using free software.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- e. Use of video, animation films to explain concepts, facts and applications of mechanics.

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Strength of Materials	R. K. Rajput	S Chand & Co. Ltd. ISBN 978-8121925945
2	Strength of Materials	R. S. Khurmi.	S Chand & Co. Ltd. ISBN 978-8121928229
3	Strength of Materials	S. Ramamurtham.	DhanpatRai& sons ISBN 9788187433545
4	Mechanics of Structure Vol 1	S. B. Junnarkar and H. J. Shah	Charotar Publishing House Pvt. Ltd. ISBN 978-9380358659
5	Strength of Materials	Ratan S. S.	Tata McGraw Hill Education, ISBN-9385965514

11. LIST OF MAJOR EQUIPMENTS AND MATERIALSREQUIRED:

Sr.No.	Name of equipment	Brief specification
1	Universal Testing Machine	Capacity - 100 tonnes. Type: Mechanical type digital, electrically Operated. Accessories: (1) Tensile test attachment for flat and round specimen up to 32 mm. (2) Compression test attachment (3) Shear test attachment with sizes of bushes 5,6,8,10,12,16,20,24 mm, (4) Transverse test attachment with bending Punch,(5)Service tools,(6) Operation and maintenance manuals - 2 nos. (7)Hardness attachment
2	Extensometer	Least count - 0.001 mm. Max. Extension = 5 mm. Single dial gauge for 30,40 mm. 60 mm, 80 mm, 100 mm, 125 mm gauge length.
3	Impact Testing Machine	CHARPY Test Apparatus: Pendulum drop angle 140°; Pendulum effective Wt 20-25 kg; Striking velocity of pendulum 5-6 m/sec; Pendulum impact energy 300 j; Min scale graduation 2 J; Distance of axis of pendulum rotation from center of specimen to specimen hit by pendulum 815 mm. IZOD Impact Test Apparatus: Pendulum drop angle: 90°-120; Pendulum effective Wt: 20-25 kg; Striking velocity of pendulum: 3-4 m/sec; Pendulum impact energy: 168 j; Min scale graduation: 2 J; Distance of axis of pendulum rotation from center of specimen to specimen hit by pendulum : 815 mm

4	Compression Testing Machine	Digital display manual control compression testing; machine; Max. Capacity (KN): 2000 ; Measuring range: 4%-100% of FS; Relative error of reading: $\leq \pm 1\%$; Max. distance between two platen (mm): 330; Compression platen size (mm): 220×220; Max. piston stroke (mm): 0-20; Max. piston speed (mm/min): Approx. 30; Column clearance (mm): 300×200; Oil pump motor power (KW): 1.5; Whole dimensions (mm): 855*380*1435
5	Tile flexural Testing Machine	Tile flexural testing machine confirming to IS:654, capacity 200Kg with uniform loading rate of 45 to 55 Kg/minute provided with lead shots
6	Tile abrasion testing machine	Tile abrasion testing machine confirming to IS:1237 and IS :1706 for determining resistance to wear and abrasion of flooring tiles complete with dial gauges , revolution counter, thickness measurement holder and abrasion powder.

12. LEARNING WEBSITE & SOFTWARE:

- i. http://nptel.ac.in/courses/IIT-ADRAS/Strength_of_Materials/Pdfs/4_1.pdf
- ii. nptel.iitm.ac.in/courses/.../IIT.../lecture%202023%20and%2024.htm
- iii. en.wikipedia.org/wiki/Shear_and_moment_diagram
- iv. www.freestudy.co.uk/mech%20prin%20h2/stress.pdf
- v. www.engineerstudent.co.uk/stress_and_strain.html
- vi. https://www.iit.edu/arc/workshops/pdfs/Moment_Inertia.pdf
- vii. <https://www.youtube.com/watch?v=-JG9IEqRzQ4>
- viii. <https://www.youtube.com/watch?v=4VIhh6sGkrl>
- ix. <https://www.youtube.com/watch?v=EcPGKLUE04I>
- x. <https://www.youtube.com/watch?v=-ndT35aqDfAQ>
- xi. https://www.youtube.com/watch?v=ZJn_Mj2HeNM
- xii. <https://www.youtube.com/watch?v=KU1gHy8Adrc>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs):

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Calculate types of stresses and strains due to various types of actions.	2	3	2	-	-	-	-	-	-	-	-	-
2	Suggest suitability of engineering materials as per BIS standards	2	3	3	-	-	-	-	-	-	-	-	-
3	Draw shear force diagram and bending moment diagram for statically determinate beams for given loading.	2	3	-	-	-	-	-	-	3	-	-	-
4	Calculate M.I., bending and shear stresses in beams for given loading and draw stress distribution diagrams.	2	3	2	-	-	-	-	-	-	-	-	-
5	Calculate direct and bending stresses for given loading situation and draw resultant stress distribution.	2	3	-	-	-	-	-	-	-	-	-	-

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Rajesh T. Aghao	Sr. Lecturer in Applied Mechanics, Government Polytechnic, Aurangabad
2	Ganesh M. Kechkar	Sr. Lecturer in Applied Mechanics, Government Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- ROAD ENGINEERING

COURSE CODE 6C406

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Third

1. RATIONALE

The road is effective and convenient means mass communication. In our country, there is very wide scope of road development and its maintenance. Student of Diploma in Civil Engineering works as technician in Government and Non Government road construction organization. This course is applied level and it gives the knowledge and skills required to carry investigation, design, construction, maintenance works related to different types of road.

2. COMPETENCY

At the end of studying this course students will be able to

Investigate design, construction and maintenance different types of roads.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE# (OR)	PA (TW)	150
3	--	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Prepare the cross sections and identify components of roads and their dimensions, functions, and IRC recommendations of different types of roads.
2. Design the road geometry sight distances, super elevation, gradients etc
3. Describe the construction procedure earth, WBM, bitumen and concrete roads.
4. Identify the type and location for traffic signs and signals.
5. Identify the road defects and repairs of existing roads.

5. DETAILED COURSE CONTENTS

Units	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit-I Introduction and Investigation For Road Project	1a. Classify Road as IRC 1b. Explain Modes of transportation. 1c. Draw the L section, different cross sections, and Sketching of standard C/S of national highway in embankment and cutting. 1d. Explain factors affecting alignment of road.	1.1 Role of transportation in the development of nation. 1.2 Classification of roads according to IRC, Expressway features. Classification of urban roads. Types of roads according to materials used. 1.3 Modes of transportation system – roads, railway, airways, waterways , Importance of each mode, comparison and their relative merits and demerits, 1.4 Concept of BOT (Built, operate & Transfer) for road construction. 1.5 Investigation For Road Project : 1.5.1 Reconnaissance survey, Preliminary survey for a road project. 1.5.2 Fixing the alignment of road, Factors affecting alignment of road. 1.5.3 Detailed survey for the road project, Plotting L- Section and C/S sections of road, scale used. 1.5.4 Survey for availability of

		<p>construction material, location of quarry</p> <p>1.5.5 Sketching of standard C/S of national highway in embankment and cutting.</p>
<p>Unit– II Geometric Design Of Highways</p>	<p>2a. Identify component of Road and their functions, IRC recommendations.</p> <p>2b.Explain different types of gradients, sight distance and curves.</p> <p>2c.Design super elevation.</p>	<p>Geometric Design Of Highways :</p> <p>2.1 Cross section elements- Definition, purpose, types & IRC Specifications- Roadway, shoulder, right of way, carriage way, C/S in cutting and embankment.</p> <p>2.2 Gradient– Definition, types, IRC specification.</p> <p>2.3 Sight distance – definition, types IRC Specification.</p> <p>2.4 Curves–Necessity, types- Horizontal, vertical, transition curves General idea about providing horizontal curves. Widening of roads on curves</p> <p>2.5 Super Elevation – definition, necessity & importance formula for calculating super elevation, minimum and maximum values of super elevation, and methods of providing super elevation, Simple numerical problems on super elevation.</p>
<p>Unit– III Highway Materials & Testing.</p>	<p>3a. Identify the different road materials and test used for WBM, Concrete road construction.</p> <p>3b. Explain bitumen test – penetration, ductility, softening point test.</p>	<p>3.1 Type of road materials- soil, aggregates, Bitumen, type and grade of cement concrete,</p> <p>3.2 Types of laboratory and field test required on soil sub grade</p> <p>3.3 Test on bitumen – penetration, ductility, softening point test.</p>
<p>Unit– IV Construction of Road</p>	<p>4a. Explain the Pavement structure.</p> <p>4b. Describe the construction procedure of earth, WBM, bituminous and cement concrete roads</p>	<p>4.1 Pavement – objective of pavement, types, structure of pavement, function of pavement components</p> <p>4.2 Construction of Earthen Roads</p> <p>4.2.1 General terms used- borrow pits, spoil bank, lead and lift, balancing of earthwork.</p>

		<p>4.2.3 Construction procedure – setting out construction limits, construction operation – clearing, stripping and storing top soil, placing of embankment, rolling and finishing</p> <p>4.2 Soil Stabilized Roads – Necessity, Methods of Soil Stabilization, Brief details of mechanical soil Stabilization only.</p> <p>4.3 Water Bound Macadam (WBM) Roads</p> <p>4.3.1 Materials used, Size and Grading of aggregates and IRC recommendations detailed construction</p> <p>4.3.2 Procedure Water Bound Macadam(WBM) Road including precautions in rolling,</p> <p>4.4 Construction Of Bituminous Roads:</p> <p>4.4.1 Terms used – bitumen, asphalt, emulsion, cutback, tar, common grades adopted. prime coat, tack coat, seal coat.</p> <p>4.4.2 Surface dressing– procedure of construction</p> <p>4.4.3 Penetration bituminous macadam – procedure of construction</p> <p>4.4.4 Premixed- Bitumen/Tar carpets – procedure, construction and detailed.</p> <p>4.5 Cement Concrete Roads-</p> <p>4.5.1 Materials, equipments, Stepwise Construction procedure, and precautions</p> <p>4.5.2 Joints –Types, uses, joint filler and joint sealer material.</p>
<p>Unit– V Traffic Engineering</p>	<p>5a. Know the different types studies.</p> <p>5b. Identify the type and location for traffic signs and signals.</p> <p>5c. Select the suitable type of island at road intersections</p>	<p>5.1 Definition, scope of traffic engineering. , traffic characteristics,</p> <p>5.2 traffic studies, volume studies, speed studies, counting the traffic volume, parking studies, accident studies,</p> <p>5.3 Traffic control measures –informatory signs, regulatory signs , warning signs, signal & island- different types, purpose & sketches</p>

Unit – VI Road Drainage & Maintenance	6a. Locate surface and sub surface drains. 6b. Explain Necessity, types of road maintenance. 6c. Identify the road pavement defects and failures, and suggest required its maintenance	6.1 Surface drainage–Types and uses of side gutter, catch water drains, surface drainage. Chimney drains. 6.2 Sub–surface drainage – L – drains, cross drains. 6.3 Maintenance of roads–Necessity, types of road maintenance , 6.4 Defects and failures in bituminous roads and its Maintenance 6.5 Defects and failures of Cement Concert Roads and its maintenance,
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction and Investigation For Road Project.	06	04	04	02	10
II	Geometric Design of Highways	12	06	08	04	18
III	Highway Materials & Testing.	06	06	06	00	12
IV	Construction of Road	12	08	08	04	20
V	Traffic Engineering	06	04	04	02	10
VI	Road Drainage & Maintenance	06	04	06	00	10
		48	32	36	12	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Preparing drawings to show detailed sections in cutting and banking for (a) major district road b) state Highway c) National highway d) Express highway (Full Imperial sheet)	04
2	I & II	Prepare drawing of longitudinal section and typical cross sections of the road in cutting and filling. (Two Full Imperial sheets of L section and four cross sections in cutting ,filling, level) and list data of Site selection. Reconnaissance surveys, fixing the alignment by using data collected in Road project survey conducted in survey course.	10
	III	Performing test on bitumen for determination of Penetration.	02
	III	Performing test on bitumen for determination of Ductility.	02
	III	Performing test on bitumen for determination of Softening point test.	02
	IV	Prepare Visit report which consist of construction procedure of WBM road / flexible pavement / rigid pavement roads for observing the various construction step and construction equipments.	04
	V	Prepare inspection report which consists of (a) Listing various defects observed in different types of roads. (b) Sketches of different defects (c) Suggestions the possible remedial of a roads by arranging visit in city.	04
	V & VI	Prepare Mini Project on any one topic on : (for group of 2/3 students) 1.Design the road geometry sight distances, super elevation, gradients etc 2.Different types traffic studies, accident on road 3. Identify the type and location for traffic signs and signals. 4. Select the suitable type of island at road intersections Locate surface and sub surface drains. 5.Necessity and types of road maintenance,	04

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		6. Identify the road pavement defects and failures, and suggest required its maintenance etc. 7. New road construction materials, machinery, tools etc. 8. Cost comparisons of different types pavements. 9. Advance/latest road construction methods, machinery and materials. 10. Topic related to similar suggested topics on above contents.	
Total			32

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- i. Prepare journals and drawings based on practical performed in field/ laboratory.
- ii. Draw different sketches of components of different types of road section.
- iii. Prepare Visit report about road construction and defects, pavement failure and maintenances of nearby roads.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Arrange road project survey
- c. Arrange visits to Road construction site
- d. Arrange visits to damaged road to study road defects, pavement failure and maintenances.

10. SUGGESTED LEARNING RESOURCE

Sr. No.	Title and Edition	Author	Publisher
1	Transportation Engineering	N. L. Arora	Standard Publications, New Delhi
2	Road, Railway, Bridges	Birde & Ahuja	Standard Publications, New Delhi

3	Road, Railway, Bridges and Tunnel Engineering	V. L. Gupta	Standard Publications, New Delhi
4	Transportation Engineering	Kamala.	Tata MaGraw
5	Highway Engineering	Justo and Khanna	Khanna Publisher

Journals and Handbooks

Sr. No.	Title and Edition	Author	Publisher
1	DATA Book of P.W.D.	PWD	
2	Manual of Maintenance of roads 1983	IRC	CPWD

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

1. Bitumen ductility test apparatus
2. Bitumen softening point test apparatus
3. Bitumen penetration test apparatus
4. Charts

12. LEARNING WEBSITE & SOFTWARE

1. www.irc.org.in
2. www.irc.nic.in
3. www.accessengineeringlibrary.com
4. www.engineeringcivil.com
5. www.mahapwd.com
6. www.irc.nic.in
7. www.mea.gov.in
8. www.nhai.org

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	Pos										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Prepare the cross sections and identify components of roads and their dimensions, functions, and IRC recommendations of different types of roads.		2	1	1								1	
2	Design the road geometry sight distances, superelevation, gradients etc.		1	1	2								1	
3	Describe the construction procedure earth, WBM, bitumen and concrete roads.		1	3	1	1								1
4	Identify the type and location for traffic signs and signals.		2		1	1							1	
5	Identify the road defects and repairs of existing roads.		2		1	1							1	

Course Curriculum Design Committee

Sr No Name of the faculty members Designation and Institute

- | | | |
|----|-------------|--|
| 1 | K. S.Borde | Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad |
| 2. | Y. M. Patil | Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad |

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- HYDRAULICS
COURSE CODE 6C205

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil	Fourth

1. RATIONALE

A Civil engineer is required to measure flow and pressure of water through distribution system of irrigation and water supply. He has to design small irrigation structures, storage tanks, pipelines used for water supply and drainage to ensure safety. He has to ensure effective functioning of waste weir, spillways, canals their gates operation at the designed discharge. This course aims at developing competencies related to behavior of fluid on hydraulics structure, measure the flow of fluids, control the flow and design hydraulic structure.

2. COMPETENCY

At the end of studying this course students will be able to

“Measure the fluid properties and rate of flow through conduits and hydraulic structures.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (PR)#	PA (TW)	
4	-	2	6	80	20	25	25	
Duration of the Examination (Hrs)				03	01	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Determine the pressure and centre of pressure of fluid on different hydraulic structures.
2. Measure discharge through orifice, pipes and channel.
3. Calculate major and minor losses in pipe lines
4. Select suitable type of pump under different situations.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - 1 Properties Of Fluids and its pressure measurement	1a. Describe types of fluids. 1b.Explain the Atmospheric pressure, Gauge pressure, Absolute pressure and develop relation between them 1C.Measure pressure by using piezometer, simple manometer, The U-tube manometer and pressure difference by using differential manometers.	Concept of Ideal & Real fluid Physical properties of fluid mass density, weight specific gravity, viscosity, cohesion, adhesion, compressibility, Simple Problems Pressure, pressure head, Pascal's law 1.4 Atmospheric pressure, Gauge pressure, Absolute pressure, relation between them, simple problems on calculation of gauge pressures / absolute pressure. 1.5 Measurement of pressures- Different devices for measurement of pressure.- Piezometers, Simple Manometers, U-tube Manometers, Differential Manometers, Simple problems on manometers. Bourdon tube pressure gauge construction, working principle, use
Unit- 2 Applications of Hydrostatic and hydro kinematics pressure	2a. Determine total pressure and centre of pressure on Horizontal, vertical, inclined surfaces and hydraulic structures.	2.1Concept of total pressure and centre of pressure on Horizontal, vertical and inclined surfaces, 2.2 Problems on Sluice gates. 2.3 Application of Pressure diagrams to calculate pressure on sides & bottoms of water tanks. simple problems 2.4 Total pressures on vertical faces of gravity dam. 2.5Types of flow – steady and unsteady, uniform and non-uniform, Laminar and turbulent, compressible and incompressible, with examples.

		<p>2.6 Discharge and its unit. Volumetric and weighing method of measurement of discharge. Continuity equations for liquids.</p> <p>2.7 Concept of Datum head, pressure head, velocity head, total head.</p> <p>2.8 Bernoulli's theorem, modified Bernoulli's theorem, assumption, limitations, Simple problem</p>
<p>Unit- 3 Minor and major losses in the pipe line</p>	<p>3a.Determine major and minor losses in pipelines</p> <p>3b.Design compound and parallel pipes under given conditions.</p> <p>3c.Explain water hammer phenomenon with its causes, effects and remedial measures.</p>	<p>3.1Laws of pipe friction</p> <p>3.2 major Loss of head due to friction ,Determination of frictional losses -Darcy Weisbach equation.($h_f = flv^2/ 2gd$). Simple problems</p> <p>3.3 Reynolds number and its significance,</p> <p>3.4 Determination of friction factor by laboratory method</p> <p>3.5 Minor head losses in pipe loss of head due to sudden contraction and expansion, loss of head at entrance, exit and loss of head in various pipe fittings, Simple problems</p> <p>3.6 Flow through pipe in series and parallel, equivalent pipe. Simple problems</p> <p>3.7 Water hammer phenomenon, Causes, effects and remedial measures.</p>
<p>Unit- 4 Flow through open channels and orifice</p>	<p>4a Design most economical channel</p> <p>4b.Describe hydraulic jump phenomenon with its uses</p> <p>4c.Determine the hydraulic coefficients</p>	<p>4.1 Different shapes of artificial channels, wetted perimeter, Wetted area, hydraulic mean depth. Chezy's formula and Manning's formula,</p> <p>4.2Calculation of discharge through an open channel. Constants for different types of channel surfaces. Simple problems</p> <p>4.3Conditions of most economical rectangular and trapezoidal channel sections. Simple problems</p> <p>4.4Hydraulic jump phenomenon, situations where hydraulic jump occurs, uses of hydraulic jump, concept of Frauds number and its significance</p> <p>4.5 Orifice- Definition, jet of flow, vena contracta, use of orifice.</p>

		<p>4.6 classification of orifice according to size, shape and discharge condition</p> <p>4.7 coefficient of contraction, coefficient of velocity, coefficient of discharge.</p> <p>Determination of C_c, C_v, C_d by experiment, (Simple problems)</p>
<p>Unit - 5</p> <p>Flow Measurement Through pipe and channel</p>	<p>5a.Determine discharge by various discharge measuring devices for flow through pipes and channels</p> <p>5b.Determine Velocity of flow through channels.</p>	<p>5.1 Discharge measuring devices in closed conduits /pipes-Venturimeter- Principle component part, expression for discharge, coefficient of meter. (Simple problems)</p> <p>5.2 Orifice plate meter – Expression for discharge, situation where orifice plate meter is used. (Simple problems)</p> <p>5.3 Water meters ,use.</p> <p>5.4.Discharge measuring devices used in open channels- Notches – types of notches, expression for discharge through rectangular and triangular notch. (Simple problems)</p> <p>5.5 Weir–Expression for discharge. Francis formula, discharge computation, (Simple problems)</p> <p>5.6 flumes, its principle and use, discharge calculation</p> <p>5.7 Velocity measuring devices.- Surface floats, Pitot tube, Current meter .</p>
<p>Unit – 6</p> <p>Pumps</p>	<p>6a.Design and Select suitable type of pump.</p>	<p>6.1 Purpose, Types of pumps.</p> <p>6.2 Centrifugal pumps - principle of working, component parts, priming of pump, calculation of power required for pumps. (Simple problems)</p> <p>6.3 Reciprocating pumps principle of working, component parts</p> <p>6.4 Submersible pump and Jet pump.</p> <p>6.5 Selection and choice of type of pumps</p>

5. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Properties Of Fluids and Pressure Measurements	12	02	04	06	12
2	Applications of Hydrostatic and hydro kinematics pressure	14	02	06	08	16
3	Minor and major losses in the pipe line	10	00	04	08	12
4	Flow through open channels and orifice	12	02	04	10	16
5	Flow Measurement Through pipes	12	02	06	10	18
6	Pumps	04	02	02	02	06
	Total	64	10	26	44	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

6. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

(Conduct any ten practical’s from given list)

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
	I	Measure pressure by Piezometer, simple U- tube manometer, and Bourdon’s pressure gauges.	02
	I	Measure pressure difference by U- tube differential manometer.	02
3	II	Measurement of discharge by rotometer & measuring tank	02
4	II	Verification of Bernoulli’s theorem	02

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
5	II	Determine types of flow by Reynolds apparatus	02
6	III	Determine minor losses in pipefitting for Sudden contraction, Sudden expansion, Bends and Elbows (minimum two)	02
7	III	Determine of friction factor of a given pipe by using experimental set up	02
8	IV	Determine hydraulic coefficient for a given orifice.	02
9	V	Determine coefficient of discharge of a given rectangular or triangular notch.	02
10	VI	Determine of coefficient of discharge for a given Venturi meter.	02
11	IV	Calculate Chezy's and Manning constant for a given rectangular channel.	02
12	IV	Demonstrate hydraulic jump, water meter and current meter	04
13	I TO VI	Micro project: Preparation of Model, collection of Photograph of hydraulic structure, discharge measuring devices etc.	06
Total			32

7. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Prepare journals based on practical performed in laboratory.
- b. Solve numerical problems.
- c. Internet Survey of hydraulics structures and their functions
- d. Field visit to hydraulics laboratory.

8. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Practical performance
- b. Improved Lecture methods
- c. Q & A technique.
- d. Demonstration
- e. Seminars
- f. Activity based learning

9. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1	Hydraulic and Hydraulic Machines	R.S.Khurmi	S. Chand & company Ltd. New Delhi
2	Elements of Hydraulics	Panchanadikar	Nirali Prkashan
3	Hydraulics	J. R. Muley & B. S Choudhari	Vrinda Publication
4	Hydraulic and Fluid Mechanics	Dr. P. N. Modi S. N. Seth	Standard Book House, Delhi
5	Fluid mechanics	R.K.Bansal	Laxmi publications

10. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment
1.	Pressure measurement apparatus
2.	Flow measurement apparatus
3.	Venturimeter apparatus
4.	Orifice apparatus
5.	Notch apparatus
6.	Reynolds apparatus
7.	Friction factor apparatus
8.	Minor losses apparatus

11. LEARNING WEBSITE & SOFTWARE

- 1.<http://www.chem.elte.hu/departments/altkem/vakuumtechnika/CERN06.pdf>
- 2.https://www.lesker.com/newweb/gauges/pdf/kjlcged09_sec07_pages2-4_technicalnotes.pdf
- 3.https://en.wikipedia.org/wiki/Bernoulli%27s_principle

4. <https://www.khanacademy.org/science/physics/fluids/fluid-dynamics/a/what-is-bernoullis-equation>
5. www.google.com
6. www.youtube.com
7. www.asce.org.in
8. www.springers.com

12. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No.	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Determine the pressure and centre of pressure of fluid on different hydraulic structures.	2	-	3	-	-	-	-	-	-	-	1	1	-
2	Measure discharge through tanks, pipes and channel.	1	-	3	-	-	-	-	-	-	-	1	1	-
3	Calculate major and minor losses in pipe flow	1	-	3	-	-	-	-	-	-	-	1	-	-
4	Select suitable type of pump under different situations	1	-	2	-	-	-	-	-	-	-	1	-	-

Course Curriculum Design Committee

Sr No Name of the faculty members Designation and Institute

1. Smt. P.V. Amale Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2. Shri. K. S. Borde Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- THEORY OF STRUCTURES

COURSE CODE 6C401

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fourth

1. RATIONALE

Civil *Engineering* diploma holders should be able to analyze components of structures under various types of loads, by which they will be able to design the components. The course enables the students to draw shear force and bending moment diagrams, deflected shapes for determinate as well as indeterminate structural components (fixed beam, continuous beam) subjected to various types of loads with different support conditions. Students will be familiar with basic principles and methods of structural analysis and their appropriate application for different problems. The course create base for design of RCC and steel structures.

2. COMPETENCY

At the end of studying this course students will be able to

“Discretize structural components ,understand structural mechanism under various types of loads and analyze structural components and frames.”

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE@ (PR/OR)	PA (TW)	100
4	-	0	4	80	20	--	--	
Duration of the Examination (Hrs)				4	1.15	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Calculate stresses on given plane for the element with given state of stresses.
2. Analyze statically determinate structures
3. Analyze statically indeterminate beams/frames and draw shear force and bending moment diagrams.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Principal planes & Principal stresses	1a. Compute normal, tangential, resultant stress for element subjected to various stress condition. 1b. Compute principal stresses and locate principal planes for elements subjected to various stress condition	1.1 Concept of simple shear, normal and tangential stress, resultant stress. Definition of principal planes, principal stresses and maximum shear stress 1.2 Determination of normal, tangential & resultant stress, maximum shear stress and its position for a member subjected to uni-axial load/stress 1.3 Determination of normal, tangential & resultant stress, maximum shear stress and its position for a member subjected to biaxial axial load/stress 1.4 Determination of normal, tangential & resultant stress, Angle of obliquity and maximum shear stress & its position along with principal stresses & principal planes for a member subjected to biaxial axial load/stress along with shear stress
Unit - II Slope and Deflection	2a. Compute slope and deflection of statically determinate beam using Double integration and Macaulay's method 2b. Locate point of maximum slope and deflection for beam subjected to	2.1 Concept of slope and deflection, stiffness of beams. relation between slope, deflection and radius of curvature, different boundary conditions . 2.2 Methods of calculating slope and deflection by Double integration method, derivation of stand

	different types of loading	ard formulae for maximum slope and maximum deflection for cantilever, simply supported beam subjected to concentrated load and uniformly distributed load. 2.3 Methods of calculating slope and deflection by Macaulay's method for cantilever, simply supported beam subjected to concentrated load and uniformly distributed load
Unit - III Fixed Beam	3a. Distinguish determinate and indeterminate structures 3b. Draw shear force and bending moment diagrams for fixed beam under given loading condition.	3.1 Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam, fixed end moments 3.2 Principle of superposition, Using first principle derivation of formulae for fixed beam subjected to uniformly distributed load over entire span, central point load, point load at any position. 3.3 Application of standard formulae to find end moments and drawing shear force and bending moment diagrams for fixed beam subjected to concentrated load and uniformly distributed load over entire span only.
Unit - IV Continuous Beam	4a. Compute support moments and reactions for given continuous beam 4b. Draw shear force and bending moment diagrams for continuous beam under given loading condition. 4c. Draw deflected shape for continuous beam for given loading condition	4.1 Definition, effect of continuity, practical examples, nature of moments induced due to continuity, concept of deflected shape 4.2 Clapeyron's theorem of three moments (no derivation) 4.3 Application of theorem of three moments upto three spans only with two unknown support moments, supports at same level, beams of equal & unequal moment of inertia subjected to concentrated load and U.D.L. 4.4 Drawing of shear force and bending moment diagrams.

<p>Unit - V Moment Distribution Method</p>	<p>5a. Draw shear force and bending moment diagram for continuous beams and symmetrical portal frames for given loading situation</p> <p>5b. Draw deflected shape of continuous beams and asymmetrical portal frames under given loading condition</p>	<p>5.1 Introduction to sign convention, carry over factor, stiffness factor, moment distribution theorems, distribution factor</p> <p>5.2 Application of moment distribution method to various types of continuous beams, subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia</p> <p>5.3 Application of moment distribution method to non-sway, single bay, single story symmetrical portal frames, having same or different moment of inertia, drawing shear force and bending moment diagrams (rigid supports and at same level). (Solution up to three iterations will be asked in examination)</p>
<p>Unit – VI Columns</p>	<p>6a. Classify column on the basis of slenderness ratio</p> <p>6b. Determine load carrying capacity of columns for different end conditions</p> <p>6c. Design solid circular and hollow circular section of column for different end conditions</p>	<p>6.1 Definition, classification of columns (short & long), buckling of axially loaded compression member, effective length, radius of gyration, slenderness ratio, types of end conditions for columns.</p> <p>6.2 Euler's theory, assumptions, buckling load, factor of safety, safe load, application of Euler's theory for load carrying capacity of column, designing solid circular or hollow circular section, limitations of Euler's theory</p> <p>6.3 Empirical formulae – Rankine's formula for calculating load carrying capacity of column and designing solid circular or hollow circular section.</p>

Unit – VII Analysis of Trusses	7a. Analyze determinate truss/frame for given loads.	7.1 Definition of frame, classification of frame, perfect, imperfect, redundant & deficient frame, relation between members & joints 7.2 Determination of axial forces in the members of the truss using method of joints 7.3 Determination of axial forces in the members of the truss using method of sections.
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Principal planes and Principal stresses	08	02	04	06	12
2	Slope and deflection	10	02	04	06	12
3	Fixed beam	10	02	04	06	12
4	Continuous beam	10	02	06	06	14
5	Moment distribution method	10	--	06	06	12
6	Columns	06	02	--	06	08
7	Analysis of trusses	10	02	04	04	10
Total		64	12	28	40	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Assignments: Four various types of problems on each Unit I to VII as assignments should be given to students. Students shall solve these problems in separate note book. The staff member shall assess these work batch wise.

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Compare fixed beam with simply supported beam of same span and loading
- b. Draw deflected shape of five simple structural components given by teacher and understand their importance
- c. Collect photographs on site for continuity and fixity .
- d. Prepare truss using given number of members and joints to carry given load (use web tool and video games available on internet as X construction)
- e. Use Flash /Animation to explain various theorems used for analysis and structural mechanism for components subjected to different types of loading

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration
- d. Seminars
- e. Activity based learning

10. SUGGESTED LEARNING RESOURCES:

S.No.	Name of Book	Author	Publication
1	Theory of structures	R. S. Khurmi	S.Chand and company Ltd.New Delhi,2006 ISBN:978-81-21905-20-6
2	Analysis of structures	V.NVazirani&M.M.Ratwani	KhannaPublisher,New Delhi.
3	Mechanics of structures Vol.I& II	S.B.Junnarkar	Charotar Publishing house,Anand ISBN:978-93-80358-99-4
4	Theory Of Structures	S.Ramamruthum	DhanpatRai and Sons,Delhi ISBN:978-93-84378-10-3
5	Theory Of Structures	B.C.Rangwala	Charotar Publishing house,Anand
6	Structural Analysis Vol.1	S.B.Bhavikatti	Vikas Publishing House Pvt.Limited ISBN:978-93-80358-99-4
7	Basic Structural Analysis	C.S.Reddy	Tata McGraw Hill Co.Delhi
8	Theory of structures	Pandit Gupta	Tata McGraw Hill Co.Delhi ISBN:978-93-80358-99-4
9	Theory of structures	B.C.Punmia	SBH,New Delhi

11. LEARNING WEBSITE & SOFTWARE

- 1) www.csiberkeley.com
- 2) www.gtstrudl.gate
- 3) www.ramint.com
- 4) nptel.ac.in/courses/112107146/lects
- 5) nptel.ac.in/courses/105101085/downloads/lec-32.pdf
- 6) www.civilprojectsonline.com
- 7) www.mathalino.com/reviewer/engineering/method-sections-analysis-simple-trusses
- 8) www.facweb.iitkgp.ernet.in/baidurya/CE21004/online_lecture_notes/m3119.pdf

12. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Calculate stresses on given plane for the element with given state of stresses.	2	3										
2	Analyze statically determinate structures	2	3										
3	Analyze statically indeterminate beams/frames and draw shear force and bending moment diagrams	2	3							2			

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Madhuri Ganorkar	Head of the Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	Rajesh Aghav	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- GEOTECHNICAL ENGINEERING

COURSE CODE 6C402

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fourth

1. RATIONALE : Geotechnical investigations play significant role for construction of civil engineering structures. Civil engineer has to supervise construction of buildings, dams, roadways, canals, railways, tunnels etc. He/she should be able to find out physical and engineering properties of the soil like density, bearing capacity, CBR value, permeability to decide type of foundation, extent of compaction, stability of slopes, suitability of soil for construction of pavement. He/she should be able to suggest methods to improve properties of soil to suit the site requirements.

2. COMPETENCY

At the end of studying this course students will be able to,

“Suggest suitability of soil for constructing civil engineering structures and their foundation ”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE#(OR)	PA (TW)	150
3	-	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Comprehend various engineering properties of soil as construction material.
2. Conduct different laboratory tests to determine engineering properties/characteristics of given soil sample for its classification and use as a construction material
3. Suggest suitable method of compaction and /or stabilization of soil for given situation.
4. Suggest appropriate foundation by interpreting bearing capacity of soil.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Overview of geotechnical engineering	<p>1a. Explain importance of geotechnical engineering for construction of civil engineering structures</p> <p>1b. Identify field applications of Geotechnical engineering</p>	<p>1.1 Civil engineering structures for which soil is used as construction material</p> <p>1.2 Definition of soil, soil as a construction material and as foundation bed for structures</p> <p>1.3 Field application of geotechnical engineering in foundation design, pavement design, design of earth structures, design of earthen dams.</p>
Unit - II Determination of index properties and classification of soil	<p>2a. Determine different index properties as per IS</p> <p>2b. Calculate index properties in functional relationships</p> <p>2c. Draw particle size distribution curve from given sieve analysis data and classify soil</p> <p>2d. Determine Atterberg's limits for given soil sample and Classify soil.</p>	<p>2.1 Soil as three phase system</p> <p>2.2 Water content determination by oven drying method, Void ratio, porosity and degree of saturation, density index and unit weight of soil mass-dry unit weight, bulk unit weight, saturated unit weight, submerged unit weight determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, specific gravity, specific gravity by pycnometer</p> <p>density index and functional relationships</p> <p>2.3 Classification of soil as per Indian standard classification system, particle size distribution curve ,effective diameter of soil, coefficient of uniformity, coefficient of curvature, wellgraded, uniformlygraded, poorly graded soil</p> <p>2.4 Consistency of soil, stages of consistency,Atterberg's limits of consistency,determination of liquid limit, plasticlimit,shrinkajelimit. Plasticity index and plasticity index determination, plasticity chart and classification of soil</p>

		as per plasticity chart
Unit- III Permeability	<p>3a. Explain permeability and factors affecting it</p> <p>3b. Classify soil by determination of coefficient of permeability</p> <p>3c. Use application of flow net in given situation</p>	<p>3.1 Permeability – Definition of permeability, Darcy’s law of permeability, coefficient of permeability, values of coefficient of permeability for different types of soil Factors affecting permeability</p> <p>3.2 Determination of coefficient of permeability by constant head and falling head method and simple problems on that.</p> <p>3.3 Seepage through earthen structures, seepage velocity, seepage pressure, phreaticline, equipotentiallines, flowlines, application of flow net(no numerical problem)</p>
Unit- IV Compaction	<p>4a. Explain compaction and factors affecting compaction</p> <p>4b. Differentiate compaction and consolidation</p> <p>4c. Determine optimum moisture content and maximum dry density of given soil sample</p> <p>4d. Decide method of compaction for given site condition</p> <p>4e. Determine CBR and soaked CBR for given soil sample and interpret the results</p>	<p>4.1 Concept of compaction, purpose of compaction, field situations where compaction is required,</p> <p>4.2 compression, consolidation, settlement, Difference between compaction and consolidation</p> <p>4.3 Standard proctor test, compaction curve, optimum moisture content, maximum dry density, zero air void line, modified proctor test,</p> <p>4.4 Factors affecting compaction, common methods of compaction on field-rolling, ramming, vibration. Types of rollers (smooth wheel roller, sheepfoot roller, pneumatic typed roller)</p> <p>4.5 CBR Test and its significance</p>
Unit - V Shear strength	<p>5a. Explain shear strength and Mohr-Coulomb failure envelope</p> <p>5b. Determine C and ϕ properties of given soil sample by direct shear, vane shear</p> <p>5c. Draw failure envelope</p>	<p>5.1 Concept of shear strength, components of shear resistance of soil, definition of cohesion and internal angle of friction, Mohr-Coulomb failure theory, failure envelope for purely cohesive and cohesion less soil</p> <p>5.2 Determination of shear strength by direct shear test (No numerical)</p>

	and interpret the results	5.3 Determination of shear strength by vane shear strength(No numerical)
Unit – VI Bearing Capacity	6a. Use concept of ultimate bearing capacity, safe bearing capacity, allowable bearing pressure in design of footing 6b. Use values of bearing capacity for given field situation 6c. Interpret graph of load vs settlement drawn from plate load test	6.1 Concept of bearing capacity, ultimate bearing capacity, net ultimate bearing capacity, safe bearing capacity, allowable bearing pressure 6.2 Introduction to Terzaghi's analysis and assumption made in it. Effect of water table on bearing capacity. Typical values of bearing capacity for different types of soil as per National building code and selection of foundation 6.3 Plate load test as per Is1888 and IS2131(procedure, graph of load vs settlement, limitations),no numerical(No numerical)
Unit-VII Stabilization	7a.Suggest appropriate soil stabilization method for given field situation	7.1Concept of stabilization and need of stabilization 7.2 Different methods of stabilization: Mechanical stabilization, limestabilization, cementstabilization, bitumenstabilization,flyashandlime stabilization

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Overview of geotechnical engineering	4	2	2	2	6
2	Determination of index properties and classification of soil	10	8	6	4	18
3	Permeability	8	4	6	2	12
4	Compaction	8	4	8	2	14
5	Shear strength	6	2	4	4	10
6	Bearing Capacity	6	2	4	4	10
7	Stabilization	6	2	4	4	10
	Total	48	24	34	22	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS:(Conduct ten practicals from given list,practicals marked with * are compulsory)

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	II	Determination of Water content of given soil sample as per IS2720 part II	02*
2	II	Determination of specific gravity of coarse soil by pycnometer as per IS 2720 part III	02*
3	II	Determination of bulk density of soil by sand replacement method as per IS 2720 part XXVIII	02
4	II	Determination of dry density of soil in situ by core cutter method as per IS 2720 partXXIX	02*
5	II	Determination of liquid limit ,plastic limit and plasticity index as per IS 2720 partV	02*
6	II	Determination of grain size distribution of given soil by mechanical sieve analysis and determination of Cc and Cu as per IS 2720 part IV	02*
7	III	Determination of permeability of soil by constant head method as per IS 2720 part XVII	04
8	III	Determination of permeability of soil by variable head method as per IS 2720 part XVII	04
9	IV	Determination of optimum moisture content and maximum dry density using standard proctor test as per IS 2720 part VII	04*
10	V	Direct shear test to find shear strength parameters(c and ϕ)and shear strength of soil sample collected from foundation strata as per IS 2720 partXIII	04
11	V	Determination of shear strength of given soil sample using Vane shear test as per IS 2720 part XXX	02
12	IV	Determination of CBR value for soil sample collected from proposed road	04
13	II	Determination of shrinkage limit of given soil sample as per IS 2720 partV	02*
TOTAL			32

(Theory procedure of experiments may be asked in examination.)

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Collect few samples of various soils and classify by visualization and simple field techniques
- b. Field visit to road compaction work
- c. Study of Plate load test set up actually on site
- d. Prepare a report of bearing capacity and coefficient of permeability values for different soil
- e. Preparation of important chart for geotechnical engineering laboratory
- f. Determine bearing capacity of soil using liquid limit and plastic limit.

9. **SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES** These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration
- d. Seminars
- e. Activity based learning

10. SUGGESTED LEARNING RESOURCES:

S.No.	Name of Book	Author	Publication
1	Principles of Soil Mechanics and foundation engineering	VNS Murty	UBS Publishers
2	Soil Mechanics & foundation engineering	B.C.Punmia	Standard Book House
3	Soil Mechanics & foundation engineering	K.R.Arora	Standard Publisher & Distributer
4	Modern Geotechnical Engineering	Dr.Alam Sing	Jodhpur University

5	A text book of Engineering Geology.	Dr.R.B.Gupte	Pune Vidyarthi Griha Prakashan.
6	Geotechnical Engineering (Soil Mechanics)	Prof.T.N.Ramamurthy & Prof.T.G.Sitharam	S Chand and Company LTD. ISBN 9788121924573
7	Soil Mechanics	S.P.Pathak	Pune Vidyarthi Griha Prakashan.
8	Soil sampling and testing manual	Dr.A.K.Duggal	NITTTR, Chandigarh
9	Geotechnical engineering portable handbook	Day (ISBN:9780071789714)	McGraw Hill New Delhi
10	Video clips of soil	NITTTR, Chandigarh	NITTTR, Chandigarh

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S.No.	Name of equipment	Brief specification
1	Core Cutter	Core Cutter with dolly (2 No.) Core cutter apparatus- cylindrical core cutter of steel 100 mm dia x 127.3mm high with 3mm wall thickness beveled at 1mm
2	Sand Replacement Method	Sand replacement method equipment(2) as per IS: 2720(Part-28)
3	Liquid limit apparatus	Casagrande liquid limit apparatus- as per IS: 9259-1979-(2 No.)
4	Shrinkage limit apparatus	Shrinkage limit apparatus- as per IS: 2720(Part- V)
5	Constant and Variable head permeability apparatus	Permeability apparatus on which both tests can be conducted (constant and variable head) Constant head permeameter- as per IS:2720(Part-

		4)1986, Falling head permeameter - as per IS:2720(Part-4)1986
6	Standard Proctor Test apparatus	Standard Proctor Test Apparatus
7	Direct shear test apparatus	Direct Shear Test Apparatus:- as per IS: 2720(Part 13) 1986
8	Vane Shear Test apparatus	Laboratory Vane shear test apparatus as per 2720 (Part -30)
9	Sieve Shaker	Mechanical sieve shaker- carries up to 7 sieves of 15 cm to 20 cm dia (as per IS 2720-(Part 4)1985),Set of sieves containing 2mm,1mm,1.7mm,425 μ with receiving pan along with sieve shaker(Two set)
10	Oven	Oven-thermostatically controlled to maintain temperature of 110°C to 115° C
11	Infra Red Moisture Meter	Infra red moisture meter
12	CBR Test apparatus	CBR test apparatus with standard mould as per IS specification.
13	Weighing Balance	Digital weighing balance capacity 2kg
14	Specific Gravity appatus	Set of pycnometers (six)-Pycnometer – consisting of 1 kg.honey /fruit jar with plastic cone, locking ring and rubber seal.
15	Proctor compacto meter	Proctor compactometer for light compaction as per IS specification

12. LEARNING WEBSITE & SOFTWARE

- <http://www.youtube.com/watch?v=V1m3cB.Aqy8>
- <http://www.nptel.ac.in/courses/105103097/51>
- www.issnge.org
- www.springer.com
- www.trb.org
- www.britannica.com

- g. www.nptelvideos.in
 h. [www.youtube.com /geotechnical engineering](http://www.youtube.com/geotechnical_engineering)
 i. www.learnerstv.com (video lecture course – Engg Lectures-soil mechanics)
www.whatisgeotech.org

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs):

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Comprehend various engineering properties of soil as construction material.	2	3										
2	Conduct different laboratory tests to determine engineering properties/characteristics of given soil sample for it's classification and use as a construction material	2	3	3	2								
3	Suggest suitable method of compaction and /or stabilization of soil for given situation.	2	3										
4	Suggest appropriate foundation by interpreting bearing capacity of soil.	2	3		2								

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	MadhuriGanorkar	Head of the Department, Govt. Polytechnic, Aurangabad
2	Ganesh kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic,Aurangabad
3	RajeshAghav	Lecturer in Applied Mechanics, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- ADVANCE SURVEYING
COURSE CODE 6C403
PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fourth

1. RATIONALE

Field survey is the basic requirement for preparing any engineering maps or drawings. Field survey can be professionally carried out only when various steps involved in the survey work are known with skills of operating modern and advance survey equipment's. This is application level course deals with abilities for various measurements and maps in order to plan and design the civil engineering projects.

