Government Polytechnic, Aurangabad

An Autonomous Institute of Government of Maharashtra

Curriculum Document - 2012

Diploma in Civil Engineering

VISION

Government Polytechnic, Aurangabad will be world class technical institute pursuing for excellence, catering to the needs of global community, striving for its harmonious development by inculcating lifelong learning skills to serve for the socio economic development having concerned for ecology and social harmony.

MISSION

To create multi disciplinary best citizens to suit local, state, National and International needs having scientific temperament , moral ethics, values and multi facetted proactive personality by providing excellent education system.

Certificate of PBOS

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 implemented with effect from 2011-12, is as per the suggestion given by the members of PBOS (Civil)

Chairman
PBOS

Certificate of BOS

This is to certify that the Curriculum of Diploma in Civil Engineering Programme has been implemented with effect from 2011-12.

This Curriculum Document contains pages from 1 to 168.

Head of
Civil Engineering Dept.
Government Polytechnic
Aurangabad

In Charge
Curriculum Development Cell
Government Polytechnic
Aurangabad

Principal
Government Polytechnic
Aurangabad

Chairman Board of Studies
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 2011-12 academic year, is equivalent to Diploma in Civil Engineering Programme Implemented by Maharashtra State Board of Technical Education, therefore Equivalence is hereby granted .

Member *Member* *Member*
( ) ( ) ( )

Member *Member* *Member*
( ) ( ) ( )

Member Secretary *Chairman*
( ) ( )

GOVERNMENT POLYTECHNIC, AURANGABAD.

(An Autonomous Institute of Govt. of Maharashtra)

DEPARTMENT OF CIVIL ENGINEERING

REVISION OF CURRICULUM OF
DIPLOMA IN CIVIL ENGINEERING PROGRAMME
YEAR 2011-12

INDEX

REVISION OF CURRICULUM OF
DIPLOMA IN CIVIL ENGINEERING PROGRAMME
YEAR 2011-12

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.

AREA OF EMPLOYMNET:

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

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.

PROGRAMME AIM

"To provide a practice oriented education emphasizing execution of design plan and in-depth knowledge of the competencies required at profession."

IDENTIFIED COMPETENCIES 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

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

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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.

APPROACH TO DESIGN OF CURRICULUM

This Curriculum has been designed on the systematic approach based on competency-based curriculum of educational technology and theories of learning. The data is collected in following ways

- Feedback of alumni
- Feedback of staff
- Past experience of 3 years.
- Through observational records
- By study of documents used in industries, expert reports, newspapers and trade literatures etc., their views on different aspects of the curriculum.
- Through a series of discussions in programme committee.

Taking into account the knowledge, skills/competencies, attitudes etc. required to be possessed by the diploma pass outs the content of different courses is designed.
While designing the curriculum emphasis is given on following points.

- New/emerging technologies being used in the world of work.

- Personal values and social skills required to be possessed.
- Skills related to life-long learning and independent study.

Professional skills required for different jobs along a career path

SALIENT FEATURES OF CURRICULUM

a) Competency based curriculum development based on the competencies identified and validated by experts in construction industry.

b) Overall focus of Curriculum

- Developing competencies as prime focus.
- Team building
- Entrepreneurial skills
- Learning to learn
- Information collection/processing through computer.

c) Unified Approach to all courses

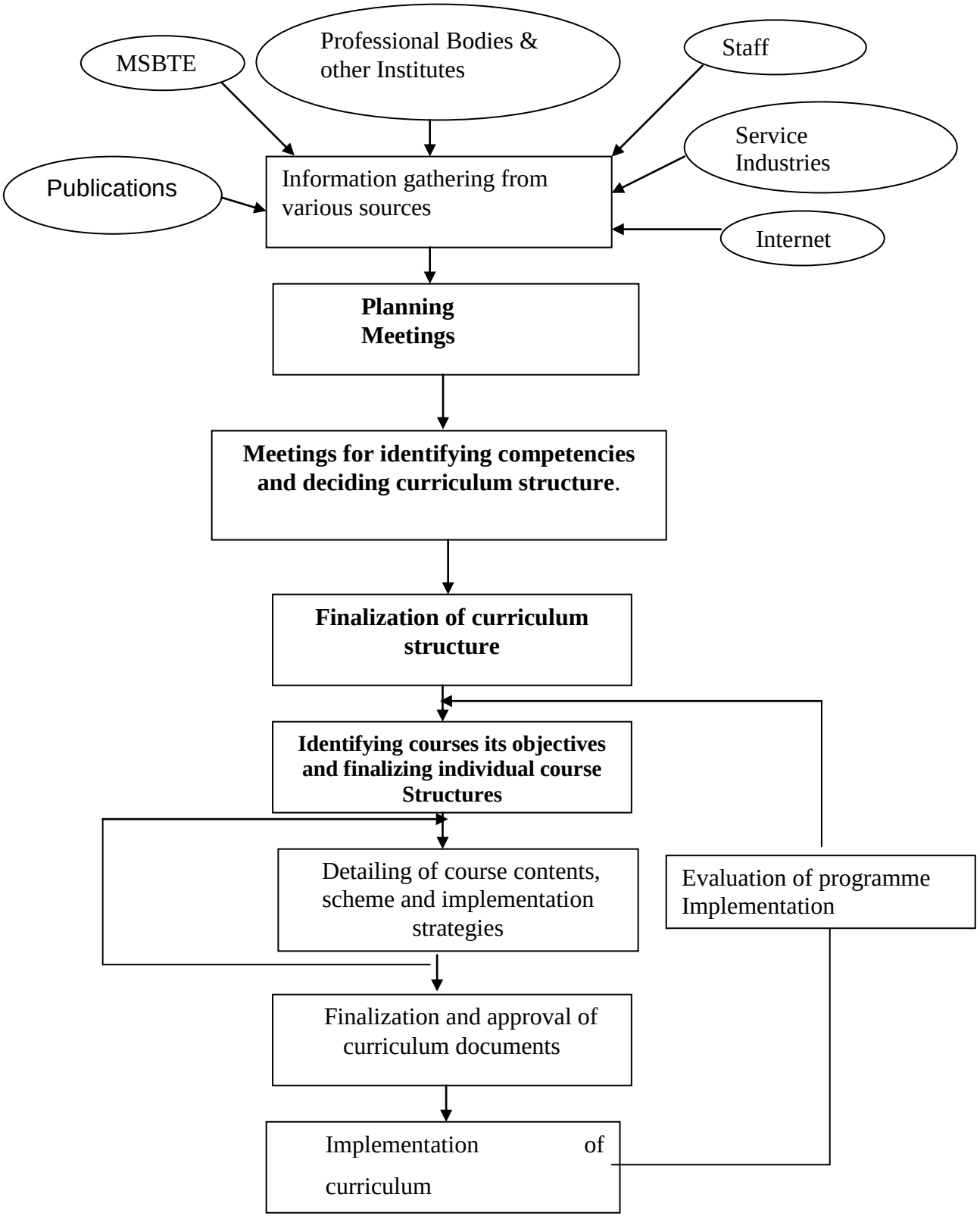
- Use of I. S. codes in appropriate course
- Quality control, safety, productivity etc as part of content in appropriate courses.
- Do's and Don't
- Diagnostic skills (case studies), thinking skills
- Interlinking of courses/ Integrated approach
- Project approach.

LIST OF INDUSTRIES VISITED

- Disha Construction ,Osmanpura Aurangabad
- Water & Land Management Institute (WALMI) Kanchanwadi,, Aurangabad
- Command Area Development Authority (CADA),Aurangabad.
- Ideal Cement Product , MIDC Waluj, Aurangabad
- Nandura Madhmeshwar canal Sub div. Tirthpuri, Dist, Jalana.
- Public Works Department Div. 2 , Jalana.
- Maharashtra Jeevan Pradhikaran, Nagsenwan , Aurangabad
- Works Division (Civil), Zilla Parishad , Aurangabad
- Chief Engineer Office, M.S.R.D.C., Bandhkam Bhawan,Aurangabad
- DILASA , NGO, Aurangabad.
- Maharashtra Industrial Development Corporation Div. Office (M.I.D.C.) Aurangabad.

FLOW CHART SHOWING DEVELOPMENT PROCESS OF CURRICULUM

Programme structure consisting of teaching and examination schemes was finally arrived at through consensus. The approach followed for curriculum development is shown diagrammatically as follows-



PROGRAMME STRUCTURE

Sr. No	Levels	Compulsory Cources	Optional Courses	Credits Comp.+ Optional	Marking Scheme		
					Compulsory Courses	Optional Courses	Total
1	Foundation	07	--	28	750	--	750
2	Basic	07	--	38	950	--	950
3	Allied	07	--	25	550	--	550
4	Applied	13	01*	65	1700	150	1850
5	Diversified	04	01**	28	650	150	800
	TOTAL	38	02	184	4600	300	4900

*** 1 out of 6**
**** 1 out of 6**

OVERALL SCHEME AT A GLANCE:

- Total number of courses offered : 50
- Number of compulsory courses : 38
- Number of optional courses : 12
- Total courses to be opted : 40

LEVELWISE COURSE STRUCTURE

LEVEL : I (FOUNDATION LEVEL COURSES)

Sr. No.	Course Code	Course Name	Abbr e.	Teaching Scheme				Examination Scheme					
				Th	Pr	Cr	Term	Pt	Th	Pr	Tw	Or	Total
01	5G101	Basic Mathematics	BMT	4	--	4	I	20	80	--	--	--	100
02	5G102	Engineering Mathematics	EMT	4	--	4	II	20	80	--	--	--	100
03	5G103	Engineering Physics	EPH	3	2	5	II	20	80	25	25	--	150
04	5G104	Engineering Chemistry	ECH	3	2	5	I	20	80	25	25	--	150
05	5G105	Workshop Practice	WSP	--	3	3	I	--	--	--	50	--	50
06	5G106	Engineering Graphics	EGR	2	2	4	I	--	--	50	50	--	100
07	5G107	Basics of Computer System	BCS	1	2	3	I	--	--	50	50	--	100
Total				17	11	28		400		350			750

'G'-Courses are common to all programmes.
'C'-Courses are for Diploma in Civil Engineering.
'Q'-Courses are common to Diploma in Civil Engineering & Diploma in Mechanical Engineering.

OVERALL SCHEME AT A GLANCE:

Total Number of courses offered	:	07
Number of Compulsory Courses	:	07
Number of Optional Courses	:	Nil
Total Courses	:	07
Total Credits	:	28
Total Marks	:	750

LEVEL : II (BASIC LEVEL COURSES)

Sr. No.	Course Code	Course Name	Abbre.	Teaching Scheme				Examination Scheme					
				Th	Pr	Cr	Term	Pt	Th	Pr	Tw	Or	Total
01	5Q201	Applied Mechanics	APM	4	2	6	II	20	80	--	50	--	150
02	5C202	Concrete Technology	COT	3	2	5	III	20	80	--	25	25	150
03	5C203	Building Construction	BUC	4	2	6	II	20	80	--	25	25	150
04	5C204	Basic Surveying	BAS	3	4	7	II	20	80	50	50		200
05	5C205	Hydraulics	HYD	4	2	6	III	20	80	25	25		150
06	5C206	Building Drawing	BUD	1	4	5	III	--	--	50	50	--	100
07	5C207	Fundamentals of Civil Engineering	FCE	1	2	3	I	--	--	--	25	25	50
Total				**20**	**18**	**38**		**500**		**450**			**950**

'G'-Courses are common to all programmes.
'C'-Courses are for Diploma in Civil Engineering.
'Q'-Courses are common to Diploma in Civil Engineering & Diploma in Mechanical Engineering.

Scheme at Glance-

Total Number of courses offered	:	07
Number of Compulsory Courses	:	07
Number of Optional Courses	:	Nil
Total Courses	:	07
Total Credits	:	38
Total Marks	:	950

LEVEL : III (ALLIED LEVEL COURSES)

Sr. No.	Course Code	Course Name	Abbre.	Teaching Scheme				Examination Scheme					
				Th	Pr	Cr	Term	Pt	Th	Pr	Tw	Or	Total
01	5G301	English	ENG	2	2	4	I	20	80	--	25	--	125
02	5G302	Communication skills	CMS	1	2	3	II	-	-	-	50	25	075
03	5G303	Entrepreneurship Development	END	2	2	4	VI	--	--	--	25	25	50
04	5C305	Management	MAN	3	2	5	IV	20	80	--	25	25	150
05	5Q202	Strength of Materials	SOM	3	2	5	III	20	80	--	25	25	150
06	5G311 to 5G325	Non Exam credits		--	2	2	II	--	--	--	--	--	--
07	5G311 to 5G325	Non Exam credits		--	2	2	IV	--	--	--	--	--	--
Total				**11**	**14**	**25**		**300**			**250**		**550**

'G'-Courses are common to all programmes.
'C'-Courses are for Diploma in Civil Engineering.
'Q'-Courses are common to Diploma in Civil Engineering & Diploma in Mechanical Engineering.

Scheme at Glance-

Total Number of courses offered : 07
Number of Compulsory Courses : 07
Number of Optional Courses : Nil
Total Courses : 07
Total Credits : 25
Total Marks : 550

LEVEL : IV (APPLIED LEVEL COURSES)

Sr. No.	Course Code	Course Name	Abbre	Teaching Scheme				Examination Scheme					
				Th	Pr	Cr	Term	Pt	Th	Pr	Tw	or	Total
01	5C401	Theory of structures	TOS	4	-	4	IV	20	80	--	--	--	100
02	5C402	Soil Engineering	SOE	3	2	5	IV	20	80	--	25	25	150
03	5C403	Surveying	SUR	3	4	7	III	20	80	50	50	--	200
04	5C404	AutoCAD for Civil Engineering	AUC	1	4	5	V	--	--	50	50	--	100
05	5C405	Railway, Bridge &Tunnel Engg.	RBT	3	2	5	IV	20	80	--	25	25	150
06	5C406	Road Engineering	ROE	3	2	5	III	20	80	--	25	25	150
07	5C407	Irrigation Engineering	IRE	4	2	6	V	20	80	--	25	25	150
08	5C408	Water Supply & Sanitary Engineering	WSS	4	2	6	IV	20	80	--	25	25	150
9	5C409	Contract, Accounts & Valuation	CAV	3	2	5	VI	20	80	--	25	25	150
10	5C410	Project	PRO	0	4	4	V	--	--	--	100	50	150
11	5C411	In plant Training & Seminar	IPT	0	2	2	VI	--	--	--	50	50	100
12	5C412	Structural Design & Drawing	SDD	0	4	4	VI	--	--	--	50	50	100
13	5C413	Professional Practices	PRP	0	2	2	III	--	--	--	25	25	50
14	Any One from following group (Group A)												
a)	5C414	Advance Structures and Design	ASD	3	2	5	VI	20	80	--	25	25	150
b)	5C415	Plumbing Services	PLS	3	2	5	VI	20	80	--	25	25	150
c)	5C416	Advance Construction Methods and Equipment	ACM	3	2	5	VI	20	80	--	25	25	150
d)	5C417	Micro-irrigation Engineering	MIE	3	2	5	VI	20	80	--	25	25	150
e)	5C418	Advance Surveying	ADS	3	2	5	VI	20	80	--	25	25	150
f)	5C419	Airport Engineering	AIE	3	2	5	VI	20	80	--	25	25	150
Total				**65**				**900**			**950**		**1850**

'G'-Courses are common to all programmes.
'C'-Courses are for Diploma in Civil Engineering.
'Q'-Courses are common to Diploma in Civil Engineering & Diploma in Mechanical Engineering.