2. COMPETENCY

At the end of studying this course students will be able to

“Undertake linear & angular measurement using the skills of operating various advance survey equipment's for preparing maps for plan, design and execution of civil engineering project.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (PR)	PA (TW)	
3	--	4	7	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES (COs)

At the end of studying this course students will be able to :-

1. Determine the horizontal, vertical angle, deflection angle between lines.
2. Use of Theodolite for Traversing
3. Calculate the height and distance of object by tachometer.
4. Setting out the Simple curve by Rankin's method.
5. Measure and generate the drawings using advanced surveying equipment like Digital Theodolite and Total station.
6. Apply GPS in Civil Engineering.

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Theodolite	1a. Measure horizontal, vertical, deflection angle magnetic bearing and traversing of lines. 1b. Determine a latitude and departure of given points on the ground.	1.1 Introduction to theodolite , Uses of Theodolite , Sketch and parts of Transit Vernier theodolite , Reading of main and Vernier scale on horizontal and vertical plate . 1.2 Temporary adjustment of a Theodolite adjustment of Theodolite (Fundamental axis of theodolite and their relationship) 1.3 Definitions and various technical terms. 1.4 Methods of measuring horizontal angles and vertical angles. 1.5 Use Theodolite for measuring a magnetic bearing; prolong a line, ranging a line. 1.6 Measuring direct and deflection angles. 1.7 Errors in Theodolite work 1.8 Theodolite Traversing , Traverse computations , Closing errors, Balancing the traverse Gale’s Traverse Table Related examples,
Unit– II Contouring and area , volume calculation	2a.Explain the uses and Characteristics of contours 2b. Calculate the area and volume between contours	2.1 Definition of contour, uses of contours . 2.2 Characteristics of contours 2.3 Methods of contouring. 2.4 Polar Planimeter, Digital Planimeter simple problems on calculation of area of irregular figures. 2.5 Volume calculation between two contours by trapezoidal & prisomodal formula.
Unit – III Tacheometry	3a. Explain the principles and various methodologies involved in techeometry. 3b. Calculate R.L. and horizontal distance	3.1 Introduction , Purpose and Principles of tacheometric surveying 3.2 Instruments used in tacheometry 3.3 Anallatic Lens, advantages & disadvantages. 3.4 Methods of determining constants of a Tachometer. Related examples on tachometer constants 3.5 Methods of Tacheometry (Stadia & Tangential) 3.6 Method of Fixed Hair : - When line of sight is horizontal and staff held vertically - When line of sight is inclined and staff held vertically (Angle of Elevation & Depression) . 3.7 Advantages and disadvantages of Tangential

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		method. 3.8 Related examples of Tacheometer using all methods.
Unit– IV Curves	4a. Describe different elements of curves. 4b. Calculate necessary data required to setting out curve on field	4.1 Introduction , Types of circular curves , Definitions and notations 4.2 Designation of curve. 4.3 Relation between Radius and degree of curve. 4.4 Elements of simple circular curve 4.5 Setting out simple circular curve 4.6 Methods of setting out simple circular curves. 4.7 Numericals on setting out simple circular curves By Long Chord & Rankine method
Unit – V Advanced Survey Equipments	5a. Explain the principles of total station. 5b. Record data on total station as well as on computer. 5c. Retrieving the data and generate the drawings using application software	5.1 Introduction , Basics of Digital Theodolite 5.2 Introduction and Principles of E.D.M. 5.3 Introduction and Basics of Total station ,- Parts of Total station Advantages, disadvantages and uses of Total Station, Types of Total Station, Advancement in Total Station Technology. 5.4 Surveying using Total Station - Flow chart of data collection - Fundamental Parameters of Total Station. 5.5 Precautions to be taken while using Total Station 5.6 Set up of Total Station Centering, Levelling , back-sight, Azimuth Marks . 5.7 Measurement with Total Station Total Station Initial Setting , Radial Shooting , Total Station Traversing ,4 Survey Station description , Occupied Point Entries . 5.8 Data Retrieval , Field Generated Graphics , Construction layout using Total Station .Overview of Computerized Survey Data System 5.9 Equipment Maintenance , Maintaining Battery Power 5.10 Total Station Job Planning and Estimating, Total Survey system errors Sources.
Unit– VI Introduction to Global Positioning	Appreciate the applications of GPS in civil engineering	6.1 Introduction to GPS 6.2 Maps & types of digital map 6.3 Fundamentals of GPS. 6.4 Uses of GPS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
System (GPS)		6.5 GPS Receivers(Hand Held GPS Receivers) 6.6 Field procedures of GPS 6.7 Observations and applications in Civil Engineering.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Theodolite	14	06	08	08	22
II	Contour and Area, volume calculation	06	04	06	04	14
III	Tachometric surveying	10	02	06	06	14
IV	Curves	09	02	04	06	12
V	Advanced Survey Equipments	05	02	04	04	10
VI	Introduction to Global Positioning System (GPS)	04	04	02	02	08
	Total	48	20	30	30	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
	I	Theodolite: (1) Identify various parts of the theodolite (2) Measure the horizontal angle by Repetition, Reiteration (3) Measure the vertical angle (4) Measure the deflection angle	02 04 04 04
	II	Find the Area and volume between contours by using Digital and polar planimeter	04

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
	III	Tacheometry: (1) Determine the tacheometric constant (2) Determine the distance and R.L. of a point when line of sight is horizontal.	04 04
	IV	Curve Setting: Determine the data for setting out curve from offset of long Chord	04
5	V	Total Station: (1) Set out the total station on a station (2) Measure the horizontal Angle (3) Measure the vertical angle (4) Measure the deflection angle	04
6		Mini Project (1) To Carry out the project for a closed traverse 4 to 5 stations and prepare the drawing sheet using Gale's Table. (2) To carry out the project of Block contouring in the undulating terrain of area 150 m X 150 m. Also preparing the contour drawing. (3) To carry out the project for small traverse on a ground and prepare the drawing sheet by using Total Station.	08 16 06
			64

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i. Prepare filed book based on practical exercises.
- ii. Draw the various sketches related to surveying equipment.
- iii. Analyze the observation for preparation of maps and calculation necessary data..
- iv. Understand the operation of various survey equipments and develop the skill to carry the field work .

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i. Lecture cum demonstration of equipments of advanced surveying
- ii. Field demonstration
- iii. Mini Project on Block contouring should be conducted on accessible and safe open

undulated land near to city. One additional faculty per batch and supportive staff should be deputed to guide and monitor students along with course teacher based preparing of maps.

10.SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Surveying &levelling-28 th edition	N.N.Basak-	Tata Mc Graw
2	Surveying I&II- 11th Edition	Dr.B.C. Punmia	Laxmi Publication
3	Surveying& levelling I&II- 23 rd Edition	T.P. Kanetkar	Pune Vidhyarthi Gruh Prakashan
4	. Surveying I&II	S.K. Duggal	Tata Mc Graw
5	Surveying-5 th edition	V.S.Gajare	Nirali Prakashan

11. LIST OF MAJOR EQUIPMENT AND MATERIALS REQUIRES

- i. Transit Theodolite,
- a. Digital Theodolite,
- ii. Levelling Staff,
- iii. Techeometer,
- iv. Total Station and its accessories,

12. LEARNING WEBSITES & SOFTWARES

- i. www.Autodesk.com
- ii. www.drawingnow.com
- iii. www.learn-to-draw.com
- iv. www.sitetopo.com
- v. www.surfer.com

13. MAPPING OF PROGRAMME OUTCOMES (POS) WITH COURSE OUTCOMES (COS)

SNo	Course Outcome	Pos										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Determine the horizontal, vertical angle, deflection angle between lines.		1	1	2							1	
2	Use of Theodolite for Traversing		1	1	2							1	
3	Calculate the height and distance of object by tachometer.		1	1	2							1	
4	Setting out the Simple curve by Rankine method		2	1	3							1	
5	Measurements and generating the drawings using advanced surveying equipment like Digital Theodolite and Total station.		2	1	3							1	
6	Apply GPS in Civil Engineering		1	2	3							1	

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	K. S. Borde	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	P.K. Agale	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : AUTOCAD FOR CIVIL ENGINEERING

COURSE CODE : 6C 404

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CIVIL ENGINEERING	Fourth

1. RATIONALE:

In the era of accuracy/precision, drawings should be presented to client by using engineering tools in effective way. Use of computersoftware such as AUTOCAD enables civil engineers to prepare quality drawings in shortest possible time without any human error. Software relieves laborious work of draftsman. This helps to generate all possible working drawings using basic data and basic drawing with precision. After completion of course students will be able to draw all two dimensional drawings, Perspective views and 3D views of a structure/building which can be better understood by client.

2. COMPETENCY:

At the end of studying this course students will be able to, “Prepare working drawings of all civil engineering buildings/ structures using AutoCAD”.

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE~(PR)	PA (TW)	100
--	-	4	4	---	--	50	50	
Duration of the Examination (Hrs)				--	--	2	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – **Progressive Test**, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course, using ‘AUTOCAD’ students will be able to: -

1. Prepare working and submission drawings for civil engineering structures using AutoCAD
2. Prepare contour map from available data
3. Prepare three dimensional view of one room
4. Draw perspective view of small building/building component

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit-I:- Introduction to Autocad and Autocad commands	1a Use CAD in Civil Engineering Applications 1b. Use features of CAD screen for drawing 1c Perform initial setting and use grid and snap for given drawing 1d. Calculate coordinates 1e. Draw and edit objects	1.1. Starting up AUTOCAD, AUTOCAD graphics window, command window, profile setting 1.2. Drop-down menus, toolbar, saving the drawing with save and save as command 1.3 UCS icon, coordinates, relative coordinates, Cartesian coordinates, polar coordinates, drawing units, drawing size, grid, drawing limits, Drawing with grid and snap, ortho feature, use of X ref 1.4 Drawing Objects: Line, Circle, Rectangle, Ray, Polyline, Multiline, Polygon arc, Ellipse. Use of object snap, Use of different scale in single sheet. 1.5 Editing commands with their options: copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, explode, join 1.6 Use of Default shortcut and self shortcut, Insertion of classic mode in recent version, profile setting, workspace switching
Unit- II Drawing Strategies	2a. Create detail of doors, walls, kitchen and bathroom	2.1 Laying out walls, external and internal walls, cutting wall opening 2.2 Creating doors, drawing swinging doors, drawing sliding glass door 2.3 Drawing steps, balcony (plan, elevation & section) 2.4 Laying out kitchen and bathroom (Inserting electrical and plumbing details and furniture details)
Unit- III Using Layers and blocks (local and global) in Drawing	3a. Assign objects to layers 3b. Use layer properties manager dialog box for the given drawing	3.1 Layers as an organizing tool, setting up layers, layer properties manager dialog box. 3.2 Assigning objects to layers, freezing and turning off layers, drawing the headers 3.3 Drawing roof, assigning colour, assigning an individual line type scale factor 3.4 Making block, inserting block, finding blocks in

	<p>3c.Create, insert, blocks in drawing or into another DWG file.</p> <p>3d.Detect block using commands and using properties dialog box.</p> <p>3e.Draw contour map for given data</p>	<p>drawing ,using list of commands to detect block, using properties dialog box to detect block, use of point filters to insert block</p> <p>3.5Revising block, inserting block in drawing,DWG file into another DWG file</p> <p>3.6 Application of auto cad for drawing contour map</p> <p>3.7Use of Template file(.dwt), Indian and Global standard</p>
<p>Unit– IV</p> <p>Generating Elevation & Working with Hatches and fills.</p>	<p>4a Create Elevation by Considering differentdrawing scale in single sheet</p> <p>4b. Hatch the required part of Thegiven drawing, modify hatchedpattern and give special effects</p>	<p>4.1Drawing the front elevation, setting up lines for the heights, Trimming lines in the elevation</p> <p>4.2Creating rear, left and right elevation by drawing scale considerations</p> <p>4.3Hatching the front elevation: looking at hatch pattern, special effects, modify hatch pattern</p> <p>4.4Using hatching in the floor plan: hatching the floors, hatching the walls, modify the shapes of hatch patterns</p>
<p>Unit - V</p> <p>Text in Drawing&Dimensioning and 3D drawing</p>	<p>5a.Use single line and multiline text to place titles of the views in the drawings</p> <p>5b. Use Dimension Style to place dimension on the drawing and modify it.</p> <p>5c.Prepare 3D view of a room</p> <p>5d.Prepare perspective view forsmall buildings/building components.</p>	<p>5.1Setting up text styles: text and drawing scale, defining a text style for room labels</p> <p>5.2Single line text: Placing titles of views in the drawing, placing room labels in the floor plan, using text in grid, creating title block and border, use of multiline text, use of table style, text style</p> <p>5.3Placing dimensions on the drawing:Horizontal, Vertical,Radial dimensions, leader lines, angular and aligned dimensions</p> <p>5.4 Modify Dimensions: Modify dimension text, dimension overrides, dimensioning short distances, modify multiline style dialog box</p> <p>5.5Preparing centre line plan with dimensions,three dimensional and perspective drawing of small buildings/building components.</p>

Unit – VI Printing Autocad Drawing	6a. Use layout to set up a print 6b. Print AutoCAD Drawing with different scales on paper 1:100, 1:200, 1:500 etc.	6.1 Drawing border on a layout, designing a title block for layout, adjusting a view port, switching between model 6.2 Space and a layout Setting up multiple view ports, aligning view ports, setting up view ports in different scales, adding multiple view ports to layout, adding text to paper space, turning off view port. 6.3 The plot dialog box: Paper size and paper units, drawing orientation and plot scale, plot offset and plot options, plot area. 6.4 Printing a drawing: Determining line weights for a drawing, setting up the other parameters for a print previewing 6.5 Printing a drawing using layouts: Printing a drawing with multiple view ports, printing the site plan 6.6 Convert Autocad file to PDF format, conversion of AutoCAD file in different types like DXF 6.7 Insert Autocad drawing in to power point presentation
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching/Practical schedule Hours	Distribution Of Theory Marks			
			R Level	U Level	A Level	TOTAL
I	Introduction to AutoCAD and AutoCAD commands	12	Not Applicable			
II	Drawing Strategies	12				
III	Using Layers and blocks in Drawing	06				
IV	Generating Elevation & Working with Hatches and fills	12				
V	Text in Drawing & Dimensioning and 3D drawing	14				
VI	Printing AutoCAD Drawing	08				
	Total	64				

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

5. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:

Term work: Shall consist of preparing drawings of below mentioned exercises and taking their print-out.(PDF)

SR. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Single line plan(residential/public building)	06
2	I	Double line plan(residential /public building)	08
3	II	Submission drawing of a residential building	10
4	II	Submission drawing of a public building	10
5	III	Preparation of contour Map	02
6	III	Drawing cross sections and longitudinal sections showing reinforcement details in slab	04
7	IV&V	Preparation of center line plan	02
8	IV	Preparation of working drawing of building also draw Electrical layout	10
9	V	Preparing 3D view of a room	04
10	VI	Preparing perspective view for small building/building components	04
11		Micro Project	04
Total			64

Teacher shall prepare schedule for submission of every exercise and assess throughout the term continuously.

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Collect the working drawings from builders, architect and engineers
2	Collect the 3D drawings from various resources
3	Collect information of software used in construction industry
4	Use of Google sketches in drawing

SUGGESTED MICRO-PROJECTS:- (Any one for group of seven students)

- Collect drawings form Corporation (Road-work, Water supply and sewerage line), Prepare one of them
- Collect drawings from P.W.D. office (culvert, barrage, fly over, retaining wall), prepare drawing of retaining wall/pier/culvert etc.
- Collect drawing from builder /structural designer (Public and Residential building) Draw entire drawing i.e. plan, elevation, section, site plan, construction notes etc.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- Improved Lecture methods-
 - Q & A technique.
 - Demonstration.
 - Activity based learning.
- f. Use of video, animation films to explain concepts, facts.

10. SUGGESTED LEARNING RESOURCES:**A) TextBooks:**

Sr.No.	Title of Book	Author	Publication
1	AUTOCAD 2000	David Frey ISBN-108176560804 ISBN-139788176560801	BPB Publication, New Delhi
2	Introduction to AUTOCAD 2012 for Civil Engineering Applications	Nighat Yasmin ISBN-978-1-58503-642-4	SDC Publication 2011
3	AUTOCAD 2016: A Problem-Solving Approach, Basic and Intermediate	Shyam Tickoo, ISBN 10:1942689004 ISBN 13:978-1942689003	CADCAM Technologies, 22 nd Edition August 2015
4	AUTOCAD 2010 Instructor	James Leach ISBN -0073375411 ISBN -9780073375410	Tata McGraw Hill, 2007

5	AUTOCAD and its Applications	Terence M.Shumaker,DavidA.Madsen,DavidP.Madsen 10: 1590707605 13:9781590707609	Goodheart-Willcox Publishers 17 th Edition ,2010
6	Working with AUTOCAD 2000	Ajit Singh ISBN-0070435960 ISBN-9780070435964	Tata McGraw Hill Publishing Co.Ltd.Edition 2002

B) Reference Books:

SR. No.	Title of Book	Author	Publication
1	Engineering Drawing	N.D.Bhatt	Charoter Publications,anand,53 rd Edition,2016
2	Mastering AUTOCAD 2017 and AutoCAD LT 2017	George Omura,BrianC.Benton ISBN:-978-1-119-24005-1	Autodesk

11. LIST OF MAJOR EQUIPMENTS AND MATERIALSREQUIRED:

Sr.No.	Resources with brief specification
1	Computers(at least 20) with latest configuration as 2GB RAM,HDD 500GB,LCD monitor with CAD software with latest version.
2	Printer for the output of A3 size
3	LCD projector
4	Legal Software for Autocad

12. LEARNING WEBSITE &SOFTWARE:

E-learning recourses

(Please mention complete URL of the E- recourse CO wise)

- <http://www.autodesk.com/education/freesoftware/autocad>
- http://www.youtube.com/playlist?list=PLIpyIyby_iCupI-9xvel3CxxzwKoPLL
- www.zwsoft.com/cad accessed on 15th October 2016
- <https://www.scribd.com/doc/260678036> accessed on 12th October 2016
- Medobute.pixnet.net/blog/post/123908069 accessed on 10th October 2016

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Prepare working and submission drawings for civil engineering structures using AutoCAD	2	2		2						3		
2	Prepare contour map from available data	2	2		2						3		
3	Prepare three dimensional view of one room	2	2		2						3		
4	Draw perspective view of small building/building component	2	2		2						3		

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Madhuri Ganorkar	Head of Applied Mechanics Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	R.T.Aghav	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
4	N.R.Bansode	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- RAILWAY AND BRIDGE ENGINEERING
COURSE CODE 6C405

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fourth

1. RATIONALE

This subject caters to the need of technician engaged in the investigation, planning, construction & maintenance of railway, and bridges In practical field each component of transportation is a specialized branch of engineering. This subject aims at basic knowledge about railway, and bridges in respect of their various types, materials used, functions of component parts, methods of construction, planning principles, aspects of supervision and maintenance.

2. COMPETENCY

At the end of studying this course students will be able to

“Investigate, plan, construction & maintenance of railways and bridges’.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE @ (PR/OR)	PA (TW)	
03	-	2	05	80	20	--	25	125
Duration of the Examination (Hrs)				03	01	--	--	---

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Classify the types of railways zones and bridges.
2. Describe different methods of survey and investigation of alignment and geometry of railway, and bridges
3. Select proper component parts of permanent way of railway and bridges
4. Organize, supervise and coordinate the construction activities related to railway and bridges.
5. Prepare and interpret the drawings related to work.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
RAILWAY ENGINEERING Unit-I Introduction	1a. Classify zones in Indian railways. 1b. Explain factors affecting selection of gauge. 1c. Draw cross sections of broad gauge and meter gauge.	1.1 Classification of Indian railways, zones of Indian railway. Railway Alignment-Factors governing rail alignment, Rail gauges – types, factors affecting selection of gauge. 1.3 Rail track cross sections – standard cross section of Broad Gauge and Meter Gauge. Railway Line- single & double line in cutting and embankment
Unit– II Permanent Way	2a. State types of rails. 2b. Explain creep of rail. 2c. Discuss functions of sleepers. 2d. Explain functions of sleepers. 2e. Explain functions of ballast. 2f. Discuss advantages and Disadvantages of different types of sleepers. 2g. Give uses of rail fixtures and fastenings.	2.1 Ideal requirements, components. Functions & types of rails ,Rail joints & their requirements, Creep of rail, causes & prevention of creep. 2.2 Sleepers – functions & requirement, types – wooden, metal, concrete sleepers & their suitability, sleeper density. 2.3 Ballast – function & different types with their properties, relative merits & demerits. 2.4 Rail fixtures & fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers
Unit– III Railway Track Geometric	3a. Explain different gradient. 3b. Draw sketches of points and crossings.	3.1 Coning Of Wheels, Tilting Of Rails, Gradient & Its Types, Super Elevation On Curves, Cant Deficiency Negative Cant, Grade Compensation On Curves. 3.2 Points & Crossing, A Simple Split Switch Turnout, Line Sketches Of Track Junctions Crossovers- Scissor, Diamond Crossing
Unit– IV Station and Yards	4a. Explain requirements of railway station. 4b. Differentiate between different types of yard. 4c. Discuss purpose of laying of railway track. 4d. State necessity of	4.1 Site selection for railway stations , Requirements of railway station, types of stations -way side, crossing, junction & terminal 4.2 Station yards, types of station yard, passenger yards, goods yard, locomotive yard

	<p>maintenance of railway.</p> <p>4e.Explain duties of permanent way inspector.</p>	<p>– its requirements, marshalling yard</p> <p>4.3 Purpose of laying of railway track, different method of laying</p> <p>4.4 Maintenance of railway - necessity, types, tools required, duties of permanent way inspector.</p>
<p>BRIDGE ENGINEERING</p> <p>Unit - V Site Selection and Investigation</p>	<p>5a.Describe factors affecting selection of site of a bridge.</p> <p>5b.Classify different types of bridges.</p>	<p>5.1Factors affecting selection of site of a bridge. bridge alignment, collection of design data</p> <p>5.2Classification of bridges according to function, material, span, size, alignment, position of HFL</p>
<p>Unit - VI Components Of Bridge :</p>	<p>6a.Explain component parts of bridge.</p> <p>6b.Discuss different terminology of bridge.</p> <p>6c.Draw layout of bridge super structure..</p> <p>6d.Discuss functions of bearings.</p>	<p>Plan & sectional elevation of typical bridge showing component parts of substructure & super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard etc.,</p> <p>6.2 Foundation –piers-function & types., abutment – function, types,</p> <p>6.3 Wing walls – functions and types,</p> <p>6.4 Bearing – functions, types of bearing for RCC & steel bridges,</p> <p>6.5 Approaches –Functions & types</p> <p>Bridge flooring- open and solid floors.</p> <p>Permanent and Temporary Bridge:</p> <p>Permanent bridges - Culverts, causeways, Steel bridges, RCC girder bridge, pre stressed girder bridge, cantilever, suspension bridge, flyover bridge</p> <p>6.7 Temporary bridge – timber, flying, floating bridge.</p> <p>6.8 Inspection & maintenance of bridges- routine & special maintenance</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	RAILWAY ENGINEERING Introduction	03	00	04	02	06
2	Permanent Way	06	02	04	06	12
3	Railway Track Geometric	10	02	04	06	12
4	Station and Yards :	10	04	06	06	16
5	BRIDGE ENGINEERING Site Selection and Investigation	10	00	08	10	18
6	Components Of Bridge :	09	00	06	10	16
	Total	48	08	32	40	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
	I	Identification of components of railway by arranging a visit to a railway station.	04
	II	Draw sketches of different rail gauges.	06
	III	Identification of components of bridge by arranging a visit to a bridge.	06
	IV	Draw sketches of component parts of bridge.	06
5.	V	Identification of components, layout and drawing the sketch of components by arranging a visit to a slab or pipe culvert.	04
6	I TO V	Micro Project.*	06
Total			32

* Micro project list will be finalized through academic meeting and same will be displayed.

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:

1. Prepare journals based on practical performed in laboratory.
2. Draw different sketches of components of railway
3. Draw different sketches of components of bridges.
4. Interact with department persons and understand facts and maintenance problems.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

1. Arrange visits to railway station
2. Arrange visits to slab or pipe culvert.
3. Motivate students to use internet and collect name, type of bridge, span of bridge
4. Arrange visits to bridge site and make a report on it.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Transportation Engineering	J. R. Muley	Vrinda Publications, Jalgaon
2.	Transportation Engineering	Kamala	
3	Text book of Railway Engineering	S. C. Saxena	Dhanpat Rai & Sons, New Delhi
4.	Bridge Engineering	S. P. Bindra	Dhanpat Rai & Sons, New Delhi
5.	Road, Railway, Bridges and Tunnel Engineering	V. L. Gupta	Standard Publications, New Delhi

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Component parts of rail-fixtures and fastenings - models.	Wooden
2.	Transportation model- A Simple Split Switch Turnout model.	Wooden
3	Transportation model – Causways, component parts of bridge, girders.	Wooden

12. LEARNING WEBSITE & SOFTWARE

- a. <http://nptel.ac.in/courses/105107123/>
- b. <https://www.youtube.com/watch?v=37WMS483T7Y>
- c. <https://science.howstuffworks.com/engineering/civil/bridge.htm>
- d. <https://www.youtube.com/watch?v=SbCVRr5eANA>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Classify the types of railways zones and bridges.	-	2	-	-	-	-	-	-	-	-	3	-
2	Describe different methods of survey and investigation of alignment and geometry of railway, and bridges	-	-	-	2	-	-	-	-	-	-	3	-
3	Select proper component parts of permanent way of railway and bridges	-	-	3	-	-	-	-	-	-	-	-	3
4	Organize, supervise and coordinate the construction activities related to railway and bridges.		2									3	
5	Prepare and interpret the drawings related to work.	-	-	-	2	-	-	-	-	-	-	-	3

Course Curriculum Design Committee

Sr. Name of the Designation and Institute

No faculty members

1 K.S. Borde Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

2 V.V. Palsingankar Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- WATER SUPPLY & SANITARY ENGINEERING
COURSE CODE 6C408

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil	Fourth

1. RATIONALE:-

A civil engineering technician is expected to be in charge of the construction, operation and maintenance of water supply and sanitary works. He should select source of water which can ensure adequate supply of potable water. He should decide the line of treatment based on the test results of water sample from the selected source. He must be able to design and supervise construction of efficient and economic distribution system. At the same time he must be able to preserve the hygienic conditions of the environment by deciding ways and means of sanitation. He must be able to decide line of treatment to sewage before its disposal.

2. COMPETENCY:-

At the end of studying this course students will be able to

“Plan and Design water supply and sanitary scheme.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	WSSE (OR)#	PA (TW)	150
4	-	2	6	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits;
ESE- End Semester Examination; **PT – Progressive Test**, **PA-** Progressive Assessment, **OR**
 – Oral Examination, **TW** - Term Work, # External, @ Internal

4. COURSE OUTCOMES:-

At the end of studying this course students will be able to :-

1. Identify the sources of water for a town/Village.
2. Estimate the demand of water supply for a town/Village.
3. Conduct water quality test to ascertain its potability & Identify treatment units required for treatment in Water Treatment Plant.
4. Analyse the characteristics of Sewage & Identify the treatment units required for treatment in Sewage Treatment Plant.

5. COURSE DETAILS:-

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Sources of Water & Estimation of Demand of Water	1a. Select the source of water. 1b. Estimate the per capita demand of water 1b. Forecast the population 1c. Select Intake structure.	1.1 Resources of water – River, lake, canal etc, Ground water-open well, tube well, Springs. 1.2 Intake – river , reservoir, canal, jack well - its purpose 1.3 Water requirement for domestic, public, industrial needs Fire demand, losses and Wastage. Rate of demand, Factors affecting rate of demand, minimum requirements as per I.S.1172.,Variation in rate of demand 1.4 Design period for water supply scheme. Forecasting of population, various method of Forecasting. Estimation of total quantity of Water for a town.
Unit– II Water quality analysis	2a. Identify the impurities present in the water. 2b. Analyze the various of water quality parameters required for potability of water.	2.1 Potable water, impurities present in water and its classification. Need of water analysis 2.2 Tests on water – Water sampling for test, precautions to be taken for collection of sample Physical tests-Temperature,colour&odour 2.3 Turbidity, Sp. Conductivity. Chemical tests -total Solids, hardness, chlorides, dissolved gases, pH , Sulphate , Nitrogen and its compound, Bacteriological test – e-coli index MPN test. Standards for potable water as per I.S. specification & WHO
Unit– III Treatment of Water	3a. Draw the typical layout of water treatment plant 3b. Explain the sedimentation and coagulation process 3c. Describe the filtration process	3.1 Necessity of treatment. Aeration – objects, methods of aeration. Sedimentation – objects of sedimentation, plain sedimentation, sedimentation with coagulation, types of coagulant, choice for

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	Explain the disinfection	Coagulants, process of coagulation. Jar Test, Sedimentation tanks, types, working principle, study of clariflocculator 3.2 Filtration – objects, theory of filtration, filter media, classification of filters slow sand filter, rapid sand filter, pressure filter – construction ,working, suitability, merits and demerits 3.3 Disinfections – objects, methods of disinfection, chlorination, different forms of chlorination, break point of chlorination, residual chlorine, orthotolidine test flow diagram of water treatment plant
Unit– IV Conveyance & Distribution of water	4a.Prepare a layout of water supply scheme. 4b.Explain the methods of distribution of water. 4c. Select a layout of distribution system.	Typical arrangement of water supply scheme, jack well, pump house,pumps, rising main, supply reservoirs, Various types of valves 4.1 4.2 Method of distribution- Gravity, Pumping and Combined system. Service reservoir – purpose and types 4.3 Layout for distribution system – dead end, grid iron, circular ring, and radial system, their suitability, merits and demerits. 4.4 Population based approximate cost Of water supply scheme.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit– V Sanitation system	5a. Categorize waste of town. 5b. Explain sewerage system. 5c. Select Sewer appurtenances. 5d. Describe Laying of sewers.	5.1 Necessity of building sanitation, terms – sewage, sullage , storm water, Domestic sewage, Industrial sewage grey water ,blackish water, traps, types of building sanitation like one pipe system, two pipe system, building sanitation appliances 5.2 Types of sewerage system- water carriage system, systems of sewerage - separate system, combinedsystem , partially separate system, comparison and their suitability 5.3 Types of sewers – shape and material used, their suitability, Selection & Design of sewers – quantity of sewage, self-cleaningvelocity, gradient of sewers, size ofSewers, Laying of sewers. Testing ofsewers. Maintenance of sewers. 5.4 Sewer appurtenances- Manhole – components, location, spacing, construction, Drop man hole. Sewer inlet – street inlet.
Unit– VI Sewage Analysis & treatment	6a. Analyze the Characteristic of sewage. 6b. Explain the aerobic and anaerobic process of sewage treatment. 6c. Draw the layout of sewage treatment plant . 6d Explain theworkingofsewage treatment process. 6e Brief introduction of types of sewage treatment plants.	6.1 Characteristic of sewage (physical chemical, bacteriological), B. O. D.C. O. D. and its significance, strength of Sewage. 6.2 Aerobic and anaerobic process 6.3 Objective of sewage treatment,. General layout, flow diagram of sewage treatment plant, primary and secondary treatment 6.4 Grit chamber, Skimming tank, Sludge digestion tank, Trickling filters, Activated sludge process, Oxidation pond -working principle & layout, Septic tank & soak pit – design & working 6.5 Natural methods of Domestic waste water treatment. 6.6 Broad view about sewage scheme Costs.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Sources of Water & Estimation of Demand of Water	12	06	04	06	16
II	Water quality analysis	08	04	06	02	12
III	Treatment of Water	10	02	04	06	12
IV	Conveyance & Distribution of water	08	04	04	02	10
V	Sanitation system	14	06	08	04	18
VI	Sewage Analysis & treatment	12	04	04	04	12
	Total	64	20	30	30	80

Legends: R = Remembrance; U= Understanding; A= Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS (Conduct any ten practical's from given list)

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Collecting data regarding population and demand of water for small residential area / colony / village, forecasting the population of the area.	02
2	II	Determination of p^H of a given water	02
3	II	Determination of turbidity of a given water	02
4	II	Determination of Optimum dose of Coagulant	02
5	II	Determination of Dissolved oxygen present in water / waste water	02
6	II	Determination of total dissolved solids	02
7	II	Determination of chloride present in water / waste water.	02
8	II	Determination of hardness present in water	02

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
9	II	Determination Residual Chlorine Present in a water sample	02
10	VI	Determination BOD / COD present in waste water	04
11	III	Visit to a water Treatment plant or Sewage Treatment Plant to study various treatment units and their function, layout and flow diagram, collection of data regarding size, shape, capacity of different treatment units, valves. Preparation of report – it consist all details, diagram, collected during visit	04
12	III	Assignment on various types of pipes , valves and laying for a water supply scheme	02
13	I - VI	Micro project *	04
TOTAL			32

* Micro project list will be finalized through academic meeting and same will be displayed.

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i) Prepare manual based on practical exercises.
- ii) Draw the various sketches related to practical performed equipment.
- iii) Analyze the water parameter and compare it with standards
- iv) Understand the water treatment process and functions of unit
- v) Understand the sewage treatment process and its functions
- vi) To estimate the water demand and identify the sources of water as per demand of water

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i) To ensure quality of water - student should able to perform the water quality test.
- ii) While performing the practical's - student should take accurate readings and also verify it with standard parameter.
- iii) Student should carefully handle the chemicals as well as instruments during practical with safety measures.

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title and Edition	Author	Publisher
1	Environmental Engineering	Kamala A ,Kanthrao D. L.	ataMcGraw Hills Publications, Delhi
2	Water Supply And Sanitary Engg.	GurucharanSignh	Standard Publications, New Delhi
3	Water Supply & Sanitary Engineering	G. S. Bridie, J.S. Bridie.	DhanpatRai& Sons, New Delhi
4	Water Supply & Sanitary Engineering(Vol.. I & II)	S.K.Garg	Khanna Publications
5	Dr. B.C.Punmia (Vol. I & II)		Laxmi Publications, New Delhi
6	Waste Water Treatment & Disposal	Eddy & Metcalf.	Tata Mc-Graw Hills Publications,New Delhi

11. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

1. Digital PH meter,
2. Digital turbidity meter,
3. Digital DO meter ,
4. BOD incubator ,
5. COD apparatus,
6. Jar test apparatus ,
7. Turbidity rod,

12. E-LEARNING RECOURSES:-

- i) [https://www.youtube.com/Water treatment plant .](https://www.youtube.com/Water%20treatment%20plant)
- ii) [https://www.youtube.com/waste water treatment plant](https://www.youtube.com/waste%20water%20treatment%20plant)
- iii) [https://www.youtube.com/ Determination of BOD.](https://www.youtube.com/Determination%20of%20BOD)
- iv) [https://www.youtube.com/ Determination of COD.](https://www.youtube.com/Determination%20of%20COD)
- v) [https://www.youtube.com/Various water supply valves](https://www.youtube.com/Various%20water%20supply%20valves)

13. POs and PSOs assignment and its strength of assignment with each CO of the Course

CO. NO.	Course Outcome	Programme outcomes										PSO1	PSO2	
		1	2	3	4	5	6	7	8	9	10			
CO1	Identify the sources of water for a town/Village.	1	-	-	-	1	-	-					-	-
CO2	Estimate the demand of water supply for a town/Village.	2	2	-	-	-	-	-					-	-
CO3	Conduct water quality test to ascertain its potability & Identify treatment units required for treatment in Water Treatment Plant.	1	-	-	3	1	-	1					1	-
CO4	Analyse the characteristics of Sewage & Identify the treatment units required for treatment in Sewage Treatment Plant.	1	-	-	3	1		1					1	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Smt. Y.M PATIL	Lecturer in Civil Engineering Govt. Polytechnic, Aurangabad
2	Shri. K.S.Borde	Sr.Lecturer in Civil Engineering Govt. Polytechnic, Aurangabad
	(Member Secretary PBOS)	(Chairman PBOS)

COURSE TITLE ENTREPRENEURSHIP DEVELOPMENT**COURSE CODE** 6G306**PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
All Programs	Third

1. RATIONALE

In the post liberalization era significant growth in industrial sector has led to creation of huge opportunities in manufacturing and service sector. In such a scenario especially in Indian contest it has led to innumerable opportunities for first generation entrepreneurs on a large scale. Therefore it is expected that engineers need to be developed for manufacturing, service sector and entrepreneurship development. This course, which represents Allied level of courses, aims at imparting entrepreneurial skills amongst engineers of all disciplines.

2. COMPETENCY

At the end of studying this course students will be able to

“Design a project proposal for an enterprise”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE @ (PR/OR)	PA (TW)	50
2	-	2	4	--	--	--	50	
Duration of the Examination (Hrs)				--	--	--	--	

Legends : **L**-Lecture; **T**-Tutorial/Teacher Guided Theory Practice ; **P**- Practical; **C**- Credits; **ESE**- End Semester Examination; **PT** – **Progressive Test**, **PA**- Progressive Assessment, **OR** – Oral Examination, **TW** - Term Work, # External, @ Internal, ~ Online examination.

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -.

- 1 Apply business/enterprise principals and characteristics.
- 2 Design information and supporting system related to start a business.
- 3 Estimate and record financial requirements.
- 4 Develop detailed project report.
- 5 Use various software related to business.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Basic Concepts of Entrepreneur	1a. Describe Entrepreneur. 1b. Identify Risk Use Creative skills 1c. Describe Risk Situation. 1d. Generate Business Idea Methods and techniques to generate Business. 1e. Plan for Transforming Ideas in to opportunities. 1f. Carryout of SWOT Analysis.	Basic Concepts of Entrepreneur 1.1. Concept, Classification & Characteristics of Entrepreneur. Creativity and Risk taking, Concept of Creativity & Qualities of Creative person. Risk Situation, Types of risk & risk takers. 1.2 Business Idea Methods and techniques to generate business idea. 1.3 Transforming Ideas in to opportunities- transformation involves Assessment of idea & Feasibility of opportunity, 1.4 SWOT Analysis.
Unit– II Information And Support Systems	2a. Use Information data for business. 2b. Information related to support system. 2c. Lay down the Procedures and related to Information. 2d. Identify Govt. Support Systems related to EDP. 2e. Explore subsidies to entrepreneur.	2.1 Information Needed and Their Sources. Information related to project, Information related to support system, Information related to Procedures and formalities. 2.2 Support Systems: • Small Scale Business Planning, Requirements. • Govt. & Institutional Agencies, Formalities • Statutory Requirements and Agencies. Government Support and subsidies to entrepreneur.

Unit– III Market Assessment	3a Undertake Market survey. 3b Use Marketing skills and Survey. 3c Assess market for business opportunities.	Market Assessment 3.1 Marketing -Concept and Importance 3.2 Market Identification, Survey Key components. (Market Segmentation) 3.3 Market Assessment.
Unit– IV Business Finance & Accounts	4a. Determine product cost. 4b. Analyze for breakeven of business proposal. 4c. Maintain Business finance and accounts.	Business Finance & Accounts 4.1 Business Finance <ul style="list-style-type: none"> • Cost of Project • Sources of Finance • Assessment of working capital • Product costing • Profitability • Break Even Analysis • Financial Ratios and Significance 4.2 Business Account Accounting Principles, Methodology <ul style="list-style-type: none"> • Book Keeping • Financial Statements • Concept of Audit, • Trial Balance Balance Sheet
Unit - V Business Plan & Project Report	5a. Prepare Business proposal. 5b. Undertake project appraisal. 5c. Undertake cost benefit analysis. Cost benefits analysis.	Business Plan & Project Report 5.1 Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2 Project Report <ol style="list-style-type: none"> 1) Meaning and Importance 2) Components of project report/profile(Give list) 5.3 Project Appraisal <ol style="list-style-type: none"> 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis.
Unit – VI Enterprise Management And Modern Trends	6a. Manage resources. 6b. Prepare plan for productivity. 6c. Assure Quality. 6d. Explore Govt facilities (Industrial zones and SEZ.) 6e. Explore E-Commerce avenues for business.	Enterprise Management And Modern Trends 6.1 Enterprise Management: - <ol style="list-style-type: none"> 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance, Importance of Quality, Importance of testing 5) Industrial zones and SEZ. 6.2 E-Commerce, Concept and process.

		6.3 Global Entrepreneur: role and opportunities.
Unit – VII INTRODUCTION ON BUSINESS RELATED SOFTWARES	7a. Use business related software's. 7b. Survey Software's used in Mall, industries. 7c. Identify Software's used For accounting.	INTRODUCTION BUSINESS RELATED SOFTWARES 7.1 Software's used in Mall. 7.2 Software's used in Medical shops. 7.3 Software's used in industrial stores such as SAP, ERP. 7.4 Software's used for accounting such as FICO, FINNACLE

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basic Concepts of Entrepreneur.	04	NA	NA	NA	NA
II	Information And Support Systems	05	NA	NA	NA	NA
III	Market Assessment	05	NA	NA	NA	NA
IV	Business Finance & Accounts	05	NA	NA	NA	NA
V	Business Plan & Project Report	05	NA	NA	NA	NA
VI	Enterprise Management And Modern Trends	04	NA	NA	NA	NA
VII	Introduction business related software's	04	NA	NA	NA	NA
	Total	32	NA	NA	NA	NA

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Literature survey of Financial Banks for Industries– MSFC/IDBI/MSSIDC/CIDBI/MSME/DIC/ ROLE OF DIFFERENT COMMERCIAL BANKS etc.	06
2	II	Administration of readymade tools like questionnaires, Analytical, Interview schedule for product identification process (decision making process)	04
3	III	Development of “Business Ideas”. Take any product and develop the business idea for it.	04
4	IV	Visit to MCED/MITCON- going through the product related library.	04
5	VI	Preparation of Preliminary / Detailed project report in the formats recommended by MCED/MITCON Prepare project report and study its feasibility.	06
6	VI	At least one case study of successful entrepreneur.	04
7	---	Assess yourself-are you an entrepreneur?	04
Total			32

8. SUGGESTED STUDENTS ACTIVITIES

1. Prepare journals based on assignments.
2. Carry out Literature survey of Financial Banks for Industries.
3. Analyze the specifications, costs, quality and availability for various types of engineering components and find the business opportunity for it.
4. Interact with supplier/trader and discuss about business opportunities available in market.
5. Designing software for requirements to start business or similar type of issues. .
6. preparing project report for any product to be manufactured.
7. Search online PPT’s, PDF’s, video’s on the design and software’s for business.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

1. Group discussion among students.
2. Arrange visits to industries and show various industrial jobs.

3. Motivate students to use internet and collect name, addresses, catalogues, rates, specifications of institutes and industries working in the area of business promotions.
4. Arrange expert lecture on various opportunities in business.

10. SUGGESTED LEARNING RESOURCE

Sr.No.	Title of Book	Author	Publication
1	Entrepreneurship Development	----	NITTTTR, Bhopal
2	The Seven Business Crisis & How to Beat them	V.G.Patel	S.Chand and Co. New Delhi
3	A handbook of New Entrepreneurs	P.C.Jain	,Dhanpat Rai and Sons
4	Entrepreneurship development	E.Gorden, K. Natrajan	Charotar Publication House
5	New Initiatives in Entrepreneurship Education And training	Gautam Jain, Debmuni Gupta	Tata Mc- Graw Hill
6	Entrepreneurship Theory and Practice	J.S.Saini, B.S.Rathore	Tata Mc- Graw Hill
7	Enterpreneurship Development and management	A.K.Singh	Laxmi Publications
8	The Beer mat Entrepreneur	South on D F	Pearson Education limited

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Computers for Practical's with internet facility
1. Software's used in Mall.
2. Software's used in Medical shops.
3. Software's used in industrial stores such as SAP, ERP.
4. Software's used for accounting such as FICO, FINNACLE.

12. LEARNING WEBSITE & SOFTWARE

- i. <http://www.product-list.php>
- ii. <http://www.SAP.com/products/faro-software>
- iii. <http://www.ERP.com>
- iv. <http://www.fico.com>
- v. <http://finnacle.com>
- vi. Visit www.ediindia.org.
- vii. <http://www.project-reports.com>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

CO. NO.	Course Outcome	P	P	P	P	P	P	P	P	P	P	P	No. of hours allocated in curriculum
		O 1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	S O 1	S O 2	
CO 1	Apply business/enterprise principals and characteristics.	3	3					2		3		2	6
CO 2	Design information and supporting system related to start a business.	3	3					3		3			8
CO 3	Estimate and record financial requirements.	3	3					3		3		2	6
CO 4	Develop detailed project report.	3	3							3	2		6
CO 5	Use various software related to business.	3	3							3	3		6

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Prof. A. W. Nemade	Lecturer in Mechanical Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- IRRIGATION ENGINEERING

COURSE CODE 6C407

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALE

India has acquired an irrigation potential of about 84.9 mha against the ultimate irrigation potential of the country has been estimated to be 139.5 mha. Students has opportunity to work socially for development and utilization of water resources. This is applied course enables to students of Civil engineering diploma to design small elements of minor irrigation schemes and supervise construction, operation and maintenance of irrigation structures of any type of irrigation schemes. He/she has to also ensure optimum use of water resources through effective distribution system and crop pattern in command area.

2. COMPETENCY

“Investigate, design, construction and maintenance different types of Irrigation Structures like dams, spillways, canals etc.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE#(PR /OR)	PA (TW)	
3	0	2	5	80	20	25	25	150
Duration of the Examination (Hrs)				03	01	--	--	---

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to:

1. Identify benefits of irrigation and classify the irrigation projects
2. Calculate yield from a catchment by runoff formulae and tables.
3. Investigation, planning and design procedure of reservoir capacity.
4. Describe the planning, construction and operation of minor irrigation scheme and diversion head works.
5. Describe alignment and maintenance of canals and canal structures.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit-I Introduction to irrigation engineering.	1a.Describe benefits of irrigation. 1b.Explain classification of irrigation projects. 1c.Describe need for water policy.	1.1 Definition of irrigation and irrigation engineering, necessity and scope of irrigation in India.. 1.2 Benefits and ill effects of irrigation, single and multipurpose projects, classification of irrigation systems. 1.3 Study of latest national water policy, and latest State water policy.
Unit– II Hydrology	2a.Explain methods of calculation of averageannual rainfall. 2b.Describe factorsaffecting runoff. 2c.Calculate yield of catchment.	2.1 Definition of Hydrology , Rainfall, rain gauge and rain gauge station, types of rain gauge (only names), average annual rainfall and its calculation, 2.2 Catchments – types, 2.3 Definition of runoff, Factors affecting run off, Determination of runoff by -Inglis formulae, Estimation of maximum flood discharge by different method.. 2.4 Yield, dependable yield and its calculation.
Unit– III Water planning	3a.Explain different cropping seasons in Maharashtra. 3b.Describe factorsaffecting duty. 3c.Calculate crop water requirement. 3d.Explain methods ofassessment of water.	3.1 Crops in Maharashtra, cropping seasons in Maharashtra 3.2 Define Base period, crop period for a crop, duty and delta, factors affecting Duty, Types of command area GCA,CCA and IA . 3.3 Simple problems on water requirement for crop water requirement.. Volumetric Methods of assessment of water-

	<p>3e. Describe factors affecting silting of reservoir.</p> <p>3f. Fix control levels of reservoir</p>	<p>their advantages and disadvantages,.</p> <p>3.4 Selection of site for a reservoir. area capacity curves, silting of reservoir, factors affecting silting, evaporation from reservoir, method of reducing evaporation. 3.5 Calculation of dead storage, live storage, gross storage, fixing control levels, simple calculations of fixing of control levels.</p>
Unit - IV Dams and spillways	<p>4a. Describe classification of dam.</p> <p>4b. Explain forces acting on gravity dam.</p> <p>4c. Describe component parts of earthen dam.</p> <p>4d. Explain methods to reduce seepage through embankment.</p>	<p>4.1 Classification of dams – according to use, material, design.</p> <p>4.2 Gravity dams – forces acting on dam, theoretical and practical. Profiles, limiting height of dam high dam and low dam, drainage gallery, transverse and longitudinal joint in Concrete dams.</p> <p>4.3 Earthen dams – components of earthen dam and their functions, Typical cross section of earthen dam, causes of failure of earthen Dam, Methods to reduce seepage through embankment and foundation.</p> <p>4.4 Spillways – purpose, types of spillways. Ogee spillway, bar spillway. Spillways crest- Put logs, radial gates, vertical lift gate ,</p>
Unit - V Minor Irrigation scheme and Diversion Head Works	<p>5a. Explain component parts of bandhara.</p> <p>5b. Discuss necessity of percolation tank.</p> <p>5c. Draw layout of diversion head work.</p> <p>5d. Discuss functions of weir.</p> <p>5e. Distinguish between weir and barrage.</p> <p>5f. Draw layout of lift irrigation system.</p>	<p>5.1 Bandhara – purpose, component parts and layout, advantages and disadvantage, solid and open bandhara</p> <p>5.2 Percolation tank – necessity, selection of site, component parts</p> <p>5.3 Layout of diversion headwork with its components and their functions- divide wall, bunds, silt excluder, channel head regulator etc.</p> <p>5.4 Weirs – functions, types, sloping weir, vertical drop weir, dry stone weir, pick up weir, situation favouring its suitability.</p> <p>5.5 Barrages – components and their functions, layout of typical barrage situation favoring construction on barrage, comparison between weir and barrage with respect to crest level, afflux during flood, clearance of flood, silting.</p>

		Lift irrigation – lifting water from river, canal, necessity, layout of lift irrigation scheme, pump, rising main, storage tank, distribution system..
Unit - VI Canal and Cross Drainage Works	6a. Classify different types of Canal. 6b. Draw typical canal Sections. 6c. Give the suitability of aqueduct, super passage, level crossing, cross regulator. 6d. Discuss advantages of canal lining. 6f. Discuss purpose of canal lining.	6.1 Classification of canals. according to alignment, its position in the network, function of each canal in the network, Typical canal section, balancing depth of canal, capacity of canal, time factor. Canal falls and canal escape 6.2 Cross drainage works, aqueduct, siphon aqueduct, super passage, level crossing, cross regulator, 6.3 Canal lining – purpose and common material used, advantages of canal lining, 6.4 Maintenance of canal. Water logging-causes, effects, prevention and remedial measures

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introduction to irrigation engineering	02	00	04	02	06
2	Hydrology	06	02	04	06	12
3	Water planning	16	06	10	12	28
4	Dams and spillways	12	00	06	08	14
5	Minor Irrigation scheme AND Diversion Head Works	06	00	04	06	10
6	Canal and Cross Drainage Works	06	00	04	06	10
	Total	48	08	32	40	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Prepare list of documents and drawing required for minor irrigation project by Collecting information from department .	04
2	II	Determine yield from a topo sheet of a catchment, plot catchment area and determine catchment area by planimeter	04
3	III	Calculate Canal capacity from a given command area and cropping pattern.	04
4	III	Fix control levels of reservoir from available data.	02
5	IV	Prepare drawings of a typical section earthen dam with drainage details.	04
6	V	Prepare checklist for pre monsoon and post monsoon repairs/ maintenance for irrigation work.	04
7	VI	Prepare list of hydraulic Structures, different components and its related data by arranging a visit to an irrigation scheme or project nearby city and Meteorological field laboratory	04
8		Prepare report on expert lecture of Irrigation Engineering Department person on current practices .	02
9	I to VI	Micro Project.* 1. Prepare report on Water supply reservation in existing irrigation project. 2. Prepare preliminary irrigation report.	04
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Prepare journals based on practical performed in laboratory.
- b. Solve numerical problems.
- c. Interact with department persons and understand facts and maintenance problems.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- I. Arrange visits to irrigation project.
- II. Motivate students to use internet and collect name, type of project, catchment area of project, necessity of irrigation project.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Irrigation and water Power Engineering 12 th Edition	Dr. Punmia B. C. & Dr. Pande B.B.	Laxmi Publication
2.	Textbook of Irrigation Engineering 2 nd Edition	J.G. Dahigaonkar	Wheeler Publication
3	Irrigation Engineering 1 st Edition	Upadhyaya N.A.	Tech-Max Publication
4	Irrigation and Hydraulic structure	Garg S. K.	Khanna Publisher, New Delhi

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr.No.	Name of equipment	Brief specification
1.	Irrigation model.- Dams canals models	Wooden
2.	Irrigation model. –Cross drainage works	Wooden
3	Irrigation model- Spillway	Wooden

12. LEARNING WEBSITE & SOFTWARE

- a. www.nptel.ac.in/downloads/105101002
- b. [ocw.usu.edu/Biological and Irrigation Engineering/Irrigation Conveyance Control Systems/6300 L19 CanalLinin](http://ocw.usu.edu/Biological_and_Irrigation_Engineering/Irrigation_Conveyance_Control_Systems/6300_L19_CanalLinin)
- c. npcc.gov.in/Barrages.aspx
- d. www.differencebetween.com/difference-between-dam-and-vs-barrage
- e. [www.intechopen.com/books/water-conservation/importance-of-percolation-tanks-for-waterconservation-for sustain](http://www.intechopen.com/books/water-conservation/importance-of-percolation-tanks-for-waterconservation-for-sustain)

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Identify benefits of irrigation and classify the irrigation projects	3											2	
2	Calculate yield from a catchment by runoff formulae and tables	1	2										2	
3	Explain the construction and working procedure of dams and spillways.			3										3
4	Describe the planning, construction and operation of minor irrigation scheme and diversion head works			3									1	
5	Describe alignment and maintenance of canals and canal structures				3		1							2

Course Curriculum Design Committee

Sr. No	Name of the faculty members	Designation and Institute
1	K.S.Borde	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2	V.V.Palsingankar	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE: BUILDING SERVICES**COURSE CODE: 6C409**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALS:

Building cannot be used for occupancy unless it is provided with plumbing and building services building and plumbing services gives comfort to the dwellers and protects the users from environment. It creates healthy and working environment in the building. Work for various building as entrepreneur to provide various services which is required to provide comfort to the users of the building. This course gives the information regarding codal requirements to provide building services such as Plumbing, Fire, Acoustic etc. With these requirements the diploma engineer will be able to plan and design the plumbing and building services which will help him to work as consultant or supervise the construction and maintenance of different building services.

2. COMPETANCY:-

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Provide building services to consult & supervise the construction & maintenance of different building services so that he/she can become a service provider (Entrepreneur) for different building services to society.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE #(OR)	PT	
3	0	2	5	80	20	25	25	150

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, ESE - End Semester Examination; PA - Progressive Test; OR-Oral examination

4. COURSE OUTCOMES:-

1. Identify and study various building services and its component & extract market survey of material with reference to each service.
2. Apply NBC byelaws to design water supply, drainage line as well as rain water harvesting for multi-storied building and process of termite, water and damp proofing.
3. Analyse the plan of public building & apply design of acoustics, electrification, ventilation & fire fighting services as per NBC.

5. COURSE DETAILS:-

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit-I Water Supply and Drainage Arrangements in Buildings	1a. Identify all the water supply arrangement for building. 1b. Differentiate between different distributions systems in multistoried building. 1c. Describe need of licensing, duties & responsibilities of plumber. 1d. Design of diameter of water supply, drainage and rainwater pipes. 1e. Estimate water requirement, maximum flow of waste water and material used in plumbing multi-storied buildings	1.1 Terminology- Water main, Service pipe, Communication pipe, Supply pipe, Distribution pipe Consumers pipe, Air Gap 1.2 Principles for conveyance and distribution of water with in the premises. 1.3 Application for obtaining water supply connection, drawing /document required for connection. Licensing of plumbers, basic qualification of plumbing contractor, duties and responsibilities of the plumbing contractor. 1.4 Water supply requirement for building. Estimate of demand load & Calculation of water demand for a building and campus. 1.5 Distribution systems in multi-storied Buildings- Direct supply system, Direct pumping system, Hydro-Pneumatic system, Overhead Tanks distribution 1.6 Design of distribution system for a building. Laying of mains and pipes on site. Excavation and refilling. Precautions and Testing of pipeline. . 1.7 Definition of terms – Building drain building sewer, soil waste, soil pipe, BSP, BWP, BVP, different traps, ventilating pipe etc. 1.8 Aims and principles of building Drainage. Choice of plumbing systems

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		<p>– one pipe system, two pipe system, single stack system,</p> <p>1.9 Design of drainage pipe-Estimation of maximum flow of waste water. Fixture units and fixture unit value for different sanitary appliances. Maximum numbers of fixture units to branches and stocks Maximum number of fixture units to building drains and sewers. Gradients and pipe sizes. Inspection testing and maintenance.</p> <p>1.13 Concept and design of Roof rain water harvesting for apartment.</p>
Unit– II Fire Protection	<p>2a.Explain necessity of different fire resisting material</p> <p>2b. Classify different types of material and its degree of fire.</p> <p>2c.Identify fire zones and techniques and method of fire safety.</p> <p>2d.Suggest various requirement of extinguishing arrangement</p>	<p>2.1 Terminology – Combustible material, Down comer, Dry riser, Fire load, Fire load density, Fire resistance rating</p> <p>2.2 Important consideration in fire protection, Fire resisting construction. Fire resistant materials and its properties. Classification of building based on occupancy. Types of construction and degree of fire resistance</p> <p>2.3 Fire Zones. General measures of fire safety in building. Alarm system, Fire extinguishing, Arrangements normally operated equipment's, fire hydrants, automatic sprinkler system.</p> <p>2.5 Escape routes- fire separation, fire tower, and roof exist, fire lifts.</p> <p>2.6 Sketches for typical arrangement of wet riser cum down comer for Apartment house above 15 meter and above 24 meter height.</p>
Unit– III Acoustics.	<p>3a.Explain audible sound its necessity and characteristics.</p> <p>3b.Describe different behavior of sound and its effect..</p> <p>3c.Identify different acoustical defects and its causes and remedial</p>	<p>3.1 Definition and necessity of Acoustics of building and characteristics of audible sound- Pitch, Intensity & Tone</p> <p>3.2 Behavior of sound and its effects- Reflection coefficient, Absorption coefficient, Transmission loss</p> <p>3.3 Different acoustical defects and its remedies. Reverberation time and optimum time of reverberation.</p>

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	<p>measures.</p> <p>3d. Describe various principle and step for acoustical design</p>	<p>3.4 Principles and factors to be considered during acoustical design. Practical cases of some acoustical buildings.</p> <p>3.5 Acoustical materials and its classification.</p>
<p>Unit- IV</p> <p>Termite Proofing Water Proofing, Damp Proofing</p>	<p>4a. Select appropriate method for termite proofing.</p> <p>4b. Explain causes, effects and remedial for dampness. .</p> <p>4c. Describe different steps for water closet of bath, WC, terrace</p>	<p>4.1 Anti-termite –Essentials of termite proofing. Termite proofing methods.</p> <p>4.3 Water proofing – Necessity and materials, latest chemicals available.</p> <p>4.4 Water closet water proofing – Preparation, base coat, brick bat coba, water proofing and topping coat for W.C. water proofing.</p> <p>4.5 Bathroom water proofing – preparation, base coat, brickbat coba, topping coat for bathroom water proofing.</p> <p>4.6 Terrace water proofing - preparation, brickbat coba, final coat for terrace water proofing.</p> <p>4.7 Underground water tank and overhead water tank water proofing</p> <p>4.8 Damp proofing - Introduction, causes of dampness, effect of dampness, remedies for the dampness in walls, damp proof course (DPC) in plinth.</p>
<p>Unit - V</p> <p>Ventilation and Air Conditioning</p>	<p>5a. Explain need and functional requirement of ventilation system</p> <p>5b. Compare various ventilation system, their requirement, advantages and disadvantages..</p> <p>5c. Explain purpose of A.C. with its principles.</p> <p>5d. Classify various types of A.C. and its essentials.</p>	<p>5.1 Definition and necessity of ventilation. Functional requirement of ventilation system</p> <p>5.2 Different Ventilation system & their choice- Natural ventilation – Wind effect, Stack effect. General consideration and rules for natural ventilation Mechanical ventilation and its methods</p> <p>5.3 Purposes and classification of air conditioning. Principles of comfort air conditioning.</p> <p>5.4 Systems of air conditioning. Essentials of air conditioning system.</p>

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit– VI Electrification of Buildings.	6a..Identify material for fitting and planning in electrical work 6b.Explain flow chart and requirement of electric Point. 6c.Describe ear thing and its procedure. 6d.. Compare various types of wiring and its merits and demerits. 6e. Suggest precautionary measures for electric work and fitting for house electrification.	6.1 Planning for internal electrical works. Positions and requirements of electrical point, Heights of electrical points Sizes of boards, Gauges of wires, Colour codes of wires 6.2 Planning for external electrical works, Flow chart for electric supply from electricity board to consumer. 6.3 Electrical meter cabinet. Ear thing – procedure of the ear thing. 6.4 Types of wiring used in building construction. Temporary C.T.S wiring, Casing -capping wiring, Conduct wiring, Conduit wiring- Open conduit wiring and concealed conduit wiring. 6.5 Single phase supply, three phase supply. Protection against short circuits, Fuses, Introduction to protective instruments, Miniature circuits breaker (M.C.B.)

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Water Supply and Drainage Arrangements in Buildings:-	13	04	06	10	20
II	Fire Protection	08	02	04	06	12
III	Acoustics	07	02	06	04	12
IV	Termite Proofing Water Proofing, Damp Proofing	06	02	06	04	12
V	Ventilation and Air Conditioning	07	02	04	06	12

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
VI	Electrification of Buildings	07	02	04	06	12
	Total	48	10	28	42	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1.	III/ II	Conduct market survey of latest material for water proofing, termite proofing, acoustical material with latest development. and write a report on it which includes cost, specification, and uses of material	04
2.	I/V	Report writing on the building showing system of plumbing and prepare report for plumbing fittings & fixtures in details, and air conditioning systems.	08
3.	I	Prepare a water supply, sanitary and drainage system for multi storied residential building	04
4.	I/III	Study an existing building and design roof rainwater harvesting system and present design process.	02
5.	IV	Suggest requirement for firefighting services for a building, and prepare a drawing showing its details.	04
6.	II	Prepare report on auditorium or cinema theatre for studying acoustic treatment and sound insulation.	02
7.	II	Case study of acoustics for conference hall/ lecturer hall, /small Auditorium hall.	02
8.	V	Plan or Extract data required for natural ventilation and	02

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		artificial ventilation.	
9.	IV	Draw a layout plan and prepare electrical drawing for a building.	04
Total			32

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

1. Prepare journals based on practical performed and visits.
2. Conduct survey; analyze the specifications, costs, quality and availability for various types of plumbing, acoustical and various proofing materials.
3. Interact with owner and list common troubles in plumbing services water proofing termite proofing& damp proofing .
4. Prepare and analyze the detail layout plan and design of water supply system, drainage system, and roof rain water harvesting for an existing apartment..
5. Prepare report on fire resisting appliances available in market.
6. Collect data of auditorium/cinema hall/conference hall where acoustical planning, artificial ventilation fire fighting services and electrification is made.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

1. Arrange industrial visits to fire fighting office to study fire fighting equipments and their working.
2. Arrange visit to a building where green building concept is used for construction.
3. Motivate students to use internet and collect name, addresses, catalogues, rates, specifications of manufacturers of various plumbing equipments and available materials.
4. Arrange industrial visits to building units and study and plan water supply and plumbing design & drawing, and RWH with the reference of national building code.
5. Motivate students to refer NBC, videos and use internet, collect name, addresses, catalogues, rates, specifications of manufacturers of materials equipment used in betterment of building services.

10. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Building Construction	S.P. Arrora & Bindra	Dhanpat Rai & sons, Delhi
2.	Water Supply And Sanitary Engineering	S.K. Garg	Tata McGraw Hills Publications, Delhi
3.	Building Drawing	Kale, Shaha, Patki	Dhanpat Rai & sons, Delhi
4.	National Building Code	Year 2005	New Delhi
5.	A to Z practical Building Construction	Sanjay Mantri	Mantri House publication, Pune
6.	Environmental Engineering-	Kamala	Khanna Publications
7.	Plumbing Engineering.	Subhash Patil	Seema publication Mumbai

11.MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

Sr.NO.	Name of the Equipment	Specification
1	Various plumbing fittings and fixtures-latest material available in market.	GI PVC & FRP
2	Various fire fighting equipments –latest available in market.	Portable as well as wall mounted
3	Various electrification fitting and equipments –latest available in market	PVC and latest
4	Various acoustical and water proofing -latest material available in market.	Sample Acoustical sheet and Dr. fixit waterproofing booklet and other product

12. E-LEARNING RECOURSES

- 1 <http://www.plumbing.com/fixtures> .
- 2 <http://acostical material.com/>
3. <http://fire fighting equipments.com/>
4. <https://www.youtube.com/watch> water proofing procedure.
5. <https://www.youtube.com/watch artificial> ventilation

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identify various building services & extract market survey of material with reference to each service.	03	03				01		01	02	02		
2	Apply NBC bye laws to design water supply, drainage line as well as rain water harvesting for multi-storied building.	02	03				03		01		02	02	
3	Analyse the plan of public building & apply design of acoustics, electrification, ventilation & fire fighting services as per NBC.	03	03	02	02	02	03		01		02	02	

Course Curriculum Design Committee

Sr. No	Name of the faculty members	Designation and Institute
1	K. S. Borde	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2	Dr.R.S.Bang	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE: ESTIMATING AND COSTING

COURSE CODE: 6C411

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALE

Civil engineering diploma graduate has to find out the quantities of various items of works and probable cost of construction of different civil works, before the actual execution of works. This requires him to develop skills of computing quantities of different items of the works and their costs in standard measurement sheet and abstract sheet. This also requires him to develop the skill in referring the rates and specifications from DSR. He / she should have knowledge about various factors, which affects the cost along with data required and accuracy expected as per IS 1200. Further diploma graduate is required to prepare proposals for getting sanctions to the approximate or detailed estimates of project to decide its feasibility and economy. This is a core technological subject and essentially required for the civil engineering diploma graduate to work effectively on the Civil Engineering field.

2. COMPETENCY

At the end of studying this course Students should be able to

“Prepare detailed estimate, bar bending schedule, road estimates and provide consultancy services for the society”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical	Total	
			C	ESE	PT	(OR)#	PA (TW)	150
3	--	4	7	80	20	25	25	
Duration of the Examination (Hrs)				4	75 mins.	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course Students should be able to

1. Make use of I. S. 1200 Codes in preparations of Estimates and to Interpret data from the drawings of a building and other structures for Estimating.
2. Prepare approximate estimate for purpose of administrative approval.
3. Prepare detailed estimate for purpose of technical sanction.
4. Design and draw bar bending schedule for various structural members.
5. Conduct market survey for rates of materials, labors and hire charges for equipments required for rate analysis and carry out rate analysis.
6. Compute quantity of earth work for road sections.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit-I Introduction	1a.Compile clauses of IS 1200 and rates from PWD DSR. 1b.Practice use of modes of measurements and deduction rules in finding quantities of various items of work. 1c.Compare types of estimates.	1.1Estimating and Costing: Meaning, purpose of estimate, data required for estimating and costing. PWD-DSR. 1.2Modes of measurement: Standard modes of measurements / unit of measurements of different items of Civil Engineering Works as per I.S. 1200. General principles for deciding units of measurementAccuracy expected Deductions rules for plastering, pointing and masonry works. 1.3Types: Types of estimates and uses. Approximate estimate, detailed estimate, revised estimate, supplementary estimate and annual maintenance and repair estimates.
Unit- II Approximate Estimate	2a.Justify the cost of construction/ funds required. 2b.Compare different methods of estimation. 2c.Prepare the approximate estimates of projects. 2d.Prepare proposals for administrative approvals.	2.1Approximate Estimate: Meaning, necessity, uses, stages of preparation of approximate Estimate 2.2Methods of Approximate Estimate: Methods for preparations of approximate Estimate. Plinth area method, cubical content method, service unit method, typical bay method, Approximate quantity Method. 2.3 Approvals: Administrative approval, Technical sanction and budget provisions. 2.4Steps: Steps for calculations of

		approximate cost of different projects. Simplenumerical.
Unit– III Detailed Estimate.	3a.Compute quantities in standard measurement sheet. 3b.Calculate costs of items and estimated cost in standard abstract sheet. 3c.Categorise different methods of quantity calculations. 3d.Prepare detailed estimates of buildings, roads, septic tank and community well.	3.1 Detailed Estimate: Methods of detailed estimate such as Unit quantity method, total quantity method, steps in detailed estimate and factors affecting detailed estimate, data required for estimation. 3.2 Provisions: Provisions for Contingencies, Work Charged Establishment in the detailed estimate. Lump sum provisions Prime cost. Provisional sum and extra items, Necessity of provision for additional percentage for Electrification, water supply and sanitation in the estimate. Preparation of abstract sheets and face sheet/recapitulation sheet. 3.3 Checks: preparation of checklist of items. Estimates for load bearing, framed structure building, W.B.M road and septic tank / community well. 3.4 Methods of taking out quantities, Long wall and short wall method and Centre line method. Calculation of quantities of different items of works and abstracting for probable cost of the work by referring latest schedule of rates and IS 1200, of load bearing / framed structure small building plan.(Reinforcement quantities to be calculated on percentage basis)
Unit IV Reinforcement Computation	4a.Enlist various bends and extra length calculation method. 4b.Reading and interpreting drawings, reinforcement types and calculate length of bars, per meter weight of bars etc 4c.Prepare bar bending schedule.	4.1 Meaning, necessity and procedure of calculation of steel reinforcement. 4.2Computation of quantity of steel for Lintel, Slab, Beam, Column and footing from the given drawing/plan. 4.3 Preparation of bar bending schedule(BBS)
Unit - V Analysis of Rates	5a.Collect market rates of materials and labours. 5b.Tabulater the task-work of skilled, semiskilled and unskilled labours, and transportation capacities.	5.1 Analysis Of Rate: Meaning, factors affecting rate analysis, materials and labor rates. 5.2 Data and factors: Task work, category of labours, factors affecting the task work, transportation capacities and Lead

	5c. Compose the steps of rate analysis considering water charges and contractors profit. 5d. Prepare the analysis of rates of important items of works	&Lift considerations. 5.3 Preparations: Rate Analysis of important Items of Civil Engineering Works of residential building
Unit – VI Earthwork computation	6a. Enlist and compare the methods of computation of earthwork. 6b. Compute earth work quantities for road, canals and embankments. 6c. Listing software available / used in practice for quantities and cost calculations.	6.1 Earthwork computation: Meaning, necessity, applications and methods of earthwork computation. 6.2 Computation: Taking out quantities of earthwork for a small portion of road / canal / percolation tank / railway embankment from the given drawing by using methods. Prismoidal formula, Trapezoidal formula, Mean area method, Mid-sectional area method. 6.3 Software: Introduction to software in estimating and costing.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Introduction	04	02	02	00	04
II	Approximate Estimate	06	04	04	04	12
III	Detailed Estimate	16	08	08	08	24
IV	Reinforcement Computation	10	04	06	06	16
V	Analysis of Rates	06	02	06	04	12
VI	Earthwork computation	06	02	04	06	12
	Total	48	22	30	28	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Refer I.S. 1200 for mode of measurements / deduction rules. Collect market rates of materials, labours and equipment's along with PWD-DSR. (Attach Xerox / print-out / hand written)	06
2	II	Prepare Approximate Estimates for various civil Engineering works using different methods.	04
3	III	<p>Prepare Check list of any one of the following of Civil works.</p> <p>a) Framed structure type building</p> <p>b) W. B. M. Road.</p> <p>2. Taking out quantities of main items of works of two / three/four-room load bearing simple building by long wall and short wall method and entering them in standard measurement sheet.</p> <p>Suggested items i) Earthwork ii) PCC bed concrete iii) UCR masonry iv) DPCv) Brickwork in superstructure.</p> <p>3. Taking out quantities of main items of the works of load bearing building (Two rooms) by centre line method and entering them in standard measurement sheet.</p> <p>Suggested items i) Earthwork ii) PCC bed concrete iii) UCR masonry iv) DPCv) Brickwork in superstructure.</p> <p>4. Detailed estimate (Measurement + Abstract sheet) of ground floor only for Frame type residential building 1BHK and calculating per sq.m Cost of the building for reference and comparison. (RCC component / steel quantities on percentage basis)</p>	26
4	IV	Calculation of quantity of steel and preparing bar bending schedule (BBS) for various structural members like Footing, column, beams, slab, lintels, chajjas.	10
5	V	Prepare rate analysis of any five important items from building works.	10
6	VI	<p>a) Estimating quantities of earthwork for road/canal from the drawing. (Small problem is preferred)</p> <p style="text-align: center;">OR</p> <p>a) Taking out quantities of different items for a Community well / Septic Tank from the drawing.</p> <p>b) Micro project: Listing the software in estimating and costing. Solve simple numerical using MS Excel or prepare small program in EXCEL for estimation of small work.</p>	08
		Total	64

8.SUGGESTEDSTUDENTS ACTIVITIES

Following are the list of proposed student activities like:

1. Collect PWD – DSR, IS 1200.
2. Local market survey for rates.
3. Read standard specifications.
4. Collect drawings required well in advance. .
5. Prepare and practice foundation plans.
6. Refer PWD prepared preforms for detailed estimates.
7. Group discussions on different units of curriculum.
8. Solve problems from sample question papers.
9. Test your estimating skills from the concerned teacher.
10. Practice small problems and count the time required to solve it.
11. Solve simple numerical in MS Excel.

9.SUGGESTEDSPECIFIC INSTRUCTIONAL STRATERGIES

1. State the importance of professional skills..
2. Help the students in collection of DSR, IS 1200.
3. Give assignment to local market survey of labor and materials.
4. Motivate students to use internet searching (DSR and Software available)
5. Show the ready prepared standard estimates.
6. Arrange expert Lecture of PWD authorities.

10.SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1	Estimating and costing	B.N. Dutta	USB New Delhi
2	Civil engineering contracts And estimate	B.S.Patil.	Orient Longman
3	Estimating, Costing, Specification & Valuation	M.Chakraborty.	
4	Estimating & Costing	S C. Rangwala	Charotar Pub.
6	Estimating & Costing	Birdie G.S.	---
7	Estimating and costing	J.R. Muley	Vrunnda Pub.

11. REFERENCES

Sr No	Title of Book	Author	Publication
1	Standard specification	PWD	PWD
2	Standard mode of measurements	I.S. 1200	I.S.
3	P.W.D. Hand book /D.S.R.	PWD Current year.	PWD

12. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

1. Public Works Department Schedule of rates for the current year.
2. I.S. 1200
3. PWD standard specifications(handbook)
4. Demonstrations / expert lecture of estimating software.

13. LEARNING WEBSITES& SOFTWARE

- i. <http://www.mahapwd.com>
- ii. www.midcindia.org
- iii. <http://www.wrd.maharashtra.gov.in>
- iv. <http://www.mjp.co.in>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	1. Make use of I. S. 1200 Codes in preparations of Estimates, also able to interpret data from the drawings of a building / other structures for estimating.	3	3	--	3	--	--	--	2	2	2	--	2
2	Prepare approximate estimate for purpose of administrative approval.	3	3	2	--	--	--	1	2	2	2	---	2
3	Prepare detailed estimate for purpose of technical sanction	3	3	3	2	2	--	2	2	2	2	1	---
4	Design and draw bar bending schedule for various structural members.	3	3	3	3	1	--	2	--	--	2	2	2
5	Conduct market survey for rates of materials, labours and hire charges for equipments required for rate analysis and carry out rate analysis.	3	3	2	--	2	--	--	2	--	--	2	2
6	Estimate quantity of earthwork for road sections.	3	3	3	2	2	--	--	2	--	--	2	2

Course Curriculum Design Committee

Sr. No	Name of the faculty members	Designation and Institute
1	Smt.J.S.Patil	H.O.D.Civil Engineering, Govt. Polytechnic, Aurangabad
2	Shri.Y.N.Shaikh	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : DESIGN OF REINFORCED CONCRETE STRUCTURES

COURSE CODE : 6C 412

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALE:

Reinforced concrete is widely used construction material for different Civil engineering structures such as residential buildings, public buildings, dams, bridges etc. It is essential for civil engineers to study properties of concrete and steel and understand behavior of structural components under different loading conditions. The diploma graduates should be aware of the basic concepts & philosophies of RC design. He/She should be familiar with relevant BIS codes for designing simple RCC structural components and preparation of structural drawings and detailing.

2. COMPETENCY:

At the end of studying this course students will be able to,

Design simple RC components using limit state method & draw detailing.

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE@ (OR)	PA (TW)	150
4	-	2	6	80	20	--	50	
Duration of the Examination (Hrs)				4	1.25	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES :

At the end of studying this course students will be able to: -

1. Explain philosophy of limit state design.
2. Analyze, design and draw detailing of rectangular and tee section for flexure.
3. Analyze, design and draw detailing of slabs
4. Analyze, design and draw detailing of axially loaded short columns and pad footing.

5.DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Fundamental Concepts	1a. Compare RC and steel structures 1b. Use appropriate grades of concrete, and cover for given exposure condition. 1c. Determine design strength and design load using relevant partial safety factors	1.1 Introduction of reinforced concrete, importance of RC material, advantages and disadvantages of RC structures in comparison with steel structures 1.2 Objectives of structural design, various grades of concrete and steel, Necessity of steel in concrete, location of reinforcement for beams, slabs and footing RC sections. Cover to reinforcement and exposure conditions as per IS 456-2000. 1.3 Limit state design philosophy, types of limit states, partial safety factor for material strength and loads, characteristic strength, characteristic load, design load, 1.4 Various loads on structures as per IS 875-2000.
Unit- II Limit State of Collapse for Flexure: Beam	2a. Identify the type of RC section for given data 2b. Determine moment of resistance for singly and doubly reinforced sections for given data. 2c. Design singly and doubly reinforced sections for given data. 2d. Determination of moment of resistance for Tee section when neutral axis lying in flange only.	2.1 Assumptions in limit state of collapse for flexure. 2.2 Singly reinforced rectangular beam section: Stress and strain diagram, stress block parameters, concept of under reinforced, balanced and over reinforced sections, Equations (no derivation) for balanced section. ($X_{u,max}$, X_u , $M_{u,lim}$), Problems on determining moment of resistance of section, design of simply supported, cantilever beams for given loading conditions. 2.3 Doubly reinforced rectangular section: Meaning and condition for doubly reinforced section, stress strain diagrams, problems on analysis and design of doubly reinforced section. 2.4 Singly reinforced Tee section: General features, condition for formation of Tee section, advantages of Tee section over

		rectangular section, stress and strain diagram, width of flange as per IS456-2000 Determination of moment of resistance with neutral axis lie within or up to bottom of flange only.
Unit– III Design of beam for limit State of Collapse for shear and bond	<p>3a. Using IS code provisions design RC beam for shear and draw detailing for given data</p> <p>3b. Apply check for development length for given situation as per provisions of IS 456-2000</p> <p>3c. Sketch various forms of bends and hook as per IS provision</p>	<p>3.1 Diagonal cracks due to shear, necessity of shear reinforcement, nominal shear stress, maximum shear stress, design shear strength of concrete, various types of shear reinforcement.</p> <p>3.2 IS code provision for minimum shear reinforcement, shear strength of vertical stirrups and bent-up bar, minimum and maximum spacing of stirrups, design of shear reinforcement using vertical stirrups and bent bar.</p> <p>3.3 Concept of bond and its type, importance of bond, bond stress, types of bond length, end anchorage and its need, hook or bend in terms of 45 degree, 90 degree and 180 degree bend, development length in tension, compression, and flexure, lap length as per IS 456-2000.</p>
Unit– IV Design of slab	<p>4a. Classify slabs for given data.</p> <p>4b. Design one way simply supported slab for given data and draw detailing.</p> <p>4c. Design two way simply supported slab for given data and draw detailing.</p> <p>4d. Design one way cantilever slab for given data and draw detailing.</p> <p>4e. Plan and Design dog-legged staircase for given data and draw detailing.</p>	<p>4.1 Definition and classification of slabs as one way and two way slabs, support conditions, IS 456-2000 provisions for deflection control, effective span, diameter of bar and spacing</p> <p>4.2 Design and detailing of one way simply supported slab, checks for deflection, development length and shear.</p> <p>4.3 Design and detailing of two way simply supported slab with corners free to lift, checks for deflection, development length and shear.</p> <p>4.4 Design and detailing of cantilever slab, checks for deflection, development length and shear</p> <p>4.5 Planning of dog-legged staircase, recommendations of IS 456-2000 for effective span. Design and detailing of dog-legged stair spanning longitudinally.</p>

Unit - V Design of column	5a. Classify the column for given data. 5b. Calculate load carrying capacity of axially loaded column for given data 5c. Design of axially loaded short column for given data.	5.1 Assumptions in limit state of collapse in compression, short and long columns, unsupported and effective length of column, check for minimum eccentricity, minimum and maximum reinforcement requirements as per IS 456-2000 provisions. 5.2 Calculate load carrying capacity of axially loaded column 5.3 Design of axially loaded short column having square, rectangular and circular cross section with lateral ties
Unit – VI Design of footing	6a. Locate critical sections in design of footing 6b. Design axially loaded square footing of uniform depth.	6.1 Types of footing, safe bearing capacity, ultimate bearing capacity, allowable soil pressure of soil, critical sections for deciding depth of pad footing. 6.2 Design of isolated square footing with uniform depth for flexure, one way shear and two way shear, check for bond length and draw detailing.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R Level	U Level	A Level	TOTAL
I	Fundamental Concepts	04	2	4	--	06
II	Design of beam for limit state of Collapse for flexure	10	2	4	6	12
III	Design of beam for limit State of Collapse for shear and bond	14	2	6	10	18
IV	Design of slab	20	2	4	18	24
V	Design of column	08	--	4	6	10
VI	Design of footing	08	2	2	6	10
	Total	64	10	24	46	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:**Term work:**

The term work shall be based on contents of curriculum.

1. Writing the clauses and recommendations of code IS 456 2000 about design and detailing of beam, slab, column, stair and footing.
2. Writing the general specifications of various structural components like beam, column, footing, beam-column joints, column-footing joint of RC building subjected to seismic forces.
3. Sketching of reinforcement detailing of slabs, beams, column and column footing.
4. Prepare chart of moment of resistance, of commonly adopted beam sections.
5. Prepare chart of load carrying capacity of commonly adopted column sections

Also, visit nearby construction of residential or public building by preparing brief report including reinforcement detailing, concrete work etc.

The faculty of concern shall assess this work batch-wise

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Visit the RCC construction site and collect the information regarding grade of steel and concrete, commonly used diameters of reinforcing bars, their available lengths in market, unit weight of reinforcement.
2	Collect photographs/sketches of reinforcement detailing of slabs, beams. Columns, footings, staircase.
3	Visit the RCC construction site and collect schedules of footings, beams, columns, slabs

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- e. Use of video, animation films to explain concepts, facts.

10. SUGGESTED LEARNING RESOURCE:**A) TextBooks:**

S.No.	Name of Book	Author	Publication
1	Comprehensive Reinforced Concrete structures	B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications (P) Ltd, New Delhi
2	Limit State Theory and Design of Reinforced Concrete structures	Dr. V.L. Shah & Dr. S. R. Karve.	Structures Publications, Pune
3	Design of Reinforced concrete structures	S. Ramamruthum	DhanpatRai and Son
4	Reinforced Concrete Design Principles and Practice	N Krishna Raju & R. N. Pranesh	New Age International, Mumbai
5	Fundamentals of Reinforced concrete	N. C. Sinha & S. K. Roy	S. Chand & Company, New Delhi

B) Reference Books:

S. No.	Title of Book	Author	Publication
1	Reinforced concrete Design	S. U Pillai & Devidas Menon	Tata McGraw Hill
2	Advanced Reinforced concrete Design	N. Krishna Raju	CBS Publishers & Distributors Delhi
3	Limit State Design of Reinforced Concrete	Vaghrese P. C.	PHI learning Pvt. Ltd. Delhi
4	IS 456 2000	-----	Bureau of Indian Standards, New Delhi
5	IS 13920-2016	-----	Bureau of Indian Standards, New Delhi
6	Handbook on RCC SP 16, SP34	-----	Bureau of Indian Standards, New Delhi

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

12. LEARNING WEBSITE & SOFTWARE:

- i. nptel.ac.in/courses/122104015/
- ii. <https://www.youtube.com/watch?v=6nguX-cEsvw>
- iii. www.discoveryforengineers.com

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Explain philosophy of limit state design.	2	3	-									
2	Analyze, design and draw detailing of rectangular and tee section for flexure.	2	3			2				3			
3	Analyze, design and draw detailing of slabs	2	3			2				3			
4	Analyze, design and draw detailing of axially loaded short columns and pad footing.	2	3			2				3			

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Madhuri Ganorkar	Head of Applied Mechanics Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	R T Aghao	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- SEMINAR
COURSE CODE 6C501

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CE/ME/EE/ET/CO/IT/DD/AE	Fifth

1. RATIONALE

A technician is responsible for handling various resources like Man, Material, Machine and also for the quality supervision, construction and proper maintenance of different civil engineering structures in various areas of civil engineering. While working in the industry a technician is employed for planning, preparation, supervision, and quality control. Arrangement and handling of materials, labours and equipments are also the role of a technician. Seminar will help in enhancing the knowledge & skills of the technicians in recent advancements in Civil Engineering and also improves presentation and communication skills.

2. COMPETENCY

The students must be able to....

“Handle human resources and communicate effectively in Civil Engineering profession.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE @ (OR)	PA (TW)	75
-	-	2	2	--	--	25@	50	
Duration of the Examination (Hrs)				--	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – **Progressive Test**, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course

1. Becomes professionally competent.
2. Acquire effective communication and presentation skills.
3. To create awareness about latest technological aspects.
4. To improve skills related to searching on internet.
5. To realize importance of basic technological aspects.

5. DETAILED COURSE CONTENTS

- 1 Student studying in Final year civil engineering program has to select topic for seminar presentation of his/her interest under guidance of teaching faculty members , which shall be finalized by guide and approved by concerned Head of department.
- 2 Student has to prepare and submit short (One Page) abstract of the selected seminar topic. Further guidance shall be give the allotted faculty members.
- 3 Finally the students shall prepare the report of his seminar under the guidance of the teaching staff members (Maximum 35 pages) which may consists of observations, drawings, sketches, sample calculations / simple designs, processes, procedures, applications, managements, and costing aspects if necessary.
- 4 Student should deliver a seminar for 10 to 15 minutes preferable by ppt / model / charts etc of his selected topic followed by question and answer session of 5 minutes.
- 5 Evaluation will be done on the basis of Seminar topic, contents, communication presentation skills and response to questions asked at the end of presentation.

6 LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	1	Term work Identify the topic related to civil Engineering field/ construction industry.	04
2.	2	Literature survey and Analysis of data collected.	08
3	3	Identify methodology, do comparative study of various methods, identify related case study.	08
4	4	Preparing rough draft along with collected drawings. maps and designs / calculations or tables etc.	04
5	5	Prepare Final draft with attachments. Binding and term work completion.	04
6	6	Presentation in presence of guide and Head of the Department.	04
Total Hours.			32 hrs

7 SUGGESTED STUDENTS ACTIVITIES

i) Aspects to be considered for report writing

- To study recent developments and technological advances in Civil Engineering field.
- Develop the Entrepreneurial skills.
- Develop communication skills.
- To enhance the presentation skills
- Seminar reports preparations & cost analysis.

II) SUGGESTED AREAS FOR THE SEMINAR FOR CIVIL ENGINEERING PROGRAMME:

SR. NO	AREA OF CIVIL ENGINEERING	SUGGESTED CONSTRUCTIONS / SITES
1	Building construction system.	Low Cost Housing Smart City / Smart village Slum area development Apartments / flats / row houses Multiy story buildings. Construction of Malls / sports complex. Special repairs of buildings Interior decoration of buildings
2	Transportation engineering system	Highway construction and machinery. Railway track maintenance. Air port run-way construction. Tunnel construction. Fly-over construction. Bridge maintenance.
3	Irrigation engineering system.	Percolation tank. Canal maintenance. Flood Studies. Cross drainage works. Waste weirs / Bandhara..
4	Environmental engineering system	Municipal water supply Maintenance of drainage line. Industrial pollution. Solid waste pick-ups.and disposal system. Construction of swimming tank / water park. Rehabilitation work.
5	Structural engineering	Ready Mix Plant. Over head RCC water tank Testing of materials in Government / Private Concrete roads / bituminous roads Maintenance of Concrete / bituminous roads Sugar factory / Industrial shed construction..
6	Any other Civil Engineering area and work area related to Government schemes. Society problems / current case study.	Current Projects of Government or Private firms, etc National and State policies like skill India, PMKVY ,Digital India, Smart villages, Smart city, etc.

8 SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

- i. Do literature survey and identify area of interest for seminar preparation.
- ii. Visit the site if required.
- iii. Search on internet for information gathering.
- iv. Prepare sketches, layouts in AUTOCAD if required.
- v. Collect drawings and prepare estimates if needed.
- vi. Do comparative study of methods, identify case study etc
- vii. Prepare report of seminar as per above instructions.
- X Prepare power point presentation of Seminar topic.

SEMINAR REPORT FORMAT

1. Seminar report shall be in the print form on A-4 size white bond paper.
2. Typing shall be in Times New Roman with spacing of 1.5 using one side of paper.
3. Margins: Left = 37.5 mm Right , Top and Bottom = 25mm.
4. Front page : Titles - TNR 18 bold , other – TNR 14 bold. With Institute Logo.
5. Inner Pages : Titles –TNR – 14 Bold , other TNR 12 .
6. Page Nos :Should appear on the right hand top corner of each page starting after index page.
7. Tables to be preferable in the Text format only.
8. Sketches to be drawn on separate sheet / pages in black ink .
9. The Last content in the index to be of references. Acknowledgement to be added in the report.
10. Binding: Spiral binding is preferred for the seminar report. The number of copies are to be prepared by the student are 3 nos. (Student + Guide + Department copy)

9 SUGGESTED LEARNING RESOURCE

Visit to institute library to find the related text books.

Sr No	Title of Book	Author	Publication
1	As per site details / area of Seminar	Related reference books / I.S. codes , Hand books etc	Under guidance of faculty members.

10. Major Equipment/ Instrument with Broad Specifications

1. Demonstrations / Explanations at site by experts and faculty.
2. Observations and collections at site.

11. Learning Websites

Search on WEB for related construction sites. Take guidance from faculty members.