Scheme at Glance:

Total Number of courses offered : 19
Number of Compulsory Courses : 13
Number of Optional Courses : 01
Total Courses : 14
Total Credits : 65
Total Marks : 1850

LEVEL : V (DIVERSIFIED LEVEL COURSES)

Sr. No.	Course Code	Course Name	Abbre	Teaching Scheme			Examination Scheme						
				Th	Pr	Cr	Term	Pt	Th	Pr	Tw	Or	Total
01	5C501	Design of Reinforced Concrete Structures	DRS	4	2	6	V	20	80	--	25	25	150
02	5C502	Design of Steel Structures	DSS	3	2	5	VI	20	80	--	25	25	150
03	5C503	Estimating & Costing	ESC	3	4	7	V	20	80	--	50	50	200
04	5C504	Building Services	BUS	3	2	5	V	20	80	--	25	25	150
05	Any One from following group (Group B)												
A	5C 505	Precast and Pre-Stressed Concrete Structures	PPS	3	2	5	VI	20	80	--	25	25	150
B	5C506	Water Conservation Engineering	WCE	3	2	5	VI	20	80	--	25	25	150
C	5C507	Town Planning & Municipal Engineering	TPM	3	2	5	VI	20	80	--	25	25	150
D	5C508	Earthquake Engineering	EAE	3	2	5	VI	20	80	--	25	25	150
E	5C509	Hydraulic Structures	HYS	3	2	5	VI	20	80	--	25	25	150
F	5C510	Architectural Practices & Interior Design	API	3	2	5	VI	20	80	--	25	25	150
Total				**28**				**500**			**300**		**800**

'G'-Courses are common to all programmes.
'C'-Courses are for Diploma in Civil Engineering.
'Q'-Courses are common to Diploma in Civil Engineering & Diploma in Mechanical Engineering.

Scheme at Glance-

Total Number of courses offered : 10
Number of Compulsory Courses : 04
Number of Optional Courses : 01
Total Courses : 05
Total Credits : 28
Total Marks : 800

GOVERNMENT POLYTECHNIC, AURANGABAD
CIVIL ENGINEERING DEPARTMENT.
Programme: Diploma in Civil Engineering

SEMESTERWISE COURSES

Sem.	Course Code	Course Name	Abbre.	Examination Scheme								
				Th	Pr	Cr	Pt	Th	Pr	Tw	Or	Total
FIRST	5G301	English	ENG	2	2	4	20	80	--	25	--	125
	5G101	Basic Mathematics	BM	4	--	4	20	80	--	--	--	100
	5C207	Fundamentals of Civil Engineering	FCE	1	2	3	--	--	--	25	25	50
	5G105	Workshop Practice	WSP	0	3	3	--	--	--	50	--	50
	5G106	Engineering Graphics	EGR	2	2	4	--	--	50	50	--	100
	5G107	Basic of Computer System	BCS	1	2	3	--	--	50	50	--	100
	5G104	Engg. Chemistry	ECH	3	2	5	20	80	--	25	25	150
		TOTAL		13	13	26	60	240	100	225	50	675
SECOND	5Q201	Applied Mechanics	APM	4	2	6	20	80	--	25	25	150
	5G302	Communication skills	CMS	1	2	3	--	--	--	50	25	75
	5G102	Engineering Mathematics	EMT	4	--	4	20	80	--	--	--	100
	5C203	Building Construction	BUC	4	2	6	20	80	--	25	25	150
	5C204	Basic Surveying	BAS	3	4	7	20	80	50	50	--	200
	5G103	Engineering Physics	ENP	3	2	5	20	80	--	25	25	150
	5G311 TO 5G325	Non Exam credits.		--	2	2	--	--	--	--	--	--
		TOTAL		19	14	33	100	400	50	175	100	825
THIRD	5C202	Concrete Technology	COT	3	2	5	20	80	--	25	25	150
	5Q202	Strength of Materials	SOM	3	2	5	20	80	--	25	25	150
	5C406	Road Engineering	ROE	3	2	5	20	80	--	25	25	150
	5C403	Surveying	SUR	3	4	7	20	80	50	50	--	200
	5C206	Building Drawing	BUD	1	4	5	--	--	50	50	--	100
	5C205	Hydraulics	HYD	4	2	6	20	80	25	25	--	150
	5G311 to 5G325	Non Exam credits.		--	2	2	--	--	--	--	--	--
		TOTAL		17	16	33	100	400	125	200	125	900
FOURTH	5C401	Theory of structures	TOS	4	0	4	20	80	--	--	--	100
	5C402	Soil Engineering	SOE	3	2	5	20	80	--	25	25	150
	5C413	Professional Practices	PRP	0	2	2	--	--	--	50	25	75
	5G305	Management	MAN	3	2	5	20	80	--	25	25	150
	5C405	Railway, Bridge	RBT	3	2	5	20	80	--	25	25	150

Sem.	Course	Course Name	Abbre.	Examination Scheme								
		& Tunnel Engg.										
	5C408	Water Supply & Sanitary Engineering	WSS	4	2	6	20	80	25	25	--	150
	5G311 to 5G325	Non Exam credits.		--	2	2	--	--	--	--	--	--
		TOTAL		17	12	29	100	400	25	150	100	775
FIFTH	5C404	AutoCAD for Civil Enginering	AUC	1	4	5	--	--	25	50	--	75
	5C501	Design of Reinforced Concrete Structures	DRS	4	2	6	20	80	--	25	25	150
	5C503	Estimating & Costing	ESC	3	4	7	20	80	--	50	50	200
	5C504	Building Services	BUS	3	2	5	20	80	--	25	25	150
	5C407	Irrigation Engineering	IRE	4	2	6	20	80	--	25	25	150
	5C410	Project	PRO	0	4	4	--	--	--	100	50	150
		TOTAL		15	18	33	80	320	25	275	175	825
SIXTH	5C502	Design of Steel Structures	DSS	3	2	5	20	80	--	25	25	150
	5C412	Structural Design & Drawing	SDD	0	4	4	--	--	--	50	50	100
	5C409	Contract, Accounts & Valuation	CAV	3	2	5	20	80	--	25	25	150
	5G303	Entrepreneurship Development	END	2	2	4	--	--	--	25	25	50
	5C411	In plant Training & Seminar	IPT	0	2	2	--	--	--	50	50	100
ANY ONE FROM GROUP A												
	5C414	Advance Structure and Design	ASD	3	2	5	20	80	--	25	25	150
	5C415	Plumbing Services	PLS	3	2	5	20	80	--	25	25	150
	5C416	Advance Construction Methods and Equipments	ACM	3	2	5	20	80	--	25	25	150
	5C418	Advance Surveying	ADS	3	2	5	20	80	--	25	25	150
	5C510	Architectural Practices & Interior Design	API	3	2	5	20	80	--	25	25	150
	5C509	Hydraulic Structures	HYS	3	2	5	20	80	--	25	25	150
ANY ONE FROM GROUP B												
	5C505	Precast & Pre-Stressed Concrete Stuctures	PPS	3	2	5	20	80	--	25	25	150
	5C506	Water conservation	WCE	3	2	5	20	80	--	25	25	150

Sem.	Course	Course Name	Abbre.	Examination Scheme								
		Engineering										
	5C507	Town Planning & Municipal Engineering	TPM	3	2	5	20	80	--	25	25	150
	5C508	Earthquake Engineering	EAE	3	2	5	20	80	--	25	25	150
	5C419	Airport Engineering	AIE	3	2	5	20	80	--	25	25	150
	5C417	Micro Irrigation Engineering	MIE	3	2	5	20	80	--	25	25	150
		TOTAL		14	16	30	80	320	--	225	225	850
GRAND TOTAL				95	89	184	520	2080	325	1250	775	4900
CREDIT (%)				51.63	46.37		53.06		46.94			

'G'-Courses are common to all programmes.
'C'-Courses are for Diploma in Civil Engineering.
'Q'-Courses are common to Diploma in Civil Engineering & Diploma in Mechanical Engineering.

Summary:

Total Courses for the Diploma:

i) Theory papers: a) Compulsory Courses 24 Nos.
b) Optional Courses 02 Nos.

Total 26 Nos.

ii) Non Theory : 12 Nos.
iii) Non Exam. : 02 Nos.

G. Total 40 Nos.

GOVERNMENT POLYTECHNIC, AURANGABAD
CIVIL ENGINEERING DEPARTMENT

TERM-WISE SAMPLE PATH- FOR 3 YEARS DIPLOMA COURSE IN CIVIL ENGINEERING

Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI
English (ENG) 5G301 4(2+2)	Applied Mechanics (APM) 5Q201 6(4+2)	Concrete Tech. (COT) 5C202 5(3+2)	Theory of Structure (TOS) 5C401 4(4+0)	AutoCAD for Civil Engineering (AUC) 5C404 5(1+4)	Design of Steel Structure (DSS) 5C502 5(3+2)
Basic Mathematics (BMT) 5G101 4(4+0)	Communication Skills (CMS) 5G302 3(1+2)	Strength of Materials (SOM) 5Q202 5(3+2)	Soil Engineering. (SOE) 5C402 5(3+2)	Design of Reinforced Concrete Structures (DRS) 5C501 6(4+2)	Structural Design & Drawing (SDD) 5C412 4 (0+4)
Fundamentals of Civil Engineering (FCE) 5C207 3 (1+2)	Engineering. Maths (EMT) 5G102 4(4+0)	Road Engineering (ROE) 5C406 5 (3+2)	Professional Practices (PRP) 5C413 2(0+2)	Estimating & Costing (ESC) 5C503 7(3+4)	Contract Accounts & Valuation (CAV) 5C409 5 (3+2)
Workshop Practice (WSP) 5G105 3 (0+3)	Building Construction. (BUC) 5C203 6 (4+2)	Surveying (SUR) 5C403 7 (3+4)	Management (MAN) 5C305 5 (3+2)	Building Services (BUS) 5C504 5(3+2)	Entrepreneurship Development (END) 5G303 4 (2+2)
Engineering Graphics (EGR.) 5G106 4 (2+2)	Basic Surveying (BAS) 5C204 7(3+4)	Building Drawing (BUD) 5C206 5(1+4)	Railway ,Bridge & Tunnel Engineering (RBT) 5C405 5 (3+2)	Irrigation Engineering. (IRE) 5C407 6 (4+2)	In Plant Training & Seminar (IPT) 5C411 2 (0+2)
Basic of Computer System (BCS) 5G107 3 (1+2)	Engineering Physics (EPH) 5G103 5(3+2)	Hydraulics (HYD) 5C205 6(4+2)	Water Supply & Sanitary Engg. (WSS) 5C408 6(4+2)	Project (PRO) 5C410 4 (0+4)	Any one From Group A 5(3+2)
Engineering Chemistry (ECH) 5G104 5(3+2)	Non Exam 5G311 to 325 2(0+2)	--	Non Exam 5G311 to 325 2(0+2)	--	Any one From Group B 5(3+2)
Total Credits 26	33	33	29	33	30
Cumulative Total 26	59	92	121	154	184

LIST OF SUBJECTS FROM GROUP A & B

GROUP A:	**GROUP B**
Advance Structure and Design (ASD) - 5C414	Precast & Pre-Stressed Concrete Structures (PPS) – 5C505
Plumbing Services (PLS) –5C415	Water conservation Engineering (WCE) – 5C506
Advance Construction Methods & Equipment (ACM) – 5C416	Town Planning & Municipal Engineering (TPM)- 5C507
Hydraulic Structure (HYS) – 5C509	Earthquake Engineering (EAE) – 5C508
Advance Surveying (ADS) – 5C418	Micro-irrigation Engineering(MIE) - 5C417
Architectural Practice & Interior Design (API) – 5C510	Airport Engineering (AIE) - 5C419

TERM-WISE SAMPLE PATH- FOR 4 YEARS PART TIME DIPLOMA COURSE IN CIVIL ENGINEERING

Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Sem VII	Sem VIII
English (ENG) 5G301 4(2+2)	Applied Mechanics (APM) 5Q201 6(4+2)	Concrete Tech. (COT) 5C202 5(3+2)	Theory of Structure (TOS) 5C401 4(4+0)	Irrigation Engineering. (IRE) 5C407 6 (4+2)	Entrepreneurship Development (END) 5G303 4 (2+2)	AutoCAD for Civil Enginerring (AUC) 5C404 5(1+4)	Design of Steel Structure (DSS) 5C502 5(3+2)
Basic Mathematics (BMT) 5G101 4(4+0)	Engineering. Maths (EMT) 5G102 4(4+0)	Strength of Materials (SOM) 5Q202 5(3+2)	Soil Engineering. (SOE) 5C402 5 (3+2)	Road Engineering (ROE) 5C406 5 (3+2)	Management (MAN) 5C305 5 (3+2)	Design of Reinforced Concrete Structures (DRS) 5C501 6(4+2)	Structural Design & Drawing (SDD) 5C412 4 (0+4)
Engineering Chemistry (ECH) 5G104 5(3+2)	Engineering Physics (EPH) 5G103 5 (3+2)	Fundamentals of Civil Engineering (FCE) 5C207 3 (1+2)	Professional Practices (PRP) 5C413 2(0+2)	Surveying (SUR) 5C403 7 (3+4)	Railway ,Bridge & Tunnel Engineering (RBT) 5C405 5 (3+2)	Estimating & Costing (ESC) 5C503 7(3+4)	Contract Accounts & Valuation (CAV) 5C409 5 (3+2)
Engineering Graphics (EGR) 5G106 4(2+2)	Communication Skills (CMS) 5G302 3 (1+2)	Building Drawing (BUD) 5C206 5(1+4)	Basic Surveying (BAS) 5C204 7 (3+4)	Hydraulics (HYD) 5C205 6 (4+2)	Water Supply & Sanitary Engg. (WSS) 5C408 6(4+2)	Project (PRO) 5C410 4 (0+4)	In Plant Training & Seminar (IPT) 5C411 2 (0+2)
Workshop Practice (WSP) 5G105 3 (0+3)	Non Exam 2(0+2)	Basic of Computer System (BCS) 5G107 3 (1+2)	Building Construction (BUC) 5C203 6 (4+2)	--	Any one From Group A 5 (3+2)	Building Services (BUS) 5C504 5(3+2)	Any one From Group B 5(3+2)
Non Exam 2(0+2)							
Total Credits 22	20	21	24	24	25	27	21
Cumulative Total 22	42	63	87	111	136	163	184

Students of Part Time courses are exempted for the Non Exam and Workshop practice courses.