12.LEARNING WEBSITE & SOFTWARE

1.www.google.com

2.www.youtube.com

websites related to seminar topic

13 MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No.	CO. NO.	Course Outcome	Program Outcomes										Pr. Sp. Outcomes	
			1	2	3	4	5	6	7	8	9	10	1	2
1	1	Becomes professionally competent.	--	3	--	3	--	--	--	--	--	--	--	2
2	2	Acquire effective presentation and communication skills.	--	1	--	---	--	--	--	--	--	--	--	2
3	3	To create awareness about latest technological aspects.	---	-	3	3	--	---	--	1	--	--	1	
4	4	To improve skills related to searching information on internet.	--	2	3	--	--	--	---	--	--	--	2	2
5	5	To realize importance of basic technologies.	--	3	--	--	--	--	--	2	--	--	2	2

Sr No 1 Name of the faculty members Smt.J.S.Patil Designation and Institute Head of Department Civil Engineering.Govt.Polytechnic,Aurangabad.

. Shri. Y.N.Shaikh Lecturer in Civil Engineering, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- TOWN PLANNING & MUNICIPAL ENGINEERING

COURSE CODE- 6C505

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALE

Urbanization and industrialization are complementary to each other and are instrumental in the socio economic growth of a nation. India being a developing nation, has been witnessing a fast growth in towns /cities. Systematic planning and execution of town plans will ensure that towns develop in an orderly manner and provide comfortable living environments.

Town Planning Authorities have to ensure that slums are prevented from formation , however the evils that creep in during growth of town need to corrected by proper timely interventions .

Diploma civil engineer in several situations is required to assist in activities related to town planning . Therefore he /she is required to understand modern day towns & town planning process, development plans of towns. He /She is required to develop basic competencies related to town planning so as to make himself/herself competent to assist the town planner.

2. COMPETENCY STATEMENT

At the end of studying this course students will be able to

“Assist Town Planner in town planning process”.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE #(OR)	PA (TW)	
3	-	2	5	80	20	25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination

4. COURSE OUTCOMES (COs)

1. Use Objectives and Principles in Town Planning.
2. Collect and Tabulate data related to socio economic aspects of town planning.
3. Comprehend Zoning in town planning.
4. Outline Housing layout and Slum development.
5. Comprehend Various Centers of Town & Communication System of Town
6. Delineate Development Plan of a town.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Introduction of Town Planning, Objectives /principles of Town Planning	1a Identify main parts of town 1b Identify elements of Town.	1.1 Necessity and importance of town planning, 1.2 Historical developments in town planning, 1.3 Objectives and Principles of town planning, 1.4 Growth of existing towns, types -. Horizontal and vertical, satellite towns, garden city 1.5 Main parts of town such as town center, suburbs, industrial areas, communication networks, open spaces. 1.6 Elements of town: Communication, built up area, open areas, public services, public amenities distribution of land, with the help of pie diagram..
Unit– II Surveys and Zoning	2a Identify data required for socio economic survey 2b Use survey instrument 2c Collect and present data for town planning. 2d Outline Zoning process.	2.1 .Necessity of surveys, objectives of surveys, 2.2 Types of survey: physical survey, social survey, economic survey, 2.3 Collection of data/ information using survey instruments or questionnaire methods of data collection suitability of survey instrument. 2.4 Tabulation of data, presentation of data, analysis and inference of data Reporting of survey work 2.5 Definition, importance of zoning Classification of zoning- Use zoning , residential, commercial zone, civic zone, imitational zone, recreational zone, 2.6 Height zoning- 45 ⁰ rule, 63.5 ⁰ rule, Density zoning- gross density, net density, estimating net and gross density. 2.7 Zoning powers, color coding to indicate

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		different types of zones.
Unit– III Housing and Slums	3a Outline a Neighborhood 3b Outline a Housing Layout. 3c Identify causes and effects of slum formation..	3.1 Introduction, Classification of housing, 3.2 Neighborhood planning, principles, Typical Neighborhood, 3.3 Layout of housing, Reilly plan, Radburn plan, Cul De sac, 3.4 Concept of slum, causes and effects of slum formation, 3.5 Slum development & precautions against formation of slum. 3.6 Slum Clearance, slum development schemes. Improvement method, complete removal method
Unit– IV Public Building, Parks Playgrounds and Industries	4a Outline Layout for public buildings. 4b Identify various Town Centers. 4c Outline park system.	4.1 Types, site selection, grouping, public building complex, 4.2 Typical layout of a complex of public buildings. 4.3 Town center- elements, Markets, Shopping center ,amenities, . Necessity , types- active, passive recreation, Types, classification, 4.4 Types, classification, Selection of site for an industrial estate, 4.4 typical layout of an industrial estate, planning for an industrial estate, industrial township, 4.5 Selection of site for parks, Forms of recreation amenities, park layout, park recreation amenities. 4.6 Park layout, park design, standards of open spaces, Design of a park for a neighborhood.
Unit– V Communication System & Traffic Management	5a Classify Road/ Communication system of town. 5b Identify various elements / of Communication system for town. 5c Assist for management of	5.1 Need for communication and transportation facilities, 5.2 Functions of communication system, 5.3 Requisites of city roads, factors in town road design, 5.4 Classification of town roads- arterial, sub arterial, local roads, ring roads, other roads, 5.5 street systems, types, layout. 5.6 Traffic management, necessity, objectives

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	<p>traffic system for town</p> <p>5d Prepare parking system for neighborhood .</p>	<p>traffic surveys,</p> <p>5.7 Traffic congestion- causes, remedies,</p> <p>5.8 Traffic control- traffic segregation, road junction, types,</p> <p>5.9 Parking signs, facilities, space requirement, traffic signs, signals, marking,</p> <p>5.10 Street lighting, lighting patterns.</p>
Unit- VI Master Plan of Town and Acts & Bye Laws	<p>6a Outline process of developing master plan of a town.</p> <p>6b Identify building bylaws & various acts related to town planning.</p>	<p>6.1 Definition, objective, necessity of Master plan,</p> <p>6.2 Data to be collected, maps to be prepared,</p> <p>6.3 Stages in preparation of master plan,</p> <p>6.4 Typical master plan, features of master plan,</p> <p>6.5 Urban renewal and re planning the existing towns,</p> <p>6.6 Objects of re planning, data to be collected,</p> <p>6.7 Sanction of development plan, Building</p> <p>6.8 byelaws, provision of building regulation, functioning of local authority,</p> <p>6.9 Smart City & Main features of Smart City Mission of Govt. of India</p> <p>6.10 Land acquisition act, payment to damage, compensation, betterment contribution,</p> <p>6.11 Bombay town planning act, model town planning act 1957.</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction of Town Planning, Objectives /principles of Town Planning	6	4	6	--	10
II	Surveys and Zoning	8	4	4	4	12
III	Housing and Slums	6	4	6	4	14
IV	Public Building, Parks Playgrounds and Industries	8	4	6	4	14
V	Communication System & Traffic Management	12	4	6	6	16

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
VI	Master Plan of Town and Acts & Bye Laws	8	4	6	4	14
	Total	48	24	34	22	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

S. No.	Unit No.	Practical Exercises/ Outcomes	Approx. Hrs. required
1	2	Prepare a questionnaire for socio economic survey of a town/village.	4
2	2	Collect , tabulate and analyze socio economic data of an underdeveloped area of town or a village to find the developmental needs of the area/village.	6
3	3	Identify various elements / aspects of neighborhood through visit and analyzing map of neighborhood.	4
4	4	Prepare an Outline of a Park of a neighborhood showing important features of the park	2
5	3	Prepare an Outline of a Housing layout.	4
6	5	Identify different types of roads of a city given the map showing communication network.	2
7	4	Prepare a layout map to show a campus of public building showing frontage and parking area.	2
8	6	Identify documents /maps required to be submitted for starting a new construction project conforming to bye laws of local government.	2
9	6	Present main features of Smart City Mission of Govt. of India	2
		Total =	32

8. SUGGESTED STUDENT ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of

various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

Following is the list of proposed student activities like:

Prepare questionnaire for different types surveys for town planning

- a. Collect data for socio economic survey of a slum for development
- b. Prepare housing layout of neighborhood where students are living
- c. Collect master plan of town
- e. Collect byelaws /acts related town planning .

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

Visits to planned city

Expert guidance

Hands on experiences on field. :

Collection, tabulation and interpretation of field data.

Collection, byelaws/acts.

Interpretation of maps/ results of survey

10. SUGGESTED LEARNING RESOURCES

Books

S. No.	Title of Book	Author	Publication
1	Fundamentals of Town Planning	G.K Hiraskar	Dhanpatrai
2	Text book of Town Planning	S.C. Rangwala	Charotar
3	Town and country planning and housing	N.V. Modak	---
4	Town and country planning and housing	Gandhi	---

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED

None (Nil)

12. LEARNING WEBSITE & SOFTWARE

Ministry for Urban Development : moud.gov.in/

Department of city planning : www.nyc.gov/planning

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	CO. NO.	Course Outcome.	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
			1	2	3	4	5	6	7	8	9	10	1	2
1	CO1	Use Objectives and Principles in Town Planning.	-	2	-	-	2	--	1	1	2	2	--	--
2	CO2	Collect and Tabulate data related to socio economic aspects of town planning.	-	-	1	2	2	--	1	3	3	--	--	--
3	CO3	Comprehend Zoning in town planning	1	1	-	-	2	--	-	--	1	1	--	--
4	CO4	Outline Housing layout and Slum development.	1	2	-	-	2	1	-	3	2	1	--	1
5	CO5	Comprehend Various Centers of Town and , Communication System of Town	-	1	-	-	2	--	-	--	1	--	--	--
6	CO6	Delineate Development Plan of a town	-	2	-	-	2	--	-	1	1	--	--	1

Sr No	Name of the faculty members	Designation and Institute
1	Shri.K.S.Borde	Lecturer in Civil Engineering, Govt. Polytechnic,Aurangabad
2.	Shri. S.S.Ragte	Lecturer in Civil Engineering, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE: ENVIRONMENTAL POLLUTION AND CONTROL
COURSE CODE: 6C506

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALS:-

Environmental pollution and control provides knowledge about the environment, ecosystem, various types of pollution and its effects. This course also provides the ways of pollution control and environmental conservation by using technology, eco friendly practices, law and awareness.

2. COMPETENCY:-

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

“Apply the different practices, technologies and policies for pollution control”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	#(OR)	PA (TW)	150
3	--	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1.	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES:-

1. Managing man, material, equipment in civil engineering project by knowing environment, ecology and ecosystem.
2. Apply the various methods of wastewater disposal and treatment for water pollution control.
3. Describe the effects of air pollution and to apply various techniques for air pollution control.
4. Describe the soil and noise pollution and its possible effects along with various methods and practices of its control.

5. Suggest the ways for attaining sustainable development in various civil engineering projects.
6. Apply environmental laws, regulations, efforts and ethics for environmental conservation.

5. COURSE DETAILS:-

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
D) INTRODUCTION ABOUT ENVIRONMENT AND POLLUTION	1.1. Define Environment, Ecology Pollution, Biodiversity, global warming. 1.2 Explain the Ecosystem 1.3. State the effects of various civil engineering projects on environment. 1.4. State the effects global warming	1.1 Define: Environment, Ecology, Pollution, Global warming, climate change ,Biodiversity, Acid Rain, Ozone depletion 1.2 Classification of environment 1.3 Ecosystem and its types 1.4 Benefits of biodiversity. 1.5 Describe the renewable and non renewable sources of energy 1.6 Describe term deforestation and its effect. 1.7 Types of pollution 1.8 Effects of various civil engineering projects on environment. 1.9 Impact of global warming.
II) WATER POLLUTION	2.1 Explain the Sources of water pollution and its effects. 2.2 General standards for discharge of effluents as per CPCB. 2.3 Describe the Characteristics of wastewater and its sources . 2.4 Explain the Methods of wastewater Disposal. 2.5 Explain the Methods of wastewater treatment 2.6 State the Factors for selection of wastewater treatment method 2.7 Compare Natural and Mechanical methods	2.1 Define: Pure water, Polluted water, wastewater, 2.2 Types of water pollution. 2.3 Sources of water pollution and its effects : 2.3.1 Domestic wastewater. 2.3.2 Industrial wastewater. 2.3.3. Agricultural chemicals, 2.3.4 Thermal and radioactive waste 2.3.5. Biodegradable and Non-Biodegradable 2.3.6 Eutrophication 2.3.7 Biological Magnification. 2.3.8. Heavy Metals. 2.3.9 Biological contamination of water. 2.4 General standards for discharge of effluents as per CPCB: Suspended solids ,TDS,pH,Oil and grease,BOD,COD,Ammonia,chloride, Fluoride, Sulphate,Ammonical Nitrogen, Total Kjeldahl Nitrogen ,pesticides,Arsenic 2.5 Characteristics of wastewater and its

	wastewater treatment	<p>sources .</p> <p>2.6 Natural Methods of wastewater Disposal</p> <p>2.7 Self purification of natural stream</p> <p>2.8 various units/process of wastewater treatment its applications and flow chart for wastewater treatment</p> <p>2.9 Methods of wastewater treatment</p> <p>2.9.1 Natural Methods</p> <p>2.9.2 Mechanical methods</p> <p>3.0 Methods of Industrial wastewater treatment</p> <p>3.1 Factors for selection of wastewater treatment method.</p>
III) AIR POLLUTION	<p>3.1 Define Air Pollution, Aerosol, Dust, Droplet, Fly-ash, Fog, Fume, Mist, Particle, green house gases ,Smok, Soot, Vapour</p> <p>3.2 Describe the Sources of Air Pollution</p> <p>3.3 Explain the Effects of Air Pollution</p> <p>3.4 Explain the Methods for controlling the air Pollution</p>	<p>3.1 Define: Air Pollution, Aerosol,Dust,Droplet,Fly-ash,Fog,Fume, Mist, Particle,green house gases ,Smoke,Soot, Vapour</p> <p>3.2 Sources of Air Pollution: Natural Sources, Man-mad sources.</p> <p>3.3 Effects of Air Pollution :</p> <p>3.3.1 Humans and Animals</p> <p>3.3.2 Material</p> <p>3.4 Units of Air Pollutants</p> <p>3.4 Methods for controlling the air Pollution .</p>
IV) SOIL & NOISE POLLUTION	<p>4.1 Describe the Sources of Soil Pollution.</p> <p>4.2 Explain the Effects of Soil Pollution.</p> <p>4.3 Explain the Methods for soil pollution control.</p> <p>4.4 Describe the Sources of Noise Pollution.</p> <p>4.2 Explain the Effects of Noise Pollution.</p> <p>4.3 Explain the Methods for Noise pollution control.</p>	<p>4.1 Define soil pollution and its causes</p> <p>4.2 Sources of Soil Pollution</p> <p>4.3 Effects of Soil Pollution</p> <p>4.4 Methods for soil pollution control.</p> <p>4.5 Define Noise Pollution</p> <p>4.6 Sources of Noise Pollution</p> <p>4.7 Effects of Noise pollution</p> <p>4.8 Noise pollution control measures.</p>
V) SUSTAINBALE DEVELOPME NT	<p>5.1 Describe the Concept of Sustainable development 5.2 State the Need for Sustainable development</p>	<p>5.1 Concept of Sustainable development</p> <p>5.2 Need for Sustainable development</p> <p>5.3 Goals of sustainable development</p> <p>5.4 Sustainable development in various construction project: Road, Building, Dam,</p>

	5.3 State the Goals of sustainable development 5.4 Explain Sustainable development in various construction project: Road, Building, Dam, Railways 5.5 Describe the Environment Impact Assessment (EIA) and its process	Railways , Sustainable cities 5.5 Environment Impact Assessment (EIA) 5.5.1 EIA process
VI) ENVIRONMENT POLLUTION CONTROL	6.1 Explain the ways of pollution control 6.2 State and explain the Environmental Laws 6.3 Explain the policies for pollution control 6.4 Describe the Role of Individual in Pollution Control	6.1 Environment Management 6.2 Ways of Environment Pollution control 6.2.1 Environmental Ethics way 6.2.2 Technological way 6.2.3 Legal way 6.2.5 Social way 6.3 Environmental Laws 6.3.1 The Environment (Protection) Act 1986 6.3.2 The water (Privations and control of pollution)Act 1974 6.3.3 The Air (Privations and control of pollution)Act 1981 6.3.4 Constitutional provisions in India . 6.4 Global Environmental Movements 6.5 Precautionary Principle 6.5.1 Polluter Pay Principle (PPP) 6.5.2 Beneficiary Pay Principle (BPP) 6.5.3 Emission Trading 6.5.4 Carbon Trading 6.5.5 Provisions of ISO 14000 6.6 Role of Individual in Pollution Control

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	INTRODUCTION ABOUT ENVIRONMENT AND POLLUTION	06	06	04	04	14
II	WATER POLLUTION	13	10	08	04	22
III	AIR POLLUTION	05	06	04		10

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
IV	SOIL & NOISE POLLUTION	08	04	04		08
V	SUSTAINABLE DEVELOPMENT	08	02	04	06	12
VI	ENVIRONMENT POLLUTION CONTROL	08	08	04	02	14
	Total	48	36	28	18	80

Legends: R = Remembrance; U= Understanding; A= Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Literature collection related to Study of Ecosystems	02
2	II	Report writing Methods of wastewater treatment	02
3	III	Visit to Pollution control lab to study various air quality monitoring equipments.	02
4	IV	Prepare a report on Global environmental issues and its presentation	02
5	V	Prepare a report on National environmental issues its presentation	02
6	VI	Prepare a Report on local environmental issues its presentation	02
7	II	Visit report on ecosystem	06
8	V	Visit report on industrial /domestic effluent treatment plant	06
9	V	Visit report on solid waste treatment plant	04
10	VI	Arranging the Environment Awareness camp for society	04
TOTAL			32

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i) Collection of data regarding to Ecosystem, Pollution, Air and Water Quality Standards .
- ii) Study the various types of Methods of wastewater treatment
- iii) Presentation of data in the group
- iv) Arranging visits for understanding the Ecosystem, Methods of wastewater treatment
- v) Study the various environmental issues
- vi) Arranging the Environment Awareness camp

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i) Proper care should be taken while visiting to study the eco system, industrial /domestic effluent treatment plant solid waste, hazardous waste, biomedical waste.
- ii) During visits Observation should be accurately done.
- iii) Good quality of video,PPT , literature should be collected for group presentation.

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title and Edition	Author	Publisher
1	Environmental Studies	AninditaBasak	Pearson India Education Services Pvt.Ltd.
2	Environmental Studies	R.Rajagopalam	Oxford University Press New Delhi .
3	Air Pollution	M N Rao& H V N Rao	Tata McGraw Hill Education Private Limited.
4.	Wastewater Engineering	B.C.Punmia,ArunJain,Ashok Jain	Laximi Publication Ltd. New Delhi .
5	Water Pollution Causes ,effects and Control	P.K.Goel	New Age International Publishers, New Delhi .
6	Environmental Science and Engineering	Prentice Hall Peavy , H.S., Rowe, D.R., &Tchobanoglous, G. (1985).	Tata McGraw Hill Education
7	Environment Engineering	A Kamala & D L KanthaRao	Tata McGraw Hill Education
8	An Environment to be Proud Of?	Prof.Soli J. Arceivala	The Indian water works association , Mumbai Centre
9	Environment Engineering (Vol.II)	Santosh Kumar Garg	Khanna Publishers

11. Major Equipment/ Instrument with Broad Specifications

NIL

12. E-learning recourses:-

- <https://www.youtube.com/watch?v=xwFr2hWjo5s>
- <https://www.youtube.com/watch?v=FDNzhEAqxgc>
- <https://www.youtube.com/watch?v=i9L45sC20qk>
- <https://www.youtube.com/watch?v=uME-5LP4KJo>
- <https://www.youtube.com/watch?v=Ko0TWHKa14k>
- https://www.youtube.com/watch?v=YR80_aMOB-E

POs and PSOs assignment and its strength of assignment with each CO of the Course

No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Managing man, material, equipment in civil engineering project by knowing environment, ecology and ecosystem.	01				0 1	02					01		01
2	Apply the various methods of wastewater disposal and treatment for water pollution control.	01	01			0 1	02	01	01	01	01	01	01	
3	Describe the effects of air pollution and to apply various techniques for air pollution control	01	01			0 1	02	01	01	01	01	01	01	
4	Describe the soil and noise pollution and its possible effects along with various methods and practices of its control.	01				0 1	02	01	01	01	01			
5	Suggest the ways for attaining sustainable development in various civil engineering projects.		02			0 1	02					01		
6	Apply environmental laws, regulations, efforts and ethics for environmental conservation.	01				0 1	02					01		

Name and Designation of Course Designer:- 1. Dr. PRIYANAND AGALE

HOD

CDIC coordinator

COURSE TITLE- MICRO IRRIGATION ENGINEERING

COURSE CODE 6C507

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALE

The conventional methods of irrigation lead to considerable losses or wastage of water. Water resources are becoming scarce day by day. Civil Engineer has to use those proven methods irrigation which ensure productive use of water. Micro Irrigation system is best alternatives for country like India where water is not available in abundance. Therefore Civil Engineer has to plan, design, and supervise installations vis-à-vis commissioning of micro irrigation system to ensure optimum use of water resources for improving the productivity of irrigation systems.

2. COMPETENCY STATEMENT

At the end of studying this course students will be able to

“ Design, Install, Operate and Maintain Micro Irrigation Systems.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical		Total
L	T	P	C	ESE	PT	ESE #(OR)	PA (TW)	150
3	--	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – **Progressive Test**, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES (COs).

At the end of studying this course students will be able to;

1. Plan and Design Drip Irrigation Systems.
2. Supervise Installations and Commissioning of Drip Irrigation Systems.
3. Plan and Design Sprinkler Irrigation Systems
4. Supervise Installations and Commissioning of Sprinkler Irrigation Systems.
5. Maintain Micro Irrigation Systems.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Introduction	1a. Classify Irrigation methods 1b. Classify Micro irrigation.	1.1 Irrigation water application methods -gravity irrigation methods and pressurized irrigation methods, surface and subsurface water irrigation methods: border, check basin and furrow. 1.2 Micro irrigation methods sprinkler and drip irrigation systems. 1.3 Relative advantages and disadvantages of various irrigation methods.
Unit– II Design of drip irrigation system	2a. Identify / select parts for drip irrigation system. 2b. Design drip irrigation system. 2c. Prepare estimate for drip irrigation system.	2.1 Introduction to components parts of drip irrigation systems, Specifications and uses of components parts 2.2 Types of drip irrigation systems its applications soil, plant water relation , 2.3 Design aspect of drip Irrigation system, Typical layout of drip irrigation system in field 2.4 Determination of crop water requirement, irrigation schedule, irrigation cycle, Emitters types & selection ,selection of micro jet, , pump, 2.5 Design of laterals, sub main, main, filter unit, pump etc by using plot mainline chart and pump chart. 2.6 Preparation of cost estimate. (Simple numerical on above)
Unit– III Installation of drip irrigation system	3a. Supervise installation process of drip irrigation system. 3b. Identify the valves for drip irrigation system.	3.1 Introduction, Installation drawing, trenching work for main, sub main, foundation work for filter and pump unit. 3.2 Installation of filter main, sub main, laterals valves, Placement of dripper micro tube line source tubing (drip tape), Installation and commissioning of venturi tube, back wash and bypass. 3.3 Types and functions of control valves –gate valve, non return valves, air release cum vacuum breaker valves, foot valves. 3.4 Testing of drippers- for the Performance (pressure v/s discharge).

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit– IV Application of Chemical/ fertilizer Treatment and Maintenance of drip irrigation system	4a. Supervise Administration of Chemical/ fertilizer in drip irrigation system . 4b. Maintain drip irrigation system.	4.1 Function of venturi, preparation of acid solution as per water analysis report. treatment of bleaching powder or copper sulphate, use of ph paper. flushing of laterals sub main and back washing of sand filter, 4.2 Necessity of maintenance, general maintenance and maintenance of filters.
Unit– V Design of Sprinklers	a. Identify / select parts for sprinkler irrigation system. b. Design sprinkler irrigation system. c. Prepare estimate for sprinkler irrigation system.	5.1 Selection of sprinklers, selection and design sprinkler and laterals, 5.2 Design of sub main, design of main line, design of pump, determination of water requirement, irrigation schedule, irrigation cycle, 5.3 Preparation of estimate/ cost. 5.4 Operation of sprinkler Irrigation Systems. 5.5 Principle and Operating System as per Field and Crop Requirement

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	8	3	6	-	9
II	Design of drip irrigation system	16	6	6	10	22
III	Installation of drip irrigation system	10	3	9	4	16
IV	Application of Chemical/ fertilizer Treatment and Maintenance of drip irrigation system.	6	3	9	4	16
V	Design of Sprinklers	12	3	6	8	17

Legends: R = Remembrance; U= Understanding; A= Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of Programme Outcomes/Course Outcomes in affective domain as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

Term work shall consist of undertaking of a mini project by students. The mini project will consist of .Block Contouring for 1-2 acres of agriculture/ horticulture plot for planning/ Designing for Drip/ Sprinkler Irrigation System.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	2	Design Drip irrigation system for 1-2 acres of agriculture/ horticulture plot .Students shall undertake block contouring.	8
2	2	Prepare estimate for Drip irrigation system	4
3	3	Undertake Testing of drippers- for the Performance (pressure v/s discharge).	2
4	5	Design Sprinkler irrigation system for 1-2 acres of agriculture/ horticulture plot for which block contouring is already done as above considering the crop water requirements.	6
5	5	Prepare estimate for Sprinkler irrigation system	4
6	3/5	Supervise Installation procedure of laying of Drip or Sprinkler system, by undertaking a planned field visit to site of installation.	4
7	4	Supervise the flushing of laterals sub main of Drip Irrigation System	2
Total			30

8.SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Undertake the data /information collection regarding suppliers/vendors for drip/sprinkler irrigation.
- Collect the price list for all items involved in installation of drip/sprinkler irrigation.
- Collect data /information about chemicals/fertilizers/filters used in the micro irrigation system.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- Blended learning through use of AV aids/videos in teaching learning process.
- Expert Lectures for developing insight regarding field practices.
- Field visits.

10. SUGGESTED LEARNING RESOURCES

Books

S. No.	Title of Book	Author	Publication
1	Micro Irrigation Engineering	R.Suresh	Standard Publisher
2	Principles of SprinklerIrrigation	M.Mane	Jain Publisher
3	Irrigation – Theory and Practice	Michael A.M	Vikas Publication
4	Water Management	Dinesh kumar	Sunset Publisher
5	Irrigation engineering 5 th edition	Gajre	Nirali Publisher
6	Micro Irrigation Manuals	-	WALMI
7	Micro Irrigation Manuals	-	Jain Publisher

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED

Sr. No.	Name of the Equipment	Specification
1	Display Boards showing all parts of drip irrigation system	Drippers of various diameters, Pipes (Main/Sub mains/laterals) of different make
2	Sprinkler guns with all accessories.	With operating pressure of 2 to 7.5 kg/cm ² & flow of 3 to 30 lps with nozzles of dia 10 to 30 mm for a wetting radius of 27 to 60 m.

12. LEARNING WEBSITE & SOFTWARE

Design & Installation: www.novedades-agricolas.com

Drip Irrigation Wikipedia :https://en.wikipedia.org/wiki/Drip_irrigation

Drip Irrigation supplies :<https://www.dripworks.com>

Valves :<https://www.dripirrigation.com>

13. POs and PSOs assignment and its strength of assignment with each CO of the Course

Sr .No.	CO. NO.	Course Outcome	Programme Outcomes (POs)										Programme Specific Outcome	
			1	2	3	4	5	6	7	8	9	10	1	2
1	CO1	Plan and Design Drip Irrigation Systems.	2	3	--	2	--	--	--	3	2	1	--	--
2	CO3	Supervise Installations and Commissioning of Drip Irrigation Systems.	2	2	3	3	--	--	--	3	2	1	2	1
3	CO2	Plan and Design Sprinkler Irrigation Systems	2	3	--	2	--	--	--	3	2	1	--	--
4	CO4	Supervise Installations and Commissioning of Sprinkler Irrigation Systems.	2	2	3	3	--	--	--	3	2	1	2	1
5	CO5	Supervise Maintenance of Micro Irrigation Systems.	--	2	3	2	--	--	--	3	2	1	1	1

Sr No	Name of the faculty members	Designation and Institute Lecturer in Civil Engineering, Govt. Polytechnic,Aurangabad
1	Shri.K.S.Borde	
2.	Shri. S.S.Ragte	Lecturer in Civil Engineering, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : EARTHQUAKE RESISTANT BUILDINGS

COURSE CODE : 6C508

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Fifth

1. RATIONALE:India's seismic zone map emphasizes that over 60% of land area in India is under moderate to severe earthquake hazard. Recent earthquakes in India indicate that many of the collapses of buildings, normal structures were due to lack of understanding of behavior of building in earthquake and no integration with Architectural design. So key requirement is the integration of the concepts and awareness of earthquake resistant design and construction with architectural design. Such collapses and failures of buildings can be avoided in future earthquakes, if these concepts are taught in curriculum and practiced. Course will be helpful to diploma engineers to plan and construct earthquake resistant buildings to minimize loss of properties and lives.

2. COMPETENCY:

At the end of studying this course students will be able to,

‘Supervise construction of earthquake resistant buildings using relevant IS codes provisions and integrating architectural design concepts.’

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical	Total	
			C	ESE	PT	ESE#(OR)	PA (TW)	150
3	-	2	5	80	20	25#	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course students will be able to: -

1. Explain basics of earthquake occurrence
2. Describe post-earthquake damages (failures) to buildings and their related causes
3. Suggest building configuration and structural layout of earthquake resistant building
4. Apply principles of earthquake resistant buildings in the construction
5. Use the relevant IS code provisions for construction of earthquake resistant building

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit –I Earthquake Basics	<p>1a. Relate magnitude of the earthquake occurred in the given area to the severity of the damages.</p> <p>1b. Classify earthquake on the basis of magnitude and intensity</p> <p>1c. Describe procedure of formation of the earthquake and movement of tectonic plates</p> <p>1d. Draw sketches showing movement at a fault</p> <p>1e. Classify seismic waves in the given situation</p> <p>1f. Locate correct Seismic zone of the area using seismic zone map.</p> <p>1g. Suggest safety measures to be adopted to minimize damage in the given earthquake zone.</p>	<p>1.1 Definition and meaning of terms: Focus, Epicenter, Focal depth, foreshocks, aftershocks, magnitude & intensity of Earthquake. Seismic waves, Body waves, faultline, peak ground acceleration, Impact of soil characteristics on buildings</p> <p>1.2 Natural period, fundamental natural period, nodal natural period, response spectrum, seismic mass, seismic weight, structural response factor, time history analysis, earthquake zones, zone map, zero period acceleration.</p> <p>1.3 Measurement of earthquake: Seismograph & Accelerograph, Richter scale.</p> <p>1.4 Structure of the Earth and plate Tectonics, evolution of Indian subcontinent, types of earthquakes (Inter-plate and intra-plate), types of movement at a fault (Strike slip fault, Reverse Fault, Normal Fault)</p> <p>1.5 Waves generated by ground motion and their characteristics: Body waves- longitudinal and transverse waves; surface Waves-Rayleigh & Love waves; Attenuation of waves; random direction of shaking</p> <p>1.6 Seismic Zoning and Micro zoning, zone map</p>
Unit –II Major earthquake case studies-Impact on built environment (limited to two)	<p>3a. Correlate planning, designing and detailing deficiencies with the different failure patterns</p> <p>3b. Tabulate consequences /losses and decide their priority to bring back in function</p>	<p>3.1 Study Of Two major earthquakes in India: Causes of failure and classification of observed building failure patterns for</p> <p>3.2 Study of Social and Economic consequences for earthquakes studied in</p>

Unit-III Building Configuration	<p>3a. Establish relationship between mass center and stiffness for given data.</p> <p>3b. Choose correct geometric shape of building in vertical and horizontal plane to improve earthquake resistance</p> <p>3c. Identify irregularities in horizontal and vertical planes in the given drawing</p> <p>3d. Justify importance of base shear in the design of earthquake resistant Building</p>	<p>3.3 Different terms:- Base, base dimensions, center of mass, center of stiffness, design eccentricity, design seismic base shear, diaphragms storey drift ,storey shear, soft storey</p> <p>3.4 Scale of building, size in horizontal plane, size in vertical plane, building proportions, symmetry of building-torsion, re-entrant corners, irregularities in building-Horizontal and vertical plane like soft storey, short column and discontinuous walls</p>
Unit-IV Concrete and masonry buildings	<p>4a. Correlate causes and damages in masonry buildings</p> <p>4b. Classify observed failure patterns of buildings and corresponding deficiencies in configuration and design.</p>	<p>4.1 Typical damage and failure patterns of brick masonry, causes of damages in brick masonry</p> <p>4.2 Typical damage and failure of stone masonry, causes of damages in stone masonry</p> <p>4.3 Damage to RCC buildings: Sliding of roof support, falling of infill walls, crushing of column ends, diagonal cracking of column beam joints, pulling out of reinforcement bars, foundation sinking and tilting.</p>
Unit-V Philosophy of earthquake resistant design of buildings and codal provisions	<p>5a. Use relevant codal provisions to construct earthquake resistant building in the given seismic zone.</p> <p>5b. Calculate base shear for given building frame.</p> <p>5c. Check detailing for the given structural drawing as per IS: 13920-2016.</p> <p>5d. Use provisions of IS: 4326:1993 to improve seismic behavior of masonry buildings</p>	<p>5.1 Objectives of Earthquake resistant design, Earthquake design philosophy under minor, moderate and strong shaking as per IS1893-2002.</p> <p>5.2 Definition of Seismic zone factor, Importance factor,damping,critical damping, floor spectra, seismic mass, seismic weight, soft storey, storey drift</p> <p>5.3 Factors affecting earthquake loading(Mass, Natural period, damping, Ductility)</p> <p>5.4 Determination of design base shear using equivalent static lateral force method, distribution of design base shear IS:13920-</p>

		<p>2016:-Ductile detailing ,meaning of ductility, need of ductile detailing in RC frames(joints), critical sections in the building where ductile detailing is required, typicalsketches with reinforcement details of columns, beams and beam column connections showing longitudinal steel , splicing of steel, transverse steel, stirrups as per IS:13920-2016. (No numerical)</p> <p>5.5 IS:4326:1993 Recommended provisions to improve seismic resistance of buildings earthquake resistance of masonry buildings: mortar, wall enclosure, openings in walls, masonry bond, horizontalbands, section of bands, dowels atcorners and junctions, verticalreinforcement in walls</p>
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Earthquake Basics	12	04	08	06	18
II	Major earthquake case studies- Impact on built environment (limited to two)	06	02	06	04	12
III	Building Configuration	08	04	04	06	14
IV	Concrete and masonry buildings	08	04	04	06	14
V	Philosophy of earthquake resistant design of buildings and codal provisions	14	04	06	12	22
	Total	48	18	28	34	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:**(Any Ten Practical * Marked practical are compulsory)**

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I and II	Prepare a report on past earthquake having magnitude less than 6 occurred in India w.r.t. Focus, Epicenter Focal depth, foreshocks, aftershocks, magnitude, intensity and seismic waves on the basis of the information obtained from internet/text book/concern department.	4
2	I and II	Prepare a report on past earthquake having magnitude more than 6 occurred in India w.r.t. natural period, fundamental natural period, nodal natural period, response spectrum, structural response factor and time history analysis on the basis of the information obtained from internet/text book/concern department.	4*
3	I	Mark various seismic zones on a printed map of India, with earthquake magnitude as per the guidelines provided in IS: 1893-2002 for two cities in India in each earthquake zone.	2
4	IV	Analyze the damages to the masonry and concrete structures from the relevant information of any two past earthquakes from India w.r.t.type of structures, zones, site conditions, types of failuresetc.	4*
5	III	Check the plans/drawing provided by teacher for construction work in progress from building configuration point of views in seismic prone area (any two plans/drawings).	4*
6	IV	Decide structural stability of existing masonry building during earthquake shocks.	4
7	IV	List the retrofitting techniques that can be adopted with justification for improving seismic resistance of existing framed building and draw sketches or attach photographs for the same.	4
8	IV	Determine strength of any two given structural members of framed building using rebound hammer and comment on its seismic sustainability.	4*
9	IV	Check performance of any two members of framed building using ultrasonic pulse velocity and comment on	2

		its seismic sustainability.	
10	IV	Determine compressive strength of any one member of framed structure by taking core from cubes or from existing concrete structures and comment on its seismic sustainability.	2
11	V	Calculate base shear and distribution among floors using IS method for two bay single storey RCC building.	2*
12	V	Calculate base shear and distribution among floors using software for two bay single storey RCC building.	2
13	V	Calculate base shear and distribution among floors using Indian Standard method for three storied RCC building.	2
14	V	Calculate base shear and distribution among floors using software for single bay three storey RCC building.	2*
15	V	Draw typical sketches of beam, column and beam-column joint showing reinforcement details as per I.S. 13920-2016.	2
TOTAL			32

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Study any two case studies of past earthquakes in World
2	Study of minimum earthquake related to magnitude, intensity, epicenter and damages caused.
3	Study of tsunami after earthquake.
4	Indian standard provisions for earthquake resistant structures for your regions.
5	Behavior of old masonry structures during earthquake.
6	Effect of earthquakes on reservoirs/dams.
8	Effect of earthquakes on liquefaction of soils during earthquake.
9	Behavior of buildings with open parking during earthquake.
10	Importance of shear wall provided in building

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- f. Use of video, animation films to explain concepts, facts and applications.

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Seismic Conceptual Design of Buildings-Basic principles for engineers	Hugo Bachmann,ISBN:81-904190-0-5	NICEE Publications
2	The Seismic Performance of Reinforced Concrete Frame Buildings with Masonry Infill Walls	C.V.R.MurtySvetlana Brzev.ISBN:1-932884-22-X	NICEE Publications
3	Guidelines for Earthquake Resistant Non-Engineered Construction	-----	NICEE Publications
4	IITK-BMTPC Earthquake Tips	C.V.R.Murty ISBN:81-904190-2-1	NICEE Publications
5	Earthquake Design Criteria:	G.W.Housner and P.C.Jennings ,ISBN:1-943198-23-2	NICEE Publications
6	Architectural Teaching Resource Material on	C.V.R.Murty,AndrewW.Charleson	NICEE Publications

	Earthquake Design Concepts for teachers		
7	Earthquake Resistant Design of Structures	Agarwal, Pankaj Shrikhande, Manish	Prentice Hall of India, Delhi, 2011 ASIN: B00K7YFYVE ISBN-10 8120328922 ISBN-13 9788120328921
8	Elements of Earthquake Engineering	Jai Krishna, A. R. Chandrashekharan Chandra, B.	South Asian Publishers Pvt Ltd, Delhi, 2014 ISBN13 9788180142192 ISBN-10 8170031834 ISBN-13 9788170031833
9	Earthquake Resistant Structure	Dumne, S.M.	Nikita Publication Latur, ISBN 978-93-85124-09-9
10	Earthquake Resistant Design of Structures	Duggal, S. K.	Oxford University Press, Delhi, 2013 ISBN10 9780198083528 ISBN-13 9780198083528

I.S. Codes:

- 1 IS 1893(Part I):2002 ,Indian Standard Criteria for Earthquake Resistant Design of Structures- General Provisions and Buildings ,BIS, New Delhi.
- 2 IS 13920:2016 Ductile Detailing of Reinforced Concrete Structures subjected to Seismic forces-Code of Practice, BIS, New Delhi.
- 3 IS 456:2000 - Plain and Reinforced concrete code of Practice
- 4 I.S. 875 (Part 1-5) - 1987 code of practice of design loads for Buildings and structures
- 5 IS 13935- Repair and seismic strengthening of building: Guidelines
- 6 IS 4326-1993 Earthquake resistant design and construction of buildings
- 7 IITK-BMTPC Earthquake Tips- IIT Kanpur
- 8 A CD on Earthquake Engineering- An ICJ Compilation

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr.No.	Name of equipment	Brief specification
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1	Rebound Hammer	Rebound Hammer: W-M-250 Manual Test Hammer, confirming to BS-1881-202, Weight: 2.7 kg, Size: 127 x 76 x 355 mm, Shipping Weight: 2.7 kg and minimum verifiable strength is 10 MPa to 62 MPa.)
2	Ultrasonic Pulse Velocity test apparatus	Ultrasonic Pulse Velocity test apparatus: range 0.1-7930 μ s, resolution: 0.1 μ s, (< 793 μ s), 1 μ s (>793 μ s), display 7", color 800 x 480, pulse voltage 100 – 450 Vpp, bandwidth 20 – 500 kHz
4	Concrete core cutter	Core cutter of automatic grade, vertical layout, power consumption 230 volt, 50HZ, capacity 130mm diameter
5	Compression Testing Machine	Digital display manual control compression testing; machine; Max. Capacity (KN): 2000; Measuring range: 4%-100% of FS; Relative error of reading: $\leq \pm 1\%$; Max. distance between two platen (mm): 330; Compression platen size (mm): 220 \times 220; Max. piston stroke (mm): 0-20; Max. piston speed (mm/min): Approx. 30; Column clearance (mm): 300 \times 200; Oil pump motor power (KW): 1.5; Whole dimensions (mm): 855*380*1435
6	Design Related Software STAAD Pro/ STRUD, SAP, ETABS etc.	Design software for building modeling, analysis design and reports. Minimum: Intel Pentium 4 or AMD Athlon 64. Recommended: Intel i5/i7, AMD Athlon X4/Ryzen, or better. A 64-bit CPU is required.

12. LEARNING WEBSITE & SOFTWARE:

- a. www.nptel.ac.in
- b. <https://youtu.be/uBMqJMXhs4M>
- c. https://youtu.be/n0_LNyfQTJg
- d. https://youtu.be/DR_PQyYMaA0
- e. www.tn.gov.in/tsunami/digitallibrary/ebooks
- f. <https://www.nicee.org/EQTips.php>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs):

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Explain basics of earthquake occurrence	3	2	-	-	-	-	-	-	-	-	-	-
2	Describe post-earthquake damages (failures) to buildings and their related causes	3	3	-	-	-	-	-	-	-	-	-	-
3	Suggest building configuration and structural layout for earthquake resistant building	2	3	-	-	2	-	-	-	-	-	-	-
4	Apply principles of earthquake resistant buildings in the construction	1	2	3	-	2	-	-	-	-	-	2	-
5	Use the relevant Is code provisions for construction of earthquake resistant building	2	3	-	-	2	-	-	-	-	-	-	-

Course Curriculum Design Committee:

Sr No	Name of the faculty members	Designation and Institute
1	Rajesh Aghao	Sr. Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Sr. Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	Madhuri Ganorkar	Head Applied Mechanics Department,

		Govt. Polytechnic, Aurangabad
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(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE INDUSTRIAL ORGANIZATION AND MANAGEMENT

COURSE CODE 6G305

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
ME,EE,CE,AE,E&TC,CO,IT,DD	Fourth/Fifth

1. RATIONALE

Diploma graduate works at middle management level in the industries/engineering organizations. Therefore he has to be proficient in planning, organizing & coordinating various activities of industries/ organizations or when he is required to work in different types of projects.

They are also expected to deal with workforce and management problems. In the present era of competition, optimum utilization of the resources with achieving higher productivity is essential for any industry to survive. Quality and cost controls are also other important factors which contribute to the day to day supervision issues. This course aims to deal effectively with such issues along with familiarization of acts and laws applied to industries.

2. COMPETENCY

At the end of studying this course students will be able to

“Plan, Organize and Coordinate various activities/ processes in industry/projects by ensuring optimal use of resources ”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE~	PT~	ESE@ (PR/OR)	PA (TW)	125
03	-	02	05	80	20	-	25	
Duration of the Examination (Hrs)				03	01	-	-	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term. Work, # External, @ Internal,~ Online Examination.