LIST OF SUBJECTS FROM GROUP A & B

GROUP A:	GROUP B
Advance Structure and Design (ASD) - 5C414	Precast & Pre-Stressed Concrete Structures (PPS) – 5C505
Plumbing Services (PLS) –5C415	Water conservation Engineering (WCE) – 5C506
Advance Construction Methods & Equipment (ACM) – 5C416	Town Planning & Municipal Engineering (TPME)-5C507
Hydraulic Structure (HYS) – 5C509	Earthquake Engineering (EAE) – 5C508
Advance Surveying (ADS) – 5C418	Micro-irrigation Engineering(MIE) - 5C417
Architectural Practice & Interior Design (API)– 5C510	Airport Engineering (AIE) - 5C419

COURSE CONTENT FOR COURSES IN CHRONOLOGICAL ORDER OF COURSE CODE

BASIC MATHEMATICS (BMT) : 5G101

COURSE STRUCTURE :

Teaching Scheme		Evaluation Scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	00	Max.Marks	20	80	--	--	--	100
TOTAL	04	Duration	1.00	3.00	--	--	--	--

RATIONALE:

The subject is classified under basic sciences and intends to teach students basic facts, concepts and principles of mathematics, as a tool to analyze Engineering problems. Mathematics lies down the foundation to understand core technology subjects.

COMPETENCY STATEMENT(S):

To inculcate the practice of mathematic
Comprehend the principles of other subjects
Solve problems by using analytical and systematic approach**.**
The students will be able to:
Develop process of logical thinking

CONTENTS:

COURSE CONTENTS:-

Sr.no.	Name of the Chapter / topic (Follow S.I. units)	Hours	Marks
1.	**Algebra** **1. logarithms** **1.1 Defination natural and common logarithams.** 1.2 Laws of logarithams 1.3 Simple numericals. On logarithams	**04**	**04**
2.	**Determinant** 2.1 Definition of Determinant, Order of Determinant 2.2 Expansion of Determinant of order 2and3 2.3 Properties of Determinant 2.4Cramer's Rule (solution of simultaneous equations in two and three Unknowns)	**08**	**08**
3.	**Partial fractions** 3.1Definition 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	**06**	**08**
4.	**Matrices** 4.1 Definition of matrix: Type of matrix: viz.- null, row, column, square, diagonal, scalar, unit, Triangular. 4.2 Algebra of matrices –addition, subtraction and	**08**	**10**

	Multiplication 4.3 Transpose of a matrix 4.4 Adjoint of a matrix 4.5I nverse of matrix by adjoint method		
5.	**Trigonometry** 5.1 Trigonometric ratios of allied, compound and multiple angles 5.2 Trigonometric Ratios of allied angles 5.3 Trigonometric Ratios of compound angles 5.4 Trigonometric Ratios of multiple angles Product, sum and difference formulae 5.5 Sub-multiple angles.	**10**	**16**
6.	**Inverse circular functions** 6.1 Definition of Inverse circular functions 6.2 Principle values of Inverse circular functions 6.3 Simple problems	**04**	**08**
7.	**Properties of Triangles** 7.1 Sine rule, Cosine rule, 7.2 Tangent rule(without proof)Simple problems	**06**	**06**
8.	**Calculus** 8.1Cartesian products of sets. 8.2Definition of relation,definition of fuction, real value fuction,domain,co-domain of a fuction. 8.3 Types of Fuctions. 8.4 value of the fuction at given point. 8.5 composite fuction.	**08**	**08**
9.	**Limits** 9.1Definition and concept of limit Limits of algebraic functions 9.2 Limits of trigonometric functions 9.3 Limits of exponential functions 9.4 Limits of logarithmic functions	**10**	**12**

TEXT BOOKS

Sr. No	Title of Book	Author and Publication
1	Mathematics for polytechnic students for first year	By S.P.Deshpande
2	Mathematics for polytechnic students for first year	By G.V.Kumbhojkar
3	Mathematics for polytechnics	By TTTI Bhopal
4	Applied Mathematics	By Gore and Patil
5	Trigonometry Part I	By Loney

ENGINEERING MATHEMATICS: 5G102

COURSE STRUCTURE :

Teaching Scheme		Evaluation Scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	00	Max.Marks	20	80	--	--	--	100
TOTAL	04	Duration	1.00	3.00	--	--	--	--

RATIONALE:

The subject is classified under basic sciences and intends to teach students basic facts, concepts and principles of mathematics, as a tool to analyze Engineering problems. Mathematics lies down the foundation to understand core technology subjects.

COMPETENCY STATEMENTS:

To inculcate the practice of mathematic
Comprehend the principles of other subjects
Solve problems by using analytical and systematic approach.

COURSE CONTENTS:-

	Name of the Chapter / topic (Follow S.I. units)	Hours	Marks
1	**Derivatives** 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. 1.10 Simple applications of derivative such as equation of Tangent & normal, maxima & minima, radius of Cur vature.	18	26
2	**Integration** 2.1 Definition of integration. 2.2 Integration of standard function. 2.3 Rules of Integration: sum, difference & multiplication. 2.4 Methods of Integration. 2.4.1 Integration by substitution. 2.4.2 Integration by partial fraction. 2.4.3 Integration by parts. 2.5 Definition of Definite integral. 2.6 Simple problems on definite integral.	18	22
3	**Differential Equations** 3.1 Definition of differential equation, order &degree. 3.2 Formation of differential equation. 3.3 Solution of Diff. equation. 3.3.1 variable separable. 3.3.2 Homogeneous equation. 3.3.3 Exact diff. equation. 3.3.4 Linear diff. equation.	14	16

4	**Statistics** 4.1 Graphical representation: Histogram & give curve to find Mode and median. 4.2 Measures of dispersion : Range, mean deviation and Standard deviation	06	08
5	**Probability.** 5.1 Introduction & definitions of different terms permutation & combination. 5.2 Definition of probability. 5.3 Addition Theorem of probability. 5.4 Multiplication Theorem. 5.5 Conditional probability.	08	08

TEXT BOOKS

S.No.	Name of Book	Author	Publication
1.	Mathematicsfor polytechnic students for second Year	S. P. Deshpande	Dhanpatrai publishing Co.
2.	Applied Mathematics	ByPatel & Rawal	S. Chand & Co., N. Delhi
3.	Fundamentals of Mathematical statistics	S.C.Gupta & Kapoor	Pune vidhyarti graham prakshan

ENGINEERING PHYSICS (EPH):-5G103

COURSE STRUCTURE :

Teaching scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	TOTAL
PR	02	MAX MARKS	20	80	25	25	--	150
TOTAL	05	DURATION	01	03				

Competency statement : The Student will be able to:

1. Analyze different factors on which capacitance depends.
2. Differentiate between field intensity and potential.
3. List advantages of optical fiber.
4. Describe principle of working of optical fiber.
5. Differentiate between conductor, insulator and semiconductor on the

Rationale:

Physics provides foundation for core technology subjects. Understanding of any subject is entirely depending on logical thinking and hierarchy of knowledge component. As Physics is considered as basic science its principles, laws, hypothesis, concepts, ideas are playing important role in reinforcing the knowledge of technology.

Deep thought is given while selecting topics in physics. They are different for different groups. This will provide sound background for self-development in future to cope up with new innovations. Topics are relevant to particular programme and student will be motivated to learn and

can enjoy the course of Physics as if it is one of the subjects of their own stream.

Topic no	contents	hrs	Marks
01	**01 UNITS AND MEASUREMENTS** **1.1** Need of measurement and unit in engineering and science, definition of unit , requirements of standard unit, systems of units-CGS,MKS and SI,fundamental and derived quantities and their units **1.2** Least count and range of instrument, least count of vernier caliper, micrometer screw gauge and sphereometer, **1.3** Definition of accuracy, precision and error, estimation of errors -absolute error, relative error and percentage error, rules and identification of significant figures. **1.4** Scalars & Vectors: Definition, laws of Vectors (Law of Triangle, law of parallelogram) scalar product, Vector product and their characteristics. **(Numerical on percentage error and significant figures, Scalar and vectors)**	**07**	**12**

02	**KINEMATICS** **2.1 Angular Motion:** Definition of Angular displacement, angular velocity, angular acceleration, Relation between angular velocity and linear velocity definition of S.H.M **2.2 Kinetics:** Definition of momentum,impulse,impulsive force, Statements of Newton's law of motion with equations, Application of laws of motion-Recoil of gun, Motion of two connected bodies by light inextensible string passing over smooth pulley, motion of lift. **2.3 work power & energy.** Definition of work, power & energy equation for potential energy & kinetic energy, work done by a torque.	**08**	**10**
03	**GENERAL PROPERTIES OF MATTER 3.1 Elasticity** Deforming force, restoring force, elastic and plastic body, and stress and strain with their types. Elastic limit, Hooke's law, Young's modulus, bulk modulus, modulus of rigidity and relation between them (no derivation), stress strain diagram. Behavior of wire under continuously increasing load, yield point, ultimate stress, breaking stress, factor of safety. **3.2 Surface Tension.** Molecular force, cohesive and adhesive force, Molecular range , sphere influence, Laplace's molecular theory, Definition of surface tension and its S.I.unit,angle of contact, capillary action with examples, shape of meniscus for water and mercury, relation between surface tension , capillary rise and radius of capillary (no derivation),effect of impurity and temperature on surface tension **(Numerical on relation between surface tension, capillary rise and radius)** **3.3 Viscosity** Fluid friction, viscous force, Definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its S.I. unit, streamline and turbulent flow with examples, critical velocity, Reynolds's number and its significance, free fall of spherical body through viscous medium (no derivation), terminal velocity, Stokes law (statement and formula). **(Numerical on coefficient of viscosity Reynolds number and Stroke's formula**	**14**	**20**
04	**HEAT** **4.1 Transmission of heat and expansion of solids** Three modes of transmission of heat -conduction, convection and radiation, coefficient of Thermal conductivity and its S.I. unit, Definition of linear, Aerial and cubical expansion and relation between them.(no derivation)	**02**	**04**
05	**LIGHT, LASER and SOUND** **5.1 Properties of light** Reflection, refraction, Snell's law, physical significance of	**06**	**12**

	refractive index, definition of dispersion, polarization and diffraction of light along with ray diagram, principle of superposition of waves, interference of light, constructive and destructive interference. **5.2 LASER** Properties of laser, spontaneous and stimulated emission, population inversion, optical pumping, construction and working of He-Ne laser. **5.3 Sound** Definition of wave motion, amplitude, period, frequency, and wavelength, relation between velocity, frequency and wavelength , equation of progressive wave (no derivation), longitudinal and transverse wave, definition of stationary Wave, node and antinodes, forced and free vibrations, definition of resonance with examples, formula for velocity of sound with end correction (no derivation) **(Numerical on relation v = n λ and resonance)**		
06	**ELECTROSTATICS & MAGNETISM:** **6.1 ELECTROSTATICS** Coulomb's Inverse square law and Ohm's law Unit charge, Intensity of electric field, Electric lines of force & their properties, flux, flux density. General equation of Ohms law - Resistances in series & parallel Specific resistance Effect of temp on resistance. Platinum resistance thermometer, Wheat stone's bridge. Principle of potentiometer, **2 ELECTRIC POTENTIAL AND ELECTRIC CAPACITANCE:** Principles of condensers Energy stored in condensers, condensers in series & parallel, numerical	**04**	**08**
07	**SEMICONDUCTORS:** Conductivity, Classification of conductors,insulators,semiconductors,p-n type semiconductors-n junctions, space-charge region, barrier potential, biasing of p-n junction, diode as a rectifier and its charecteristics,reverse saturation current, cut in voltage, diode capacitance	**03**	**06**
08	**MODERN PHYSICS.** **8.1 Photo electricity** Concept of photon**,** Plank's hypothesis, properties of photon, photo electric effect, Characteristics of photoelectric effect, work function, Einstein's photoelectric equation(no derivation), photoelectric cell-construction ,working and applications. **(Numerical on Energy of photon, work function, Photoelectric equation)** **8.2 X-rays** Introduction to x-rays, types of x-ray spectra-continuous and characteristics, production of x-rays using Coolidge tube, minimum wavelength of x-rays, properties of x-rays, engineering, medical and scientific applications.	**04**	**08**

PRACTICALS

Skills to be developed

1) Intellectual skills-

_ Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement.

_ Analyze properties of matter & their use for the selection of material.

_ To verify the principles, laws, using given instruments under different conditions.

_ To read and interpret the graph.

_ To interpret the results from observations and calculations.

_ To use these results for parallel problems.

2) Motor skills-

_ Proper handling of instruments.

_ measuring physical quantities accurately.

_ To observe the phenomenon and to list the observations in proper tabular form.

_ To adopt proper procedure while performing the experiment.

_ To plot the graphs.

List of Experiments:

1) To know your Physics Laboratory.
2) To use Vernier Caliper for the measurement of dimensions of given object.
3) To use Micrometer Screw Gauge for the measurement of dimensions (Length,Thickness, Diameter) of given object.
4) To verify Hooke's Law by Searle's method and to calculate Young's modulus of elasticity of steel wire.
5) To verify Law of Parallelogram.
6) To determine coefficient of viscosity of given fluid (Glycerin) using Stoke's Method.
7) To Verify Boyle's law and to find out atmospheric pressure in the laboratory using graph.
8) To determine the velocity of sound by using resonance tube.
9) Determination of specific resistance by Voltmeter-Ammeer method.
10) Determinationof Specific resistance by meterbridge.
11) Detemination of Law of resistance in Series by meterbridge.
12) Detemination of Law of resistance in Parallel by meterbridge.
13) Comparision of E.M.F by Single Cell method.

Reference books

01 Physics-I ,V. RajendranTata McGraw- Hill publication, New Delhi

2. Applied physics BY ,Arthur Beiser,Tata McGraw- Hill raw- Hill Publication, New Delhi

3. Engineering Physics by R.K.Gaur and S.L.Gupta Dhanpat Rai Publication New Delhi.

4 .Fundamentals of Physics Resnick ,Halliday & Walker ,Wiley India Pvt. Ltd

5 Applied physics by G.B. Bhandarkar.Nirali publication.

ENGINEERING CHEMISTRY (ECH): 5G104

COURSE STRUCTURE :

Teaching scheme		Evaluation scheme						
TH	**03**		**PT**	**TEE**	**TW**	**PR**	**OR**	**TOTAL**
PR	**02**	**MAX MARKS**	**20**	**80**	**25**	**25**	**--**	**150**
TOTAL	**05**	**DURATION**	**01**	**03**				

RATIONALE:

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

Due to technological progress there are hazardous effects on environment & human life. The core knowledge of environmental effects will bring awareness in students about the precautions & preventions to be taken to reduce the ill effects.

This subject will generate curiosity of carrying out further development in engineering field

COMPETANCEY STATEMENT:

The student will be able to:

1. Draw the orbital configuration of different elements.
2. Represent the formation of molecules schematically.
3. Describe the mechanism of electrolysis.
4. Identify the properties of metals & alloys related to engineering applications.
5. Identify the properties of non metallic materials, related to engineering applications.

6 Select a proper material for specific purpose.

Topic no	contents	HRS	MARKS
01	Atomic structure 1.1 Definition of Atom, element, molecule , introduction to different atomic theories, 1.2 Bohr's atomic theory, Fundamental Particles of Atom their Mass ,Charge, Location, 1.3 Atomic no, Atomic Mass no. numerical problems on it , orbit & orbitals, 1.4 Electronic configuration , electronic configuration of first 30 elements 1.5, Isotopes & Isobars, 1.6 Inert gases, Their characteristics ,electronic configuration 1.7 Molecule formation: valency, types of valency, electrovalency co valency. Its examples.Formation of Electrovalent compounds e.g. Nacl, CaCl2, formation of Covalent Compounds H2O, Cl2, C2H4, C2H2.	08	10
02	Electrochemistry 2.1 Definition & differentiation of Atom, Ion. 2.2 Ionisation & Electrolytic dissociation, Arrhenius Theory of Ionisation, Degree of Ionisation & factors affecting degree	06	12

	of ionization. 2.3 Introduction of Conductors, Insulators, Dielectrics, Electrolyte, NonElectrolyte, 2.4 Electrolysis, Electrolytic Cell, Electrodes. Mechanism of Electrolysis 2.5 Electrochemical Series for Cations & Anions, 2.6 Electrolysis of CuSO4 Solution by using Cu Electrode & Platinum Electrode 2.7 Faraday's first & second law of Electrolysis & numerical problems on it Applications of Electrolysis such as Electroplating & Electrorefining 2.8 Electrochemical Cells & Batteries , Types of cell Primary & secondary cell construction Working & Applications of Dry cell & Lead – Acid Storage,		
03	METALLURGY 3.1 Definition of Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Occurrence of Metals, 3.2 Mechanical Properties of metals such as Hardness, Toughness, Ductility, Malleability, Tensile strength, 3.3 Stages of Extraction of Metals from its Ores in detail i.e. Crushing, Concentration, methods of concentration (physical and chemical) 3.4 Reduction of iron in blast furnace with chemical reactions, Reactions in zone of reduction and zone of absorption, 3.5 Alloys Definition of Alloy, Purposes of Making alloy. 3.6 Methods of Preparation of alloy such as fusion method. 3.7 Classification of Alloys ,ferrous alloys & Non Ferrous alloys, their examples. 3.8Composition, Properties & Applications of Alnico, Duralumin, Dutch Metal, German Silver / Nickel Silver, Gun Metal, Monel metal, Wood's Metal	08	14
04	Corrosion of metals and its protection 4.1 corrosion Definition of corrosion, Types of corrosion 4.2 Atmospheric corrosion or dry Corrosion, corrosion due to oxygen , different film formation , 4.3 Immersed Corrosion or Electrochemical Corrosion, oxygen absorption Mechanism , Hydrogen evolution mechanism 4.4 Protection of Metals from corrosion. Purification of Metals from corrosion, Alloy Formation, Cathode Protection Appling Protective Coatings like metal coating by Galvanising, Tinning, Electroplating.	06	08
05	WATER 5.1 Sources of water, impurities in water, 5.2 Hard water & soft water, types of hardness, causes of hardness,	07	10

	5.3 Effects of hard water in boiler, scale & sludge formation in boiler its effects on boiler, 5.4 Effects of hard water in diff. industries and domestic purposes, 5.5 Softening of hard water by soda lime process, permutite process, ion exchange process, 5.6 Potable water its condition for portability, 5.7 Diff. methods of purification of water		
06	Non Metallic Materials 6.1 Plastics Definition of Plastic, Formation of Plastic by Addition Polymerisation with example such as Polyethylene 6.2 Condensation Polymerisation with suitable example such as Bakelite plastic. 6.3Types of Plastics, Thermo softening & Thermosetting Plastic, 6.4 Compounding of Plastics – Resins, Fillers, binders ,Plasticizers, Accelerators, Pigments etc. .Engineering properties of plastic and its related uses. 6.5 Rubber Natural Rubber, Its Processing, Drawbacks of Natural Rubber, 6.6 Vulcanisation of Rubber with Chemical Reaction. 6.7 Synthetic Rubber its examples Buna –S & Buna –N rubber, Distinction Between Natural & synthetic rubber. 6.8 Properties of rubber such as Elasticity ,Tack, resistant to abrasion, Rebound capacity. 6.9 Engineering Applications of rubber based on their properties. 6.10 Thermal Insulating Materials Definition & Characteristics of Thermal insulators. Preparation, Properties & Applications of Thermocole & glass wool, cork, asbestos.	07	18
07	Lubricants- 7.1 Definition of lubricant, lubrication, 7.2 functions of lubricants ,need of lubrication 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 Chemical Characteristics such as Acid Value , Neutralization Number, Emulsification, Saponification Value, Selection of proper Lubricants for Various Types of Machines.	06	08

LIST OF PRACTICALS (any 10 should be perform)

01) Orbital configuration of different elements (at least 10 elements)
02) To verify Faraday's first Law of electrolysis.
03) To determine neutralization point of acetic acid (weak acid) and ammonium hydroxide (Weak base). calculate the normality and strength of acetic acid.
04) To determine the equivalent point of precipitation titration of $BaCl_2$ with H_2SO_4 using Conductivity Meter. To find the normality and strength of $BaCl_2$

05) To find the strength in grams per liter of the given solution (NaOH) with the help of standard hydrochloric acid.
06) To determine pH value of given solutions, water samples, by using pH paper, universal indicator and pH meter.
07) To determine the strength of given hydrochloric acid solution by titrating it against standard potassium hydroxide solution.
08) To determine percentage of iron from steel by titration method.
09) To determine the hardness of potable water and boiler feeding water.
10) To determine the chloride content potable water and boiler feeding water.
11) Preparation of phenol formaldehyde plastic.
12) To determine the acid value of oil sample by neutralization method.
13) Qualitative analysis of given salt solutions, i.e. to determine one acidic and one basic radical from given salt solution. (At least 05 salt solutions.)

TEXT BOOKS:

S.No.	Name of Book	Author	Publication
1.	Chemistry of engineering materials	S.S.Narkhede	Nirali publication
2.	chemistry of engineering materials	Shane patil	Tata tech publication
3	chemistry of engineering materials	Jawale	Mc vranda publication. Inc.

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	Engineering Chemistry	Jain & Jain	Dhanpat Rai and Sons Co.
2.	Engineering Chemistry	R.S. S. S. Dara	S. N. S. S. Chand Publication
3.	nvironmental Chemistry & PollutionControl	S. S. Dara	S.Chand Publication

WORKSHOP PRACTICE (WSP): 5G105

COURSE STRUCTURE:

Teaching Scheme		Evaluation Scheme						
TH	00		PT	TEE	TW	PR	OR	Total
PR	03	Max. Marks	--	--	50	--	--	50
TOTAL	03	Duration	--	--	--	--	--	--

RATIONALE:

The knowledge of different basic tools and different processes such as smithy, forging, carpentry, welding, plumbing, fitting etc. is the basic requirement of the diploma technician. These are the basic & fundamental operations encountered in workshop. At this level it is essential to impart the practical feel of these basic operations & processes to the students. With this intention this course is being introduced.

COMPETENCY STATEMENTS:

1. To understand use of different hand tools and workshop processes.
2. To perform basic workshop processes such as smithy, forging, carpentry, welding, plumbing, fitting.

COURSE CONTENTS:

TERM WORK:

1) Smithy & Forging: - One job involving cutting, bending, drawing down/ up operations.
2) Carpentry: - One Job involving Different types of carpentry joints (min. two joints) used in furniture, wooden items with the use of teak wood, combination of wood & steel frames, plywood, sun mica.
3) Welding: - One job welded joint involving operations such as Lap, Butt welding with the help of Arc Welding machine
4) Fitting & Filling: - Fitting and filing one job involving filing, chamfering, drilling, tapping etc. operations
5) Plumbing: - One practical job on pipe fitting and threading

Job diary, drawing of different types of tools, operations is to be submitted by each candidate.

TEXT BOOK:

Sr.No	Title and Edition	Author	Publisher
1	Workshop technology Vol. 1	B.S. Raghuwanshi	
2	Workshop technology Vol. 1	S.K. Hajra Choudhary	
3	Production technology	R.K. Jain.	

ENGINEERING GRAPHICS (EGR): 5G106

COURSE STRUCTURE:

Teaching Scheme		Evaluation Scheme						
TH	02		PT	TEE	TW	PR	OR	Total
PR	02	Max. Marks	--	--	50	50	--	100
TOTAL	04	Duration	--	--	--	2.00	--	--

RATIONALE:

Engineering drawing (Graphics) is the language of engineers. Often it is required to imagine the different objects from various directions, sound knowledge of engineering graphics will help the engineer to represent various objects and read various drawings used in workshop, industry and in various manufacturing processes.

COMPETENCY STATEMENT:

To understand the basic principles of Engineering Drawing

COURSE CONTENTS:

Topic No.	Content	Hours	Marks
1.	**Introduction** 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 its use, dimension with text	04	00
2.	**Simple Drawing Practices** 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	04	00
3.	**Engineering Curves** 3.1 To draw ellipse by – a) Arcs of circle method b) Concentric circle method c) Oblong method 3.2 To draw parabola by – a) Directrix focus method b) Rectangle method 3.3 To draw hyperbola by – a) Transverse axis & focus method.	08	00

	b) Passing through a given point. (Rectangular hyperbola) 3.4 To draw involute of square, hexagon and circle. 3.5 To draw cycloid, epicycloid, hypocycloid.		
4.	Orthographic Projections 4.1 Converting pictorial view into orthographic views (First angle method of Projection), 4.2 Sectional orthographic projection of simple objects	08	00
5.	Isometric Projections 5.1 Isometric projection of simple objects 5.2 Isometric projection of objects having circular holes	08	00

LIST OF PRACTICAL/EXPERIMENTS:

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

1. One sheet on types of lines, letters, numbers and scales.
2. One sheet on Engineering curves, (Minimum 4 curves).
3. One sheet on Orthographic Projection, (Minimum 2 objects) by first angle method
4. One sheet on Isometric projection of simple object (Minimum 2 objects).
5. One sheet on geometrical constructions which includes all additional drawings given in chapter 5

PRACTICAL EXAMINATION:

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

a) Engineering curves (Solve any one out of two given) 10 marks
b) Geometrical construction & scales (Solve any one out of two given) 10 marks
c) Orthographic Projections (One Problem) 15 marks
d) Isometric projections (One Problem) 15 marks

TEXT BOOKS:

S.No	Title and Edition	Author	Publisher
1	Engineering Drawings	N. D. Bhatt	Charotar Publishing House
2	Engineering Drawings	Sidheshwar,Shastri	Tata Mc Graw Hill
3	Engineering Drawing	R.V.Mali	Vrinda Publication

BASICS OF COMPUTER SYSTEM (BCS): 5G107

COURSE STRUCTURE:

Particulars	Theory		Practical	T.W.	Oral	Total
Credit	1		2			3
	Prog. Test	End Exam.	50	50	--	100
Marks	-	-				
Exam Duration	-	-				

COMPETENCY STATEMENT (S):

- To understand working & use of Computer for day-to-day use.
- To use computer for word processing, accounting related applications
- To prepare professional presentations.
- To understand and use Internet.

RATIONALE:

With rapid development of Technology and competitive economy, computers play very important role in the diversified fields such as CAD, CAM, power generation, image processing, telecommunication modeling and simulation etc.

The built in characteristics of computers have made them inevitable in different applications areas. So it is essential for a Diploma Technician to have a knowledge regarding computers and develop a skill to handle different software's available. It is always essential for a technician to update their knowledge to cope up with the fast development in software's. Considering this in view and duties to be performed by Diploma Technician in professional life, following curriculum is suggested.

COURSE OBJECTIVES:

Student should able to,

- Understand working of computers
- Get knowledge of various components of computers.
- Understand concept & functions of Operating System.
- Perform file management operations using My computer & Windows Explorer
- Print the letter using MS Word
- Perform worksheet operations using MS Excel
- To prepare professional presentations using MS PowerPoint
- Use Internet for Create E-mail id, receive & send E-mail with attachment
- Search for the information on Internet.

CONTENTS:

1. Fundamentals (H-02)

1.1 Types of computer, Block Diagram showing components of computer,
1.2 Input, output devices, CPU,
1.3 Primary Memory, Secondary memory.(Usage of Memory)
1.4 processor and its speed, RAM, Monitor, Display card,
1.5 Hard Disk, Floppy drives, CD drive,
1.7 Hardware and software,

1.6 Types of software.(Application, Basic Application , System Software) Concept of Operating System: Definition, functions and examples of operating system (like DOS, WINDOWS, Linux,)

2. Dos & Windows (H-03)

DOS:

2.1 Bios, Power on self-test, Dos & its functions.

2.2 Concept of file & directory, rules for file & directory names,

2.3 Types of files-system files, data files, Program files, text files, Config.sys, Autoexec.bat, Batch files. File attributes

2.4 DOS commands:

Internal Commands: DATE, TIME, CLS, DIR, COPY, DEL, REN, CD, MD, RD, PROMPT, PATH

External Commands: FORMAT, CHKDSK, DISKCOPY

2.5 WINDOW 98/2000/XP

2.6 Introduction: Starting Windows, Desktop, Icons, Task bar, Short cuts, the start Button, arranging windows, shutting down windows

2.7 Windows Explorer: Creating, renaming, deleting Folders/ file. Copying,

2.8 moving, deleting, renaming files, Using Send to, Search files and folders,

Recycle bin

2.9 **Windows Setting:** Date format, adding printer.

2.10 **Windows Accessories:** Calculator, Notepad, paint, word pad.

3. Ms-Word (H-03)

3.1 Introduction to word processing, usage MS Word, Introduction to MS word.

3.2 Opening, Saving, closing a file. Page setup: Changing Margins, layout, and paper size. 3.3 Formatting Text: Tables: Insert table, enter and edit data into table.

3.4 Printing: Print preview, selecting printer, and print options.

4. Ms-Excel (H-04)

4.1 Introduction to electronic spreadsheet. Introduction to MS Excel.

4.2 Components of MS Excel window like Title bar, Menu bar, Formula Bar, Status bar, Worksheet area, Sheet Tabs, Columns, rows. Hiding and viewing Toolbars like standard and formatting tool bars. Entering data, copying, moving, Editing cell entries use of auto fill Saving, closing and opening file.