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Plan, organize and Coordinate various activities in industry or a project.
2. Ensure the optimal use of resources.
3. Identify the need of finance and its optimal use in an organization.
4. Manage materials & Stores.
5. Apply PERT/CPM method for project scheduling of given project.
6. Apply marketing strategies to promote the sales & services.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics (Containing POs and PSOs assignment in each Sub-topic)
1. Business overview	1a. Classify businesses. 2a. Outline the impact of Globalization and IPR on business. 3a. Identify need of e-commerce.	1.1 Type of sectors. Service, Manufacturing, Trade. 1.2 Globalization and IPR- Introduction, Advantage and Disadvantage w.r.t India. 1.3 e - Commerce: Merits and Demerits.
2. Evolution of Scientific Management.	2a Outline the historical perspective of management. 2b Identify the functions of management. 2c Develop organization structure. 2d Select appropriate form of ownership.	2.1 Evolution of management thoughts. 2.2 Definition of management, levels of management. 2.3 Scientific management by F W Taylor 2.4 Administration vs. Management 2.5 Henry Fayol's Principles of management. 2.6 Functions of management-Planning, Organizing, Staffing, Directing & controlling 2.7 Types of organization- Line, Line & Staff, Functional & Project 2.8 Centralization and decentralization. 2.9 Forms of Ownership- Proprietorship, Partnership, Joint Stock Company, Co-operative society & Government Sector.
3 Personnel Management & Legislative Act.	4a Identify & develop human resource 4b Apply strategies of motivation. 4c Practice safety procedure 4d Identify the features of industrial acts.	3.1 Definition, Objectives and Function of Personnel management 3.2 Recruitment & Selection Procedure 3.3 Training & its type: Induction, Skill Enhancement & Motivation. 3.4 Leadership & its style. 3.5 Motivation-Definition, its type & Maslow

		<p>Theory</p> <p>3.6 Safety management: Causes of Accident and Safety procedure</p> <p>3.7 Salient Features of (Introduction, Objective, Scope, Important definition & Related provision)</p> <ol style="list-style-type: none"> 1 Indian Factory act 1948. 2 Industrial dispute acts 1947. 3 Workmen compensation act 1923. 4 The employees state insurance Act 1948. 5 Contract Labour Act.
4 Financial Management	<p>6a Identify sources of finance</p> <p>6b Prepare budget.</p> <p>6c Acquaint with prevailing taxation policy.</p>	<p>4.1 Objectives & Functions of financial management,</p> <p>4.2 Capital Generation & Management</p> <p>4.3 Types of Capitals-Fixed & Working Capital</p> <p>4.4 Elements of Cost-Direct & Indirect Cost</p> <p>4.5 Sources of raising Capital-Internal & external sources</p> <p>4.6 Introduction of budget, budgetary control</p> <p>4.7 Production Budget (including Variance Report)</p> <p>4.8 Labour Budget</p> <p>4.9 Introduction to Profit & Loss Account (only concepts)</p> <p>4.10 Introduction of Income Tax & GST (Good & Service Tax)</p>
5 Materials Management	<p>5a. Plan Inventory for processes</p> <p>5b. Calculate EOQ.</p> <p>5c. Practice purchase procedure.</p>	<p>5.1 Objective and function of material management</p> <p>5.2 Inventory – Concept , its Classification & Objective</p> <p>5.3 Economic Order Quantity (EOQ)- Concept & Graphical Representation</p> <p>5.4 ABC Analysis- Definition & Step</p> <p>5.5 Purchase Procedure</p> <p>5.6 Overview of ERP, JIT, 5's Kaizen & six sigma (Introduction, Objective & Benefit).</p>
6 Project Management	<p>5a Use CPM/PERT for project scheduling for execution.</p> <p>5b Track the project with the help of project management techniques.</p>	<p>6.1 Introduction of Project Management, project Network Analysis</p> <p>6.2 Concept and introduction of CPM/PERT.</p> <p>6.3 Concept of Breakeven analysis.</p> <p>6.4 Progress tracking charts-bar charts, Gantt charts and histogram.</p>

		6.5 Solving simple network using CPM/ PERT
7 Marketing Management	7a. Apply marketing strategies .	7.1 Objective & Function of marketing management 7.2 Sellers and Buyers markets, Marketing, Sales, Selling vs. Marketing, Sales promotion, Marketing Mix, Pricing Policies. 7.3 Marketing Strategies: Segmentation, Targeting & Positioning. 7.4 Marketing Information System.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Business Overview	03	02	04	00	06
II	Evolution of Scientific Management	09	04	10	00	14
III	Personnel Management & Legislative Act	11	04	10	04	18
IV	Financial Management.	07	04	06	02	12
V	Materials Management	06	04	04	02	10
VI	Project Management	07	02	02	08	12
VII	Marketing Management	05	02	04	02	08
	Total	48	22	40	18	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/ programme outcomes. Following is the list of practical exercises for guidance.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

1. Plan, Organize and Coordinate various activities in industry or a project.
2. Ensure the optimal use of resources.
3. Identify the need of finance and its optimal use in an organization.
4. Manage materials & Stores .
5. Apply PERT/CPM method for project scheduling of given project
6. Apply marketing strategies to promote the sales & services.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
Part A- Common to all programmes			
1.	I	To collect data / information and prepare report about business/organization and identify the nature of business and prepare organization structure.	04
2.	III	Identify and propose Safety requirements/ mechanism for an industry .	04
3	V	Prepare a report of inventory by visiting stores of an industry/organization.	02
4	VI	Prepare network diagram using CPM& PERT (3-4 networks each)) for identified Projects	04
5.	IV/VII	Undertake Survey/Data Collection, Presentation and Data interpretation for following . (Any One) a. Sales Promotion. b. Channel of Distribution	04

		c. Capital Generation & Management	
		Part B- Programme Specific Practical (Five Numbers)	
6	III	Prepare a report on Human Resource (HR) policies used in Multinational companies	02
7	IV	Give presentation(PPT)on various Financial budget of a company	02
8	IV/V/VII	Data collection on i)GST ii) Six sigma iii)Market segmentation	02
9	VII	Discuss Global marketing strategies by making small presentation(PPT)	04
10	All Units	Micro Project (visit to an industry ,observe & prepare a report on various management techniques adopted by the company)	04
Total			32Hrs

8. SUGGESTED STUDENTS ACTIVITIES

Sr No	Activities
1	Prepare a group of five students and write qualities of a good leader.
2	Prepare a group of 10 students and conduct a group activity like housekeeping of a class room.
3	Draw a network for given set of activities and identify the critical path
4	Calculate the total time required to accomplish a task when t_e , t_p and t_m is given.
5	Visit to nearest ESIC office and collect information about services provided by ESIC office to the working employees.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

Sr no	Unit no	Unit name	Strategy
1	1	Business Overview	Live explanation, videos.
2	2	Evolution of Scientific Management	Live explanation, , case study
3	3	Personnel Management & Legislative Act	Live explanation, movie, case study
4	4	Financial Management.	Case study, survey, industrial visits
5	5	Materials Management	Net survey, Case study, industrial visits
6	6	Project Management	Net survey, Case study, industrial visits
7	7	Marketing Management	Net survey, Case study, industrial visits

10. SUGGESTED LEARNING RESOURCE

S. No.	Title of Book	Author	Publication
1.	Industrial Organization and Management	O.P.Khanna,	DhanpatRai and Sons
2.	Industrial Organization and Management	Banga and Sharma,	Khanna Publications
3.	Modern Business Organization & Management	S.A.Sherlekar& V.A. Sherlekar,	Himalaya Publications

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED

NIL

12. LEARNING WEBSITE & SOFTWARE

<https://mitpress.mit.edu>

<http://iveybusinessjournal.com/publication/a-new-role-for-management>

https://en.wikipedia.org/wiki/Project_management

<http://www.pmi.org.in/>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SR No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Plan, Organize, and Coordinate various activities in industry or a project.	03	03	02		03			01			03	
2	Ensure the optimal use of resources.	02	03		02	03			01			02	02
3	Identify the need of finance and its optimal use in an organization	03	03		02						01	03	03
4	Manage materials & Stores	02	03		03							03	
5	Apply PERT/CPM method for project scheduling of given project	01	03		03						02	03	02
6	Apply marketing strategies to promote the sales & services.		03		03			02	02		02	03	

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	A.B.Deshpande	Lecturer in Mechanical Engineering, Govt. Polytechnic, Aurangabad
2	K.S.Borde	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
3.	P.B.Lahoti	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- CONTRACT, ACCOUNTS AND VALUATION
COURSE CODE 6 C 410
PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE

Civil engineering technician has to prepare the tender and contract documents of the construction projects, before the actual execution of works. This requires him to develop skills of document preparations and technical feasibility of the works / of the project. He / she should have knowledge about various factors, which affects the total project cost and procedures. He / she always required to prepare proposals for getting various sanctions of project. Execution of the projects should be smoothly completed in given time limit. The agencies involved should be legally responsible for their jobs and prepared documents of projects to be supported by the various rules, regulations, laws and acts. Further rent of building, taxes, present costing of the building depends upon the values of the structure. This requires him to develop the valuation skills to work as professional. Thus a professional / practicing engineer / Government contractor essentially requires this course knowledge and documentation skills to work effectively for the Government and society.

2. COMPETENCY

At the end of studying this course students will be able to,

“Prepare Tender and Contract documents of the Civil Engineering works for its execution and Valuation of property as professional”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (OR)	PA (TW)	150
3	0	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits;
ESE- End Semester Examination; **PT – Progressive Test**, **PA-** Progressive Assessment, OR
 – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Apply the procedure of execution and method of works as per PWD.
2. Prepare tender notice and tenders for civil Engineering works.
3. Prepare contract document of a small residential building Projects.
4. Draft general, detailed and standard specifications of items of work.
5. Acquire knowledge of accounting and store keeping.
6. Compute valuation, rent fixation and decide the value of property.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Introduction	1a. Prepared / refer proforma estimate of PWD. 1b. Describe procedures of Execution and taking approvals / sanctions of projects from references. 1c. Search the current financial limits of PWD works for the Govt. contractor. Rules, regulations, laws and acts of contracts.	1.1 Procedure of execution of works: PWD procedure of execution of works and steps. 1.2 Sanctions: Meaning, necessity and authority of Administrative approval, Technical and Financial sanction. 1.3 Methods of Execution: Contract system and department system / method. PWD Classification of works and limits as per contractor's registration. Departmental Method such as Piece Work, Day Work , rate list and employment of daily labours.
Unit - II Tender and Tender documents	2a. Enlist activities of different tender stages. 2b. Classify the different tenders. 2c. Prepare / Draft the tender notices of different civil works. 2d. Compose comparative Statement for tender.	2.1 Tender: Meaning of tender, classifications of tenders, advantage and disadvantage of each type of tender. 2.2 Tender stages: Preparation and stages of tender pre and post tender planning. 2.3 Tender notice:: Meaning of tender notice, Invitation of Tenders, Tender Forms, Tender Notice publication, Preparing / drafting of tender notices of different works. Authority of tender invitation , Advertise Number and date, cost of blank tender form, availability of forms, Title and location of works, Estimated cost, Earnest money deposit, Security deposit, time limit, class of

		<p>registration, mode of submission and its pocketing, opening schedule of submitted tenders, and rights of rejections.</p> <p>2.4. Tender Documents; Tender planning- pre and post, Preparation of tender Submitting tenders, opening of tender, scrutiny of tenders, Comparative statement, acceptance of tender , rejection of tenders any one or all, Selection of tender, unbalanced tender and work order. List of tender essential documents.</p> <p>2.5. E-Tender: Meaning of E- Tender/ on line tender, necessity, E- tender norms on PWD web site. Procedure of uploading preliminarily information of on –line tender.</p>
<p>Unit - III</p> <p>Contract and contract documents</p>	<p>3a. State the requirements of a valid contract</p> <p>3b. Compare the different types of contract.</p> <p>3c. Enlist the different essential contract documents.</p> <p>3d. Prepare contract documents and conditions of contract for a civil work.</p>	<p>3.1 Contracts: Definition, Objects, necessity and requirements of valid contracts.</p> <p>3.2 Types of Contracts- Lump Sum, Item rate, percentage rate, cost plus , Labour Contracts, Negotiated and Sub Contract.</p> <p>3.3 Conditions of Contract: Necessity of conditions, deciding / drafting conditions of civil contract, Draft /prepare agreement / conditions / paragraphs based on Earnest Money, Security Deposit, Time Limit, Schedule A, B, and C, Defect Liability Period, Liquidated Damages, Extra Items, Escalation of Cost, Termination of Contracts. Violation of Contracts, Disputes, Arbitration, Penalties, Claims, advances to contractor and workmanship expected with standards of quality/</p> <p>3.4 Contract documents: List of contract documents, preparations of contract documents along with conditions for civil works as per PWD. Government policies, allotment and acceptance of</p>

		work with legal aspects.
Unit - IV Specifications	<p>4a. Understand the types of specifications.</p> <p>4b. Draft general specifications building / structures.</p> <p>4c. Draft detailed specifications of important items of work of building.</p> <p>4d. Read standard specifications of PWD.</p>	<p>4.1 Specification: Definition and importance/Purpose of Specification, Types of Specifications. General, Detailed, and standard Specifications.</p> <p>4.2 Drafting: Drafting of General specifications for civil works, Drafting of Detailed Specifications for different important items of the civil works. 4.3 Aspects: Necessity of referring standard PWD specifications. Legal Aspects of Specifications.</p>
Unit - V Accounting in PWD	<p>5a. Choose different accounting proforma's of PWD</p> <p>5b. Choose different store-keeping proforma's of PWD..</p> <p>5c. Prepare Nominal muster roll of civil work from the data.</p>	<p>5.1 Accounting in PWD: PWD accounting procedure, different types of contractor's bills (R.A.bill, Final bill, First and final bill) various advances and payments to contractor,. Measurement book, Care to be taken in measurements book, Nominal muster roll and its parts.</p> <p>5.2 Store Keeping Procedure: PWD store keeping procedure, records. Duties, role and responsibility of store officer / store keeper.</p>
Unit – VI Valuation	<p>6a. Enlist factors affecting the valuation.</p> <p>6b. Compute sinking fund installments and year's purchase.</p> <p>6c. Calculate the rent of building from data.</p>	<p>6.1 Valuation; Definition, necessity, importance, meaning of cost, price and value. Role of valuator.</p> <p>6.2 Factors: Factors affecting the valuation of properties. Types of values Such as Book value, Market value, Salvage value, Scrap Value, sentimental Value, and distressed value.</p> <p>6.3 Depreciation: Meaning, methods of depreciation. Sinking fund , year's purchase, life of structures, annual depreciation. Simple numerical.</p> <p>6.4 Rent Fixation: Income / rent concepts of buildings, Computation of gross income, fixation of rent as per PWD, valuation of land and buildings. Valuation basis, meaning of Net Earnings Gross Income, Outgoing, Net Income, Year's</p>

		Purchase and Capitalized Value, Numerical problem solving for valuation and rent fixation.
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6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	06	04	04	02	10
II	Tender and documents	10	06	10	04	20
III	Contract and documents	10	04	06	10	20
IV	Specification	06	04	02	04	10
V	Accounting and Store-Keeping	06	04	02	02	08
VI	Valuation	10	02	04	06	12
	Total	48	24	28	28	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit	Title Practical/ Exercises/ Lab. Work/ Assignments/ Tutorials (Term work)	Hours
1.	I	1. Collect and discuss small estimate of any civil Engineering work from PWD/MJP/WRD/MIDC and prepare summary report. Search and attach the current financial limits of PWD civil works classes of registrations and limits of the Govt. contractor.	04
2.	II	2. Collection of any three different types of tender notices of civil works from news paper cutting new /maintenance / corrigendum and one from web site. Draft / Preparation of one tender notice and of any one Civil work. (Web searching of one tender notice especially of PWD.)	04
3.	III	3. Preparation of contract documents of any one Civil	

S. No.	Unit	Title Practical/ Exercises/ Lab. Work/ Assignments/ Tutorials (Term work)	Hours
		Engineering Work/ project in a printed agreement form. (List of essential documents, preparation of Schedule A. B, C, conditions of contract, tender notice of work and tender form, declarations, comparative statement, work order etc.)	06
4.	IV	4. Draft general specifications of (Load bearing or Framed structure) residential building. Preparing any four detailed specification of importan Items of work for building / road / irrigation / Environmental works.	08
5.	V	5. a) MINI PROJECT : Collection of different blank PWD accounts / bills / store keeping blank records forms / Xerox forms and attaching. Filling of these forms and formats for Ex No. 3 or for one civil work and its group discussion along with Expert lecture with report writing. (Expert lecture : PWD officials / Govt contractor or other Govt Dept. Accountant or an Expert Engineer is preferred.)	04
6.	VI	6 .a) Problem on rent fixation or valuation of small building property. b) Listing by searching the different software used for contract, accounts and Valuation in practices for Government / private organizations. c) Introduction to on line contract / up loading information / procedure by referring PWD web site.	06
Total Hours.			32

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Collect / refer PWD estimates, tenders and standard specification book.
- b. Read and refer different tender notices from news papers / web.
- c. Read standard specifications of different items of works.
- d. Collect / refer / read and prepared contract documents and conditions.
- e. Practice the drafting of tender notices and specifications.
- f. Group discussions on accounting and store keeping.
- g. Solve problems from sample problems of valuation.
- h. Attend expert lecture and get aware of acts of contracts.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Create the interest of course among students.
- b. Help the students in collections of tenders and agreements..
- c. Give assignments for group discussions.
- d. Motivate students to use internet searching.
- e. Show the ready prepared PWD contract agreements.
- f. Arrange Exhibition / expert Lecture of PWD authorities.

10. SUGGESTED LEARNING RESOURCE

Sr No	Title of Book	Author	Publication
1	Estimating and costing	B.N. Dutta	USB New Delhi
2	Civil engineering contracts And estimate	B.S.Patil.	Orient Longman
3	Estimating, Costing, Specification & Valuation	Chakraborty.	Calcutta
4	Estimating & Costing	S C. Rangwala	Charotar Pub.
5	Estimating & Costing	Mahajan	Sattya Pub New D.
6	Estimating & Costing	Birdi	---
7	Contract and accounts	Gangarde	-----
8	Standard specification Book	PWD	PWD
9	Standard mode of measurements	I.S.	B.I.S.
10	P.W.D. Hand book /D.S.R.	Current year PWD	PWD

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Sr. No.	Name of equipment	Brief specification
1.	Public Works Department Schedule of rates for the current year.	As per standards and specification
2.	I.S. 1200	As per standards and specification
4	PWD standard specifications.	As per standards and specification
5	Demonstrations / expert lecture of estimating software.	As per standards and specification

12. LEARNING WEBSITE & SOFTWARE

- a. www.mahapwd.com
- b. www.midcindia.com

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

POs and PSOs assignment and its strength of assignment with each CO of the Course

CO. NO.	Course Outcome	PO 1	PO 2	PO 3	P O 4	PO 5	P O 6	P O 7	P O 8	P O 9	PO 10	PS O1	PS O2
CO1	Apply the procedure of execution and methods as per PWD.		03				03						03
CO2	Prepare tender notice and tenders for civil Engineering works.		03				03						
CO3	Prepare contract document of a small residential building Projects.		02				02						01
CO4	Draft general ,detailed and standard specifications of important items.			03									
CO5	Acquire knowledge of PWD accounting and store keeping process.		01			02						01	
CO6	Compute valuation, rent fixation and decide the value of property.		01					02	02		02	02	
Total													

Name and Designation of Course Designer:

1. Prof. J. S. Patil Head of Civil Engineering Government Polytechnic Aurangabad.
2. Prof. Y. N. Shaikh, Lecturer in Civil Engineering Government Polytechnic Aurangabad.

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : DESIGN OF STEEL STRUCTURES

COURSE CODE : 6C 413

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE:

Steel structures are landmarks of modern society. For the construction of civil engineering structures, reinforced concrete, steel or combinations are used in construction practices. Steel is widely used material due to its light weight, flexibility, ductile behavior, less construction duration, easily repaired, good scrap value etc. After completion of course students will design simple structural steel components/members and draw detailing and supervise the work of industrial shed with minor alternation and modifications to suit the local site conditions.

2. COMPETENCY:

At the end of studying this course students will be able to,

“Design and Supervise simple structural steel elements/components using limit state method & draw detailing.”

3. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE#(OR)	PA (TW)	150
3	-	2	5	80	20	25	25	
Duration of the Examination (Hrs)				4	1.25	--	--	

Note: Use of IS 800-2007, IS 875-2002 part I to III and steel table is permitted in Examination

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – **Progressive Test**, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course students will be able to: -

1. Design structural steel components for trusses and their connections using relevant I.S. codes.
2. Design steel beam, slab base using relevant I.S.
3. Prepare and interpret structural drawings for steel structures.

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit –I Fundamental of Steel design	<p>1a. Compare steel with other construction material.</p> <p>1b. Use appropriate grade of steel for given situation</p> <p>1c. Select proper steel section for the given situation</p> <p>1d. Use of different components in various steel structures</p> <p>1e. Use of steel table and Is for finding properties of different sections</p>	<p>1.1 Introduction of steel material and its importance, grade and strength of steel, use of steel table, IS808, advantages and disadvantages of steel as construction material, Types of steel sections used.</p> <p>1.2 Overview of common steel structures, Functions of components of common steel structures like steel tower, roof trusses, steel water tanks, steel bridges, plate and gantry girders, steel columns, steel chimney, building frames etc.</p> <p>1.3 Types of loads considered on steel structures using IS 875 2002: dead load, live load, wind load, snow load, seismic load (IS 1893 2002).</p> <p>1.4 Method of steel structure design: working stress method, limit state method, meaning and types of limit state, partial factor of safety for material strength and load.</p>
Unit– II Connections: A) Bolted	<p>2a. Compare black bolt and HSFG bolt</p> <p>2b. Design bolted joint for the given data and draw detailing</p> <p>2c. Compare rigid, semi-rigid and pinned connections with respect to transfer of forces and draw Beam to beam ,beam to column connections</p>	<p>2.1Types of connections: rigid, pinned and semi-rigid.Types of bolts: black bolt, turned bolt and HSFG bolt,grades of bolts</p> <p>2.2 Bolted connection(Using black bolt): Types of bolted connections, various modes of joint failure,bolt value, IS 800 2007 specifications for cross sectional area, pitch, gauge distance, edge distance, end distance, tack bolt, bolt holes for bolted connections,design strength of bolt, strength and efficiency of joint. Tension capacityof plate. Patterns of bolted connections, Numerical on chain bolting only.</p> <p>2.3Analysis and design of bolted joint for axially loaded lap and butt joint using flats, single and double angle sections.</p> <p>2.4Framed connections: Types of framed connections, diagrams of beam to beam</p>

		and beam to column bolted connections (No numerical problems).
Unit– II Connections: B)Welded	2d. Design welded joint for the given data and draw detailing	2.5 Introduction and types of welds: Advantages and disadvantages of welded connections, Types of weld-Butt, fillet, their symbol, size of weld, throat thickness 2.6 Analysis and design of lap and butt joint connections subjected to axial load for flats, single angle and double angle sections.(No numerical on slotted weld and slots)
Unit– III Design of Tension Members	3a. Choose appropriate section for design of tension member for given situation 3b. Analyze and design tension member using bolted and welded connections for given problem.	3.1 Types of sections used for tension members, shear lag effect 3.2 Design strength of tension member for Yielding of gross section, rupture of net section, block shear failure and check for slenderness ratio 3.3 Analysis and design of axially loaded single angle and double angle tension members with bolted and welded connections
Unit –IV Design of compression Members	4a. Choose appropriate section for design of compression member for given situation 4b. Analyze and design of compression member using bolted and welded 4c. Differentiate lacing and battening	4.1 Types of sections used for compression members, effective length for different boundary conditions, effective length for struts , radius of gyration, slenderness ratio and it's limit, design compressive stress 4.2 Analysis and design of axially loaded simple compression members by equivalent slenderness ratio(λ_e),by using Table 9.connected by bolted or welded connections with gusset plate at ends. Limits of width to thickness ratios to prevent buckling 4.3 Stanchions and columns –Meaning and diagram of built up sections(Nonnumerical) 4.4 Introduction to lacing and battening: Purpose of providing lacing and battening, diagrams of single lacing, double lacing and battening. (No numerical)

Unit – V Design of Beams	<p>5a. Select appropriate section of beam for given situation.</p> <p>5b. Classify given section as plastic, compact, semi compact and slender</p> <p>5c. Analysis and design of simple beam sections as per Is provisions for given situation</p>	<p>5.1 Different steel sections used for beams, simple and built up sections</p> <p>5.2 Meaning of Plastic, Compact, semi compact and slender section, moment rotation curve</p> <p>5.3 Flexural analysis and design of simple beam ($V < 0.6V_d$) sections, laterally supported and subjected to udl, central point load, check for shear, deflection.</p>
Unit – VI Column Bases	<p>6a Differentiate slab base and gusseted base</p> <p>6b Draw components of slab base and gusseted base</p> <p>6c Design slab base for given conditions.</p>	<p>6.1 Types of steel foundations-slab base and gusseted base</p> <p>6.2 Analysis and Design of slab base foundation with bolted connection only</p> <p>6.3 Introduction to gusseted base foundations: Situations when gusseted base is provided and functions of different components. (No numerical)</p>
Unit – VII Steel roof truss	<p>7a. Calculate dead load, live load and wind load per panel point for given problem</p> <p>7b. Design components of truss and joints for given situation</p> <p>7d. Design purlin for given data</p>	<p>7.1 Types of steel roof trusses for different spans</p> <p>7.2 Calculation of panel point loads for dead load, live load and wind load as per IS 875-2002, Meaning of K1, K2 and K3 factors only. Values of K1, K2 and K3 should be given in examination.</p> <p>7.3 Design of angle purlin by simplified IS method, roof slope $< 30^\circ$</p> <p>7.4 Arrangement of members at support (no numerical)</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R Level	U Level	A Level	TOTAL
I	Fundamental of Steel design	03	06	--	--	06
II	Connections: A) Bolted	04	--	02	04	06
II	Connections :B) Welded	04	--	02	04	06
III	Design of Tension Members	08	02	04	06	12
IV	Design of compression Members	08	02	04	06	12

V	Design of Beams	08	02	06	06	14
VI	Column Bases	05	--	04	04	08
VII	Steel roof truss	08	02	04	06	12
	Total	48	20	24	36	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:

Term work:

The term work shall be based on contents of curriculum.

1. Planning, analysis and design of truss for given Industrial shed and detailing of truss members and joints (plan and sectional elevation)-Analysis and design of steel roof truss for given industrial shed for gravity and wind load, determination of nodal point loads, calculation of member forces by graphical method, critical combination of forces, design of members and joints by Bolted or welded connections, detailing on two imperial size drawing sheets along with report file related to design calculations.-
-----16 Hrs
2. Sketch book contains following sketches ----- 10 Hrs
 - a)Types of roof trusses for different spans
 - b)Various sections used for structural members
 - c)Types of bolts, joints and their failure modes
 - d)Sections used for tension members
 - e)Sections used for compression members
 - f) Beam to beam connections at same level
 - g) Column to beam Seated Connection
 - h)Column to beam framed Connection
 - i) Slab base and gusseted base
3. Visit nearby Industrial shed, Railway Station or Prefab. construction collect photograph and write report—06 Hrs

Concerned faculty shall assess this work batch-wise

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Collect photographs of different Industrial shed
2	Prepare video for fabrication work
3	Prepare report on prefab. Construction with photographs-Different sections used for prefab.construction,their assembly erection on site

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- f. Use of video, animation films to explain concepts, facts.

10. SUGGESTED LEARNING RESOURCES:**A) TextBooks:**

Sr.No.	Name of Book	Author	Publication
1	IS 800-2007	Bureau of Indian standard	BIS,New Delhi
2	Limit State Design of steel structures	Dr. V.L. Shah &Mrs.Veena Gore	Structures Publications, Pune
3	Design of steel structures(By limit state method as per Is-800-2007)	Prof.S.S.Bhavikatti	I.K.International publishing house pvt.ltd.Newdelhi and Banglore
4	Design of steel structures	P.Dayarathnam	S.Chand and Company
5	Limit state Design of steel structures	Prof.S.K.Duggal	McGraw Hill Education(India) Pvt.Ltd.
6	IS-875-2002 Part 1 to 5	Bureau of Indian standard	BIS,New Delhi
7	Handbook on steel-SP-6	Bureau of Indian standard	BIS,New Delhi

B) Reference Books:

Sr. No.	Title of Book	Author	Publication
1	Design of steel structures: Theory and practice	N.Subramanian	Oxford University Press(2010)

11. LIST OF MAJOR EQUIPMENTS AND MATERIALSREQUIRED:

12. LEARNING WEBSITE &SOFTWARE:

- i. nptel.ac.in/courses/

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Design structural steel components for trusses and their connections using relevant I.S. codes.	2	3	-	-	3	-	-	-	-	-		
2	Design steel beam, slab base using relevant I.S.	2	3	-	-	3	-	-	-	-	-		
3	Prepare and interpret structural drawings for steel structures.	-	2	-	-	-				3		3	

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Madhuri Ganorkar	Head of Applied Mechanics Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	N.R. Bansode	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
4	R.T. Aghav	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : Structural Design and Drawing

COURSE CODE : 6C414

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE:

Planning and structural designing are important parts of Civil engineering construction. The diploma graduates shall have the appropriate knowledge of designing and detailing of simple RCC building elements/components and able to do minor alteration as demanded by the situation. The course has been introduced to know, properties of constituent materials of reinforced concrete, critical load combinations, to know need and method of approach to structural planning, aspects of structural analysis and design of components of residential/office buildings as per IS 456- 2000. Detailing of designed components (as per SP 34 and IS 13920 -2016) will be useful for effective supervision of construction work. Learning of the course develops ability to prepare, read and interpret structural drawings of buildings and execute construction work effectively.

2. COMPETENCY:

The aim of this course is to help the student to attain the following competency through various teaching learning experiences:

Design the elements/components of simple RCC buildings and draw the reinforcement detailing.

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE# (OR)	PA (TW)	
-	-	4	4	-	-	25	50	75
Duration of the Examination (Hrs)				-	-	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

The practical experiences should be taught and implemented in such a manner that students will be able to acquire following course out comes:

1. Suggest layout of R.C.C. structural components for given building plan.
2. Analyze, design and draw detailing of R.C.C. structural components

5. DETAILED COURSE CONTENTS:

Unit Number	Title of Unit
I	Draw functional plan of two storied residential/public building.
II	Draw the structural plan showing the position of columns and beams, spanning of slabs.
III	Compute the design loads and draw the load distribution diagram.
IV	Design of various building elements/components(slabs, beams, columns, footings and stairs)
V	Draw reinforcement details of designed elements/components using Auto CAD tool on A3 sheets.
VI	Draw ductile detailing of RC building elements/components per IS 13920 -2016 on single A3 size sheet/sketch book.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN:

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Draw the functional plan of RC framed two storied building.	04	NOT APPLICABLE			
II	Draw the structural plan showing the position of columns and beams, spanning of slabs.	06				
III	Compute the design loads and draw the load distribution diagram.	08				
IV	Design of various building elements/components(slabs, beams, columns, footings and stairs)	20				
V	Draw reinforcement details of designed elements/components using Auto CAD tool on A3 sheets.	20				
VI	Draw ductile detailing of RC building elements/components per IS 13920 -2016 on single A3 size sheet/sketch book.	06				
	Total	64				

Legends: *R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)*

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS:

The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Term work:

The term work based on curriculum of DRS (6C 412) shall consist of:

A. Design of RC framed two storied residential/public building

1. Draw the functional plan of RC framed two storied building.
2. Draw the structural plan showing the position of columns, beams and spanning of slabs.
3. Compute the design loads and draw the load distribution diagram.
4. Design of various building elements/components (slabs, beams, columns, footings and stairs) Draw reinforcement details of designed elements/components on A3 sheets using AutoCAD.

B. Ductile detailing of various building elements

Draw ductile detailing of RC building elements/components per IS 13920 -2016 on A3 size sheet using AutoCAD.

8. SUGGESTED STUDENT ACTIVITIES: (Any two)

Other than classroom and laboratory activities, following are the suggested co-curricular activities which need to be undertaken to facilitate the attainment of course outcomes of this course. The students are required to maintain portfolio of their experiences.

Sr.No.	Activity
1	Use Stadd-pro for designing and detailing of building elements/components.
2	Collect photographs/sketches from the construction sites/internet showing reinforcement detailing of various structural elements of RC buildings.
3	Collect, read and interpret working drawings from different construction sites

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Field visits to nearby construction sites.
- b. Activity based learning.

- c. Use of PPT/ Photographs/working drawings of construction projects
- d. Use of video, animation films to explain concepts, facts.

10. SUGGESTED LEARNING RESOURCES:

A) Text Books:

S. No.	Title of Book	Author	Publishers
1	Comprehensive Reinforced Concrete structures	B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications (P) Ltd, New Delhi
2	Limit State Theory and Design of Reinforced Concrete structures	Dr. V.L. Shah & Dr. S. R. Karve.	Structures Publications, Pune
3	Design of Reinforced concrete structures	S.Ramamruthum	DhanpatRai and Son
4	Reinforced Concrete Design Principles and Practice	N Krishna Raju & R. N. Pranesh	New Age International, Mumbai
5	Fundamentals of Reinforced concrete	N. C. Sinha & S. K. Roy	S. Chand & Company, New Delhi

B) Reference Books

S. No.	Title of Book	Author	Publication
1	Reinforced concrete Design	S. U Pillai and Devidas Menon	Tata McGraw Hill
2	Limit State Design of Reinforced Concrete	Vaghrese P. C.	PHI learning Pvt. Ltd. Delhi, ISBN-8120320390
3	IS 456 2000	-----	Bureau of Indian Standards, New Delhi
4	IS 13920-2016	-----	Bureau of Indian Standards, New Delhi
5	IS 875-1987 (All parts)	-----	Bureau of Indian Standards, New Delhi
6	SP 16, SP 34		Bureau of Indian Standards, New Delhi

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

12. LEARNING WEBSITE :

- a. <http://nptel.ac.in>
- b. www.w3schools.com
- c. www.britannica.com
- d. www.trb.org

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs) :

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Suggest layout of R.C.C. structural components for given building plan	2	3								2		
2	Analyze, design and draw detailing of R.C.C. structural components	2	3			2					3		2

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Madhuri Ganorkar	Head of Applied Mechanics Department, Govt. Polytechnic, Aurangabad
2	Ganesh Kechkar	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad
3	Rajesh Aghav	Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE: Major Project

COURSE CODE: 6C502

PROGRAMME AND SEMESTER:

Diploma Programme in which this course is offered	Semester in which offered
CE/ME/EE/EJ/CO/IT/AE/DDGM	Sixth

1. RATIONALE

Apart from supervising construction /manufacturing processes and maintenance of Engineering work ,machines and equipments , a diploma technician has to do investigate, survey, collect data, refer handbooks and design some components , prepare estimates. Thus it will be observed that the job of a civil engineer is of integrating knowledge of different theoretical subjects in successful completion of an engineering work.

The course of project work is included in the curriculum mainly with a view to provide students with the teamwork, leadership and enterprenuership skills.

A student is given a real life problem and he has to provide a technical feasible solution by linking projects with national policicies / Govt . schemes like Skill India Unnat Bharat abhiyan , Unnat Maharashtra abhiyan, Smart city & Smart village schemes DMIC (Delhi-Mumbai Industrial corridor. The project activity is intended to expose students to a real life situation and thus to prepare him to enter into the world of work.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:-

“Apply the knowledge of various courses to solve real life problems of society and to develope team work , leadership and entrepreneurship skills to make students professionally competent”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE(OR)	PA	150
00	00	04	04	00	00	50#	100	

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, ESE -End Semester Examination; PT - Progressive Test;PA-Progressive Assessment OR- Oral examination,TW-Term Work,#External,@ Internal

4. COURSE OUTCOMES

At the end of studying this course Students should be able to

1. Work independently & Work as member of a team, learning to learn skill and thinking
2. Select project title, plan and prepare the activities schedule of project work with the help of guide.
3. Collect data/literature from various sources,
4. Conduct required survey/experimentation/testing etc.
5. Interpret, analyze collected data and design components with the help of handbooks, data books, etc
6. Prepare and present the project report.

5. SUGGESTED EXERCISES/PRACTICALS

The project work should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills.

Unit	Project work activities	Hours
1	Literature survey, data collection, identifying problem, deciding scope topic and objective of the project, discussion, topic selection	12
2	Searching of information, analyzing, Interpretation, editing of information of collected data, procurement of material for experimentation if required.	12
3.	Experimentation, testing, calculations, data survey, Solutions to given problem / work if any .	12
4	Design, calculations, costing and programming wherever necessary, finding Conclusions.	12
5	Preparation of Model/chart/video shoot/ppt etc.	08
6	Report writing, editing, Presentation and submission	08
		64

6.SUGGESTED STUDENT ACTIVITIES

- Form the group of 4/5 student for a project activity.
- Allot the guide (faculty) for each group.
- Decide the topic of project
- Conduct survey/experimentation
- Report writing and presentation

7. SUGGESTED AREAS FOR THE PROJECT WORK.**i) Civil Engineering**

1. Building construction system.
2. Transportation engineering system
3. Irrigation engineering system.
4. Environmental engineering system
5. Structural engineering system.
6. Interior decoration & designing of buildings.
7. Town planning of an area.
8. Soil & water conservation.
9. Geological aspects of civil engineering projects.
10. Management practices.
11. Rehabilitation projects.
12. Earthquake resistant designs of civil Engineering Projects.
13. Use of software's in Civil/ APM fields.
14. Low Cost Housing and Township
15. Any other area of civil engineering.

8. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- The project topic/ title should not repeated by group.
- Guide should be Senior or experienced faculty
- The project topic should selected such that, it should complete in a semester.

9. MAJOR PROJECT REPORT FORMAT

- a. Project report shall be in the print form on A-4 size white bond paper.
- b. Typing shall be in Times New Roman with spacing of 1.5 using one side of paper.
- c. Margins: Left = 37.5 mm Right , Top and Bottom = 25mm.
- d. Front page : Titles - TNR 18 bold , other – TNR 14 bold. With Institute Logo.
- e. Inner Pages : Titles –TNR – 14 Bold , other TNR 12 .
- f. Page Nos :Should appear on the right hand top corner of each page starting after index page.
- g. Tables to be preferable in the Text format only.
- h. Sketches to be drawn on separate sheet / pages in black ink .
- i. The Last content in the index to be of references. Acknowledgement to be added in the report.
- j. Binding: Hard with golden embossing on the front cover of black colour is preferred for the Major Project report. The number of copies are to be prepared by the student are 7 nos.
(If, 5 Student + Guide +Department Copy)

10. SUGGESTED LEARNING RESOURCES

1. Reference Books: Books

S. No.	Title of Book	Author	Publication
1	Projects Planning, Analysis, Selection, Implementation, and Review	Prasanna Chandra	Tata McGraw Hill Publications.
2	The A to Z of Practical Building Construction and Its Management	Sandip Mantri	Satya Prakashan, New Delhi
3	Indian Practical Civil Engineers' Handbook	P.N.Khanna	
	<p>IS: 456 – code of practice for plain and reinforced concrete.</p> <p>IS: 2386 – methods of tests for aggregate for concrete. (9 parts)</p> <p>IS: 2250 – compressive strength test for cement mortar cubes.</p> <p>IS: 269-2015 – specifications for 33, 43 & 53 grade OPC.</p> <p>IS: 3495 – methods of testing of bricks.</p> <p>IS 516-1959:Method of Tests for Strength of Concrete.</p> <p>IS 13311-1992 (Part-I): Method of Non-destructive testing of concrete, Part 1: Ultrasonic pulse velocity.</p> <p>IS 1786-2008: High strength deformed steel bars and wires for concrete reinforcement.</p> <p>etc.</p>		

11. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS:

12.SOFTWARE/LEARNING WEBSITES:

i)www.mahapwd.com

ii)websites related to civil engg. construction field/ materials.

13.MAPPING OF PROGRAMME OUTCOMES(Pos) and PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES(COs)

CO. NO.	Course Outcome	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	PS1	PSO 2
CO1	Work independently & Work as member of a team , learning to learn skill and thinking.							1	3	2		3	
CO2	Select project title, plan and prepare the activities schedule of project work with the help of guide.		3						3	2		3	
CO3	Collect data/literature from various sources.		2						3	2		3	
CO4	Conduct required survey/experiment/testing etc.			3	2				3	2			3
CO5	Interpret, analyze collected data and design components with the help of handbooks, data books, etc							2	3	2			3
CO6	Prepare and present the project report.		2						3	2			3

Course Curriculum Development Committee

1. Prof. J. S. Patil Head of Civil Engineering Government Polytechnic Aurangabad.
2. Prof. Y. M. Patil, Lecturer in Civil Engineering Government Polytechnic Aurangabad.

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE: VOCATIONAL TRAINING

COURSE CODE: 6C503

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CE/ME/EE/ET/CO/IT/DD/AE	Sixth

1. RATIONALE:

A technician is responsible for the quality supervision, production/construction/development and repairs and maintenance of different engineering machines / equipments / structures in related area of engineering. Vocational training course is mainly integrated with theoretical knowledge and practical experiences and various situations of performing the jobs correctly actually on sites / Industries. While working in the industry a technician is employed for planning, preparation, supervision, and quality control. Arrangement of materials, labours and equipments are also the additional role of a technician. Vocational training will provide an opportunity to relate theoretical knowledge and its field / industry applications, quality assurance of processes and safety measures. It also provides hands on experience of various activities and standard practices along with enhancement of employability skills.

2. COMPETENCY

The student should be able to

“Relate, verify and apply theoretical knowledge and procedures to field / industrial practice and situations through observation, participation and hands on experience to supervise the manufacturing/construction/ development and maintenance of engineering entities as a self / wage employee.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	100
-	-	4	4	--	--	50#	50	
Duration of the Examination (Hrs)				--	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Supervise various processes in construction / manufacturing / erection / execution and maintenance of structures / systems / machines as per standard code of practices.
2. Assists in project planning, execution, monitoring and management.
3. Identify and solve the field problems and communicate effectively to various agencies / stake-holders.
4. Plan and observe safety measures in Industry / field.
5. Test the materials / products / works for its conformity with quality parameters.
6. Prepare a Report of training experiences.

5. DETAILED COURSE CONTENTS.

Following are the general guidelines for implementation of Vocational training

1. Student studying in Final year diploma engineering program is expected to work in a group 4-5 students for vocational training. Each group shall work under the guidance of a regular employee(engineer) of the industry as a trainee in a Major (Large) /medium /small industry(Civil/Mechanical/ Electrical/Electronics Computer/IT/Garment manufacturing) for four weeks. (This includes 3/ 4 days of orientation, 3 weeks of working in industry and report preparation in sixth semester (2hrs /week).
2. Finally the students in group shall prepare the report of his vocational training under the guidance of the teaching staff members which may consists of observations, drawings, sketches, sample calculations / simple designs, processes, procedures, applications, managements, costing aspects. Student should deliver a seminar on his training experiences.
3. Vocational Training is to be undertaken after fifth semester's end examination.)

Role of Department:

1. Department have to send training request letter to various industries well in advance before commencement of training.
2. After getting sufficient number of seats from the industries/garages, students will be placed in different industries/garages for their 5th semester training.
3. Students will have to fill up training form.(attached here with form-1)
4. Department will issue an order letter to industry for the said training mentioning the name and registration number of students.
5. All above activities have to be carried out in advance of previous semester as plan out of placement in consultation with industry & students .
6. During the training period, the head of the department will maintain a schedule for follow – up of industrial training and according to it he/she will send the guide faculty members to various industries.

7. The faculty member during the visit to industry will check the progress of the student in the training, his/ her attendance, discipline and daily diary preparation.
8. The department has to keep record of above progressive assessment during visits of teachers to industry .
9. At the end of the training internal faculty member and industry representative will assess the work done by student based on his presentation at the institute and training report.

6: CONTENT DETAILS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	A	Term work Identify the industry. Take concerns and depute the groups along with faculty members. Daily Visits for vocational training, Completion of training by maintaining daily diary under guidance of site / Industry Engineer and faculty. (Following activities B-I to B IV may also be considered during this period)	32* Hrs- Min) Semester Break Activity. 32 Hours in sixth semester.
2.	B- I	Collect and analyze site / industry data on Planning, preparation, erecting, production, manufacturing & quality control aspects as per the daily diary recorded at site / industry.	08
3	B-II	Preparing rough draft along with collected drawings. Maps and designs / calculations or tables.	08
4	B-III	Group discussion in presence of guide Give presentation - ppts / models / charts / drawings etc. in a group .	08
5	B-IV	Prepare Final draft with all attachments. Spiral Binding of the vocational training work and term work completion.	08
Total Hours.			32* + 32 = 64 hrs

7: SUGGESTED STUDENTS ACTIVITIES

- I) Aspects to be considered for Vocational training / report writing of it.
- Planning, preparation & quality control for various activities and processes.
 - Management of materials, labours & equipments,
 - To solve the minor industrial problems.
 - Develop the Entrepreneurial skills.

- Develop ability to work in a team.
- To enhance the presentation skills
- Vocational training reports preparations & cost analysis,
- To be familiar with financial sources.

II) SUGGESTED AREAS FOR THE VOCATIONAL TRAINING WORK (PROGRAMME SPECIFIC) FOR:CIVIL

SR. NO	AREA OF CIVIL ENGINEERING	SUGGESTED CONSTRUCTIONS / SITES
1	Building construction system.	Low Cost Housing Smart City / Smart village Slum area development Apartments / flats / row houses Multy story buildings. Construction of Malls / sports complex. Special repairs of buildings Interior decoration of buildings
2	Transportation engineering system	Highway construction and machinery. Railway track maintenance. Air port run-way construction. Tunnel construction. Fly-over construction. Bridge maintenance.
3	Irrigation engineering system.	Percolation tank. Canal maintenance. Flood Studies. Cross drainage works. Waste weirs / Bandhara..
4	Environmental engineering system	Municipal water supply Maintenance of drainage line. Industrial pollution. Solid waste pick-ups.and disposal system. Construction of swimming tank / water park. Rehabilitation work.
5	Structural engineering	Ready Mix Plant. Over head RCC water tank Testing of materials in Government / Private Concrete roads / bituminous roads Maintenance of Concrete / bituminous roads Sugar factory / Industrial shed construction..
6	Any other Civil Engineering area of problem or case study.	Current Projects of Government or Private firms, National and State Government schemes like skill India. Digital India, Smart cities / village, DMIC, Five Star MIDC. Unnat Bharat Abhiyan, Unnat Maharashtra Abhiyan.