4.3 Page setup: Changing Margins, layout, and paper size. Enter formula, copy formula using fill handle Inserting functions.

4.4 Use of functions like SUM, AVERAGE, MIN, IF, COUNT, LOG, SIN, COS, ROUND, SQRT, PI etc.

4.5 Formatting data: Change number format, alignment, borders, font, size etc. Use auto Format, Restructuring worksheet: Inserting and deleting the columns and rows. Changing column width, row height.

4.6 Charts (Graphs): Types of charts, creating and modifying charts, printing charts.

5. PowerPoint: (H-02)

5.1 Overview, Using design template and auto content wizard, creating presentation, slides and its types, slide operations, modifying & running presentation,

5.2 adding & editing objects, creating tables, charts & Diagram, save & print option, custom presentation, applying transition & animation effects.

6 Internet:

(H-02)

6.1 Introduction: uses of internet, Resources required using Internet. Internet Service Provider: Need & Duties of ISP, Connecting to Internet, Domain &addresses, Internet Browsers, Search engines, Email, Chat,

6.2 Introduction to MS OUTLOOK, uses of Ms Outlook.

Teaching Methodology:

- Lecture method without media.

- Lecture method-using media.
- Demonstration using LCD projector.

Teaching Resources:

- Overhead projector
- LCD projector.

LIST OF PRACTICALS/EXPERIMENTS:
(If required specify minimum number of practicals to be conducted from the following)

6. List and identify the peripheral devices of a PC. Connect the keyboard, mouse, printer, monitor, and scanner to a computer. Get the information about the manufacturers and prices of various components of a PC.
7. **DOS:-**Use various Internal & External commands of DOS mentioned in chapter.
8. **Windows** **(Any Three)**
   I. Start and shutdown of windows. Starting different applications. Using applications like calculator, paint, word
   II. Observe various features of windows like menus, push buttons, drop down list, check boxes, option buttons etc.
   III. Perform file management operations such copying, deleting, renaming, creating folders, renaming folders using My computer , Windows Explorer, searching files and folders.
   IV. Change windows format such as wall paper, date & time format, Installing printer, installing & removing programs by using add /remove programs, change display properties
9. **Microsoft Word** **(Any Three)**
   I. Prepare a sample bio data
   II. Write an application for job
   III. Prepare a time table in tabular format.
10. **Microsoft Excel**
   I. Create a sample result sheet of your class.
   II. Create salary sheet for Employees (Apply Excel formulae/ functions to solve problems.)
11. **Internet** **(Any Two)**
   I. Creation of email account
   II. Send E-mail, Receive E-Mail. (use attachment)
   III. Management of email account.
   IV. Searching information on internet
12. **PowerPoint** **(Any Two)**
   I. Creating PowerPoint presentation, running presentation.
   II. Applying design template, background, transition effects, animation to slide.
   III. Preparing custom presentations and using pack and go features.

REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher
1	Subhas Mehta	DOS made simple	Galgotia Publications
2	P.K.Sihna	Fundamentals of Computers	BPB Publication
3	Greg Perry	Teach Yourself Windows 98	Techmedia
4	Cassel & Hart	Teach Yourself Windows 98	BPB Publication
5	Alen Simpson	Windows 98 Bible	BPB Publication
6	Ed Bott Woody Ceonhard Prentice Hall India	MS Office 2000	
7	Ron Mansfield	Microsoft Office	BPB Publication
8	Greg Perry	Teach Yourself MS Office 97	Techmedia
9	Herbert Schildt	DOS made easy	McGraw Hill

ENGLISH (ENG): 5G301

COURSE STRUCTURE:

Teaching Scheme		Evaluation Scheme						
TH	02		PT	TEE	TW	PR	OR	Total
PR	02	Max. Marks	20	80	25	--	--	125
TOTAL	04	Duration	1.00	3.00	--	--	--	--

RATIONALE: English is the only language used all over the world. It is necessary to gain command over English languge .English is also developed as a language of International, Trade& Commerce, Library, Link language.
To help students to:
•Become competent in English Grammar and its usage.
•Write and speak English confidently correctly.
•Gain command over English language.
•Learn the modern methods of English such as sending, receiving emails to be competent with International trends.
•To use proper pronunciations

COMPETENCY STATEMENTS:
• To develop Theoretical concepts and practical implementations of English language.
• To develop writing skills.

Sr.No.	Name of Topic	Hours	Marks
1	**TEXT FROM BOOK** 1.1 Comprehension – Responding to the questions from text (Spectrum) 1.2 Vocabulary - Understanding meaning of new words from text 1.3 Identifying parts of speech from the text.	**16**	**30**
2	**Situational Grammar** 2.1 Tenses and Time 2.2 Yes/No, Wh-questions and Question Tags, Punctuation Marks 2.3 Reported Speech; Voice ;Degree 2.4 Articles ,Prepositions, Conjunction	**10**	**25**
3	**Craft of Writing** 3.1 Paragraph Writing-Definition, Types, Essentials. 3.2 E-mail 3.3 Resume	**04**	**15**
4	**Functional English** 4.1 Vocabulary building- (Synonyms Antonyms, Homophones) Sounds and syllable Sentence structures 4.2 Use of Contextual words in a given paragraph.	**02**	**10**

List of Assignments:

1) Building of Vocabulary

Words from the glossary given at the end of each chapter, to be used to make sentences.

2) Applied Grammar

Identify the various parts of speech and insert correct parts of speech in the sentences given by the teachers.

3) Punctuation

Punctuate 20 sentences given by the teachers.

4) Tenses

List 12 tenses and give two examples for each tense.

5) Dialogue Writing

Write at least two dialogues on different situations.
(Conversation between two friends, conversation between two politicians etc.)

6) Idioms and Phrases

Use of Idioms and Phrases in sentences. (20Examples)

7) Biography

Write a short biography on your favorite role model approximately. (250 – 300) Words with pictures

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
1.	Spectrum-A Text Book on English	--	MSBTE

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	English grammar and Composition	R.C.JAIN	Macmillan
2.	Dictonary	Oxford	Oxford University
3.	English at Workplace	Mukti Sanyal	Macmillan
4.	A Remedial English Grammar for Foreign Students	P.T.WOOD	Macmillan

COMMUNICATION SKILLS (CMS):5G302

COURSE STRUCTURE:

Teaching Scheme		Evaluation Scheme						
TH	01		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	--	--	50	--	25	75
TOTAL	03	Duration	--	--	--	--	--	--

RATIONALE:

Language skills pertaining to English have been already introduced previously. With a view to achieve some command over a language & to develop communication skills is the main objective of this subject.

COMPETANCEY STATEMENT:

The student will be able to:

To develop Listening, Speaking, Reading and Writing skills.

1. Ability to engage & interact effectively with others.
2. To enable an individual to express perfectly.
3. To use appropriate body language.
4. To obtain acceptance & provide assistance, direction & leadership.

Topic no	contents	HRS	MARKS
01	**Introduction to Communication** 1.1 Definition, Importance Communication cycle/process 1.2 The Elements of communication	04	
02	**Types of Communication** 2.1 Verbal-Nonverbal, Formal – Informal, Upward-Downward, Vertical-Horizontal-Diagonal Communication.	02	
03	**Principles of Effective Communication :** 3.1 Principles of effective communication 3.2Communication Barriers & how to overcome them	04	
04	**Non Verbal Communication** 4.1 Aspects of body language(gestures ,Postures etc.) 4.2 Pictorial Representation(tables,graphs, piechart etc.)	02	
05	**Formal Written Skills** 5.1 Office Drafting: Circular, notice & memo 5.2 Job Application 5.3 Business Correspondence: Inquiry , order letter & adjustment letter	04	

List of Practicals-

01 Communication Cycle (With the Help of Diagram) + any two communications Situations to be represented with the help of Communication Cycle. (Use Pictures)
02 Speech
03 conversation
04 Group discussion
05 Non-Verbal Communication:
Body Language: Five Illustrations of appropriate use of Body Language used on the part of student in formal and Informal setups. (Example- formal setup- classroom)

06 Seminar related on any topic.
07 Interview Techniques
08 Job Application & Effective Resume Writing

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	Text book of Communication skills	MSBTE	MSBTE
2.	Everyones guide to Effective Writing	Jayakaran	Apple
3	Developing Communication Skills	Krushnan Mohan,Meera Banarji	Macmillan
4	Professional Communication Skills	Pravi S R Bhatia	s. chand&co.

MANAGEMENT (MAN): 5C305

COURSE STRUCTURE:

Teaching Scheme -		Evaluation Scheme						
TH	03		PT	TEE	T W	PR	Oral	Total
PR	02	Max. Marks	20	80	25	-	25	150
TOTAL	05	Duration	1.00	3.00	-	-	-	-

RATIONALE: -

Civil engineering technician has to handle construction projects. He has to manage the resources optimally and effectively. This requires him to develop abilities and strategies for project planning and its execution. This will ensure timely completion of projects with due consideration to quality economy and safety.

COMPETENCY STATEMENTS:-

1. Familiarize environment, Identify the resources and activities involved in a project
2. Organize the resources
3. Prepare schedules for activities and resources with due consideration to constraints and time limit
4. Monitor the project Estimate the project cost w.r.t. time
5. Estimate the project cost w.r.t. time
6. Ensure safety and preparedness. Mitigation about disasters

CONTENTS:

Sr. No.	Name of the Chapter / topic / Content (Follow S.I. units)	Hours	Marks
1.	**Management of construction work** 1.1 Different terms- management ,project, project management, objectives of management 1.2 Principles of scientific management, functions of management- forecasting, planning, scheduling, organization, Directing, coordinating, controlling and their application to civil engineering work. role of decision taking, methods of planning and programming.	05	08
2.	**Project Scheduling : Bar and Milestone Charts:** 2.1 Introduction, development of bar charts with examples, merits & limitations 2.2 Milestone charts, development of network using bar chart.	04	06
3.	**Network Techniques :** 3.1 Elements of Network: Event, activity, dummy activities, network rules, graphical guide lines for network, steps in developing a network, work breakdown structure 3.2 Time Estimates and computations, Uncertainties, use of PERT time estimates, frequency distribution, mean variance, standard deviation, probability distribution, beta distribution 3.3 Critical path with examples, CPM-process, CPM networks, activity time estimate, event time, latest allowable occurrence time, combined tabular calculations, start and finish time of activity, float, critical activities, critical path, examples.	08	12
4.	**Project Cost Model & Analysis** 4.1Project costs, direct and indirect costs, slope of direct cost curve Total project cost and optimum duration, optimization of cost by network, examples. 4.2 Direct and indirect cost breakup of building , material, labor cost break up for various items.	04	08
5.	**Resources Allocation and Organization** 5.1 Updating, data required for updating, steps in updating Project resources, resources usage profiles, histograms, resources allocation,	09	16

	leveling and smoothing. 5.2 Definition and need of organization, types of organization,. merits & demerits of each type organization suitable for construction firm, different site personnel in organization, PWD organization.		
6.	**Labour Management and Safety in Civil Engineering** 6.1 Skilled, semiskilled and unskilled labour. Piece rate & time rate employment. Recruitment, interviews, trade test. Training of workers, labour welfare activities. 6.2 Labour laws – Factory act. Minimum wages act, Work men's compensation act, Contract labour act. 6.3 Importance of safety, terms used like accident cost, Injury frequency rate, injury severity rate etc. Common causes leading to accidents on construction sites. Precautions to be taken to avoid accidents. Safety programme	06	10
7.	**Stores and Material Management** 7.1Functions of material manager. Requirement of material and phasing of the same in relation to the programme of construction. 7.2 Inventory, cost of inventory and inventory control. Procurement of materials. Indent requisitions, storing of materials, Economic order quantity, A-B-C analysis. List of various records related to store..	06	10
8.	**Disaster Management** 8.1Definition of disaster, types of disaster, different phases of disaster, disaster management cycle, disaster prevention management, preparedness, mitigation, disaster response, vulnerability, 8.2 Rehabilitation, Retrofitting, Trigger mechanism. Role of insurance in Disaster Mitigation. Principle authorities for disaster management. Power and responsibilities of the state Government.	06	10

Term Work:

Term work consists of

A) Prepare a bar chart of construction activities of bunglow / residential building and develop critical path method network

B) Group Discussions and report writing on (Any one form following or likewise)

1) Modern Techniques of material Management
2) Human Resource Management and training
3) Causes of Accident and safety management

C) Study of various records pertaining to store like Goods received sheet, store indent, priced store ledger, register of materials at site account, statement of receipts, issues& balance of road metals, cement register Under this expert lecture of store officer shall be arranged

D) Study of PWD/ Large private construction organization.

E) Survey on causes of study of disaster and any recent disaster and its effect.

Text Books:

Sr. No	Author	Title	Publisher
01	B.C.Punmia and Khandelwal	Project planning and control with PERT	Laxmi publications, New Delhi
02	O. P. Khanna	Industrial organization & Management	Dhanpal Rai & sons New Delhi
03	Sharma V.K	Disasters Management	I.I.P.A. New Delhi www.disaster.org www.disasterrelief.org
04	V.N.Vazirani	Construction Management and Accounts	Khanna Publication, Delhi
05	J.R.Muley	Construction Management	Central Techno Publications,

ENTREPRENEURSHIP DEVELOPMENT (END): 5G303

Course Structure:

Particulars	**Theory**	Practical	**Practical**	**T.W.**	**Oral**	**Total**
Credits	2	2				5
	Prog. Test	**End Exam**				
Marks	0	0	--	25	25	50
Duration						

RATIONALE:

The post liberalization industrial and economic scenario in India makes it imperative that a more dynamic and pragmatic approach be adopted to create new, first generation entrepreneurs on a large scale.

This would help in tackling the problem of unemployment and contribute to the creation of new entrepreneurs. Using knowledge & advanced technology as their strategic tools those who can take on the increased competition in the domestic as well as global markets are innovators and entrepreneurs in true sense. This can be achieved only if more and more people are motivated and convinced to choose entrepreneurship as a career and put their energies and resources to a productive use.

The student community also needs to explore the emerging opportunities. It is therefore necessary to inculcate the entrepreneurial values during their educational tenure. This will help the younger generation in changing their attitude and take the challenging growth oriented tasks instead of waiting for white- collar jobs.

This subject will help in developing the awareness and interest in entrepreneurship and create employment for others.

Objectives:

Students will be able to

1) Appreciate the importance of entrepreneurship.
2) Identify entrepreneurship opportunity.
3) Get primary information to start any business.
4) Acquire entrepreneurial values and attitude.
5) Use the information to prepare project report for business venture.
6) Develop awareness about enterprise management.