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8:SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

- i. Consider Local / Institute problem or problem related to society for providing technical solution.
- ii. Visit the site.
- iii. Take permission of concerned authority.
- iv. Follow Instructions.
- v. Write daily dairy regularly at site.
- vi. Prepare sketches on dairy / on plain pages.
- vii. Collect drawings and leaflets.
- viii. Group discussions.
- ix. Prepare report.
- X Prepare power point presentation for final assessment of vocational training.

A) VOCATIONAL TRAINING REPORT FORMAT:

Title page

- Certificate
 - Abstract
 - Acknowledgement
 - Index
 - Introduction of industry/garage
- Industry lay out (at training place)
- Hierarchy of industry/organization chart.
 - Types of major equipments/instruments/machines used in industry with their specification, approximate cost and specific use.
 - Particulars of Practical Experiences in industry.
 - Additional data/information on – cost reduction, repair , Safety features, cost estimates of major repairs, modifications, etc.
 - Special/challenging experiences encountered during training if any
 - References
 - Bibliography

REPORT FORMAT

- a. Vocational Training report shall be in the print form on A-4 size white bond paper.
- b. Typing shall be in Times New Roman with spacing of 1.5 using one side of paper.
- c. Margins: Left = 37.5 mm Right , Top and Bottom = 25mm.
- d. Front page : Titles - TNR 18 bold , other – TNR 14 bold. With Institute Logo.
- e. Inner Pages : Titles –TNR – 14 Bold , other TNR 12 .
- f. Page Nos :Should appear on the right hand top corner of each page starting after index page.
- g. Tables to be preferable in the Text format only.
- h. Sketches to be drawn on separate sheet / pages in black ink .
- i. The Last content in the index to be of references. Acknowledgement to be added in the report.

Binding: Spiral binding is preferred for the Vocational training report. The number of copies are to be prepared by the student are 7 nos. (if, 5 Student + Guide +Department Copy)

B) DAILY DIARY FORMAT

GOVERNMENT POLYTECHNIC, AURANGABAD
Civil Engineering Department

VOCATIONAL TRAINING DAILY DIARY

Period of Vocational training (4 Weeks) : From : _____ to: _____

Address of Industry / Site:-----

DAY NO : _____ Date: _____

OBSERVATIONS OF THE DAY

Signature of Student

Signature of Engineer In-charge

Signature of Guide

Signature of Head of Dept.

PERMISSION LETTER:

Government Polytechnic , Aurangabad.

(An Autonomous institute of Govt. of Maharashtra)

Osmanpura, Aurangabad.

Phone : 2334724/2321917/2353644 Resi: 2331562

GRAM : POLYTECH Fax “2334724 E-mail: gpaur@rediffmail.com

No.GPA/Civil/In-plant tra./

Date:

To,

Subject : placement for In-plant Training for the Final Year Students from date

Dear sir,

It is my pleasure to inform you that, Government Polytechnic, Aurangabad is an Autonomous Institute of Maharashtra since 1994. This Institute has introduced In-plant Training of the student as a part of curriculum of the final year Civil Engineering Diplomain addition to the project work with a view to provide an opportunity of the industrial exposure to the Civil Engineering Students.

During the In-plant Training Students are expected to learn by attending the construction site and record or observe the various technical details /daily constructional activities with the problem solving methods in – liaison with the site Engineer In – charge of the project. Student will be working / observing the activity of the construction under the guidance of the Site Engineer, without causing any inconvenience in a day to day functioning of the site for the said period. Later our student will prepare a brief report for the same and will submit to this institute as a part of their term – work for further assessment. Students are required to develop the following skill during their training.

1. Planning data collection, process and execution of the project.
2. Material, labour and equipment management.
3. Constructional and cost aspects.
4. Progress and comparisons.
5. Quality control and entrepreneurship aspects.

Kindly grant the permission for the placement of the following group of students at your construction site and direct the site engineer for the guidance to our students in order to gain the industrial experience during the In-plant Training work.

Sr No	Enrollment No	Name of the student	Mobile no of student	Name of the guide sign & mobile no

Thanking you sir, and co – operation from your end expected for this academic work.

Principal,
Govt. Polytechnic,
Aurangabad.



Government Polytechnic, Aurangabad.

(An Autonomous institute of Govt. of Maharashtra)

Osmanpura, Aurangabad.

Phone : 2334724/2321917/2353644 Resi: 2331562

GRAM : POLYTECH

Fax “2334724

E-mail: gpaur@rediffmail.com

No.GPA/Civil/In-plant tra./2015-16

Date: 03/12/2015

UNDERTAKING TO BE SUBMITTED BY THE STUDENTS UNDERGOING IN – PLANT TRAINING

I, the undersigned students of final year Civil Engineering of this Institute for the academic year 2014-15 hereby give undertaking to abide by the below rules stipulated by the Department of Civil Engineering, Government Polytechnic Aurangabad.

The rules to abide by me during the In-plant Training shall be,

1. I shall report the industry / organization on the stipulated scheduled without fail.
2. I shall observe and follow all the rules enforced by the industry / organization.
3. I shall attend the work at the industry of placement as per the schedule.
4. I shall bear the transportation, food and other charges if required for the daily visits to the industry during the training schedule.
5. I shall observe all the safety precaution at the deputed site during the training.
6. I shall take whole responsibility regarding any untoward incidents or any mishaps occurred at the site and will not make any claims of compensation from Government Polytechnic, Aurangabad or from the deputed industry / organization as I am attending the same as per my wish.
7. I shall obey the instruction of my guide and the Site Engineer during the training.
8. I shall work at the construction site In – liaison with Site Engineer, without causing any inconvenience day to day functioning of the deputed site for the said period.
9. I shall be liable for action for any indiscipline during the training period.
10. I shall collect the certificate of attendance and relieving letter from the industry.

Date:

Place : Aurangabad

Name of Guide:

Signature :

Name of Student:

Enrollment No:

Mobile No:

Permanent address:

CERTIFICATE

This is to certify that Mr.-----
 -----of Final year having Enrollment No ----- of Government
 Polytechnic, Aurangabad, attended and completed the In – Plant Training
 successfully at this site during the period from -----to -----
 -

Date :

Place :

Seal

Signature

9.SUGGESTED LEARNING RESOURCE

Visit to institute library to find the related text books.

Sr No	Title of Book	Author	Publication
1	As per site details / area of vocational training.	Refer Books , I.S. Codes, Hand Books , Standard specifications, Manuals of Govt Depts, National and Inter-national journals.	

10. MAJOR EQUIPMENT/ INSTRUMENT WITH BROAD SPECIFICATIONS

1. Daily Diary write up and taking signature of In-charge Engineer.
2. Interactions with, Managers /Engineers, Contractors, Trainers ,technicians, and labours at site.
3. Report preparation and Final presentation of work done.

11. LEARNING WEBSITES:

Search on WEB for related construction / Industrial sites.

1.www.google.com

2.www.youtube.com

3 websites related to construction sites.

12. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

CO. NO.	Course Outcome	Programme Outcomes										PSO 1	PSO 2
		1	2	3	4	5	6	7	8	9	10		
CO1	Supervise various processes in construction / manufacturing / erection / execution and maintenance of structures / systems / machines as per standard code of practices	--	3	--	3	--	--	--	--	--	--	--	2
CO2	Assists in project planning, execution, monitoring and management	--	1	--	---	--	--	--	--	---	--	--	2
CO3	Identify and solve the field problems and communicate effectively to various agencies / stake-holders.	---	--	3	3	---	--	--	1	--	--	1	
CO4	Plan and observe safety measures in Industry / field	--	2	3	--	--	--	---	--	--	--	2	2
CO5	Test the materials / products / works for its conformity with quality parameters.	--	3	--	--	--	--	--	2	--	--	2	2
CO6	Prepare a Report of training experiences	--	3	3	---	--	--	---	--	--	--	--	2

Name of the	Designation and Institute
Sr faculty members	
No Smt.J. S.Patil	HOD Civil Engineering Department
1	Govt.Polytechnic,Aurangabad
2 Shri. Y.N.Shaikh	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- DISASTER MANAGEMENT

COURSE CODE 6C509

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	sixth

1. RATIONALE

Floods , Droughts, Cyclones, earthquakes, landslides ,Tsunamis, attack by terrorists ,fire and land degradation and the effects of their pollution are affecting on . The course on Disaster Management gives the student an overview of various types of disaster ,its effect on Human and natural development .what are the measure to be taken before, during and after the disaster .Civil Engineering structures should they should with stand against these disasters .. This course is therefore an essential course for diploma programme in Environmental/Civil Engineering.

2. COMPETENCY

At the end of studying this course students will be able to,

‘Undertake the activates for preparedness and Mitigation of disaster before, during and after

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (OR)	PA (TW)	150
3	--	3	6	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4.COURSE OUTCOMES (COs)

1. Explain the Types of Disaster
2. Describe Earthquakes effects, prediction, safety and earthquake resistant buildings
3. Identification of Causes of flood and effects along with possible measure for controlling flood disaster.
4. Identification of Causes of cyclone and effects along with possible measure for controlling cyclone disaster.
5. Identification of Causes of drought and effects along with possible measure for controlling drought disaster
6. Explain Framework for disaster management at various level with responsibility ,communication and linkages for Rescue And Evacuation

5.COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Introduction	1a. State the types of Disaster 2a. Technical Terminology relating to disaster management preparedness, Mitigation ,Risk Assessment, Vulnerability, state of calamity	1.1 Disaster 1.2 Types of Disaster 1.2.1 Natural Disaster and its types 1.2.2 Man-made Disaster and its types 1.3 Technical Terminology : preparedness, Mitigation ,Risk Assessment, Vulnerability, state of calamity
Unit –II Earthquake	2a. Explain the effects of Earthquakes 2b. Explain Earthquake Prediction . 2c.Explain the Safety Rules Before , During and After an earthquake. 2d. Explain General Concepts Of Earthquake Resistant Design structures 2e. Explain Advanced Earthquake Resistant Design Techniques. 2f.Explain Earthquake Resistant House Construction	2.1 Measuring the Severity of Earthquakes 2.2 Effects Of Earthquakes 2.3 Earthquake Prediction 2.4 Earthquake Safety Rules 2.4.1 Before an earthquake 2.4.2During an earthquake 2.4.3 After an earthquake 2.5 General Concepts Of Earthquake Resistant Design structures 2.6 Categories Of Buildings achieving seismic resistance 2.7 Advanced Earthquake Resistant Design Techniques 2.7.1 Base Isolation, Uses of Base Isolation , Working Principle 2.7.2 Energy Dissipation Devices 2.8 Damage to Houses by Eathquakes 2.9 Earthquake Resistant building Construction

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit– III Flood	3a. Describe the Causes of Floods. 3b. Discuss in detail the Effects of Floods. 3c. Explain the Flood Disaster Management 3d. Discuss in detail methods of Flood Forecasting 3e. Explain the flood controlling Before, During and After. 3f. Construction Techniques used for flood control	3.1 Causes of Floods 3.2 Effects of Floods 3.3 Flood Disaster Management 3.3.1 Flood Forecasting 3.3.2 Reduction of Runoff 3.3.3 Reducing Flood Peaks by Volume Reduction 3.3.4 Reducing Flood Levels 3.3.5 Flood Plain Zoning (FPZ) 3.4 Flood Control Programmes And Policy 3.4.1 Before an Flood 3.4.2 During The flood 3.4.3 After the flood 3.5 Construction Techniques for flood control
Unit– IV Drought	4a. Discuss the Types of Drought. 4b. Explain the Causes and Effects of drought. 4c. Explain preventive measures for the drought controlling Before, During and After. 4d. Construction Techniques used for controlling the drought	4.1 Types of Drought 4.2 Causes of drought 4.3 Effects of drought 4.4 Preventive measures for drought mitigation .(before during ,After) 4.5 5 Construction Techniques for drought control
Unit– V Cyclone	5a. Discuss the Types of Cyclones 5b. Explain the Causes and Effects of Cyclones 5c. Explain preventive measures for the Cyclones controlling Before, During and After. 5d. Explain the Cyclone resistance structures.	5.1 Types of Cyclones 5.2 Causes Of Cyclones 5.3 Effects of Cyclones 5.4 Cyclone mitigation (Before, During After) 5.5 Cyclone resistance structures
Unit– VI Disaster Management	6a. Explain the Institutional disaster (framework) planning. 6b. Discuss Hazard, vulnerability, capacity and risk analyses. 6c. Explain Early warning, alert systems and triggers 6d. Explain the disaster communication channels and linkages .	6.1 Institutional disaster (framework) planning 6.2 Hazard, vulnerability, capacity and risk analyses 6.3 Resource identification and mobilization 6.4 Early warning, alert systems and triggers 6.5 Linkages and communications: 6.6 Channels Used for Disaster communication :

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	6e. Discuss the Essential Requirements For Search, Rescue And Evacuation	Radio and Television, Telephone, cell broadcasting , Satellite Radio, Internet/email/social networking sites , Amateur and Community Radio 6.7 Sect oral responsibilities 6.8 Essential Requirements For Search, Rescue And Evacuation

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	04	04	02	02	08
II	Earthquakes	14	06	08	08	22
III	Flood	08	04	06	04	14
IV	Drought	08	05	04	04	13
V	Cyclone	08	05	04	04	13
VI	Disaster Management	06	04	04	02	10
	Total	48	28	38	26	80

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED EXERCISES/PRACTICALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Group of 5 students deliver the seminar on case studies for various types of disaster	16
2	II	Preparation of flood evacuation plane for the locality which suffer from flood	08
3	III	Visit to on district disaster control room	08
Total			32

8. SUGGESTED STUDENT ACTIVITIES

- A. Explore internet for studying latest methods of disasters of the world ,
- B. Prepare charts/models of different structures for disaster mitigation .

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

Arrange expert lectures on different aspects of Disaster management.

- Discuss success stories of disaster management .
- Arrange visits to show different activities related with disaster management
- Show video films/photographs etc. related to different aspects of disaster management.

10. SUGGESTED LEARNING RESOURCES**A) Books**

Sr. No.	Title of Book	Author	Publication
1	Natural Hazards And Disaster Management: Vulnerability And Mitigation	R. B. Singh	Rawat Publications
2	Natural hazards and disasters	Donald Hyndman & Hyndman David	Thomson Brooks/Cole
3	Threats, change, vulnerability and risks in environmental human security	Blauch Hans Gunther	UNU – Institution for environmental and human security (UNU-EHS)
4	Disaster Plan and recovery – A guide for facility process	Levitt, Alan M	John Wiley & Sons Inc, 1997
5	Disaster Science And Management	Tushar Bhattacharya	Mcgraw Higher

B. List of Software/Learning Websites:

- i. <http://www.nidm.gov.in/books.asp>
- ii. https://books.google.co.in/books/about/Disaster_Management.html?id=m7UD_y4vP.
- iii. <http://www.cyen.org/innovaeditor/assets/Solid%20waste%20management.pdf>

11.MAPPING OF PROGRAMME OUTCOMES (POS) WITH COURSE OUT COMES (COS)

SNo	Course Outcome	Pos										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Types of Disaster		1	1	2							1	
2	Use of Theodolite for Traversing Earthquakes effects, prediction, safety and earthquake resistant buildings		1	1	2							1	
3	Causes of flood and effects along with possible measure for controlling flood disaster.		1	1	2							1	
4	Causes of drought and effects along with possible measure for controlling drought disaster		2	1	3							1	
5	Causes of cyclone and effects along with possible measure for controlling cyclone disaster		2	1	3							1	
6	Framework for disaster management at various level with responsibility ,communication and linkages for Rescue And Evacuation		1	2	3							1	

12. COURSE CURRICULUM DESIGN COMMITTEE

Sr No	Name of the faculty members	Designation and Institute
1	K. S.Borde	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	P.K.Agale	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE: SOLID WASTE MANAGEMENT**COURSE CODE: 6C510****PROGRAMME & SEMESTER**

Diploma Programme in which this course is offered	Semester in which offered
Civil	Sixth

1. RATIONALE:

The problem of solid waste is spread all over the country, within the urban as well as rural area. Management of solid waste at national level is today prime need to keep the environment safe and clean. Solid waste management include the activities related to generation of refuse, various sources of solid waste, its storage, Collection, transportation, processing, recycling, reuse, recovery and disposal in an environmentally acceptable manner. The responsibility lies not only on local bodies, government but also on all the citizens. This is elective subject and intended to teach the students; the activities related to generation of waste storage, collection, transportation, processing, reuse, recovery, recycling and disposal in economic and environmentally acceptable manner. Also awareness and participation of public in large is necessary in management of solid waste in eco-friendly manner.

2. COMPETENCY

At the end of studying this course Student will be able to

“Manage the activities related to solid waste generation, collection, transportation, disposal, and reuse in eco-friendly manner and aware people for segregation of waste at source itself and its reuse.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	#(OR)	PA (TW)	150
3	--	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; **T-**Tutorial/Teacher Guided Theory Practice ; **P-** Practical; **C-** Credits; **ESE-** End Semester Examination; **PT – Progressive Test**, **PA-** Progressive Assessment, **OR** – Oral Examination, **TW** - Term Work, **#** External, **@** Internal

4. COURSE OUTCOMES (COs)

At the end of studying this course students will be able to:-

1. Identify various sources, composition, quantities, physical and Chemical characteristics of solid wastes.
2. Enlist methods of storage, Collection and transportation of solid waste .
3. Aware of various health aspects in Solid Waste Management.
4. Categories methods of storage, Collection and transportation of hospital waste.
5. Describe various disposal methods – land filling , composting and incineration.
6. Compare recycling and reuse of solid waste and different types of hazardous and industrial waste.

5.DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit-I Introduction	1a Understand various types of wastes. 1b Classify wastes. 1c Sources of solid waste. 1d Composition and characteristics of solid waste.	1.1 Definitions of solid waste, classification 1.2 Domestic waste, commercial waste, Institutional waste 1.3 Industrial waste, Construction waste, Hazardous waste, 1.4 Toxic waste, street sweepings, E – waste 1.5 Sources of solid waste 1.6 Composition of solid waste 1.7 Quantities of solid waste generated, sample figure for some cities in India as well as outside India 1.8 Factors affecting on solid waste generation. 1.9 Physical and chemical characteristics.
Unit- II Storage, collection and Transportation of waste	2a Categorise segregation of waste. 2b Criteria for storage of waste. 2c Understand transportation Equipments and transportation vehicles.	2.1 Storage of Municipal Waste 2.2 Collection of Municipal Waste 2.3 Transportation of Municipal Waste 2.3.1 Transportation Equipments- Litter bin ,Broom, Shovels ,Hand carts, Mechanical road sweepers, Community bins like movable and stationary. 2.3.2 Transportation vehicles with their capacity and working- Animal carts, Auto

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		vehicles ,Tractorsor Trailers, Trucks , Dumpers, Compactor vehicles. 2.4Transfer stations: meaning, necessity, location,Organization pattern of solid waste management. 2.5Recycling of Municipal Waste, reuseand Resource Recovery of solid waste. 2.6Segregation and salvage recovery <i>2.7 Use of solid waste as raw material in industry</i>
UNIT-III Health Aspect in Solid Waste Management (SWM)	3aCompilehealth aspect in SWM. 3bUnderstand health aspects during various stages of SWM. 3cList problems and issues and remedialmeasures. 3dTo know hazardous wastes.	3.1 Health aspect and during solid waste handling and processing. 3.2 Health problems arising at the time of segregation, reuse, Recovery recycling and at final disposal sites.. 3.3Handling and disposal of hazardous waste. 3.4 Public involvement and participation in solid waste management.
Unit– IV Handling and Disposal of hospital waste or Biomedical Waste(BMW)	4a Able to know various sources of hospitalwaste. 4b 1998 Indian rules for color codes for storage 4c To know about transportation of hospital waste. 4d To know about methods of disposal Of hospital waste.	4.1 Types of hospital waste-clinical and non clinical 4.2 Storage of hospital waste 4.3 Collection of hospital waste 4.4 Transportation of hospital waste 4.5 Disposal of hospital waste- Incineration method in detail. Rotary kiln incinerator– sketch,component partsand working.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit - V Sanitary land filing	5a To identify site for Land filling 5b To understand different methods of land filling. 5c To study effect of Land filling on ground water.	5.1 Factors affecting Site selection. 5.2 Land filling Methods-Area method, Trench method, Ramp method. 5.3 Leach ate and its control 5.4 Control of contamination of ground water. 5.5 Advantages and disadvantages of land filling methods
UNIT VI Composting of waste	6a To understand basics of composting process. 6b To understand process before composting. 6c To know various methods of composting.	6.1 Theory of Composting-Principles of composting process. 6.2 Factors governing Composting process 6.3 Process before Composting 6.4 Methods of Composting – A)Manual composting -- Bangalore method, Indore method, 14 days method, Anaerobic method, vermicomposting- concept, composting at home. B)Mechanical composting plant – Dano process 6.5 Benefits of composting process 6.6 Recovery of bio-gas energy from organic solid waste.
UNIT VII Incineration of waste	7a. To study method of disposal-incineration. 7b. To understand advantages and disadvantages of incineration process.	7.1 Introduction of incineration process. 7.2 Need of incineration 7.3 Types of incinerators-Multiple chamber Incinerator, Municipal Incinerator 7.4 Pyrolysis of waste- Definition and methods. 7.5 Advantages and disadvantages of incineration process.
Unit – VIII Industrial	8a. To understand different types of	8.1 Responsibility of industry 8.2 Recycling of industrial waste 8.3 The problem of disposal of industrial

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
waste and its disposal	industrial wastes. 8b. To study organic and inorganic wastes. 8c To know disposal of industrial waste.	waste - 8.3.1 Industries producing mainly organic wasteslike - Fruit processing, Slaughter-house waste. 8.3.2 Industries producing mainly inorganic wastes- from Steel Plants, Fly ash from thermal power station.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	06	04	04	02	10
II	Storage, Collection and Transportation of Waste	10	04	06	04	14
III	Health aspect in solid waste management	04	04	02	02	08
IV	Handling and Disposal of Hospital waste	04	04	02	02	08
V	Sanitary land filling	06	04	02	04	10
VI	Composting of waste	08	04	04	06	14
VII	Incineration of waste	05	02	04	02	08
VIII	Industrial Waste And Its Disposal	05	02	04	02	08
	Total	48	28	28	24	80

Legends: R = Remember; U = Understand; A = Apply and above levels (Revised Bloom's taxonomy)

7. LIST OF PRACTICALS/LABORATORY EXPERIMENTS/TUTORIALS

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hours required
1.	I and II	a)Writing assignment on types of wastes,various sources of solid wastes,composition of solid waste. b)Collecting photographs of different types of transportation equipments and vehicles and writing their capacities.	06
2.	III and IV	a)Writing assignment on various health problems and their remedial measures during various stages of SWM. b) Visit to study hospital waste,its collection and disposal / Showing video of hospital waste management of any hospital,	04
3.	V	Assignment on method sanitary landfilling and Incineration method/visit to landfilling site under construction.	04
4.	VI	Assignment on comparative study of composting methods./Visit to bio gas plant./visit to vermin composting plant/housing colony.	06
5.	VII	Micro project: Visit to any locality/colony/village/industry for studying existingtypeswastes,collection,seggregation,storage,transfer, disposal and suggest and aware about reuse,recycle and new methods of disposal.Prepare report. OR Visit to apartment / Institute to study E-waste.Suggest methods of disposal,prepare report.	06
6.	VIII	Preparing flow diagram for method of disposal of any one industry producing organic and inorganic waste./ field visit to any industry for disposal method./video of individual industry plant like hotel.	06

8. SUGGESTED STUDENT ACTIVITIES

Following are the list of proposed student activities like:

- a)Understand organizational pattern of solid waste management.
- b)Conductingcampaign for awareness about segregation of solid waste at source itself.

c To aware people about recycling of waste in simple way.

9.SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

A.State the importance of SWM to save environment.

B.Motivate students to use internet for searching equipments and vehicles for SWM.

C.Show working of various equipments used in SWM through videos.

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Author	Title	Publisher
1	Dr. A. D. Bhide	Solid Waste Management	
2	Gorge Techobanoglous	Solid Wastes	– McGraw Hill
3	Pavoni	Hand Book on Solid Waste Management	
5	Khopkar S.M. (1993)	Environmental Pollution Analysis	New Age International (p) Limited.
6	Rao C. S.	Environmental Pollution Control Engineering.	Wiley Eastern Limited
7	S.K. Garg.	Sewage disposal and air pollution Engineering	
8	Edwards and Lofty .	Earthworm Biology.	
9	AnubhaKaushik& C.P. Kaushik -	Perspectives in Environmental Studies	New Age International (p) Limited, Publishers
10	D.L.Manjunath	Environmental studies	PEARSON Publication
11	AninditaBasak	Environmental studies	PEARSON Publication
12	B.B. Hosetti	Prospect and Perspectives of Solid Waste Management	New Age International Limited

REFERENCES

Sr No	Title of Book	Author	Publication
1	Water treatment and waste recovery	Nicholas p. Cheremisinoff	Butterworth-Heinemann Publications
2	Handbook of SWM and waste minimization Technologies.	Nicholas p. Cheremisinoff	Butterworth-Heinemann Publications

11 LEARNING WEBSITES

- 1.www. hsagolden.com
- 2.www.almitrapatel.com
- 3.www.yousee.in
4. www.skgsangha.org
- 5.www.epa.gov/epaoswer/non-hw/municipal/index.htm
6. En. Wikipedia.org/waste-management
- 7.http://www.bh.com

12 MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No.	Course Outcome	Pos										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	To understand various sources, composition, quantities, physical and chemical characteristics of solid wastes.	--	3	--	--	3	--	--	--	--	--	--	2
CO2	To know methods of storage ,Collection and transportation of solid waste.	--	2	3	--	--	---	--	---	--	--	--	2
CO3	Students shall be aware of various health aspects in Solid Waste Management	--	3	--	---	3	--	--	--	--	--	--	1
CO4	Student should learn methods of storage Collection and transportation of hospital waste .	--	--	2	---	3	---	---	---	--	--	--	3
CO5	To study various disposal methods- land filling, composting and incineration.	--	3	--	3	1	--	--	--	--	--	--	
CO6	To understand recycling and reuse of solid waste and different types of hazardous and industrial waste.	--	--	2	--	3	1	--	--	--	--	--	2

Course Curriculum Design Committee:-

1. Smt.Jayashri Sanjay Patil HOD Civil Govt.Polytechnic,Aurangabad.
2. Smt.Yaminipatil Lecturer Civil Engg. Govt.Polytechnic,Aurangabad.

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- WATER CONSERVATION ENGINEERING

COURSE CODE 6C511

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE

Water resources play a very important role in the overall development of a country like India. Water resources are becoming scarce day by day & users are multiplying in larger number. It is need of the hour to adopt scientific approaches for making use of water resources judiciously and intelligently. This is diversified course gives knowledge of use and construction different water conservation measures to conserve water and soil need be undertaken in an integrated manner to manage the resources effectively.

2. COMPETENCY

At the end of studying this course students will be able to,

Investigate, design, construction and maintenance of different types of water conservation measures.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (OR)	PA (TW)	150
3	--	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

- I. Explain the concept of watershed and its different characteristics.
- II. Calculate runoff from a watershed by different method.
- III. Describe problem caused by erosion, factors affecting soil erosion, types of Erosion
- IV. Explain the use and construction of water conversion agronomic and engineering measure for a water shed.
- V. Prepare plan and design the roof rainwater harvesting for buildings.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit-I Introduction	1a. Describe the Importance, classification, availability and use of water Resources. 1b. Explain Principles of soil conservation 1c. Explain the concept of watershed and its different characteristics	1.1 Water resources- types & its availability, its use and importance. 1.2 Classification of water resources 1.3 Principles of soil conservation. 1.4 Approaches to Soil conservation. 1.5 Concept of water shed, characteristics. of watershed
Unit– II Computation of Runoff	2a. Explain types of runoff 2b. Describe factors affecting runoff. 2c. Calculate runoff from a watershed by rational method	2.1 Runoff cycle, types of runoff, factors affecting runoff, 2.2 Methods of runoff computation of runoff by Rational method, Limitation of Rational method, Cook’s method, Unit hydrograph method, Limitation of unit hydrograph method.
Unit– III Erosion	3a. Explain different effect of erosion on soil properties and productivity. 3b. Describe problem caused by erosion, factors affecting soil erosion, types of erosion. 3c. Explain different gully control measures	3.1 Soil conservation in India, effect of erosion on soil properties and productivity. 3.2 Definition, problem caused by erosion, factors affecting soil erosion, types of erosion. 3.3 Mechanics of water erosion, types of water erosion. 3.4 Gully erosion- Causes of gully formation, factor affecting gully formation, classification of gully,

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		<p>preventive measure of gully, gully treatment measures.</p> <p>3.5 Gully control- Improvement of catchment, stabilization of gully, diagnosis for gully erosion, Gully treatment measures.</p>
<p>Unit– IV Agronomic and Engineering Measures</p>	<p>4a. Explain objective . Contour cultivation</p> <p>4b. Describe strip cropping</p> <p>4c.Explain tillage practices.</p> <p>4d.Describe purpose of mulching and list materials used for mulching,</p> <p>4e. Explain the different types of Engineering measures of water conservation.</p>	<p>Agronomic Measures</p> <p>4.1 Contour cultivation objectives, design considerations, advantages disadvantage</p> <p>4.2 Strip cropping-advantages, types</p> <p>4.3 Tillage practices.</p> <p>4.4 Mulching- purpose, materials used for mulching,</p> <p>4.5 Pastures, grazing practices.</p> <p>Engineering Measures</p> <p>4.6 Bunding- Types, Classification- contour bunding and graded bunding, design criteria, alignment & construction, surplus arrangement,</p> <p>4.7 Contour trenching-graded trenches and staggered trenches,</p> <p>4.8 Terraces- Main features, Classification, bench terraces- types, objectives, location, limitations, layout, design, construction. maintenance , Broad Base Terraces-Types, objectives, limitations, design , maintenances,</p> <p>4.9 Grassed water ways –location, selection of suitable grasses, construction and maintenances,</p> <p>4.10 Gully control measures- safe conduct of water and adaptation of gully control measure-Vegetation, Plantation, Nala bunding; check dams structures such as temporary check dam - Brush wood dams, loose rock dam or gully plugging by stone, soil, netting dam, log check dam, Permanent structures</p>

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		<p>spillways, rubble masonry dam, concrete dam, gabions-construction, components, advantages.</p> <p>4.11 Farm ponds- types, components, selection of site, construction.</p>
Unit - V - Water Harvesting and Artificial recharge	<p>5a. Explain the concept water harvesting, need for water, and harvesting principles.</p> <p>5b. Describe different Water Harvesting methods.</p> <p>5c. Design roof water harvesting system.</p> <p>5d. Explain methods of waste water recharge.</p>	<p>5.1 Water Harvesting – History, Need for water harvesting , concept and definitions, soil requirement for water harvesting , harvesting principles , site and technique selection,</p> <p>5.2 Water Harvesting methods- Tassa, half moons, contour stone bunds, Nigerian micro catchment, contour bunds, Semi circular bunds, contour ridges</p> <p>5.3 Roof rain water harvesting –concept, advantages, disadvantages, amount, layout, design of roof water harvesting system.</p> <p>5.4 Ground water recharge- Spreading method, induced recharge method, recharge –well method , subsurface dams.</p> <p>5.5 Waste water recharge.</p>
Unit – VI Watershed Management and planning	<p>6a. Explain the Principles, objectives, factors affecting watershed.</p> <p>6b. Explain the Components of watershed management</p> <p>6c. Describe the Watershed planning and management- activities and framework.</p> <p>6d. Explain the formulation of project proposal for watershed management work,,</p>	<p>6.1 Watershed management- Principles, Objectives, factors affecting watershed management,</p> <p>6.2 Components of watershed management,</p> <p>6.3 watershed management,</p> <p>6.4 Types of Water management- participatory watershed management, adaptive watershed management, community watershed management, integrated watershed management,</p> <p>6.5 Watershed management practices. Watershed planning and management- activities and framework.</p> <p>6.4 Formulation of project proposal for watershed management work, steps of watershed management, Evaluation.</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	4	4	2	0	6
II	Computation of Runoff	6	2	4	4	10
III	Erosion	8	4	8	3	15
IV	Agronomic and Engineering Measures	16	8	12	4	24
V	Water Harvesting and Artificial recharge	8	4	8	3	15
VI	Watershed Management and Planning	6	4	6	0	10

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Practical Exercises	Approx. Hrs. required
1	I	Prepare report of Literature survey & collection of various articles/photographs/sketches related to water shed developments works from books, journals, news papers and internet.	04
2	III, IV	Prepare a small report on roof rainwater harvesting of a residential / public building/township/campus with necessary drawings and technical details.	06
3	IV	Identify and locate and the various measures in upper, middle and lower reaches on watershed map and draw neat sketches of it. Suggest the proper gully control structure across a gully section by studying favorable condition and draw the sketches	06

S. No.	Unit No.	Practical Exercises	Approx. Hrs. required
		of any three types gully control measures.	
4.	V	Visit to nearby water shed to study various aspects watershed management programmes and Write a report.	06
5.	IV/VI	Prepare a mini project report on any one: Case study- consisting the planning, development of small water shed including data, drawings with suggestive measures.	10
Total			32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:

- Prepare journals based on exercises.
- Prepare the Visit report to watershed development works.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

Improved Lecture methods

- Arrange Expert lecture on development of watershed
- Arrange visits to developed watershed or rain water harvesting site.

10. SUGGESTED LEARNING RESOURCE

Text books

Sr No.	Title and Edition	Author	Publisher
1	Water and Soil conservation Engineering	R. Suresh	Standard Distributer, New Delhi
2	Watershed management	J. V. S. Murthy	New Age International publishers New Delhi.
3	Ground water assessment, development & management	R. K. Karanth	Tata Mc Grahil Publication
4	Irrigation and water Power Engineering 12 th Edition	Dr. Punmia B. C. & Dr. Pande B.B.	Laxmi Publication

Journals and Handbooks- CPWD Manual Roof rain water Harvesting

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

1. Charts,
2. Photographs
3. videos

12. LEARNING WEBSITE & SOFTWARE

- a. www.watershed.kar.nic.in
- b. www.indiastas.com
- c. www.archive.india.gov.in
- d. www.wpnr.org
- e. www.academia.edu
- f. www.livemint.com
- g. www.annahazare.org

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No.	Course Outcome	Pos										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Explain the concept of watershed and its different characteristics.		2	1	1								1	
2	Calculate runoff from a watershed by different method.		1	1	2								1	
3	Describe problem caused by erosion, factors affecting soil erosion, types of Erosion.		1	3	1	1								1
4	Explain the use and construction of water		2		1	1							1	

	conversion agronomic and engineering measure for a water shed.												
5	Prepare plan and design the roof rainwater harvesting for buildings.		2		1	1						1	

14. Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1.	K. S.Borde	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	P. K. Agale	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : PRECAST AND PRESTRESSED CONCRETE STRUCTURES

COURSE CODE : 6C 512

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE:

Civil engineer has to complete the project in stipulated time period with economy. Use of Precast components enables him to give quality work in stipulated time. Precast components are found to be economical because of mass production and reuse technology. Civil engineer should be well conversant with the method of casting, physical properties and use of precast components. This course is designed to provide basic knowledge of precast and pre-stressed elements, pre-stressing techniques, prestressing methods.

2. COMPETENCY:

At the end of studying this course students will be able to:

Suggest the precast/prestressed components for speedy and economical construction.

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical		Total
3	-	2	5	ESE	PT	ESE# (OR)	PA (TW)	150
				80	20	25#	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course students will be able to: -

1. Select the relevant precastconcrete element for a given type of construction.
2. Justify the relevance of pre-stressed element in a given situation.
3. Describe principles, types and application of prestressed concrete construction.
4. Evaluate losses in a given pre-stressed concrete construction.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
Unit – I Precast concrete Elements	1a. Explain the concepts of precast concrete in the given situation. 1b. Select the material of relevant specifications for the given pre-cast elements. 1c. Recommend the precast element in the given situation on the basis of different test carried on it. 1d. Justify the need of different tests to decide the relevance of precast element in the given situation.	1.1. Advantages and disadvantages of precast concrete members, 1.2. Materials used- PCC, RCC, PSC, SCC, Ferro-cement, Aerated and Foam concrete 1.3. Non-structural Precast elements - Paver blocks, Fencing Poles, Transmission Poles, Manhole Covers, Hollow and Solid Blocks, Door & Window frames, curb stones. 1.4. Structural Precast elements – tunnel linings, Canal lining, Box culvert, bridge panels, foundation, sheet piles 1.5. Materials required, IS specifications, casting tolerances, fabricating systems, design considerations, joints, testing, storage and transportation, equipment ; for elements mentioned above 1.6. Testing of Precast components
Unit – II Prefabricated building	2a. Describe the various elements for a Prefabricated building 2b. Describe modular co-ordination design considerations with IS provisions for prefabricated elements. 2c. Explain the requirements of structural joints of the given pre-fabricated element. 2d. Describe the procedure of the storage, transportation and erection for a given precast element. 2e. Suggest the various combinations for mixed / composite construction. 2f. Recommend the relevant equipment required for the construction of given prefabricated element with justification.	2.1 Precast Structural Building components such as slab panels, beams, columns, footings, walls, lintels and chajjas, staircase elements, 2.2 Prefabricated building using precast load bearing and non-load bearing wall panels, floor systems, 2.3 Material characteristics, Standard specifications 2.4 Modules, modular co-ordination, modular grid, finishes 2.5 Casting tolerances for above elements 2.6 Prefab systems and structural schemes and their classification 2.7 Design considerations and requirements 2.8 Joints – requirements of structural joints and their design considerations for above elements 2.9 Manufacturing, storage, curing, transportation and erection of above elements, equipment needed 2.10 Introduction to Mixed and composite construction
Unit– III Introduction to Pre- stressed Concrete	3a. Explain the principle of pre-stressing the given element. 3b. Describe the applications of pre-stressed concrete elements in the given situation. 3c. Distinguish the PSC elements with other	3.1 Principle of pre-stressed concrete and basic terminology. 3.2 Applications of pre-stressed concrete 3.3 Advantages and disadvantages of pre-stressed concrete 3.4 Materials used and their properties, Necessity of high-grade materials 3.5 Types of Pre-stressing steel -Wire, Cable,

	<p>construction elements</p> <p>3d. Justify the need of high strength material for PSC.</p> <p>3e. Select relevant type of pre-stressing steel for given member.</p>	tendon, Merits-demerits and applications
Unit– IV Methods and systems of pre- stressing	<p>4a. Select the relevant method of pre-stressing for given structural element.</p> <p>4b. Illustrate the merits and demerits for given method/system of pre-stressing.</p> <p>4c. Explain Hoyer system of pre-tensioning with diagram.</p> <p>4d. Explain relevant system of post- tensioning based on the given criteria with diagram.</p>	<p>4.1 Methods of pre-stressing – Internal and External pre-stressing, Pre and Post tensioning- applications, merits and demerits</p> <p>4.2 Systems for pre tensioning – process, applications, merits and demerits - Hoyer system</p> <p>4.3 Systems for post-tensioning - process, applications, merits and demerits - Freyssinet system, MagnelBlaton system, Gifford Udall system.</p> <p>4.4 Cover requirement for tendons</p>
Unit– V Losses of pre- stress	<p>5a. Identify the reasons for loss of pre-stress in the given element.</p> <p>5b. Describe the situations in which the given elements exhibit the loss of pre-stress.</p> <p>5c. Calculate the loss of pre-stress during anchoring in the given situation.</p> <p>5d. Calculate the loss of pre-stress occurring in the given situation.</p> <p>5e. Compile the IS recommendations for percentage loss in the given pre-stressing method.</p>	<p>5.1. Pre-stressing force in Cable, Meaning of Loss of Pre-stress</p> <p>5.2. Loss of pre-stress during the tensioning process - loss due to friction, length effect, wobbling effect and curvature effect. (Simple Numerical problems to determine loss of pre-stress)</p> <p>5.3. Loss of pre-stress at the anchoring stage,</p> <p>5.4. Loss of pre-stress occurring subsequently: losses due to shrinkage of concrete, creep of concrete, elastic shortening, and creep in steel. (Simple Numerical problems to determine loss of pre-stress)</p> <p>5.5. IS recommendations for % loss in case of Pre and Post tensioning</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Precast concrete Elements	10	04	10	06	20
II	Prefabricated building	10	02	08	04	14
III	Introduction to Pre-stressed concrete	10	04	10	02	16
IV	Methods and systems of pre- stressing	08	02	04	08	14
V	Losses of pre-stress	10	02	02	12	16
	Total	48	14	34	32	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

1. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:**Any Ten practical from following list (*markedpractical are compulsory)**

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Determine water absorption of solid / hollow building blocks of three different sizes of three different make and size.	02*
2	I	Inspect any three elements (e.g. manhole covers, paver blocks, hollow blocks, solid blocks, curb stones etc.) for dimension checking.	04*
3	I	Prepare report of field visit to a manufacturing unit (of precast elements such as fencing pole, transmission pole, and electric pole) with reference to the points such as manufacturing process, curing, stacking, handling, in-house inspection and testing.	04*
4	I	Determine compressive strength of given solid precast blocks	02*
5	I	Determine compressive strength of given hollow precast blocks	02*
6	I	Determine compressive strength of given paver blocks	02*
7	I	Perform load test on given manhole cover as per IS 12592:2002 Annex C	02
8	I	Observe Pressure Testing of given precast pre-stressed pipes	04
9	II	Prepare report of field visit to manufacturing unit (of precast elements such as lintel, chajja, door frame, wall panels, stair steps) with reference to the points such as manufacturing process, curing, stacking, handling, in-house inspection and testing.	04*
10	II	Observe flexural strength test on given wall panels on site	04
11	II	Observe Test in-situ the given prefabricated wall panel to judge its resistance against impact.	04
12	II	Observe Test in-situ the given prefabricated wall panel to judge its resistance against flexure (holding the panel simply supported and applying t force at center till collapse)	02
13	II	Observe determination of flexural strength of the given precast joists	02
14	III	Prepare the report Collect the samples of various types of pre-stressing wires / cables / strands along with their technical specifications/brochure.	02*
15	III to V	Prepare report of field visit to bridge site regarding pre-stressed member with reference to the points such as shape, dimensions, cable/ tendon, anchor block, method of pre-stressing, transfer of pre-stress, equipment used, etc.	04*
TOTAL			32

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Collect pictorial information about pre-stressing jobs
2	Collect data of pre-stressed components manufactured in your vicinity.
3	Collect data for materials required for precast elements, with their suppliers, sale price etc.
4	Conduct market survey specific to properties of various type of materials used in Precast and Pre-stressed concrete.
5	Prepare a power point presentation on systems of pre-stressing
6	Collect samples of at least five precast elements from your area.
7	Search and download video related to manufacturing process of precast units.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- e. Use of video, animation films to explain concepts, facts and applications of mechanics.

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Pre Cast and Pre Stress Technology: Process, Method and Future Technology	Marzuki, Nor Ashikin	Createspace Independent Pub ISBN 10: 1499353391 ISBN 13: 978-1499353396
2	Handbook on Precast Concrete buildings	--	Indian Concrete Institute
3	Precast Concrete Structures	Elliott, Kim S.	CRC Press, New York, 2011 ISBN- 13: 9781498723992
4	Design of Pre-stressed Concrete Structures	Lin, T.Y.	John Wiley and Sons, New York, 2014 ISBN- 8: 0471018988
5	Pre-stressed Concrete	Krishna Raju, N.	Tata McGraw Hill, New Delhi, 2012 ISBN 10: 1259003361 ISBN 13: 9781259003363
6	Pre-stressed Concrete Structures	Nagarajan, Pravin	Pearson Education India ISBN 9332517614, 9789332517615
7	IS 12592: 2002 Precast Concrete Manhole Cover and Frame	BIS, New Delhi	BIS, New Delhi
8	IS 15658: Precast concrete blocks for paving - Code of Practice	BIS, New Delhi	BIS, New Delhi
9	IS 15916: 2011 Building Design and Erection Using Prefabricated Concrete - Code of Practice	BIS, New Delhi	BIS, New Delhi
10	IS 15917: 2011 Building Design and Erection Using Mixed/Composite Construction - Code of Practice	BIS, New Delhi	BIS, New Delhi
11	IS 458 - 2003 Precast Concrete Pipes (with and without reinforcement) — Specification	BIS, New Delhi	BIS, New Delhi

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr.No.	Name of equipment	Brief specification
1	Universal Testing Machine	Capacity - 100 tones. Accessories: (1) Tensile test attachment for flat and round specimen up to 32 mm. (2) Compression test attachment (3) Shear test attachment with sizes of bushes 5,6,8,10,12,16,20,24 mm, (4) Transverse test attachment with bending Punch, (5) Service tools, (6) Operation and maintenance manuals - 2 nos. (7) Hardness attachment
2	Compression Testing Machine	Digital display manual control compression testing machine; Max. Capacity 2000kN ; Measuring range: 4%-100% of FS; Relative error of reading: $\leq \pm 1\%$; Max. distance between two platen (mm): 330; Compression platen size (mm): 220×220; Max. piston stroke (mm): 0-20; Max. piston speed (mm/min): Approx. 30; Column clearance (mm): 300×200; Oil pump motor power (KW): 1.5; Whole dimensions (mm): 855*380*1435
3	Digital weighing balance	Digital display balance of capacity 10 kg having LC 10 gm and of capacity 30 kg having LC 10 gm
4	Test frame for load test for manhole covers	Test frame for load test for manhole covers
5	Hot air electric oven	Hot air electric oven having temperature range 5 ⁰ C to 250 ⁰ C, removable 2-3 stainless steel shelves, thermostat, digital temp controller, with mineral wool insulation, door walls with silicon rubber gasket and lock

12. LEARNING WEBSITE & SOFTWARE:

- I. <http://www.asnu.com.au>
- II. www.youtube.com for videos regarding precast and prestressing procedures.
- III. www.nptel.ac.in
- IV. www.discoveryforengineers.com
- V. [Website of](#) Precast Concrete Engineers Society (PSEI)
- VI. [Website of Masterbuilder \(Precast Concrete Structures-Design aspects and its implementation in India\)](#)

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs):

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Select the relevant precast concrete element for a given type of construction	2	3	-	-	2	-	-	-	-	-	-	-
2	Justify the relevance of pre-stressed element in a given situation	2	3	-	-	2	-	-	-	-	-	-	-
3	Describe principles, types and application of prestressed concrete construction	2	3	-	-	2	-	-	-	-	-	-	-
4	Evaluate losses in a given pre-stressed concrete construction.	2	3	-	-	2	-	-	-	-	-	-	-

Course Curriculum Design Committee:

SrNo	Name of the faculty members	Designation and Institute
1	Madhuri M Ganorkar	Head, Applied Mechanics Department Government Polytechnic, Aurangabad
2	Ganesh M. Kechkar	Sr. Lecturer in Applied Mechanics, Government Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- ADVANCE CONSTRUCTION METHODS AND EQUIPMENTS
COURSE CODE 6C513
PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE

Civil Engineering is a basic branch of Engineering and involves construction of roads, railways, bridges, irrigation structures, building construction, water supply and sanitary system, tunnels, airports and offshore Structures. In the recent decades large developments have taken place in the methodology of construction and wide variety of equipments are used on the construction sites to obtain quality construction to increase productivity in construction. This subject is indented to learn advanced constructional methods, materials and equipments used on construction sites.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Establish learning about advanced construction methods, materials and equipments used on construction sites and energy efficient concept.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (OR)	PA (TW)	150
03	0	02	05	80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES:-

- Suggest & interpret various advance material, method& equipment used for construction site.
- Interpret checklist as per Indian green building council (IGBC) & study design rules of

energy efficient structure.