Course Contents:

Topic No	**Name of Topic**	**Hours**	**Marks**
01	**Basic Concepts** 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	5	

	1.3 Transforming Ideas in to opportunities transformation involves Assessment of idea & Feasibility of opportunity, SWOT Analysis.		
02	**Information And Support Systems** 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.	5	
3	**Market Assessment** 3.1 Marketing -Concept and Importance 3.2 Market Identification, Survey Key components (Market Segmentation) 3.3 Market Assessment.	5	
4	**Business Finance & Accounts** **4.1 Business Finance** • 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 • Book Keeping • Financial Statements • Concept of Audit, • Trial Balance • Balance Sheet	6	

5	**Business Plan & Project Report** 5.1 Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2 **Project Report** 1) Meaning and Importance 2) Components of project report/profile (Give list) 5.3 **Project Appraisal** 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	6	
6	**Enterprise Management And Modern Trends** 6.1 Enterprise Management: - 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.	5	

Practical:

The practical task may be divided in following heads

1. Literature survey – MSFC/IDBI/MSSIDC/CIDBI/MSME/DIC/ ROLE OF DIFFERENT COMMERCIAL BANKS etc.
2. Administration of ready made tools like questionnaires, opinionnaire, Interview schedule for product identification purpose (decision making process).
3. Development of “Business Ideas”.
4. Visit to MCED/MITCON- gong through the product related library.
5. Preparation of Preliminary / Detailed project report in the formats recommended by MCED/MITCON.
6. At least one case study of successful entrepreneur..

Text Books

Sr. No	**Title of Book**	**Author and Publication**
1	Entrepreneurship Development	TTTI, Bhopal.
2	The Seven Business Crisis& How to Beat them	V.G.Patel
3	A handbook of New Entrepreneurs	P.C.Jain ,Dhanpat Rai and Sons
4	Entrepreneurship development	E.Gorden, K. Natrajan.
5	New Initiatives in Enterprenuership Education And training	Gautam Jain, Debmuni Gupta
6	www.ediindia.org.	
7	Entrepreneurship Theory and Practice	J.S.Saini,B.S.Rathore
8	Enterpreneurship Development and management	A.K.Singh, Laxmi Publications
9	The Beermat Enterpreneur	Southon, Pearson Education limited

APPLIED MECHANICS (APM) : 5Q201

Teaching Scheme		Evaluation Scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	06	Duration	1.00	3.00	--	--	--	--

RATIONALE: -

Civil engineering technician should be able to analyse behavior of components of structure under various types of loads, which will enable him to design the same. This course provides basic knowledge of principles, laws and theory for analysis.

COMPETENCY STATEMENTS: -

The student shall be able to :

1. Verify the laws, theorems of mechanics.
2. To check for equilibrium for a force system.
3. Apply principles, laws and theorems to analyze components under static and dynamic loads.
4. Understand use & application 0f simple lifting machines.

COURSE CONTENTS:-

Sr. No.	Name of the Chapter / topic / Content (Follow S.I. units)	Hours	Marks
1	**Fundamental Concepts** 1.1 Definitions of Mechanics**,** Applied Mechanics, statics, dynamics, kinematics, kinetics, space, time, mass, particle, rigid body. Scalar & vector quantities with examples, Newtons laws. 1.2 Concept of force, definition, S.I.unit, representation of force as a vector, Bow's notation. Types of force(pull/tensile, push/ compressive)Law of transmissibility of force.	04	02
2	**Resolution of a force** 2.1 Concept of system of forces: Coplanar, Non coplanar, collinear, concurrent, non-concurrent, parallel(like & unlike), general. 2.2 Resolution of a force, Resolution of a force into two components at any angle & at right angle ie. Orthogonal components.	04	06
3	**Composition of forces** 3.1 Definition of composition of force, definition of resultant, Law of parallelogram of forces & Law of polygon of forces (No problems on Law of polygon of forces) 3.2 Resultant of collinear & concurrent force system 3.3 Concept of Moment of a force, magnitude, lever arm, types & sign convention, unit. Law of moment, Principal of moment/Verignon's theorem. Couple, characteristics of couple with example. 3.4 Resultant of parallel force system & non concurrent non parallel force system.	10	14
4	**Equilibrium** 4.1 Definition of equilibrium and equilibrant, properties of Equilibrant, relation between resultant & equilibrant. 4.2 Conditions of equilibrium for collinear, concurrent, parallel & non concurrent non parallel force system. 4.3 Concept of free boby , free body diagrams, Lami's Theorem & its applications such as cables. Problems with two	06	10

	unknowns only.		
5	**Beam reactions** 5.1 Definition of beam, types of beam: cantilevers, simply supported, over hanging, continuous, fixed beams, , types of supports: simple, fixed, hinged & roller, types of loads, point load, uniformly distributed load, uniformly varying load. 5.2 Support reaction of beams. Problems for reactions of simply supported, over hanging beams under different loading such as vertical and inclined concentrated loads, uniformly distributed load and combination of both. 5.3 Problems for reactions of simply supported beams with hinged & roller support under concentrated loads (vertical & inclined), uniformly distributed load and combination of both.	06	08
6	**Friction** 6.1 Concept of friction, Definition of friction. Types of friction (static, dynamic, rolling, sliding), laws of friction, Defination of co-efficient of friction, angle of friction, angle of repose & relation between these. Advantages & disadvantages of friction. 6.2 Equilibrium of bodies on level plane, force (pull & push) applied horizontally & inclined. 6.3 Equilibrium of bodies on inclined plane, force applied Parallel to plane only. 6.4 Ladder friction. (with one surface smooth)	10	12
7	**Centroid and center of gravity** 7.1 Definition of centroid, Centroid of triangle, square, rectangle, circle, semicircle, quarter circle. 7.2 Determination of centroid of Composite areas consisting of not more than above three standard areas. 7.3 Definition of Center of gravity, C.G. of simple regular solids, cube, cylinder, cone, sphere, hemisphere. 7.4 Determination of C.G. of solid objects made up of any two these regular solids.	10	12
8	**Moment of Inertia** 8.1 Definition of M.I., radius of gyrations, parallel axis theorem & perpendicular axes theorem, Methods to calculate MI. 8.2 Formulas for M.I. of square, rectangle, triangle, circle, semicircle, quarter circle & hallow square, rectangle, circular, laminas.(Derivation shall not be asked in the examination) 8.3 Determination of MI of sections such as I, channel, T, and angle section about centroidal & other axes & composite sections such as I section with plates & sections with combinations of not more than three standard figures.	10	12
9	**Simple Lifting Machines** 9.1 Definition of simple machine, load, effort, mechanical advantages, velocity ratio, input of a machine, output of a machine, efficiency, relation between MA, VR & efficiency. Ideal machine, ideal effort, ideal load, friction in machine, effort lost in friction, load lost in friction. 9.2 Law of machine, maximum mechanical advantages, maximum efficiency of machine, reversibility of machine, condition for reversibility of machine (no derivation), self locking machine (No numerical problems)	04	04

TERM WORK: -

It shall consist of manual/journal, based on the following experiments, to develop the ability of students to integrate the knowledge and skills by application to the field problems.

Experiments: - Manual/Journal shall consist of following experiments :

1) To verify the law of polygon of forces.
2) To verify the law of moments.
3) To verify Lami's theorem.
4) To find beam reaction using beam reaction apparatus.
5) To verify the laws of friction with two different materials.
6) Determination of coefficient of friction & angle of repose for any two different surfaces.
7) Two assignments on graphical determination of R for parallel force system.(One for R & one for equilibrant)
8) Two assignments on graphical determination of R for non concurrent non parallel force system with verification of analytical calculations.
9) Simple machines: Comparison between various types of machines, to find M.A., V.R., efficiency , law of machine from graph, study nature of graph for P_i & P_f for any three following machines:
   a. Worm & worm wheel./ Differential axle and wheel
   b. Single / double purchase crab.
   c. Simple screw jack.
   d. Two sheave / three sheave pulley block.

e. Worm geared pulley block/Differential pulley block

TEXT BOOKS:

Sr no.	Title	Author	Publisher
01	Fundamental of Applied Mechanics	Dhade, Jamdar & Walawalkar	Pune Vidhyarthi Gruh, Pune.
02	Applied Mechanics	R. S. Khurmi	Dhanpat Rai & Sones, Delhi.
03	Applied Mechanics	S. Ramamruthum	Dhanpat Rai & Sones, Delhi.
04	Engineering Mechanics	K. L. Kumar	Tata McGraw HillCo., Delhi.
05	Applied Mechanics	I.B. Prasad	Khanna Publications, Delhi.

REFERENCE BOOKS:

Sr no.	Title	Author	Publisher
01	Engineering Mechanics	Beer & Johnston	Tata McGraw Hill Co., Delhi.
02	Engineering Mechanics	Timoshenko & Young	Tata McGraw Hill Co., Delhi.
03	Engineering Mechanics	F. L. Singer	Harper International Edition.

CONCRETE TECHNOLOGY (COT) : 5C202

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	5	Duration	1.00	3.00	--	--	--	--

RATIONALE: -

One of the major job functions of civil engineer is to supervise the concreting work. He has to ensure the quality of concreting work. He has to perform certain tests on ingredients of concrete to find properties for mix design. He should be able to prepare the various grades of concrete from the available ingredients. He should get acquaint with latest developments in the field of concrete technology, admixtures and chemicals used in concreting.

COMPETENCY STATEMENTS: -

1) Conduct tests on ingredients of concrete to check for its quality as per BIS specifications.
2) Conduct tests on concrete to check for its suitability in different situations
3) Design for concrete mix.
4) Conduct Non destructive testing on concrete.

COURSE CONTENTS:-

	Name of the Chapter / topic	Hours	Marks
1.	**Properties of Cement:** 1.1. Introduction to Cement, Constituents of cement, 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 33,43, 53 and their specification of physical properties as relevant. I.S.codes. 1.3. Adulteration of cement (field test), storting 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.	06	10
2.	**Properties of Aggregates:** 2.1. Properties fine aggregates: Concept of size, shape surface texture, specific gravity, bulk density, water absorption, surface moisture, impurities 2.2. 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 2.3. Properties of coarse aggregates :Concept of size, shape texture, water absorption, soundness, specific gravity and bulk density, strength 2.4. Determination of fineness modules 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	06	12
3.	**Properties of Concrete** 3.1. Introduction to concrete, necessity of supervision for concreting operation, different grades of concrete (ordinary concete, standard concrete and high strength concrete as per provisions of IS-456-	06	12

	2000), durability of concrete, Factors affecting durability 3.2. Water cement ratio, Definition of w/c ratio, Duff Abraham w/c law, significance of w/c ration, selection of w/c ration for different grades of concrete prepared from different grades of OPC as per graphs specified in IS 10262-2007, minimum grade of concrete, minimum cement content, maximum w/c ratio for different grades of concrete and for different exposure conditions 3.3. Properties of fresh concrete, Definition of workability, factors affecting workability of concrete. Determination of workability of concrete by slump cone test compaction factor test , vee bee consistometer and flow table tests. workability requirement for different types of concrete works, cohesiveness, segregation, harshness, bleeding. 3.4. Properties of hardened concrete, Definition of compressive strength, durability, impermeability, elastic properties of concrete, modules of elasticity of concrete. Creep, factors affecting creeps, shrinkage, factors affecting shrinkage		
4.	**Concrete Mix Design** 4.1. Concrete mix design, grade of concrete, Objectives of mix design, list of different method of mix design, study of mix design procedure by I.S. method as per I.S.10262-2007 determination of mix proportion using I.S. Method for given data, yield of concrete	06	10
5.	**Testing of concrete** **5.1.** Significance of testing, determination of compressive strength of concrete cubes at different ages, split tensile test, flexural test **5.2.** 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	04	08
6.	**Concreting and Quality control** 6.1. Batching, weight batching, volume batching for designed concrete mix, concreting chain 6.2. Types of mixers (tilting and non-titling types) mixing of concrete mixing time 6.3. Transportation modes of transportation of concrete, precautions to be taken during transportation and placing of concrete in formwork. 6.4. Compaction of concrete, methods of compaction, Types of vibrator, care to be taken during compaction 6.5. Finishing of concrete, types of finishing methods of finishing (Surface treatment, expose aggregate finish, applied finish colored finish), requirement of good finish 6.6. 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 6.7. Joints in concrete construction and its Importance 6.8. Formwork for concrete works-Types, stripping time 6.9.	08	12
7.	**Admixtures** 7.1. Plasticizers 7.2. Superplasticizers 7.3. Retarders 7.4. Accelerators 7.5. Air entraining admixture 7.6. Fungicidal, germicidal and insecticidal admixture	04	06
8.	**Extreme weather concreting methods** 8.1. Cold weather concreting, effect of cold weather on concrete, general precautions 8.2. Hot weather concreting, problems encountered, general precautions	04	04

9	**Special concretes** 8.2.1. Ready Mix Concrete 8.2.2. Self compacting concrete 8.2.3. Fibre reinforced concrete 8.2.4. High performance concrete	04	06

TERM WORK: -

Term work shall consist of journal based on the following experiments

1. Cement

A. Fineness test of cement by sieving method
B. Standard consistency.
C. Initial and final setting time.
D. Compression test.
E. Soundness test.
F. Field tests on cement.

2. Coarse aggregates: -(Any three tests) (C- compulsory O-optional,)

A. Fineness modulus and particle size distribution. (C)
B. Aggregate crushing value.(O)
C. Aggregate impact value.(O)
D. Specific Gravity(C)
E. Abrasion Test(O)
F. Flakiness and Elongation test on coarse aggregate(O)

3. Fine aggregates: -

A. Determination of silt content
B. Bulk density
C. Bulking of sand
D. Fineness modulus and particle size distribution
E. Specific Gravity

4. Concrete and aggregate:

A. Determination of workability of concrete using-
   i. Slump cone test.
   ii. Compaction factor test.
   iii. Vee-Bee consistometer test.
B. Compressive strength of concrete
C. Concrete Mix Design by IS code method
D. Non destructive tests on concrete.

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
01	Concrete Technology	M.S.Shetty	S. Chand & Co. Ltd.
02	Concrete Technology	Gambhir	Tata Mc GrawHill
03	Concrete Technology	Banhatti/Upadhye	Tech ax Publication

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1	Properties of concrete	Neville	FLBE 1977
2	Properties of concrete	Powers	J. Wiley and sons
3	Testing of Hardened concret no destructive methods	Malhotra V.M.	ACI Monograph Series No. 9

BUILDING CONSTRUCTION (BUC) : 5C203

COURSE STRUCTURE:

Teaching Scheme -		Evaluation Scheme						
TH	04		PT	TEE	T W	PR	Oral	Total
PR	02	Max. Marks	20	80	25	-	25	150
TOTAL	06	Duration	1.00	3.00	-	-	-	-

RATIONALE:-

Civil Engineering Technician must be competent to supervise construction activities with quality workmanship as per standard practices... The subject is intended for giving useful knowledge with respect to facts concepts, principles and procedure related to building construction so that student can effectively plan , supervise the construction activities. He should have knowledge of Maintenance & repair of the existing structure

COMPETENCY STATEMENT:

Student should.

1) Set out a building as per the center line plan.
2) Know various processes in building construction with Do & Don'ts
3) Supervise building construction activities as per standard practices.
4) Suggest the type of structure and building components as per requirement.
5) Handle every activity & labor without undue risk & accidents.
6) Maintenance & repair of the existing structure.

CONTENTS:

Topic No	Topic	Hours	Marks
01	**Mark Out & Excavation** 1.1 Inspection of site, Site clearance, preparing job layout 1.2 center line plan, foundation plan & Mark out 1.3 Excavation, Drilling, Dewatering, Strutting of trenches for foundation. 1.4 Safety and precautionary measures in excavation.	**04**	06
02	**Foundation** 2.1 Importance & function of foundation 2.2 Types of foundation, shallow foundation, 2.3 Deep foundations in different situation with reasoning 2.4 Study of soil strata for foundation, concept of bearing capacity, factors affecting B.C. 2.5 Approximate Bearing Capacity (B. C.) values for different soil strata. 2.6 Problems in foundation due to low B.C & their remedies.	**06**	08
03	**Stone Masonry** 3.1 Technical terms , Classification- Rubble masonry 3.2 Ashlars masonry its type & requirement, 3.3 tools required. Important point to be observed while doing construction in sub structure& super structure. 3.4 Do's & don'ts for stone masonry	**04**	O6
04	**Brick & Block Masonry** 4.1Technical terms related to brick and brick work, 4.2 Requirements of good brickwork, materials required for masonry work & its specification. 4.3 Different types of bonds, 4.4 Procedure of laying brickwork, Do's & don'ts for brick masonry 4.5 Comparison between stone & brick masonry, Hollow, solid block masonry preparation & procedure, 4.6 Check list for brick work. Cavity wall- purpose and construction	**06**	08

05	**Stairs & Vertical transportation means** 5.1 Technical terms, types of stairs, 5.2 Selection of stairs, thumb rules for rise & tread for residential 5.3 Public building. 5.4 Other Means of vertical transportation – Lift, Elevator & Escalator.	**04**	06
06	**Doors & Windows** 6.1 Technical terms, 6.2 Types of doors & windows 6.3 Location, function, material used. 6.4 Procedure of fixing wooden frame & precaution to be taken, 6.5 Fixtures & fastenings, checklist. 6.6 Lintels - purpose types, construction, loading on lintels 6.7Arches- types use & necessity of chajja and sunshade	**07**	10
07	**Floors & Floor Finishing** 7.1 Ground floor, purpose, requirement, material used, laying procedure 7.2 Care to be taken, P.C.C. basement floor mezzanine floor location & uses 7.3 Upper floors use & requirement 7.4 Floor finishes- shahabad , kota, marble, granite ,Kaddappa, Ceramic tiles ,vitrified , mosaic tiles ,chequerred tiles 7.5 Glazed tiles, pavement blocks, concrete floors, tremix floor, skirting and dado.	**05**	06
08	**Roofs** 8.1 Technical terms, necessity 8.2 Types of roofs, pitched & flat roof. 8.3 Advantages of flat roof over pitched roof 8.4 Roof covering, country tiles, Mangalore tiles, A.C & G.I. sheets & their fixing. 8.5 Different types of steel roof trusses	**05**	06
09	**Finishing Work** 9.1 Plastering-Necessity, material & tools required, 9.2 Types of plaster, precautions to be in plastering work 9.3 External plaster & checklist, Internal plaster & checklist. 9.4 Defect in plastering work & remedies. 9.5 Special plasters stucco plaster, plaster board and wall claddings. 9.6 Pointing, purpose types of pointing 9.7 Painting- selection of paints at different situations, tools required, procedure & work stages, guideline for preparing painting mix. 9.8 Single coat, Double coat, Neeru finish, POP work to ceiling and wall. Application, selecting suitable painting material, white washes and colour wash.	**08**	08
10	**Temporary Supporting Structures** 10.1 Form work- requirement of form work, material & sizes, types of form work 10.2 Scaffolding- component parts of scaffolding & its type. 10.3 Shoring- necessity, types of shoring. 10.4 Underpinning- necessity, method of underpinning. 10.5 Safety precautions.	**05**	06
11	**Framed Structures & Tall Buildings** 11.1 Concept, use, advantage of framed structure over load bearing structure 11.2 Disadvantage of frame structure 11.3 Advantages & problems in tall buildings. 11.4 Care & Safety precautions while construction	**04**	04

	11.5 Ware house ,uses of ware houses, Cold storage		
12	**Building Maintenance** 12.1 **Cracks:** Causes and types of cracks, identification and repair of cracks. Guniting and grouting, use of epoxy and crack fills. 12.2 **Settlement:** causes and remedial measures Plinth protection – Necessity and materials used. 12.3 **Demolition:** Necessity, method of demolition-hand demolition, machine demolition, controlled blasting demolition, Precautions during demolition. 12.4 **Rebaring techniques:** Necessity and equipment for Rebaring techniques	**06**	06

TERM WORK

It consists of

A) Sketch book with following sketches (14 Hr)

1) Types of shallow & deep foundation
2) C/s through load bearing wall
3) Different types of bond in bricks
4) Types of stone masonry
5) Types of stairs
6) Doors & Windows their section(any two)
7) Types of steel roof truss

B) Journal consist of following practical & visit report (18 Hr)

1) Preparing center line and foundation plan and marking layout of load bearing structure of 2 to 3 room on ground from the given plan of the building.
2) Preparing center line oundation plan and marking on ground layout of framed structure, building of 3 to 4 room from the given plan of the building.
3) To observe process of Construction of BBM, UCR stone masonry. & checking for level & verticality of masonry work with tube level & plumb bob
4) To observe process of marking of slope for flooring using plastic tube & water
5) To observe process ,Checking thickness & verticality of plaster work using plumb bob & straight edge
6) To observe process Observing fixing of doors & windows for its position & verticality
7) Observing the process of painting in residential / public building and writing a report w.r.t to process & type of paint selected.
8) A report or case study on earth quake. Some peculiar cases of earthquake failure (paper cutting/ photos etc)
9) Visit to site for R.C.C. work to observe various steps/ stages in R.C.C. Construction. Checking verticality (plumb line) of formwork for column, beam & wall at construction site and writing report of the process.

REFERENCE BOOKS

Sr.No	Title	Author	Publisher
01	Building Construction	Sushil kumar	Standard Publication
02	Building Construction	Bindra & Arora	Dhanpat Rai Publication
03	Building Construction	S. C. Rangawala	Charotar Publication
04	Building Construction	B. C. Punmia	Laxmi Publication
05	Building Construction	S.K. Sharma	Tata McGraw-Hill
06	Building Construction	Dr.Janardan Zha	Khanna Publication
07	A to Z of Building Construction	Mantri Construction	Mantri Publication
08	Building Construction Vol. I to IV	W. B. Mackay	Longman(ELBS)
09	PWD Handbooks for- Materials, Masonry, Building, Plastering and Pointing, Foundation	Govt. of Maharashtra	Govt. of Maharashtra
10	Practical Civil Engineering	Khanna	Khanna Publication

	Handbook		

BASIC SURVEYING (BAS): 5C204

COURSE STRUCTURE: -

Teaching Scheme		**Evaluation scheme**						
TH	03		PT	TEE	TW	PR	OR	Total
PR	04	Max marks	20	80	50	50		200
TOTAL	07	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENT (S)

1.)Carry out survey work with chain , cross staff ,prismatic compass .
2).Prepare maps using data related to linear and angular (horizontal) measurements by chain & cross staff survey.
3)Carry out leveling work and prepare the map.
4)Prepare a layout of campus colony using plane table.
5)Set out for alignment for roads, canals, railways.

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. He should develop skills in identifying and making use of traditional modern survey instruments to undertake survey works to highest degree of accuracy and quality output in shortest possible time.

Topic no.	Content	Hours	Marks
1	**Basic concepts** 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, Difference among sketch, map &plan, small scale &large scale map	04	08
2	**Linear measurements.** 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. Ranging, Direct & Indirect ranging. Code of signals. 2.3Chaining 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.	06	12
3	**Chain & Cross Staff Surveying** 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.	08	12

	3.3 Field Book- single line &double line , Locating f features in field book. Location sketches Obstacles in chaining, Cross staff survey and calculation of areas from recorded observations .		
4	**Compass Surveying** **4.1 T**rue 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, **m**agnetic declination, Dip of the needle. 4.2Open 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	11	16
5	**Plane Tables Surveying** 5.1 Introduction, Principal ,Accessories of plane table survey, use of telescopic alidade. 5.2 Temporary adjustments. Orientation, Methods of planetable surveying - radiation, intersection, traversing, merits and demerits of plane tables survey.	05	10
6	**Levelling** 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 levelling instrument and their relationship, Study of 4m leveling staff telescopic, 6.2 Classification of leveling- simple leveling. diffrential 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 readings, Example on Height of collimation and Rise and fall methods, Computation of missing readings, , Examples on leveling.	14	22

TERM WORK:

Term work shall consists of a field book containing procedure ,neat sketches ,description of each of the practical, observations taken and results in the field during practical / project work.

1) Folding and unfolding of a chain .Reading chain, metallic and steel tape.
2) Measurement of distance with chain and tape on plain ground with necessary direct ranging.
3) Measurement of distance with chain and tape on hilly ground with necessary reciprocal ranging.
4) Setting out boundaries of a rectangular plot of size 15m x 20m using cross staff and optical square.
5) Measurement of area of a open land of irregular shape using chain and cross staff survey.
6) To find included angles using prismatic compass.
7) Measuring F-B/B-B of 4-5 sided polygon, identifying the station affected by local attractions & calculation of corrected bearing.
8) Locating objects by method of radiation.
9) Locating objects by method of Intersection.
10) Running a traverse by plane table.
11) Finding RL of various points using dumpy level by simple leveling method.

12) Carry out differential leveling by tilting level and finding RL of various points
13) Carry out fly leveling & check leveling by auto level.
14) Carry out profile leveling & cross sectioning for 30m length with spot level at 5m interval and 20m cross section at 10m interval.

MINI PROJECT:

1)Compass Traverse Project- Prepare layout of a building/campus by running a close traverse -5to 6 sides calculation of included correction of bearing for local attraction, graphical adjustment of closing error to be carried out.
2) Plane Table Survey Project-Prepare layout of a colony / campus using plane table survey
3) Profile levelling & cross sectioning for a road at a suitable interval for minimum 200m length.

Note : Mini project requires three days of work which will be arranged on separate days (one whole day per mini project) and students will prepare drawings of above mini project on full imperial size drawing sheet.

TEXT BOOK

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

HYDRAULICS (HYD) :5C205

COURSE STRUCTURE

Teaching Scheme		Evaluation scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	25	--	150
TOTAL	06	Duration	1 hrs	3 hrs				

COMPETENCIE(S)

1. To estimate hydrostatic pressure on hydraulic structures.
2. To measure flow of fluids through orifice channels, and pipes.
3. Design of distribution pipe system for flow of water in water supply scheme and drainage system.
4. Design the channel sections for carrying irrigation water.
5. To select the pumps of required specification for mini water supply schemes.

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 basic competencies related to flow of fluids to ensure efficient fluid flow systems.

Topic No	Content	Hours	Marks
1	**Properties Of Fluids** 1.1 Definition of fluid. Concept of Ideal & Real fluid Definition of hydraulics. 1.2 Importance of learning hydraulics with special reference to Irrigation engineering and Environmental engineering. 1.3 Physical properties of fluid mass density, weight weight, specific gravity, viscosity, cohesion, adhesion, compressibility, 1.4 Simple Problems on properties of fluid.	4	4
2	**Pressure and Its Measurements** 2.1 Definitions :Pressure, pressure head, free liquid surface, Pressure at a point in static liquid. 2.2 Pascal's law 2.3 Atmospheric pressure, Gauge pressure, Absolute pressure, relation between them, simple problems on calculation of gauge pressures / absolute pressure. 2.4 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	8	8
3	**Hydrostatic Pressure and Its Applications** 3.1Total pressure and centre of pressure on Horizontal, vertical and inclined surfaces, 3.2 Problems on Sluice gates. 3.3 Pressure diagrams- definition and its application to calculate pressure on sides & bottoms of water tanks. Simple problems 3.4Total pressures on vertical faces of gravity dam.	6	8

	, Simple problems		
4	**Hydro kinematics** 4.1 Types of flow – steady and unsteady, uniform and non-uniform, Laminar and turbulent, compressible and incompressible, with examples. 4.2 Discharge and its unit. Volumetric and weighing method of measurement of discharge. Continuity equations for liquids. 4.3 Concept of Datum head, pressure head, velocity head, total head, 4.4 Bernoulli's theorem, modified Bernoulli's theorem, assumption, limitations, Simple problems on Bernoulli's theorem, Simple problems	8	8
5	**Flow Through Pipes** 5.1Laws of pipe friction, major Loss of head due to friction, Determination of frictional losses -Darcy Weisbach equation. ($h_f = flv^2/ 2gd$). Simple problems 5.2 Reynold number and its significance, 5.3 Determination of friction factor by laboratory method and Moody's diagram. 5.4 Minor head losses in pipe loss of head due to sudden contraction, gradualexpansion, gradual contraction, loss of head at entrance, exit and loss of head in various pipe fittings, Simple problems 5.5 Concept of Hydraulic gradient line and total energy line. 5.6 Flow through pipe in series and parallel, equivalent pipe. , Simple problems 5.7 Water hammer phenomenon , Causes, effects and remedial measures. 5.8 Use of nomograms for design of water distribution System	10	12
6	**Flow Through Open Channels** 6.1 Different shapes of artificial channels, wetted perimeter, wetted area, hydraulic mean depth. Chezy's formula and Manning's formula, 6.2 Calculation of discharge through an open channel. Common values of Chezy's constant and Mannings constants for different types of channel surfaces. Simple problems 6.3 Conditions of most economical rectangular and trapezoidal channel sections. Simple problems 6.4 Hydraulic jump phenomenon, situations where hydraulic jump occurs, uses of hydraulic jump.	7	10
7	**Flow Measurement Through orifice** 7.1 Orifice- Definition, jet of flow, vena contracta, use of orifice. classification of orifice according to size, shape and discharge condition, coefficient of contraction, coefficient of velocity, coefficient of discharge. Determination of C_c, C_v, C_d by experiment, (Simple problems) 7.2 Discharge through small and large orifice, Simple problems on hydraulic coefficients and discharge formulae. (Simple problems)	6	6

8	**Flow Measurement Through Pipe** 8.1 Discharge measuring devices in closed conduits /pipes-Venturimeter- Principle component part, expression for discharge, coefficient of meter. (Simple problems) 8.2 Orifice plate meter – Expression for discharge, situation where orifice plate meter is used. (Simple problems) 8.3 Water meters – Principle and use.	5	8
9	**Flow Measurement Through Channel** 9.1 Discharge measuring devices used in open channels- Notches – types of notches, expression for discharge through rectangular and triangular notch. (Simple problems) 9.2 Weir–Expression for discharge. Francis formula, effect of end contraction and velocity of approachon discharge computation, Cippolitte weir. (Simple problems) 9.3 Flumes-Venturi flumes, for discharge. Situations where the above devices are used. Velocity measuring devices.- Surface floats. 9.4 Pitot tube–Principle, types, expression for velocity. (Simple problems) 9.5 Current meter - Types and method for discharge	6	10
10	**Pumps** 10.1 Purpose, Types of pumps. 10.2 Centrifugal pumps - principle of working, component parts, priming of pump, calculation of power required for pumps. (Simple problems) 10.3 Reciprocating pumps principle of working, component parts 10.4 Submersible pump and Jet pump. 10.5 Selection and choice of type of pumps,	4	6

TERMWORK :

List of Experiments:-

1) Measurement of pressure by Piezometer, simple U- tube manometer and Bourdon's pressure gauges.
2) Measurement of pressure difference by U-tube differential manometer.
3) Measurement of discharge by rotometer & measuring tank.
4) Verification of Bernoulli's theorem.
5) Determination of Cc, Cv, and Cd for a sharp edged circular orifice.
6) Determination of coefficient of discharge of a given rectangular or triangular notch.
7) Determination of coefficient of discharge for a given Venturi meter.
8) Determination of friction factors of a given pipe by using experimental set up or using of Moodys diagram.
9) To Study different types of flow by Reynolds apparatus.
10) Determination of minor losses in pipe line for (minimum any two) Sudden contraction, Sudden expression, Bends and Elbows
11) Determination of Chezy's / Manning constant for a given rectangular channel.
12) Demonstration of current meter, water meter and hydraulic jump.
13) Demonstration of centrifugal pump/ Reciprocating pump and selection for given data.