- III) Supervise activities carried out on various advance material, method & equipment on construction site with evaluation of economics of machinery.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes	Topics And Sub-Topics
Unit –I Advanced Construction Materials	<p>1a.Explain uses of various fibers in construction with example</p> <p>1b.Differentiate between various types of plastics.</p> <p>1c.Describe need for artificial timber & artificial sand.</p> <p>1d.Justify selection of various miscellaneous materials in construction industry.</p>	<p>1.1 Fibers and plastics</p> <p>1.1.1 Types of fibers & Properties – Steel, Carbon, Glass fibers. Use of fibers as construction materials.</p> <p>1.1.2 Types of Plastics & its use– PVC, RPVC, HDPE, FRP, GRP etc. Colored plastic sheets. Use of plastic as construction materials.</p> <p>1.2 Artificial Timber & Artificial sand</p> <p>1.2.1 Properties, uses of artificial timber.</p> <p>1.2.2 Necessity properties & advantages of artificial sand</p> <p>1.3 Other materials</p> <p>1.3.1 Wall Claddings , Plaster boards Micro-silica, Fly Ash</p>
Unit– II Advanced Construction Methods	<p>2a.Explain Steel formwork and its components with its importance.</p> <p>2b.Describe Slip form. Explain prefabricated construction and its various methods & examples.</p> <p>2c.Describe Jointing of structural members.</p> <p>2d.Describe Soil Reinforcing techniques & preparation methods of slope stabilization in cutting and embankments</p> <p>2e.Develop a list of precautions and safety measures for Multistoried building construction.</p>	<p>B) Advanced Construction Methods.</p> <p>2.1 Formwork</p> <p>2.1.1 Steel Formwork, H frames, Steel plates, Steel props, Telescopic props, Girders or trestles. Tubular formwork.</p> <p>2.1.2 Slip formwork- meaning, use of slip formwork.</p> <p>2.2 Prefabricated Construction</p> <p>2.2.1 Meaning of prefabrication and precast. Methods of prefabrication- plant prefabrication and site Prefabrication.</p> <p>2.2.2 R.C. Doors and windows, wall panels, Jointing of structural members.</p> <p>2.3 Soil Reinforcing techniques</p> <p>2.3.1 Necessity of soil reinforcing, Use of wire mesh and geo synthetics – geo-grid, geo textile, Strengthening of embankments,</p> <p>2.3.2 Slope stabilization in cutting and embankments by soil reinforcing techniques..</p> <p>2.4 Precautions and safety measures for</p>

		Multistoried building construction
Unit– III Energy Efficiency Structures &Techniques	<p>3a.Explain need & various techniques used for making Energy Efficiency Structures(EES)</p> <p>3b.Explain different consideration in EES.</p> <p>3c.Describe IGBC & its environmental benefits</p> <p>3d.Describe green home rating system& green home process</p> <p>3e.Justify with examples checklist for green homes</p>	<p>3.1 Introduction- Green building / Energy Efficient structures(EES)</p> <p>3.1.1 Definition, necessity & advantages</p> <p>3.1.2 Methods / Technique for EES</p> <p>3.2 General Considerations- Orientation, building envelope, Low energy material</p> <p>3.3 IGBC Green Homes</p> <p>3.3.1 Introduction & benefits of green homes</p> <p>3.3.2 IGBC green home rating system</p> <p>3.3.3 IGBC green home process</p> <p>3.3.4 Checklist for green homes</p>
Unit– IV Hoisting Conveying and earthmoving Equipments	<p>4a.Describe various Hoisting and conveying equipment. with its specific uses.</p> <p>4b.Describe the working & mechanism of belt conveyors types of belts.</p> <p>4c.Compute capacity of dumper, tractors & truck</p> <p>4d.Describe working & uses of various excavating equipment with its output & sketch.</p> <p>4e.Explain Compacting Equipments with sketch & their use - rollers, Roller types- Plain rollers, Sheep footed rollers, Vibratory rollers, pneumatic rollers. Rammer</p> <p>4f.Distinguish between Plain rollers & Sheep footed rollers.</p> <p>4g.With an example explain the situation where various Hoisting Conveying & Earth Moving machinery will be preferred.</p>	<p>4.1 Hoisting Equipments</p> <p>4.1.1 Principle and working of Tower cranes, Crawler cranes,</p> <p>4.1.2 Truck mounted cranes, gantry Cranes, Mast cranes, Derricks.</p> <p>4.2 Conveying Equipments</p> <p>4.2.1 Working of belt conveyors. Types of belts and conveying mechanism</p> <p>4.2.2 Capacity and use of dumpers, Tractors and trucks.</p> <p>4.3 Excavation Equipments</p> <p>4.3.1 Use, Working and output of bulldozers, scrapers,</p> <p>4.3.2 Graders, and power shovels, Excavator (JCB), draglines.</p> <p>4.4 Compacting Equipments</p> <p>4.4.1 Use of rollers, Roller types- Plain rollers, Sheep footed rollers,</p> <p>4.4.2 Vibratory rollers, pneumatic rollers. Rammers- use and working</p>
Unit - V Concreting Equipments & Stone Crushing	<p>5a.Explain Types of concrete mixers & compare their advantages & disadvantages</p>	<p>5.1 Concrete Mixers</p> <p>5.1.1 Types of concrete mixers.</p> <p>5.1.2 Equipments for transportation of concrete- Transit mixers,</p>

equipment	5b.List the Equipments for transportation of concrete & for production of artificial sand. 5c.Distinguish between Needle vibrators &Screed vibrators. 5e.Describe Automatic concrete plants – layout, process & working 5f.Describe Types of stone crushers, their Capacities and working	5.1.3 Automatic concrete plants – layout, process and Working. 5.2 Stone Crushers & its necessity 5.2.1 Type, capacity and working of Jaw crusher, Gyratory crushers Cone crushers, Roll crusher and Hammer mills. 5.2.2.Flow diagram for production of artificial sand
Unit – VI Equipment management	6a.Compare Standard equipment and Special equipment. 6b.Predict Owning and operating cost of construction Equipment 6c.Explain Preventive as well as Break down maintenance of equipment 6e.Explain economic life of construction equipment	6.1 Equipment Management & its necessity 6.1.1 Standard equipment, Special equipment, Selection of equipment, 6.1.2 Owning and operating cost of construction Equipment. 6.2.Economic life of construction equipment. 6.2.1 Preventive maintenance of equipment, Break down maintenance of equipments.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Advanced Construction Materials	08	04	04	05	13
2	Advanced Construction Methods	10	04	06	06	16
3	Energy Efficiency Structures &Techniques	08	02	04	08	14
4	Hoisting Conveying and Earthmoving Equipments	10	02	05	08	15
5	Concreting Equipments & Stone Crushing equipment	06	02	05	05	12
6	Equipment management	06	02	02	06	10

	Total	48	16	24	40	80
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Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Collect Specifications/ properties of at least five advanced materials of Construction and write the report on the same.	02
2	II	Write a report with sketches i)Any one case study of soil reinforcing technique used in road project in India.(from internet) ii)Steel form work size & rates available in market	06
3	III	Study any one existing project constructed under IGBC & make Checklist for green homes & its rating	04
4	IV/ V	Observing multi- story building construction process & list the advance equipments required in the report and also list various safety measures adopted in multistoried building.	04
5	IV/V	Observing at site/ Video/ LCD demonstration of Hoisting, Conveying & Excavation equipment and write a report of the process and equipments observed.	04
6	V	A report on Visit/ Video to see the working of various units of ready mix concrete plant.	04
7	V	Writing a report on working of various units of Artificial stone crusher with observing at site / Video/ LCD demonstration of it.	04
8	VI	Preparation of PPT & submit in group of $\frac{3}{4}$ students on i) Economics, for any one machinery (Weather machinery is to hire or Purchased	04
Total			32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:

1. Prepare journals based on practical performed in laboratory.
2. Study steel form work & its detailed account of types, number & drawing for two storied framed residential building.
3. Analyze the specifications, costs, out- put and availability for various types of advance equipment & machineries and materials.
4. Interact with builder/ contractor and list common troubles in owning & operating cost of equipment.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

1. Arrange industrial visits to construction site to demonstrate working of equipment & machinery.
2. Motivate students to use internet and collect name, addresses, catalogues of manufacturers of machinery and equipment used in construction.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Construction Planning and Equipment	R. Satyanarayana and S. C. Saxena	Standard Publication New Delhi
2.	Construction of structures and Management of works	S.C. Rangawala	Charotar Publication
3.	A to Z of Building Construction and its Management	Sandeep Mantri	Satya Prakashan New Delhi
4.	Construction Planning equipment and methods	R.L. Peurifoy	McGraw-Hill Co. Ltd.
5.	Advance Construction Techniques and Equipments	S. A Rasal M.N. Gangrade	Nirali prakashan
6	Advance Construction Techniques and Equipments	V. K. Kumawat N.A. Upadhye	Tech-Max publication , Pune

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Concrete mixer - Latest working models.	Tilting or non tilting or pan type
2.	Latest high rise building construction equipment - Latest working models for conveying, hoisting & excavating equipment	Steel or wooden model

12. LEARNING WEBSITE & SOFTWARE

1. <http://www.advance construction material .com>

2. [http://www.advance construction excavation equipment .com](http://www.advanceconstructionexcavationequipment.com)
3. [http://www. IGBC guidelines](http://www.IGBCguidelines)
4. [http://www.hoisting equipment construction.com](http://www.hoistingequipmentconstruction.com)
5. [http://www.concreting equipment construction.com](http://www.concretingequipmentconstruction.com)

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Suggest & interpret various advance material, method & equipment used for construction site.	02	03				02					03	03	
2	Interpret checklist as per Indian green building council (IGBC) & study design rules of energy efficient structure.		02			02	03	02				02	02	
3	Supervise activities carried out on various advance material, method & equipment on construction site with evaluation of economics of machinery.	02			02					02	02	02	02	03
			02				02							

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Dr. R.S Bang	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2	K.S. Borde	Sr. Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE-	ENERGY EFFICIENT BUILDING
COURSE CODE	6C514

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE

In the present scenario, it is Civil Engineer's responsibility to plan such buildings where the use of energy is minimum. It will reduce the dependency on finite fossil fuels. Energy Efficient Building (EEB) aims to ensure energy conservation and its optimal use. It involves technical issues, dealing with building methods and materials used to save energy while at the same time, improving comfort and performance. By opting this subject student of civil engineering will be able to design such EEB which will not sacrifice the comfort of residents keeping in view the plan concepts required.

2. COMPETENCY

At the end of studying this course students will be able to

“Plan energy efficient buildings.”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (OR)#	PA (TW)	150
3	-	2	5	80	20	25	25	
Duration of the Examination (Hrs)				03	--	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

At the end of studying this course students will be able to: -

1. Describe the concept of green building and energy efficient building.
2. Identify the energy requirements and different design aspects for energy efficient building.
3. Suggest alterations for existing buildings regarding day lighting.
4. Plan the building by adopting the concept of passive systems and different ventilation techniques
5. Prepare a detail report on conversion of any existing building to energy efficient building.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - 1 Introduction	1a. The effects of Global Warming 1b. Compare green building and energy efficient building 1c. Necessity of Energy Efficient Building	1.1 Global Warming – Concept and its effects 1.2 Definition and Necessity of Energy Efficient Building 1.3 Concept of Green Building 1.4 Difference between green building and energy efficient building
Unit– 2 Design Elements for EEB	2a. Identify Design aspects 2b. Identify Climatic Zones	2.1 Climate, solar path and intensity, humidity, wind flow, and ambient temperature of a particular place. 2.2 Different Climatic Zones of India. 2.3 Factors affecting energy consumption of building. <ul style="list-style-type: none"> • Landscaping • Ratio of built form to open spaces • Location of water bodies • Orientation • Planform • Building envelope and fenestration.
Unit– 3 Codes for EEB and Energy Audit	3a. Estimate Energy Requirement and Consumption 3b. IS 3362-1977 (R2004) 3c. Energy Audit of Building	3.1 Provisions of Energy Conservation Building Code (ECBC) 3.2 Provisions of IS 3362-1977 Code of practices for natural ventilation of residential buildings. 3.3 Definition of energy audit

		3.4 Steps involved in energy audit of building
Unit – 4 Daylighting	4a. Daylighting 4b. Sky condition models and their characteristic 4c. Parameters for daylighting design 4d. Parameters affecting daylighting factor 4e. Daylighting components 4f. Control elements	4.1 Concept and components of daylighting 4.2 Relationship between daylight and human health 4.3 Benefits of daylighting 4.4 Critical indoor illuminance and critical outdoor illuminance level. 4.5 Daylight factor distribution and glare. 4.6 Room depth, height of the window head, shading devices, glazing type, reflectance of room surfaces. 4.7 Intermediate light spaces, interior light spaces, lateral pass-through components, zenithal pass-through components, global pass-through components.
Unit – 5 Passive Systems	5a. Passive/low energy heating systems 5b. Passive/low energy cooling systems	5.1 Principle of passive heating 5.2 Types of passive heating systems 5.3 Building design strategies to reduce cooling demand 5.4 Types of passive cooling systems (evaporative cooling, indirect evaporative cooling and earth cooling systems)
Unit – 6 Ventilation Techniques	6a. Requirements of ventilation as per ECBC 6b. Natural Ventilation 6c. Artificial Ventilation	6.1 Importance of ventilation Requirements of ventilation as per ECBC 6.2 Natural ventilation: stack effect, courtyard effect, air changes, ventilation requirement calculations, cross ventilation 6.3 Artificial ventilation techniques: forced ventilation, fresh air systems, pre-cooling of fresh air

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introduction	06	02	04	02	08
2	Design Elements for EEB	06	02	06	04	12
3	Codes for EEB and Energy Audit	06	02	04	04	10
4	Daylighting	10	02	08	08	18
5	Passive Systems	10	02	08	08	18
6	Ventilation Techniques	10	02	06	06	14
	Total	48	12	36	32	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Title of Practical/Lab.Work/ Assignments/ Tutorials (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1.	1	Present a Seminar on Global Warming / Green Building and its effects on Indian Subcontinent. (Group of 4/5 Students)	04
2.	2	Prepare a poster on ½ imperial sheet showing climate, solar path and intensity, humidity and wind flow of your region. OR Prepare a chart showing factors affecting energy consumption of building. (Group of 4/5 Students)	04

S. No.	Unit No.	Title of Practical/Lab.Work/ Assignments/ Tutorials (Outcomes in Psychomotor Domain)	Approx. Hrs. required
3.	3	Write salient features of IS 3362-1977 and Energy Conservation Building Code. Write in brief about your suggestions on energy audit of building	03
4.	4	Collect literature on Daylighting and Passive Systems in Energy Efficient Buildings and prepare a summary report.	05
5	5	Visit anyone public building and study its ventilation system. Prepare a report of it suggesting shortcomings and improvements. (Group of 4/5 Students)	06
6.		Prepare a small project report in consideration with following points: (Micro Project) <ol style="list-style-type: none"> 1. Identify any one existing public building in your area. 2. Carry out the energy audit for the building. 3. Suggest alterations with minimum damage that how the building can be converted to energy efficient building. 4. Support your report with sketches and drawings (not to scale) of the building. (e.g. line plan, section and elevation, etc.) (Group of 4/5 Students)	10
Total			32

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- a. Prepare journal based on assignments given.
- b. Internet Survey of various existing energy efficient buildings in India.
- c. Prepare a mini-project report keeping in view the above given guidelines

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration
- d. Seminars
- e. Activity based learning

10. SUGGESTED LEARNING RESOURCE

Sr. No.	Name of Book	Author	Publication
1	Handbook on Energy Conscious Buildings	Nayak J.K.and Prajapati J.A.	Ministry of New and Renewable Energy, India
2	Daylighting for Sustainable Design	Guzowski M.	McGraw-Hill, New York
3	Passive And Low Energy Cooling of Buildings	Givoni B.	John Wiley & Sons Inc., New York
4	Energy-Efficient HVAC Design	Javad Khazaii	Springer
5	Energy Efficient Buildings of India	Mili Majumdar	Tata Energy Research Institute
6	Handbook of functional requirements of Buildings, Bureau of Indian standards	--	Bureau of Indian standards

	SP41, 1987		
7	Energy Conservation Building Code of India, User manual, 2007	--	Bureau of Energy Efficiency

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
Not Applicable		

12. LEARNING WEBSITE & SOFTWARE

1. www.greeningtheblue.org/sites/default/files/energyefficiencyinbuildings_0.pdf
2. www.neep.org/initiatives/energy-efficient-buildings
3. <https://beeindia.gov.in/content/buildings>
4. <http://btech.lbl.gov/pub/designguide/dlg.pdf>
5. <http://www.wbdg.org/resources/daylighting.php>
6. <http://passivesolar.sustainablesources.com/#guidelines>
7. <https://www.youtube.com>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

Sr. No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Understand the concept of green building and energy efficient building						1						3	
2	Identify the energy requirements and different design aspects for energy efficient building.				2								3	
3	Discuss the importance of daylighting			3									3	
4	Understand the concept of passive systems and different ventilation techniques			3										3
5	Apply the knowledge acquired to execute the project of energy efficient building.								2					3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1.	Rajesh L. Shirale	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	J.S. Patil	Head of Civil Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE- HYDRAULICS STRUCTURE & MAINTENANCE

COURSE CODE 6C515

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil	Sixth

1. RATIONALE

A Civil engineer occupied in irrigation department or became consultant in this area; they should possess the knowledge of different hydraulic structure. He should plan the distribution system of irrigation. He has to prepare the design of small irrigation structures and supervise construction, maintenance work. He has to ensure effective and safe functioning of waste weir, spillways, canals their gates operation at the designed discharge. This course aims at developing basic competencies related to study the design aspects canals, canal structures, weirs, barrages, spillways etc.

2. COMPETENCY

At the end of studying this course students will be able to

“Design plan and maintain hydraulic structure”

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE # (OR)	PA (TW)	150
3	0	2	5	80	20	25	25	
Duration of the Examination (Hrs)				3Hrs	1 Hrs	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT – **Progressive Test**, PA- Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

1. Apply the design aspects of different hydraulic structures while planning of distribution system
2. Design non alluvial channel and lined, unlined canals
3. Plan and Design of canals, canal structures.
4. Compute types of canal outlets and dam outlets
5. Design of diversion headwork.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics (Containing POs and PSOs assignment in each Sub-topic)
Unit-I Planning and layout of distribution system.	1a. Explain distribution system, canals etc.	1.1 Introduction, 1.2 Types of distribution system 1.3 Masonry structures on a canal system 1.4 Classification of canals 1.5 Investigation for distribution system 1.6 Factors affecting the canal alignment 1.7 Factors affecting the alignment of a water course or field channel.
Unit– II Design of channels	2a. Design channel. 2b. Compare Kennedy's theory and Lacey's theory.	2.1 Introduction, Design of non alluvial channel, 2.2 Design of lined canal, 2.3 Design of alluvial channels, Kennedy's theory, Modified form of Kennedy equation, 2.4 Lacey's regime theory, Lacey's basic regime equations, 2.5 Lacey's derived equations, design of channels by Lacey's theory 2.5 Comparison and drawback of Kennedy's theory and Lacey's theory 2.6 Longitudinal and cross section of unlined and lined channel
Unit– III Canal Regulation Works	3a. Explain functions of regulators. 3b. Describe canal maintenance	3.1 Introduction, alignment of the off-taking channel. 3.2 Regulators-Functions of regulators, design of a cross regulator and distributary head regulator 3.3 Canal fall- different types of fall, types of cisterns, roughening devices

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics (Containing POs and PSOs assignment in each Sub-topic)
		3.4 Canal maintenance
Unit– IV Canal and dam outlets and its maintenance	4a. Enlist types of canal outlets, dam outlets 4b. Explain intake structure and its maintenance	4.1 Canal outlets, requirements of good canal outlet, types, maintenance, criteria for selection of outlet capacity, Non modular outlet, semi modular and rigid modular outlet. 4.2 Introduction, location of dam outlet 4.3 Classification of outlets, component parts of outlet works, 4.4 Discharge through an outlet , required capacity of outlet , 4.5 Trash rack, intake structure and its maintenance
Unit - V Basic design principles of Hydraulic Structure	5a. Describe Theories of subsurface floor ,Exit gradient, hydraulic jump. 5b. Explain basic factors for design of diversion headwork.	5.1 Theories of subsurface floor, Blighs' creep theory, Khosla's theory, Khosla's's solutions for horizontal floor, Exit gradient, 5.2 Location of hydraulic jump, water surface profile, suction pressure in hydraulic jump profile, Scour due to surface flow. 5.3 Introduction and basic factors for design of diversion headworks. 5.4 Effect of weir and the regime of river, pond level, crest level, discharge formula. 5.5 Causes of failure of weirs on permeable foundations, 5.6 Regulation of a weir or a barrage

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Planning and layout of distribution system	06	00	06	06	12
II	Design of channels	10	02	06	08	16
III	Canal Regulation Works	10	04	04	08	16
IV	Canal and dam outlets	10	06	08	06	20
V	Basic design principles of Hydraulic Structure	12	00	06	10	16
	Total	48	12	30	38	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Identify the type of distribution system & masonry structures on a canal system	04
2	2	Prepare layout of distribution system for a minor irrigation scheme by arranging visit.	08
3	3	Mini project on Design of canal to carry irrigation water passing through alluvial soil and lined canal from given data, check economic feasibility.	08
4	4	Design canal outlets capacity and draw the sketches four types of canal outlets.	06
5	4	Prepare a typical layout, longitudinal and cross section of weir or barrages showing different components-under sluices, divide wall, fish ladder canal head regulator, silt excluder, guide banks and marginal bunks on layout.	06

8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

- Solve numerical problems.
- Interact with department persons and understand facts and maintenance problems.
- Internet Survey
- Field hydraulic structure visits

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- Improved Lecture methods-
- Q & A technique.
- Demonstration
- Seminars
- Activity based learning

10. SUGGESTED LEARNING RESOURCE

Sr.No.	Title of Book	Author	Publication
1.	Irrigation and water Power Engineering 12th Edition	Dr.Punmia B. C. &Dr.Pande B.B.	Laxmi Publication
2.	Irrigation engineering and Hydraulic structures	Santosh Kumar Garg	Khanna Publishers, Delhi.
3.	Hydraulic and Fluid Machines	Dr. P. N. Modi S. N. Seth	Standard Book House, Delhi
4.	Hydraulic and Hydraulic Machines	R.S.Khurmi	S. Chand & company Ltd. New Delhi

11. Major Equipment/ Instrument with Broad Specifications

Sr.NO.	Name of the Equipment	Specification
1	Head regulator	
2	Adjustable channel apparatus	

12. LEARNING WEBSITE & SOFTWARE

1. www.iamcivilengineer.com

2. [www.doc-developpement-durable.org/...irrigation/principles of irrigation engineerin](http://www.doc-developpement-durable.org/...irrigation/principles_of_irrigation_engineerin)
www.civilengforall.com › Water Resources Engineering

3.<https://icce-ojs-tamu.tdl.org/icce/index.php/icce/article/view/4807>

4.<https://link.springer.com>

5.<https://www.scribd.com/document/298821430/Design-Maintenance-Types-Components-of-Hydraulic-Structures>

6.<https://www.youtube.com/watch?v=fx1uUek3Iqg>

7.freevidelectures.com › Civil Engineering › IIT Kanpur

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

SNo	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
CO1	Apply the design aspects of different hydraulic structures while planning of distribution system	1	3	3	3								1	
CO2	Design non alluvial channel and lined, unlined canals	1		3	3									1
CO3	Plan and Design of canals, canal structures.	1	2	3	3									
CO4	Compute types of canal outlets and dam outlets	1		2	3									1
CO5	Design of diversion headwork.	1		3										

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Smt. P.V.Amale	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
2.	Smt. K.S.Borde	Lecturer in Civil Engineering, Govt Polytechnic, Aurangabad

(Member Secretary PBOS)

(Chairman PBOS)

COURSE TITLE : REPAIRS AND REHABILITATION OF STRUCTURES

COURSE CODE : 6C516

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE:Overlooked dilapidation and inadequate maintenance in the building lead to lose mortar, tiles, bricks of external walls, spalled concrete, lowering the strength of structural elements and thereby threaten public safety. Proper building repairs ensure that building and the environment remain healthy, clean and a safe place to work or reside. The rehabilitation of elements for sustaining loads in future enhances the life, use and raises the value of structures. For this structural audit is required. The diploma student must therefore have the knowledge to repair the deterioration in the building and also to stop further damages. Thus this course will help the student become competent to repair and rehabilitate the structural elements those are not functioning well.

2. COMPETENCY:

At the end of studying this course students will be able to,

Undertake the repairs of building structures and rehabilitate the building.

3. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
L	T	P		Theory		Practical		Total
3	-	2	5	ESE	PT	ESE#(OR)	PA (TW)	150
				80	20	25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; PR- Practical; C- Credits; ESE- End Semester Examination; PT – Progressive Test, PA- Progressive Assessment, OR –Oral Examination, TW - Term Work, # External, @ Internal, ~ Online Examination.

4. COURSE OUTCOMES:

At the end of studying this course students will be able to: -

1. Justify the necessity of minor and major repairs.
2. Assess the quality of constructions for safety of the structures.
3. Select the appropriate material for repair of the given structure.
4. Apply the relevant method of retrofitting for re strengthening of structures.
5. Suggest the relevant technique to restore the given structural elements.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit – I Basics of maintenance	1a. Explain the necessity of maintenance of civil structure. 1b. Select the relevant factors that influence the maintenance. 1c. Explain the terms, “retrofitting, re-strengthening, rehabilitation, and restoration”. 1d. Select the relevant method of maintenance management for the given structure. 1e. To comprehend the necessity of structural audit.	1.1. Meaning of maintenance and its types, the terms such as repair, retrofitting, re-strengthening, rehabilitation and restoration. 1.2. Necessity, objectives and importance. 1.3. Factors influencing 1.4. Advantages and limitations 1.5. Approach of effective management for maintenance and repairs. 1.6. Periodical maintenance: check list, maintenance manual including building plan, reinforcement details, material sources, maintenance frequency, corrective maintenance and sources. Pre and post monsoon maintenance, maintenance history sheet. 1.7. Necessity and importance of structural audit.
Unit– II Causes and detection of damages	2a Identify the causes of damages of given structure. 2b Predict the intensity of damage of the given civil structure. 2c Use the visual observations techniques to quantify the damage of civil structures. 2d Test the relevant material for the given purpose of maintenance. 2e Test the damaged structural element using non-destructive techniques.	2.1 Causes of damages, effects in brief on structures due to distress, earthquake, wind, flood, dampness, corrosion, fire, dilapidation, termites, bulging of wall, shrinkage, bonding, shear, tensile, and vegetation. 2.2 Systematic approach of damages detection, scope and purpose of investigation. 2.3 Various aspects of visual observations for detection of damages. 2.4 Various test on damaged structure and their purposes only such as using rebound hammer, ultrasonic pulse velocity, rebar locator, cover gauge, crack detection microscope, Chloride test, sulphate attack, pH measurement, Half-cell potential meter.(Detailed procedure of various tests on material not to be asked in the examination)

<p>Unit III- Materials for repairs and rehabilitation</p>	<p>3a. Comprehend the properties of different available materials for repairs</p> <p>3b. Select the relevant material to repair the given damages in masonry and RCC structures</p> <p>3c. Select repair materials for the leakages in RCC roof</p>	<p>3.1 Factors influencing the material selection.</p> <p>3.2 Types of repair material and their silent features such as Bituminous cutback, chlorinated rubber coating, Vinyl coatings, epoxy coating, coal tar epoxies, anti corrosive coatings, adhesive /bonding aids, cementitious mortar, polymer modified mortars.</p> <p>3.3 Waterproofing materials and their silent features such as polymer modified cement slurry, UV resistant acrylic polymer and ferro-cement.</p> <p>3.4 Repairing materials and their silent features for repairs of :</p> <p>3.4.1 Masonry: plastic/aluminum nipples, non-shrink cement, polyester putty or 1:3 cement sand mortar, galvanized steel wire fabrics & clamping rods, wires nails.</p> <p>3.4.2 RCC: epoxy resin, epoxy mortar, gypsum cement mortar, polymer concrete composites, membrane over-lays, fiber reinforcement concrete, dowel bars.</p>
<p>Unit –IV Maintenance and repair methods for masonry</p>	<p>4a. Prepare the surfaces for the purpose of retrofitting at given location.</p> <p>4b. Operate the relevant techniques to repair the cracks in civil structures.</p> <p>4c. Use the relevant method of strengthening the live cracks.</p> <p>4d. Justify the importance of prop in the retrofitting operation of civil structure.</p>	<p>4.1 Probable crack location such as junction of main and cross wall, junction of RCC column and wall, junction of slab and wall, cracks in masonry joints, below load bearing wall.</p> <p>4.2 Stages of repair such as material removal and surface preparation, fixing suitable formwork, bonding/passivating coat and repair application.</p> <p>4.3 Repair techniques such as grouting, patch repairs, replacement of spalling and/or delaminating, epoxy bonded mortar.</p>

		<p>4.4 Building cracks and its prevention, common methods for dormant crack repairs such as Epoxy injection, grooving and sealing, shotcreting, stitching, grouting and guniting.</p> <p>4.5.1 Repairs for minor & medium cracks (width 0.5 mm to 5mm): grouting.</p> <p>4.5.2 For major cracks (width more than 5mm): fixing mesh across cracks, RCC band, installing ferrocement plates at corners, dowel bars, propping concept for load bearing structural elements.</p> <p>4.6 Various causes and effects of dampness in wall.</p>
Unit –V Maintenance and repair methods for RCC	<p>5a. Prepare the surfaces for repair purpose at given location.</p> <p>5b. Suggest the relevant formwork to repair the given damages in RCC structures.</p> <p>5c. Use the relevant technique of building the formwork for repairs of given damages in buildings.</p> <p>5d. Justify the necessity of repairing the cracks in the building.</p> <p>5e. Suggest the relevant method of crack repairs at given location.</p>	<p>5.1 Repairs of RCC structures using chemicals such as Polymer, Latex Epoxy compound.</p> <p>5.2 Repairs of RCC structures using conventional methods such as grouting, replacement of spalling, shotcrete. Guniting and jacketing.</p> <p>5.3 Building cracks and its prevention, common methods for dormant crack repairs such as Epoxy injection, grooving and sealing, shotcreting, stitching, grouting and guniting.</p>

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Basics of repairs and maintenance	06	04	04	04	12
II	Causes and detection of damages	10	02	04	08	14

III	Materials for maintenance and repairs	10	04	04	10	18
IV	Maintenance and repair methods for masonry construction.	10	04	06	08	18
V	Maintenance and repair methods for RCC construction.	12	04	04	10	18
	Total	48	18	22	40	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom’s revised Taxonomy)

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:

(Any Ten Practicals * Marked practical are compulsory)

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Find the causes of damages for the given building elements.	02*
2	I	Prepare the check list for materials required for repair of load bearing building and framed building.	04*
3	I	Prepare a check list for repair of a load bearing building and framed building.	02
4	I	Determine the strength of any two structural elements such as column, beam, slab etc for damaged or undamaged structure using Rebound Hammer .	04*
5	IV	Determine the extent of efflorescence in masonry or concrete for damaged or undamaged structure.	02
6	I	Prepare a check list for repair and material requirement for structural elements for the given structure.	02
7	I	Prepare a check list for repair and material requirement for water storage structures for the given structure.	02
8	I	Find the causes of damages for the cracks for the given structure.	02*
9	I	Prepare a check list for repair and material requirement for flooring of given structure.	02
10	I	Prepare a check list for materials required and resources for repair of sanitary unit of the building.	02
11	VI	Repair the cracks for a damaged plane concrete member of size of 100×100×500 mm or 150×150×750 mm	02*
12	III	Prepare a list of material requirements and check list for repair of wall cracks as per the damages found.	06*
TOTAL			32

8. SUGGESTED STUDENTS ACTIVITIES:

Other than class room and laboratory activities following are the suggested co-curricular students activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences.

SR.NO.	ACTIVITY
1	Collect the information of various materials used in actual practice for repairs of cracks.
2	Compare damages caused by various natural hazards.
3	Collect the details of various types of the formwork used for RCC structures at site.
4	Collect the details of new techniques used for repair of damaged flooring.
5	Collect the data of agencies who work for rehabilitation.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES:

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

- a. Improved Lecture methods-
- b. Q & A technique.
- c. Demonstration.
- d. Activity based learning.
- f. Use of video, animation films to explain concepts, facts and applications.

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Building Repair and maintenance management	Gahlot, P. S. Sharma, Sanjay	CBS Publishers & Distributors Pvt. Ltd. New Delhi
2	Maintenance Engineering for civil Engineers	Nayak B. S.	Khanna Publication
3	Maintenance and Repairs of Buildings	Guha,P. K.	New Central book Agencies
4	Maintenance and Repairs of Buildings	Hutchin Son, BD	Newnes-Butterworth

11. LIST OF MAJOR EQUIPMENTS AND MATERIALSREQUIRED:

Sr.No.	Name of equipment	Brief specification
1	Universal Testing Machine	Capacity - 100 tonnes. Type: Mechanical type digital, electrically Operated. Accessories: (1) Tensile test attachment for flat and round specimen up to 32 mm. (2) Compression test attachment (3) Shear test attachment with sizes of bushes 5,6,8,10,12,16,20,24 mm, (4) Transverse test attachment with bending Punch, (5) Service tools, (6) Operation and maintenance manuals - 2 nos. (7) Hardness attachment.
2	Rebound Hammer	Rebound Hammer: W-M-250 Manual Test Hammer, confirming to BS-1881-202, Weight: 2.7 kg, Size: 127 x 76 x 355 mm, Shipping Weight: 2.7 kg and minimum verifiable strength is 10 MPa) to 62 MPa.
3	Ultrasonic Pulse Velocity test apparatus	Ultrasonic Pulse Velocity test apparatus: range 0.1-7930 μs, resolution: 0.1 μs, (< 793 μs), 1 μs (>793 μs), display 7", color 800 x 480, pulse voltage 100 – 450 Vpp, bandwidth 20 – 500 kHz
4	Compression Testing Machine	Digital display manual control compression testing; machine; Max. Capacity (KN): 2000; Measuring range: 4%-100% of FS; Relative error of reading: $\leq \pm 1\%$; Max. distance between two platen (mm): 330; Compression platen size (mm): 220x220; Max. piston stroke (mm): 0-20; Max. piston speed (mm/min): Approx. 30; Column clearance (mm): 300x200; Oil pump motor power (KW): 1.5; Whole dimensions (mm): 855*380*1435

12. LEARNING WEBSITE & SOFTWARE:

- <https://www.youtube.com/watch?v=mtRR-5fzKo8>
- <https://www.youtube.com/watch?v=X8WhkG70tAc>
- <https://www.youtube.com/watch?v=zX8HNbHmToM>
- <https://www.youtube.com/watch?v=-JNMIMg-CE>
- freevideolectures.com › Civil Engineering › IIT Guwahati
- www.youtube.com/playlist?list=PLF5B83BDDDBB8FCBE3
- nptel.ac.in/noc/individual_course.php?id=noc17-ce21
- <https://www.youtube.com/watch?v=hVaB0jGcyB4>
- <https://www.youtube.com/watch?v=AfHmpWlcqq4>

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs):

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Basics of repairs and maintenance	2	2	3	-	-	-	-	-	-	-	-	-
2	Causes and detection of damages	3	3	-	-	-	-	-	-	-	-	-	-
3	Materials for maintenance and repairs	2	2	-	-	-	-	-	-	-	3	-	-
4	Maintenance and repair methods for masonry construction.	3	3	2	-	-	-	-	-	-	-	-	-
5	Maintenance and repair methods for RCC construction.	3	3	-	-	-	-	-	-	-	-	-	-

Course Curriculum Design Committee:

Sr No **Name of the faculty members** **Designation and Institute**

- | | | |
|---|--------------------|---|
| 1 | Rajesh T. Aghao | Sr.Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad |
| 2 | Narendra R.Bansode | Sr.Lecturer in Applied Mechanics, Govt. Polytechnic, Aurangabad |

(Member Secretary PBOS)

(Chairman PBOS)

Government Polytechnic, Aurangabad

(An Autonomous Institute of government of Maharashtra)



NON Exam Credit Courses 2017-18

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6	6G316	French	9-10
7	6G317	Yoga	11
8	6G318	Music - Instrumental	12-13
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COURSE TITLE: PERSONALITY DEVELOPMENT

COURSE CODE: 6G311

TEACHING AND EXAMINATION SCHEME

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

Personality development is way to present ourselves. Personality development teaches you how to develop inner as well as outer personality. It is the totality of one’s own behavior towards oneself and others as well. Adapting some healthy habits really nurture your inner strength. Personality development grooms an individual and helps him make a mark of his/her own. Personality development helps you develop a positive attitude in life. It includes everything about the person , his physical, emotional, social, mental and spiritual make up

COURSE OUT COMES: The student will be able to

- Realize potential to succeed
- One can develop or boost their self – confidence/self-image
- Communicate in right way
- Develop positive attitude
- Handle people in right way & develop good behavior.

COURSE CONTENTS

Unit No.	Hrs	Major learning outcomes	Topics & sub topics
1	03	Students will come to know about importance of PD <div style="border: 1px solid black; padding: 5px; display: inline-block;"> Knowledge Skill Attitude </div>	How to develop winning attitude/personality 1.Be yourself 2.ability to smile 3.Adaptable to change 4.Respect & value for people 5.Stop procrastination 6.Never give up
2	03	How to present or how to develop communication skill	How to improve 1.Self image 2.Confidence 3.Stage fear 4.Understanding/knowledge
3	03	How to overcome obstacles in communication skill	Types of communication <div style="text-align: center;"> <pre> graph TD A[Types of communication] --> B[Verbal] A --> C[Written] B --> D[Non Verbal] B --> E[Body Language] C --> E D --- F["(Very Imp steps to effective communication)"] </pre> </div>
4	03	Basic Knowledge of Bio-data & Interview updates	Interview Techniques step by step e.g.1.Dress code 2.Non-verbalcommunication
5	03	Importance of B.L	Actions are louder than words.

			(Nonverbal communication)	Eye contact
6	Inter-personal skills & emotional intelligence	03	Interpersonal- PD- Leadership Skills Control your emotions I.S. are life skills. How to communicate effectively with surroundings	1.Listening skills Good listener/Bad listener 2.Verbal communication 3.Working in group 4.SWOT analysis
7	Self image & confidence	04	Love yourself	By walking we can recognize once image
	Total Hrs.	22		

LIST OF EXERCISES / PRACTICAL

Unit No.	Exercises / Practical Tutorial	Approx. Hrs Required
1	Exercise on implementation the change to our day to day life & schedule planning	02
2	Role play on communication skill	01
3	Types of body language by actions	01
4	Mock Interview practice	02
5	Non-verbally role play (making group)	01
6	Team builds & developing interpersonal skill	01
7	SWOT analysis of each student	02
	Total Hrs.	10

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author
1	The Secret	Rhonda Byrne
2	The power of subconscious mind	Joseph Murphy

SIGN & NAME OF THE CURRICULUM DESIGNER

**NAME : Rachana Deshpande
B.Com MBA, PGDI Tourism**

COURSE NAME: - HOBBY ELECTRONICS**COURSE CODE:- 6G313****TEACHING AND EXAMINATION SCHEME**

Particulars	Theory	Practical	Term work	Oral	Total
Credits	---	02	---	---	02

RATIONALE:-

It is essential for every diploma holder to have a basic knowledge of electronics material and components, identification of components, different types applications, its principle of operation, construction, how to use these components in practical circuits. Knowledge of testing of these components will help the students to maintain electronic equipments. Student will also acquire skill of making PCB and mounting of electronic components and testing methods of small circuits using simple testing equipments.

COURSE OUTCOMES: -

Identify and test different passive and active components.

Prepare PCB for simple electronic circuits.

Handle electronic tools and mount the components on PCB.

Handle electronics devices detect and finding the fault in various electronics devices.

COURSE CONTENTS:

Unit No.	Outcomes	Course content	Tutorial	Periods
01	Identify electronics components and to know the symbol's	Subject Introduction. Electronics symbol's Abbreviation	To draw the Symbol's of Electronics components.	04
02	Handle different types of tools and soldering & de-soldering practice.	Awareness of using all types of tools. Soldering practice & De-soldering practice.	----	05
03	Test the electronics components using Analog and Digital Multimeter	Identification of components & Testing by Analog & Digital Multimeter. (Resistors, Capacitor, Inductors, Transformer, Switches, Relay, Diode, Transistor, FET, TRIAC, MOSFET, DIAC, & IC's.)	To calculate the values of Resistor & Capacitor by colour coding.	10
04	Construct the Hobby circuit & Testing the circuit.	PCB Layout. Etching and drilling process. Project soldering. Project Testing.	----	08
05	Identify the fault & to repair it.	Remote, Mobile Charger, Bell, VCD, DVD Players, Re-charging battery, lab Power Supply Faultfinding etc. Mobile Basic Faultfinding	Component survey in market & project testing.	05

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK

Sr.No.	Title and Edition
1.	Electronics for you.
2.	Project books. Volume- I, II, III.
3.	Website :- www.electronicsgarage.com

SIGN & NAME OF THE CURRICULUM DESIGNER**NAME: Mr. Yeravar Radio Mechanic , E&TC**

COURSE TITLE: SPOKEN ENGLISH**COURSE CODE: 6G314****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

Speaking English confidently has become a supreme necessity to flourish in one's career. It is not just to leave an impression of stylishness but to converse your thoughts in a smart way. English is a language which links us with the outside world. In our country, fluency in English works as an additional benefit. Therefore, employments for a person having knowledge of English are bright in our country. Thus, our students should enhance their communication skills in English.

COURSE OUT COMES:

Pronounce English Words.

Use correct language while speaking & writing.

Implement presentation skills .

Participate in discussions following all rules & regulations.

COURSE CONTENTS:

Unit No.	Major learning outcomes	Topics & sub topics
1	Phonetics To learn the received pronunciation of English words.	Phonetics: Phoneme, Vowels and Consonants, Practice on phonetic transcription
2	English Grammar To learn the correct use of language in speaking and writing in English.	Grammar: Word Classes, Kinds of sentences, Tenses, Voice and Reported Speech
3	Presentation To enhance the presentation skills.	Presentation: Self introduction, introducing others, JAM n HAM on given topic
4	Discussion To improve mental ability, comprehensive knowledge regarding burning issues.	Discussion: Topic on that time present scenario regarding social, cultural, economical issues.

SUGGESTED EXERCISES / PRACTICAL

Unit No.	Topics	Exercises / Practical Tutorial	Approx. Hrs Required
1	Phonetics	Practice on Phonetic transcription	08
2	English Grammar	Exercises on related topics	12
3	Presentation	Practice on individual presentation	06
4	Discussion	Brain storming discussion on given topics within groups	06
		Total Hrs.	32

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author	Publication
1	Better English Pronunciation	J.D.O'Conner	Oxford University Press
2	High school English grammar and Composition	Wren and Martin	S.Chand and sonsPublication
3	English Grammar and composition	Pal and Suri	S.Chand and sonsPublication
4	A Course in Phonetics and Spoken English	J.Sethi and P.V.Dhamija	PHI Learning Pvt.Ltd

SIGN & NAME OF THE CURRICULUM DESIGNER

1.Mrs.P.Y.Kamble 2.Mrs. M.S.Ban

3.Mr.P.V.Deshmukh 4. Mr. R.L.Korde 5.Mr.D.D.Gangthade

COURSE TITLE: GERMAN
COURSE CODE: 6G315
TEACHING AND EXAMINATION SCHEME

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

To know a foreign language is important now-a-days. The knowledge of a foreign language helps in the professional career. It gives more job opportunities. The present curriculum is designed to give a brief idea about German language and culture.

COURSE OUT COMES:

Ability to understand simple sentences in present tense.

Ability to frame short and simple sentences.

Ability to communicate in some daily situations.

COURSE CONTENTS:

Topic and Sub Topics	Hrs
1.Course Topics	
Self- Introduction (1 hrs)	1 hrs
Nos. up to 10,000 (1 hrs)	1 hrs
Weekdays, Months	1 hrs
Date & Time	2 hrs
Greetings	1 hrs
2.Vocabulary related to following Themes	
My House	2 hrs
My Family	2 hrs
Daily routine	2 hrs
Hobbies	2 hrs
Food	2 hrs
Profession	2 hrs
My city	2 hrs
3.Grammar topics covered	
Verb forms (Present Tense)	2 hrs
Articles	2 hrs
Possessivpronouns	2 hrs
Auxiliary verbs	2 hrs
Wh-Question/ Yes-No Questions	2 hrs
Past-Tense of haben and sein	2 hrs
Total Hrs.	32 hrs

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition
1	Studio d A1
2	Netzwerk A
3	Themen aktuell A1
4	Tangram aktuell

SIGN & NAME OF THE CURRICULUM DESIGNER.

NAME: Aparna Sahasrabudhe, Aurangabad, Ph: 0240-6509126/9049991851

COURSE TITLE: - FRENCH**COURSE CODE: - 6G316****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

The ability to speak French is an advantage on the international job market. A knowledge of French opens the doors of French companies in France and other French-speaking parts of the world (Canada, Switzerland, Belgium, and the continent of Africa). As the world's fifth biggest economy and third-ranking destination for foreign investment, France is a key economic partner. The ability to speak both French and English is an advantage for finding a job with the many multinational companies using French as their working language, in a wide range of sectors (retailing, automotive, luxury goods, aeronautics, etc.).

Speaking French opens up study opportunities at renowned French universities and business schools, ranked among the top higher education institutions in Europe and the world. Students with a good level of French are eligible for French government grants to enroll in postgraduate courses in France in the discipline of their choice and qualify for internationally recognized degrees.

COURSE OUTCOMES:

Identify the alphabets.

Speak words & count numbers.

Use the grammar in making sentences.

Form simple sentences.

Achieve a positive attitude towards learning higher level of the language.

COURSE CONTENTS:

S.No.	Topic & Subtopic	Hours
1.	Grammar: Nouns – feminine, masculine, singular, plural The verbs 'être', 'avoir' in the present tense Articles – definite and indefinite Adjective agreement in gender and number Verbs in 'ER' Etre and Avoir Prepositions of place Il y a + Il n'y a pas Word order: sentence/question Key prepositions – à, dans, en, au, etc. Yes/no questions Possessive pronouns Revision 'ER' verbs The immediate past: 'venir de' Negative sentences Key verbs: faire, aller, sortir, etc. Demonstrative pronouns Frequency adverbs Reflexive verbs in 'ER' Question words (quel)	11 hours
	Total	11

SUGGESTED EXERCISES / PRACTICALS

SN	List of practical's	Hours
1	Greet Each other & study Pronunciation – key sounds	03
2	Days of the week, naming animals.	03
3	Make Alphabet + letters combination	03
4	List the Numbers & tell the time.	03
5	Giving personal details (address, telephone number, email, age) Describe a city (jobs and places)	03
6	Describing objects – shape, colour, size	03
7	Role play	03
	Total	21

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK

Sn	Author	Title
1	Myrna Bell Rochester	Easy French Step-by-step
2	Jean-Paul Valette & Rebecca Valette	Langue et culture françaises
3	Michael D. Oates	Entre Amis

NAME & SIGNATURE OF CURRICULUM DESIGNER

COURSE TITLE: YOGA**COURSE CODE: 6G317****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE: An irregularity in the body affects mind & similarly unpleasantness in mind can manifest as an ailment in body .Yoga gives you strength, flexibility and mind & body awareness that helps you to relax and energize. Yoga cultivates self regulation and higher consciousness in individual. Its an art of living which will be cultivated from student life hence important for students & every individual.

COURSE OUT COMES:

Practice Yoga to increase flexibility, muscle tone & strength.

Maintains balanced metabolism & healthy and peace

Improves respiration, energy and vitality

Plan the yogic diet and know its do's and don'ts.

COURSE CONTENTS:

Unit No.	Topics & sub topics	Hours
UNIT -I	Importance of Sports & Physical education With Yoga for teen agers	01
UNIT-II	Planning & Preparation in detail before learning Yogic Practices	01
UNIT-III	Introduction of YOGA various methods of yoga (Types) YOGA at a glance chart	02
UNITIV	Basic principles of YOGA – Difference between physical ed. Sports & YOGA	02
UNIT V	Importance of practical sequence of yogic practices – cleansing methods (Shatkriya)	02
	Tips of Yogic Diet	02
	Total Hrs.	10

1. SUGGESTED EXERCISES / PRACTICALS

Unit No.	YOGA PRACTICAL	Approx. Hrs Required
1	Correct sitting method (Posture) 4 Bends and Basic movements	05
2	Side bend & Twist, 12 surayanamskar + 32 Yogasanas	05
3	Three types of Basic Breathing practices and its variations	05
4	Practice of Pranayam with kumbhak & without kumbhak	05
5	Prepare diet plan for teen ager students	02
	Total Hrs.	22

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author
1	Asan Pranayam	Bahan Mudra
2	Science of Human Body & Yoga	Dr. Makarand Gore
3	Yoga & Mind	Dr. Sam Prasad Vinod

SIGN & NAME OF THE CURRICULUM DESIGNER**P.R. Bardapurkar, BA,BPEd,MPed,NIS-Yoga**

COURSE TITLE: MUSIC INSTRUMENT

COURSE CODE: 6G318

TEACHING AND EXAMINATION SCHEME

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	02

RATIONALE:

The instrumental program provides an Opportunity for all students to study an Instrument. It focuses on: Conceptual Understanding, Musical Techniques, Expressive growth. Communicate Ideas, Feelings and Moods.

Develop knowledge of the Elements of Music, Develop Self-Discipline and Personal Satisfaction

COURSE OUT COMES:

Fingers, Notation, Octave, Chords (Exercise) All these daily practice will develop Listening & Playing Skills of melody instruments.

It will Give Good & Better Presentation.

Students will handle melody & rhythmic instruments

Students will read the notations

Students will play beats on rhythmic instruments

COURSE CONTENTS:

Sr. No.	Topic	
1.	Introduction	1.Parts of Instruments
		2.How to Handle An Instrument
		3.Types of Instruments
2.	Guitar	Open strings: 1. Holding Guitar
		2.Open notes, strings
		3. Open notes exercise
		4.Notes Plucking Warm Up
3.	Melody Instruments	Fingers Formation :
	Key board & Guitar	1.Fingers Holding With Fingers
		2.Two Fingers with Exercise
		3. Three Fingers with Exercise
		4. Four Fingers with Exercise
5. Fingers Formation Exercise		
4.	Rhythm Instruments	Tablas, Drums, Congo, Bongo
	Beat Pattern	1.Basic timing exercise
		2.Counting Bit
		3.Taping
4.Bits 1/2/3/4 Clapping on time		
5.	Western Notation	1. Notes Formation
		2.Notes reading & playing on Guitar
		3. Notation Exercise
		4.Notation practice on octave
		5.Notes séance
6.	Octave	1. Introduction of Octave
		2.Types of Octave
		3. Octave Cycle

		4. Notation on Octave
7.	Signs & Symbols	1. Sign Roots
		2. Chromatic notes with signs
		3. Value of notes
		4. Symbols on Notation
8.	Co-Ordination	1. introduction of Chords
		2. Chords Making
		3. Types of Chords
		4. Reading & playing on Instrument
		5. Strumming pattern exercise
		6. Chords Sequence
		7. Chords shifting exercise with strumming pattern
		8. Chords formation with strumming
		9. Chords Co-Ordination
		10. Co-Ordination with notes & songs

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author
1.	Music Theory	Johanthan Harnum
2.	Grade 1 Music Book	Mail Bay

NAME OF THE CURRICULUM DESIGNER

**Krishna Chandrakant Badgujar
Graduate in Electronics
Eight Grades in Trinity [College Of London]**

COURSE TITLE: TWO WHEELER MAINTENANCE

COURSE CODE: 6G319

TEACHING AND EXAMINATION SCHEME

PARTICULAR	THEORY	PRACTICAL	TERM WORK	TOTAL
CREDITS	---	02	---	02

RATIONALE:

Two wheelers are the essential part of everybody's life today. Two wheelers are most convenient and economic mode of transportation along with low initial cost feature. As on today, Two wheeler vehicles like motor cycles, scooters and mopeds are extensively used by men, women and students. Considering this, it is essential that knowledge about construction, working and basic maintenance of two wheelers is essential and needs to be inculcated in students at this level. Present course aims in exposing the students to two wheelers as regards basic constructional details, working, basic fault finding and maintenance practice on hands on levels so that he/she will be able to handle basic maintenance of his/her two wheeler vehicle.

COURSE OUTCOMES:

After completion of the course, students should be able to acquire following course outcomes, Identify the basic systems and mechanisms of different two wheelers.

Handle various tools required for two wheeler maintenance.

Dismantle and assemble different parts and assemblies of two wheelers.

Identify faults and able to rectify it by replacing the defective parts.

Carry out regular maintenance of two wheeler vehicles.

COURSE CONTENTS:

Following theory should be explained before taking practical exercises in short and it should be immediately followed by practical hands on exercises. Overall working of systems and parts is expected to be delivered so that student can practically conduct the exercises. This course is intended for development of practical skills.

Unit	Major Learning Outcomes	Topics and Sub- Topics
UNIT-I - Workshop Tools and Equipments	<ul style="list-style-type: none">• Identification of different tools and their practical use in different applications.• Selection of particular tool for a specific application.• Hands on use tools for specific tasks.• Understanding of use of different equipments for different tasks in two wheeler maintenance.	<ul style="list-style-type: none">• Details of various workshop tools such as Open end spanners, double end spanners, combination spanners, ring spanners, allen key, T handle, socket set, ratchete 3/8", various types of screw drivers like flat, Philip head, Stub head Hammers, pliers, chisels, centre punch, pliers, Extension bar, universal joint, offset handle, speed handle, Torque wrench• Details of equipments like Timing light, Compression gauge, Vacuum gauge, Multimeter, Bearing puller, feeler gauge, micrometer, Temperature gauge, Tyre pressure gauge, Rocker arm shaft puller, piston pin replacer, Magneto puller, Clutch spring compressor.
UNIT-II- Basics of Two wheeler	<ul style="list-style-type: none">• Identification and understanding of functions of various parts of Two wheeler vehicles.	<ul style="list-style-type: none">• Classification and constructional layouts of two wheeler vehicles such as Motor cycles, Scooters, Mopeds.

vehicles	<ul style="list-style-type: none"> • Identification of mechanisms in Two wheeler vehicles. • Able to locate faults in different parts by external observations 	<ul style="list-style-type: none"> • Details of various parts of two wheeler vehicles such as <p>Motor cycle / Scooter /Moped: Identification and function of various parts like Frame or chasis(Diamond frame,Double cradle frame,cradle frame,single cradle frame, backbone frame,T-Bone frame steel tubular under bone frame) Engine, carburetor, Fuel tank,Meter panel display body,Speedometer,Odometer,Fuel indicator,Multi reflector head light,Telescopic front forks, front fenders,front tyres,front wheel,front disc/drum brake, front fender,Seat,Swing arm suspension,Exhaust muffler,Rear wheel,Rear tyre,Rear brake drum,Conventional Chain,rear fender,Accelator/Throttle,Brake levers, electric swiches and horn,storage compartment,catalytic converter</p>
UNIT-III-Fuel and air Intake system	<ul style="list-style-type: none"> • Understanding of working of fuel intake system of two wheeler vehicle • Develop hands on skill of dismantling and assembly of fuel cock,carburetor • Cleaning and tuning of carburetor • Fault finding in fuel cock and carburetor and repairs • Overhauling and cleaning of air cleaner and filters 	<p>Fuel Intake system: Details and construction of Fuel tank, hand operated fuel cock, Details and construction of carburetor with parts as Throttle valve,jet needle,cutway,needle jet,pilot air passage,air jet,air screw, Float chamber,Float valve,Main jet, Pilot jet Pilot outlet.</p> <p>Air Intake system: Air cleaner, Filters and types such as Dry paper type, Wet Foam type.</p>
UNIT-IV-Engine and systems	<ul style="list-style-type: none"> • Development of Hands on skills for dismantling and assembly of engine • Replacement of old and worn out parts. • Identification of faults. 	<p>Construction and working of four stroke engine with details of Cylinder head,Cylinder block,Crankcase,camshaft,inlet and exhaust valves,valve springs,rocker arm,cam chain sprockets,cam chain,cam chain tensioner, cam chain guide (Damper),Crankshaft,main bearings,</p> <p>Lubrication System: detail and construction of oil filter,oil pump and lubrication system</p> <p>Cooling system:details of air cooling system , fins.</p>
UNIT-V-Transmission System	<ul style="list-style-type: none"> • Development of Hands on skills for dismantling and assembly of multiplate clutch,Transmission gear box and Continuously 	<p>Details and construction of Primary reduction driving and driven gears , Multi plate clutch, Transmission Gear box, Gear shift mechanism, Continuously Variable</p>

	<p>Variable Transmission (CVT) mechanism and Kick mechanism</p> <ul style="list-style-type: none"> • Identification of faults and remedies 	<p>Transmission (CVT) mechanism, Secondary reduction chain drive system,</p> <p>Details of kick mechanism: primary drive and driven gears, kick pinion, kick idle gear, kick gear ratchet wheel and kick lever</p>
UNIT-VI- Suspension and steering system	<ul style="list-style-type: none"> • Development of Hands on skills for dismantling and assembly of telescopic front fork suspension, rear suspension and steering handle. • Identification of faults in suspensions 	<p>Suspension system: Details of telescopic front fork suspension</p> <p>Details of Rear suspension with conventional two shock absorber type, monocross type, unit swing arm type</p> <p>Steering System: Details of steering handle, head pipe, underbracket.</p>
UNIT-VII- Braking system	<ul style="list-style-type: none"> • Development of Hands on skills for dismantling and assembly of drum and Disc brake assembly • Fault finding and replacement of faulty parts. • Setting of brakes for optimum performance 	<p>Details of drum braking system with brake drum, cam, brake shoe, brake lining anchor pin, return spring, brake plate. Brake foot lever, brake rod, brake camshaft lever, brake pedal free play adjusting nut.</p> <p>Details of disc brake with hydraulic cylinder, piston, primary cap, return port, return spring, pipeline, wheel cylinder assembly with wheel piston and brake pad, stationary brake pad, brake caliper</p> <p>Brake torque rod details</p>
UNIT-VIII- wheels and Tyres	<ul style="list-style-type: none"> • Dismantling and assembly of front and rear wheels during repairs. • Analysis of wear of tyres for replacement 	<p>Wheels: Types of wheels as wire spoke wheels, pressed wheels, die cast wheels.</p> <p>Details of front wheel assembly, Front wheel axle, cotter pin, front wheel axle nut, bearings, oil seal</p> <p>Details of Rear wheel assembly, rear wheel axle, cotter pin, wheel axle nut, drive chain puller lock nut.</p> <p>Tyres: Details of Tubed and tubeless tyres. Tyre size markings. Mounting of tyre on wheels.</p>
UNIT- IX- Electrical Systems -I	<ul style="list-style-type: none"> • Battery working and connections of battery along with safety. • Observation and operation of starting system along with fault finding • Observation and operation of ignition system along with fault finding • Observation and operation of charging system along with fault finding 	<p>a. Battery : Conventional lead acid battery, Dry Battery, voltage and capacity, terminals i.e. body terminal and positive terminal of battery. Safety precautions in handling of battery</p> <p>b. Starting system: Layout and functioning of starting system with parts as battery, fuse, main switch, starter relay, starter motor, starter switch. one way clutch to connect starter gear with flywheel</p> <p>c. CDI Ignition system: Layout and working of CDI ignition system with details of Flywheel Magneto, charging coil and lighting coil, pickup coil, main switch, CDI unit, Ignition coil, Rectifier and Regulator (RR) unit, Spark plug,</p>

		<p>fuse and Battery.</p> <p>d. Charging System: Layout and working of charging system with details of Flywheel magneto, charging coil, Rectifier and Regulator unit (RR unit) ,battery</p>
UNIT- X- Electrical Systems -II	<ul style="list-style-type: none"> • Identification and locations of flasher lights and circuit • Fault finding in flasher light circuit • Identification and locations of brake lights and circuit • Fault finding in brake light circuit • Identification and locations of horn and circuit • Fault finding in horn circuit • Identification and locations of different lights and their circuit • Fault finding in lighting circuit 	<p>a. Signaling System: Details of Flasher light circuit with battery, fuse, flasher relay, flasher switch, flasher lights.</p> <p>Details of brake light circuit with battery, fuse, main switch, brake switch, brake lights</p> <p>Details of Horn circuit with battery , fuse main switch, horn switch and horn</p> <p>b. Lighting system: Details of lighting system circuit with details of Lighting coil, Rectifier and Regulator unit (RR unit), Main Light Switch , Light upper and Dimmer switch, Head light, High beam indicator light, meter light, Tail light</p>

SUGGESTED EXERCISES /PRACTICALS:

Unit No.	Practical Exercises	Approx. Hours Required
I	Exposure to various workshop tools and equipments by practical demonstrations and handling.	02
II	Observation and Identification of various parts of Motorcycle/Scooter/Moped	01
III	Dismantling and assembling of Fuel tank, Hand operated fuel cock , carburetor, Air cleaner and Air Filter	04
IV	Dismantling and assembling of Four stroke motorcycle/ scooter engine .	04
V	<p>a. Dismantling and assembling of Primary reduction driving and driven gear , Multi plate clutch, Transmission Gear box and Gear shift mechanism</p> <p>b. Dismantling and assembly of Continuously Variable Transmission (CVT) system of a scooter</p>	04
VI	Dismantling and assembly of telescopic front fork suspension , Rear suspension with conventional two shock absorbers for a motor cycle/scooter	02
VII	Dismantling and assembly of Disc and Drum brakes of motor cycle/scooter	02
VIII	Removal and refitting of front and rear wheels with tyres.	02
IX	Identification, observation and practical demonstration of Starting	02

	system of motor cycle/scooter	
X	Identification, observation and practical demonstration of Ignition system of motor cycle/scooter	02
XI	Identification, observation and practical demonstration of Charging system of motor cycle/scooter	01
XII	Identification, observation and practical demonstration of Signaling system of motor cycle/scooter	02
XIII	Identification, observation and practical demonstration of Lighting system of motor cycle/scooter	02
IXV	Visit to Two wheeler shop/Institute's Yamaha centre	02
Total		32

SUGGESTED LEARNING RESOURCES: REFERENCE BOOKS

Sr. No.	Title And Edition
1.	Manuals of Two wheeler companies like Bajaj, Honda, Yamaha, Tvs, Suzuki, Mahindra, Hero etc.
2.	Tools and Equipments required for Two wheeler maintenance
3.	Actual Two wheeler vehicles.

SIGN AND NAME OF CURRICULUM DESIGNER

Shri.S.P.Shiralkar
Lecturer in Mech.Dept

COURSE TITLE: COMPUTER HARDWARE MAINTENANCE**COURSE CODE: 6G323****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	02

RATIONALE:

For the smooth functioning of computer system it is frequently required to upkeep, maintain, repair, troubleshoot and take up preventive maintenance of the system and its peripheral devices. Therefore it is essential for the students to acquire skills in the area of computer maintenance and troubleshooting and its preventive maintenance.

This course is focused on developing skills in installation and configuration of Operating systems, loading and configuring various device drivers, diagnosing the faults and troubleshoots the computer at software level as well as component level.

COURSE OUTCOMES:

Survey various Operating Systems and device drivers.

Integrate various components in computer system and peripheral devices.

Find errors, diagnose faults, repair and maintain computer system and its peripherals.

Test, Connect and install the peripherals.

Find error in computer system.

COURSE CONTENTS:

Unit	Major Learning Outcome	Topics and Sub-topics
UNIT-I Inside the PC: Core Component s	1a. List and Identify the components of computer system 1b. State devices required for using laptops 1c. List ports and connecting devices 1d. Draw and explain the functional block diagram of motherboard 1.e. Explain BIOS features	1.1 Identify different type and generation of computer, Identify devices required for using laptops, Identify components which makes the system and specify its importance. Identify various types of ports and its connecting devices. Motherboard: definition, Components/connections in motherboard, functional block diagram 1.2 Basic Input Output System :Services, Bios Interaction, CMOS-RAM
UNIT-II Hard Disk Drive and Controller, DVD Drives	2a.Define: Heads, Tracks, Sectors, Cylinders, Cluster, Landing zone, MBR, Zone bit recording . 2b.Describe functioning of hard disk. 2.c Explain types of DVD, recording and constructions 2.d list blue-ray disk specification	2.1 Disk Basics 2.2 Hard Disk Interfaces: EIDE, Serial ATA, SCSI, USB and IEEE 1394 (Firewire), RAID, Solid State Drive (laptop) 2.3 Disk Geometry : Heads, Tracks, Sectors, Cylinders, Cluster, Landing zone, MBR, Zone bit

		recording. 2.3 DVD Drives : Types, Recording, Construction, Interfacing, 2.4 Blu-ray disk specification
UNIT-III Input Devices and Printers	3a. Explain operation of keyboard 3b. Explain operation of mouse 3c. Explain working of scanner 3d. Classify printer 3e. Describe the working of LaserJet and Ink-jet Printer .	3.1 Keyboard : Keyboard operation, Keyboard Types , Types of Key switches (Membrane, mechanical, rubber dome, capacitive) 3.2 Keyboard interfaces 3.3 Mouse : Types, Operation, Interfaces 3.4 Scanner : Scanner Types, Image quality measurement, Working. 3.5 Types of Printers 3.6 Printer Interfaces 3.7 Ink-jet Printer : Parts, working principle 3.8 LaserJet Printer : Parts, working principle.
UNIT-IV Monitor and Display Adapters	4a. Define video basics (CRT parameters) and VGA monitors 4d. Differentiate graphic cards 4e. Explain their applications	4.1 Video Basics (CRT parameters) 4.2 VGA monitors 4.4 Graphics Cards : Components of a card, Accelerated Video cards, CGA, EGA, VGA
UNIT-V Trouble Shooting and Preventive Maintenance	5b. Explain troubleshooting procedures of listed peripherals and motherboard 5c. Discuss preventive maintenance techniques 5d. List the Preventive maintenance tools	5.2 Troubleshooting : possible problems and diagnosis • Motherboard • Keyboard • Hard Disk Drive • Printer 5.3 Preventive maintenance tools

SUGGESTED LIST OF EXERCISES/PRACTICALS

Unit No.	Practical Exercises/Tutorial	Approx. Hrs. required
I	Identify basic components of a personal computer. Prepare a list of various computer peripherals. (e.g. CPU, Monitor, Keyboard, Mouse, Speaker, Web cam, Printer, Scanner, microphone, speakers, modem, projector etc).	02
II	Identify common ports, associated cables, and their connectors. Observe various connectors, ports back and front side of the computer. Write their purpose and specifications. (e.g. Power, PS/2 keyboard and mouse, Serial and parallel, USB, VGA, LAN, Audio & microphone, Firewire, HDMI, games, SATA etc.)	02
III	Identify major components including motherboards, memory, drives, peripheral cards and devices, BIOS, and Windows operating system. Observe the various components on the motherboard, identify it. Also	04

	observe their interconnection and arrangement inside the case. Detach and attach the cables and component in the PC case and motherboard. Carryout detailed study on all the components and devices on the given motherboard. • Processor socket ,Chipsets, • Memory module slots, BIOS, CMOS • FDD, HDD connectors • Different types of expansion slots (ISA, EISA, PCI, PCI express, AGP, Express Card & PC Card (or PCMCIA) etc.) • Add-on-cards (audio, graphics, I/O, TV tuner, network etc.) • Cables in a computer system (IDE Ribbon cable, SATA cable etc) • Connections for button, indicator lights etc. • Observe various types of memory modules (SIMM, DIMM, SO-DIMM, RIMM, SO-RIMM). Also observe impact of removal of memory modules from the system, start it and re insert memory module and restart system.	
IV	Observe the different types of motherboards, form factors and write the difference between the desktop motherboard and laptop motherboard.	02
V	Identify the on-board features of the motherboard. Add additional facilities like the network capabilities, and gaming capabilities by adding an Accelerator card.	02
VI	Observe, search and write the specifications of CD/DVD drive, HDD, motherboard, RAM chips, Power supply, Microprocessor chip, Add on cards.	02
VII	Observe the power supply (SMPS) and measure their voltage levels of a given SMPS. Measure various voltage levels, such as motherboard, storage devices and fan etc. using multi-meter.	02
VIII	Observe the various techniques for low level and high level formatting of Hard Disk. Format the given Hard Disk using any one technique and create three partitions, two for operation systems and one for data	02
IX	Observe the procedure for installing Operating System like win7/win8 with partition formatted in previous practical in one partition, (fat, fat16, fat32, ntfs, gpt). Try booting PC. Learn the content of boot.ini after the installation process. Now install unix Operating System like Linux /Ubuntu/ centos/ fedora/ red hat in another partition. Create dual booting system try booting PC.	04
X	Observe different types of printers (dot matrix, inkjet &laser, multifunction). Install driver and interface the printers with PC/Laptop on any operating system (connect the printer to one PC directly using USB/Serial/Parallel ports as per the availability; test the functioning of the printer.)	02
XI	Observe the interfacing, installation and working of various devices such as scanner, projector, web cam etc. Connect all these devices with the given PC, install & test them	02
XII	Search for various data recovery software apply on pen drive/HDD.	02
XIII	Perform computer maintenance and preventative maintenance functions. • Perform physical cleaning (internal and external) of personal computer. • Demonstrate how to adjust basic performance settings. • Perform hard drive file system maintenance. • Identify anti-virus software and applications.	02
XIV	Utilize Internet to download device drivers. Installation of drivers of various devices from the internet.	02
Total Hours		32

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr.No	Title and Edition	Author	Publication
1	Computer Installation and Servicing	D Balasubramanian	Tata McGraw Hill Education Private Limited
2	The complete PC Upgrade & Maintenance Guide	Mark Minasi	BPB Publications
3	IBM PC and clones	GovindRajalu	Tata McGraw Hill Education Private Limited

SIGN & NAME OF THE CURRICULUM DESIGNER

NAME: 1. Prof.P.B.Lahoti

2. Prof.J.P.Joshi

3. Prof.O.R.Varma

**Lecturer Computer Engg, Dept.
Govt. Polytechnic, Aurangabad**

COURSE TITLE: MUSIC VOCAL**COURSE CODE: 6G325****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

The presence of music in our society suggests that music satisfies fundamental human needs. Music has been always an important component in educational curricula. The present curriculum aims to develop listening and singing music skill as well as to introduce the history of music and their different singing forms.

COURSE OUTCOMES:

Music is co-curriculum to all subjects like social science, physical science, physics etc.

To relieve pressure and stress management

Able to listen classical music.

Beneficial for awakening artist.

Ability to participate in competition, cultural program

Get knowledge of instrument handling

COURSE CONTENTS :

UNIT	Major Learning Outcomes	Topics & Sub-topics
UNIT- I	Musical Definitions are basics of music & Exercise of Alankar helps to develop vocal cord.	Basic Information of music 1. Definition 2. Alankar
UNIT -II	Raag Yaman is easy to learn, as well as its very famous in classical Music & Film Music	Classical Music 1. Raag Yaman 2. Yaman based filmy song
UNIT-III	Light music is very close and familiar to common people and also new students. It can Perform and listen at any stage like competition, gathering etc.	Light Music 1. Bhavgeet 2. Bhaktigeet 3. Gazal
UNIT-IV	Every singer shall have knowledge of harmonium & Table to sing a song in sur and taal	Music Instruments Harmonium 2. Tabla

SUGGESTED EXERCISES / PRACTICAL

Unit No.	Exercises / Practical Tutorial	Approx. Hrs Required
1.	To collect different types of songs in Raag Yaman	12 hrs
2.	Information of folk songs, folk artists, folk instruments	12 hrs
3.	Organization & performance in departmental Musical concerts	08 hrs
Total Hrs.		32 hrs

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author	Publication
1	Sangeet Visharad	Mr. Vasant	Hathras Publications
2	Loksangeet Shastra	Dr. Ashok Ranade	-
3	Sangeet Kala Vihar (Magazine)	-	Akhil Bhartiya Gandharv Mahavidyalay Mandal, Mumbai

SIGN & NAME OF THE CURRICULUM DESIGNER

Dr. Deepali Vasekar-Kate,
(NET, Ph.D., B.Ed., Sangeet Alankar)

COURSE: AEROBICS**COURSE CODE: 6G326****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

This course helps to improve the fitness of the heart and lungs. It's an activity that causes you to sweat and breathe hard, that makes your blood pump through your veins as it carries oxygen to your muscles to keep you going. It reduces stress, increases bone density, give relief from depression & anxiety & build a confidence about your personality, and hence it is essential for students.

COURSE OUTCOMES:

Classify the various exercises & learn about the latest aerobic exercise guidelines and the health benefits of aerobic exercise.

Student can compare aerobics exercise with other exercises.

Student can use the various moves and techniques of aerobics exercise in day to day life.

Students can increases their stamina & energy for both work and play.

COURSE CONTENTS:

UNIT NO.	Topics/Contents	Hrs
UNIT-I	What Is Aerobic Exercise?	01
UNIT-II	Why You Need Aerobic Exercise	01
UNIT-III	Getting Started With Aerobic Exercise	01
UNIT-IV	Advantages /Benefits of Aerobic Exercise Mental benefits ,Health benefits, Physical benefits & Fitness benefits	02
UNIT-V	Types & Safety of Aerobics	02
UNIT-VI	Indoor Aerobic Exercise Equipment	01
UNIT-VII	Moves and techniques Basic Step, Corner knee (or corner kick),Repeater knee (aka Triple knee), T-Step, Over-the-Top Lunges, V-Step, Straddle Down, L-Step, Split Step, I-Step	02
	Total Hrs.	10

SUGGESTED EXERCISES / PRACTICAL

Unit No.	Exercises / Practical Tutorial	Approx. Hrs Required
1	Preparations and Warm Ups Aerobic Exercises Anaerobic Exercise ,Core Muscle Exercise ,Balance Exercises, Flexibility Exercises, Busy People Exercises, Beginner Routine, Intermediate Routine Hard Routine, Interval Training Routine ,Elderly Routine, Post-Exercise Techniques	07

2	List Of Aerobics Workouts- walking, running & cycling etc.	04
3	Step Aerobics Basics/ Moves and techniques Basic Step, Corner knee (or corner kick), Repeater knee (aka Triple knee), T-Step, Over-the-Top Lunges-Step, Straddle Down, L-Step, Split Step, I-Step & Turn Step & Knee Repeater	08
4	Flexible exercise & Abdominal exercise	03
Total Hrs.		22

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author	Publication
1	Aerobics & exercise	David C. Lieberman	
2	Life Of Fitness	Sara James	
3	The Aerobics Program	Kenneth Cooper	

SIGN & NAME OF THE CURRICULUM DESIGNER

NAME: Mr. Shaikh Nisar

COURSE TITLE: JAPANESE**COURSE CODE: 6G324****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE: Japan is the second largest economy in the world it is resource full country and files up nearly 400000 patents every year. Innovation has made Japanese world leader in technological advancements and has majority employment opportunities hence as a technical student learning Japanese is important which makes a way for the opportunities in the country.

COURSE OUT COMES:

The course provide introduction to subject and motivation for students to learn the next level of Japanese language.

Student can interpret basic sentences and formulate basic sentences.

Student can use the language in day to day life.

Student cans conversant basic sentences.

COURSE CONTENTS:

Unit No.	Topic	Hrs
1	Introduction of language	02
2	Alphabets, Kanjis	02
3	Greet	02
4	Days of the week	01
5	Days of the Months	01
6	Month of the year	01
7	Making Sentence with Grammar	02
8	Counter	02
9	Test	02
Total Hrs.		15

SUGGESTED EXERCISES / PRACTICAL

Unit No.	Exercises / Practical Tutorial	Approx. Hrs Required
1	Writing / identify through practice and some kanjis	03
2	Writing / identify numbers through practice	02
3	Greet each other learning practically	02
4	Writing / identify days of the week through practice	01
5	Writing / identify days of the Months through practice	01
6	Writing / Identify Months of the Year through practice	01
7	Writing / identify making simple Sentence with Grammar through practice	03
8	Writing / identify Japanese counter through practice	02
9	Above syllabus test, orally practice	02
Total Hrs.		17

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK:

Sr. No.	Title And Edition	Author	Publication
1	Minnano nihongo	Suri E Nettowa.Ka	Goyal
2	Nihongo Sho ho	Shinagu Suzuki	Vijitha Yapa

SIGN & NAME OF THE CURRICULUM DESIGNER

Anand Duryodhan Gawai (JLPY 3 Level pass)

COURSE TITLE: - ELECTRICAL MAINTENANCE.**COURSE CODE: - 6G321****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:-

It is essential for every student to have a basic knowledge of electrical components, switches, different electrical appliances and its operation. In this course, we prepare electrical switch board, wiring. Students are able to do their own house wiring as well as testing of electrical equipments such as lamps, tube light, fan, regulators, heater, mixer.

COURSE OUTCOMES:-

Identify the electrical symbols, different types of tools, safety precautions.

Test the electrical equipments.

To interpret and use switch board connection

To identify the fault and repair it.

COURSE CONTENTS:-

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Introduction of electrical tools and safety precautions	1a. Analyse the different types of tools and accessories used in electrical 1b. Draw electrical symbols of components. 1c. Which are the electrical safety precautions.	1.1 Introduction to electrical engineering, electrical tools /Accessories 1.2 Electrical symbols of components 1.3 Electrical safety
Unit– II Testing electrical accessories	2a. Test the electrical supply by using the testing lamp. 2b. Analyse and test the Switch board, capacitor (electrical) calling rose point , tube light point, MCB switch, energy meter, house wiring, voltmeter ammeter.	2.1 Identification of electrical supply and testing by test lamps 2.2 Switch board, capacitor (electrical) calling rose point , tube light point, MCB switch, energy meter, house wiring, voltmeter ammeter.
Unit–III Wiring	3a. to familiarize with switch board and placing of component.	3.1 Switch board diagram 3.2 Board cutting and drilling 3.3 Switch board connection and fitting.
UNIT –IV Repairing electrical equipment	4a. How to repair the following equipments such as Test lamp, tube light and iron, Regulator, heater, Toster, Table fan, ceiling fan, exhaust fan, mixer, motor, water cooler	4.1 Test and repair the following equipments: 4.1.1 Test lamp, tube light and iron 4.1.2 Regulator, heater, Toster 4.1.3 Table fan, ceiling fan, exhaust fan, mixer, motor, water cooler.

SUGGESTED LIST OF EXERCISES/PRACTICALS:-

Sr. No.	Unit No.	Practical Exercises (outcomes in Psychomotor Domain)	Approx Hours. required
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1	I	Identify the symbols of electrical components.	02
2	I	To study the different safety precautions	02
3	II	Identification of electrical supply and testing by test lamps	04
4	II	Analyze and test the Switch board, capacitor (electrical) calling rose point , tube light point, MCB switch, energy meter, house wiring, voltmeter ammeter.	04
5	III	To build the switchboard and wiring of electrical appliances	04
6	III	To make electrical wiring and fitting of any premises.	04
7	IV	Test and repair the following equipments: Test lamp, tube light and iron	04
8	IV	Test and repair the following equipments: Regulator, heater, Toster	04
9	IV	Test and repair the following equipments: Table fan, ceiling fan, exhaust fan, mixer, motor, water cooler.	04
Total Hours			32

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK

Sr. No.	Title of Books	Author	Publication
1	Electrical safety Handbook	John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel	Mc Graw Hill Education
2	Electrical equipment, testing and maintenance	Paul Gill	Reston Publishing Company
3	Electrical Equipment handbook	Philip Kiameh	Mc Graw Hill Education

NAME AND DESIGNATION OF COURSE DESIGNER

**NAME: Prof. B.S. Sanap,
Lect. In Electrical Dept.
Govt. Polytechnic, Aurangabad**

COURSE TITLE: - BASICS OF SEWING TECHNIQUES**COURSE CODE: 6G322****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

This course provides the basement for operating sewing machines and developing skills on hand that needs to be used for sewing basics for garment construction and mending household garments.

COURSE OUTCOMES

Develop skills operate sewing machine.

Maintain sewing machine.

Stitch permanent and temporary stitches.

Identify application of permanent and temporary stitches.

Mend garments.

Sew Seams and Seam finishes.

COURSE CONTENTS:

Unit	Major Learning Outcomes [Psychomotor]	Topics and Sub-topics
Unit-I Constructi on Basics	Describe different parts cleaning & Oiling Practicing sewing machine. Demonstration of even & uneven stitches Prepare a sample of even & uneven stitches Identify application of even & uneven stitches Collect sample of Temporary stitches Demonstration of Running Stitch, Hemming, Over Casting, Prepare a sample of Running, Hemming, and Over Casting stitches. Identify Application of Running, Hemming, Over Casting stitches Collect sample or swatches of above permanent stitches.	1.1.Cleaning, Oiling& handling of sewing machine 1.2.Temporary stitches : Even Basting, Uneven Basting 1.3.Permanent Stitches : Running Stitch, Hemming, Over Casting.
Unit-II Decorative Seams	Demonstration of Top Stitched Seam (One Side &Two Side), French Seam, Flat Felled Seam, Hong - Kong Seam Prepare a sample of Top Stitched Seam (One Side &Two Side), French Seam, Flat Felled Seam, Hong - Kong Seam Identify Application of Top Stitched Seam (One Side &Two Side), French Seam, Flat	2.1. Plain Seams , Top Stitched Seam (One Side & Two Side), French Seam, Flat Felled Seam,
Unit-III Types Of Seam Finishes	Demonstration of Edge Stitched Finish & Pinked Finish Prepare a sample of Edge Stitched Finish & Pinked Finish Identify Application of Edge Stitched Finish & pinked finish Collect sample or swatches of above seam finishes	3.2.Types Of Seam Finishes : Edge Stitched Finish, Pinked Finish

Unit	Major Learning Outcomes [Psychomotor]	Topics and Sub-topics
Unit-IV Openings	Demonstration of Opening- One Piece Opening, Two Piece Opening, Faced Slash opening, Prepare a sample of Opening- One Piece Opening, Two Piece Opening, Faced Slash opening, Identify Application of Opening- One Piece Opening, Two Piece Opening, Faced Slash opening, Collect actual sample or swatches of Opening	5.1 Introduction to Opening Two Piece Opening, Faced Slash opening, Sewing of Hook, Buttons and Eye openings.

SUGGESTED EXERCISES/PRACTICALS

S. No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	Common problem of sewing machine, Handling of sewing machine Construction Basics -Temporary & Permanent Stitches	12
2	Decorative Seams-Plain Seams ,Top Stitched Seam (One Side &Two Side), French Seam, Flat Felled Seam	06
3	Seam Finishes-Edge Stitched Finish, Pinked Finish, ,	06
4	Openings - Two Piece Opening, Faced Slash opening, sewing hook ,button and eye opening	08

SUGGESTED STUDENT ACTIVITIES

Sample preparation

Sewing an article with concerned stitches,

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK

Sr.No	Title and Edition	Author
1.	Complete guide to sewing	Reader's digest
2.	Encyclopedia of sewing techniques	Jan eaten
3.	Clothing decisions	Anita Webb
4.	Cutting & Sewing 1-2	Nimi

NAME OF THE CURRICULUM DESIGNER

: Mrs. N.R. Lakhotiya
Lecturer, Dress Designing & Garment Mfg
Govt. Polytechnic, Aurangabad

COURSE TITLE: BANDHANI**COURSE CODE: 6G320****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE

Embellishment adds value to every product, Out of various techniques of Value addition Bandhani is one of it.

This course introduces students the techniques to develop the prints on fabric for its embellishment.

COURSE OUTCOMES (COs)

After studying this course students will able to :

Identify the contribution of dyeing and printing in fabric decoration.

Develop the skills of direct printing on fabric.

Design fabric with resist printing technique.

Apply the techniques of fabric embellishment in clothing and furnishing.

COURSE CONTENTS:

Unit No.	Major learning outcomes	Topics & sub topics
Introduction to dyes	Classify dyes. Differentiate natural and synthetic dyes.	Classification of dyes: Natural and synthetic dyes
Tie and dye printing	Develop patterns by using various techniques of tie and dye. Apply tying techniques for various effects.	Single, double and triple dyeing with different tying techniques.
Direct printing and its types	Develop patterns by using various Blocks. Create stencils with motifs. Apply the single/double/triple color techniques for design development.	Block printing :Natural leaves and wooden block printing Stencil printing: Single Color, double and triple color.
Maintenance of tie and dye fabric	Understand its maintenance for durability.	Laundrying and maintenance of tie and dye, Block print, stencil printing.

SUGGESTED EXERCISES/PRACTICALS

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. Required
1	I	Tie and dye: Tying techniques: spider web, knotting, marbeling, ruching, object tieing , pleating,peging,cheveron ,lehriya etc. Prepare sample by using above tying techniques in single, double, triple colors.	14

2	II	Direct printing: Block printing: develop patterns by using Natural leaves, Wooden blocks in single double and triple color.	08
3	III	Stencil printing: Design and develop stencil for single double and triple color.	10
TOTAL			32

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK

Sr. No.	Title Of Book	Author	Publication
1	Tie and dye and batik	Dougotten	Hot off ISBN10:1562311379

SIGN & NAME OF THE CURRICULUM DESIGNER

NAME: Ms.F.B.Siddiqui
Lecturer, Dress Designing & Garment Mfg
Govt. Polytechnic, Aurangabad

COURSE:- FASHION ACCESSORIES**COURSE CODE:- 6G312****TEACHING AND EXAMINATION SCHEME**

Particular	Theory	Practical	Term Work	Total
Credits	---	02	---	2

RATIONALE:

This course provides the Knowledge & Skills of various Garment accessories which gives a complete look in Fashion grooming. The course promotes student to develop and present functional and decorative Indian & Western Jewellery which includes Neck Ornaments, Anklets Bracelet, Footwear, Bags. Etc .The course also increases the creativity of the student.

COURSE OUTCOMES

The student will be able to

Develop Neck Ornaments, Anklets, Bracelet, Bags etc.

Prepare Indian & Western Jewellery using various materials.

Implement basic principles of decorating garment with Various accessories.

Identify the material from market & select right one as per design of accessory.

COURSE CONTENTS:

Topic No.	Major learning outcomes	Topic & Subtopic	Hours
2.	Define accessories . State the importance of accessories. Identify the accessories.	Definition of accessories & its importance.	01
3.	State the design elements Identify the principles in accessories. Sate the methods of adding principles of design to accessories	Elements & principles of design	02
4.	Identify the accessories according to categories. State the basis of categorisation .	Categories of accessories.	01
5.	List the materials for accessories. Select the right material according to category. Survey the materials available in the market and compare it as per design.	Materials used for accessories. Beads ,Shilpkar,wires,laces,fabrics,pearls etc.	01
6.	Collect the snaps of accessories according to categories. Make a album of the collection.	Collection of accessories of various categories.	01
		Total	6

SUGGESTED EXERCISES/PRACTICALS

SN	List of practical's	Hours
1	Creation of Indian Jewellery	05
2	Market survey of trends in fashion accessories.& material availability .	02
3	Creation of western Jewellery	04
4	Creation of Indian Headgears	05
5	Creation of Indian Bags/waist belts	05
6	Creation of Waist belt for Women	05
	Total	26

SUGGESTED LEARNING RESOURCES: REFERENCE BOOK

Sr.No	Author	Title
1	B. Krieger	Art Design Fantasy Animal Jewellery
2	Jo Moody	Jewellery Making
3	Carol Taylor	Creative Bead Jewellery
4	Accessory making	Singer series

Learning Resources:-websites & U –Tube Videos

www.youtube.com/watch?v=LnLYakN1W7Q

<https://www.youtube.com/watch?v=Cox6Egmg6M>

www.youtube.com/watch?v=snpsdusQEJo

SIGN & NAME OF CURRICULUM DESIGNER

Ms Jyoti S Lakade.
Lecturer Dress Designing & Garment Mfg.
Govt. Polytechnic, Aurangabad