TEXT BOOK

Sr No	Title and Edition	Author	Publisher
	Hydraulic and Hydraulic Machines	R.S.Khurmi	S. Chand & company Ltd. New Delhi
	Elements of Hydraulics	Panchanadikar	Nirali Prkashan
3	Hydraulics	J. R. Muley & B. S Choudhari	Vrinda Publication
4	Hydraulic and Fluid Machines	Dr. P. N. Modi S. N. Seth	Standard Book House, Delhi

REFERENCE BOOK

Sr No	Title and Edition	Author	Publisher
1	Irrigation water power and Water resources engineering	K. R. Arora	Standard Publishers Distributors, New Delhi-6
2	Hydraulic Laboratory Mannual	Lekhi	T.T.T.I. Chandigad
3	Hydraulic Laboratory Mannual	-	M. S. B.T.E. Mumbai

BUILDING DRAWING (BUD) : 5C206

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	01		PT	TEE	TW	PR	OR	Total
PR	04	Max marks	0	0	50	50	--	100
TOTAL	05	Duration	-	-		2		

COMPETENCY STATEMENT (S):

1) Prepare drawings of existing residential building for modification, area calculation for different purposes,
2) Prepare plan for a residential building considering clients requirements conforming to bylaws and principles of architecture.
3) Prepare submission drawings for a residential building and other documents for certification of commencing work
4) Prepare working drawings using submission drawing
5) Prepare presentation drawings

RATIONALE: -

Drawing is language of communication between the engineer and architect planer, structural Engineer, quantity surveyor, supervisor and skilled worker for different types civil engineering construction activities. Civil engineering technician should be able to read, interpret execute and prepare plan a buildings. He should be able to prepare submission drawings of small residential building as per the per the functional utility and requirements of client deriving benefits of nature bylaws stipulated by local authority. He should prepare and read working drawings of civil engineering construction for execution of work. He should be able to prepare presentation drawing.

The knowledge of this subject / course is useful for building construction, estimating & costing, design of structure, surveying, projects etc.

CONTENT

Chapter	Name of topic	Hours	Marks
01	**Introductions** 1.1 Concepts of B I S symbols and notations / conventions as per IS codes used in, 1.2 Lines – visible, hidden, centre line, sectional lines, break line, importance of these lines. 1.3 Different types of building drawings, their scales and uses,	01	
02	**Rules and Regulations** 2.1 Rules and byelaws for building. 2.2 Different technical terms- plot area, side margin, FSI Builtup area, carpet area, plinth area, saleable/super built up area different heights of building, plinth height, total height etc. ventilation requirements minimum dimensions of various rooms etc.	02	
03	**Planning of residential & 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 gives data- site plan, plot size, types of rooms, size of rooms, sanitary block requirements, staircase, passage, verandah, balcony, minimum	06	

	requirement, doors windows sizes and placement. 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,		
04	**Preparation of drawings-** 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,	05	
05	**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.	02	

TERM WORK: -

Preparation of Drawings on full emperor sheet */*graph paper-

1) 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 fond type, any 10 symbols used in building drawing on a full size graph paper.
2) Drawing the Line plans of four types of public buildings on full imperial size graph sheet.
3) 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.
4) 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.
5) Tracing of sheet No.4
6) Ammonia print of sheet No.4 -inking by standard colors showing different feature-plot boundary, water supply line , drainage line etc.
7) Perspective view of a small object related to civil engineering using One Point perspective & Two point perspective drawing method.

PRACTICAL EXAMINATION:

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

a) Drawing line plans of public Building (Solve any one out of two given) 10 marks

b) Develop line plan of given building, (Plan & Elevation) (15+10) = 25 marks

c) Draw Two point perspective drawing (stair block / Pedestal) 15 marks

TEXT BOOK

Sr No	Title and Edition	Author	Publisher
1	Text book of building drawing	Shah Kale & Patki	Tata McGraw hill Publications, Delhi
2	Planing & Design of building	Y. S. Sane	
3	Civil Engineering Drawing	Gurcharan Singh and Subash Chander	
4	Civil Engg. Drawing	Malik & Mayo	New Asian Publisher N. Delhi

REFERENCE BOOK

Sr No	Title and Edition	Author	Publisher
1	Development control Regulations for Graeter Bombay 1991	Urban Development Department	Govt. of Maharashtra
2	A manual of essential architectural Data	Time saver Sdandards	Tata McGraw hill Publications,
3.	Code Practice for Architectural & Building Drawing	IS 962:1989	Bauru of Indian Standards

FUNDAMENTALS OF CIVIL ENGINEERING (FCE): 5C207

COURSE STRUCTURE: -

Teaching Scheme -		Evaluation Scheme						
TH	01		PT	TEE	T W	PR	Oral	Total
PR	02	Max. Marks	-	-	25	-	25	50
TOTAL	03	Duration		-	-	-	-	-

RATIONALE:-

Civil Engineering Technician is involved in different construction activities such as procuring quality material it's testing on site as well as in laboratories, its proper storage for effective use at construction sites. Student must be competent to identify & suggest the most appropriate type of material considering strength requirement, economy in construction. He should know various components of building &have elementary idea about various areas in civil engineering

COMPETENCY STATEMENT:

1) Student should able to make market survey for material required in construction.
2) He should able to identify and use appropriate building construction material & to assess the quality of various building construction material.
3) He should able to suggest the type of material as per requirement.\
4) He should understand various components of building & types of structure in construction
5) He should have brief idea about various areas in civil engineering such as Surveying, Transportation Engineering, Irrigation Engineering, Rural Water Supply Engineering

Course Contents:

Topic No.	Content	Hours	Marks
01	**Civil Engineering materials** **Introduction** 1.1 Importance of the study of material of construction, classification of material 1.2 General engineering properties of material, sampling & testing, sources of information	**02**	--
02	**Building Stones ,Bricks ,Lime** 2.1 Introduction, classification of rocks, requirement of a good building stones, characteristics of stones, common building stones &their uses. 2.2 Manufacturing of bricks, Classification& properties of bricks., requirement of good bricks. 2.3 Introduction, classification of limes, 2.4. Use of lime as construction material	**02**	--
03	**Timber and Wood –Based Products** 3.1 Introduction, sources of timber, Characteristics of good timber defects of timber & decay of timber 3.2 seasoning of timber, preservation of timber, availability & uses of timber,	**02**	--
04	**Building Construction & Drawing** 4.1Terminology**-**Sub-structure, plinth, superstructure , Types of structure 4.2 Components of Building -Cross-section through a load bearing wall	**04**	--

	- Sub-structure- Foundation**,** Bed concrete, - Plinth- U.C.R. Masonry, Brick Masonry 4.3 Superstructure- brick masonry, sill, lintels arches chajja and sunshade, Slab, beam, Column. Stairs Doors & Windows Floors & Floor Finishing Roofs Finishing Work such as Plastering-Pointing Painting to ceiling and wall. 4.4 Center line plan & foundation plan for load bearing structure 4.5 Center line plan & foundation plan for framed structure		
05	**Surveying & Transportation Engineering** 5.1. Introduction to survey, definition of Surveying & leveling, object of survey, 5.2 Principles of surveying, Types of Measurements 5.3 Role of transportation in the development of nation., 5.4 Modes of transportation system – roads, railway, airways, waterways	**03**	--
06	**Irrigation Engineering & Rural Water supply Engineering** 6.1 Definition of irrigation, necessity and scope of irrigation in India. 6.2 Benefits of irrigation 6.3 Sources of Water: Surface water – River, lake, canal etc, Ground water-open well, tube well, springs.	**03**	--

TERM WORK

1) Market survey and data collection of construction materials to know its specification, usage, physical properties, cost. (Minimum 10 material) and group discussion.
2) Field test of bricks: Ringing sound, color, shape, size test, dropping from height etc test.
3) Visit to Saw mill/ timber mart/ precast manufacturing unit & visit report
4) Observing & study of various specimen materials in material lab. A paper from internet related with civil engineering information and group discussion
5) Observing Residential or Public building to identify various components of building.
6) Observing the models, kept in the model room and writing a free hand sketches for any five models
7) Study various components of Highway & Permanent Way with help of model
8) To study/ observe details of Rain water harvesting for any building in campus or On model.
9) Preparing free hand sketches of plan and elevation of a small imaginary building
10) Preparing free hand sketches of Doors & Windows (any two)

REFERENCE BOOKS

Sr.No.	Title	Author	Publisher
01	Material of construction	D.N. Ghose	Tata McGraw-Hill
02	Engineering material	Surendra Singh	
03	Building materials	S. K. Duggal	New Age International
04	Civil engineering material	NITTTR Bhopal	NITTTR Bhopal
05	Building Construction	Sushil kumar	Standard Publication
06	Building Construction	Bindra & Arora	Dhanpat Rai Publication
07	Transportation Engineering	N.L.Arrora	
08	Surveying	Kanetkar/ Kulkarni	
09	Irrigation	B.C.Punmia	
10	Envoirmental Engg.	Kamala	

STRENGTH OF MATERIALS (SOM) : 5Q202

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	05	Duration	1.00	3.00	--	--	--	--

RATIONALE: -

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 forces and corresponding effects on materials and structural elements under various types of loads so that suitable material of suitable strength can be selected for the structural components.

COMPETENCY STATEMENTS: -

1. To study development of different types of stresses and strains in structural elements due to various types of actions viz. tension, compression, shearing, bending, twisting, temperature change etc.
2. To investigate the strength of structural elements of different materials under various types of loadings.
3. Testing of materials used in civil engineering structures to find their properties, behavior and failure patterns under different loading condition conforming to BIS standards.

COURSE CONTENTS:-

	Name of the Chapter / topic (Follow S.I. units)	**Hours**	**Marks**
1.	**Simple Stress & Strain** 1.1. Definition of stress, strain, Hooke's law, Modulus of elasticity, Classification of stresses, strains, sign conventions. Lateral strain, Poisson's ratio 1.2. Stress-strain curve for mild steel and HYSD bar, Yield stress/ Proof stress, Ultimate stress, Breaking stress and Percentage elongation. 1.3. Bars of uniform and stepped cross sections under axial load, Composite sections under axial load, modular ratio, equivalent area.	05	08
2.	**Shear stress and shear strain** 2.1. Concept of shear load, shear stress, shear strain, modulus of rigidity 2.2. State of simple shear, complementary shear stress, punching shear 2.3. Relation between modulus of elasticity, modulus of rigidity (No derivation of formula)	05	06
3.	**Volumetric strain** 3.1. Concept of biaxial stresses, triaxial stresses 3.2. Volumetric strain, formula for volumetric strain and change in volume due to uni-axial, biaxial and tri-axial stresses, bulk modulus, relation between modulus of elasticity and bulk modulus (No derivation of formula) **3.3.** Relation between modulus of elasticity, modulus of rigidity and bulk modulus(No derivation of formula)	06	08
4.	**Temperature Stresses and strains** 4.1. Free deformation of a simple bar due to temperature variation, thermal coefficient 4.2. Development of temperature stress 4.3. Temperature stresses in bars of uniform section - deformation	03	06

	prevented partially and fully		
5.	**Shear Force and Bending Moment in beams** 5.1. Types of beams, types of loading, types of supports 5.2. Concept of shear force and bending moment, sign conventions. 5.3. Point of contraflexure 5.4. Relation between bending moment, shear force and rate of loading 5.5. Shear force and bending moment diagrams for cantilever beam, simply supported beam, simply supported beam with overhang(s) subjected to point loads, uniformly distributed loads and couple	8	14
6.	**Shear stresses in beams** 6.1. Shear stress equation with meaning of terms in equation, shear stress distribution for solid rectangular and solid circular sections. 6.2. Relation between max. shear stress and average shear stress for rectangular and circular solid sections	03	06
7.	**Bending Stresses in Beams** 7.1. Bending of different types of beams(elastic curves) and development of bending stresses and their nature, neutral axis. 7.2. Theory of simple bending, assumptions in theory of simple bending, flexural formula with meaning of all terms, section modulus, bending stress distribution diagram, moment of resistance. 7.3. Application of theory of bending to symmetrical and unsymmetrical cross sections of beam viz. rectangular, hollow rectangular, circular, hollow circular, I- section, T-section, angle section, channel section	06	10
8.	**Direct & Bending Stresses** 8.1. Concept of direct load & eccentric load 8.2. Tension & short compression members subjected to eccentric load with eccentricity about one principle axis only, maximum and minimum stress, resultant stress distribution diagrams 8.3. Rectangular section subjected to load eccentric about one/both axes **8.4.** Condition for no tension, middle third rule, core of the section and limit of eccentricities for rectangular and circular sections **8.5.** Determination of resultant stresses for dam with upstream face vertical. Conditions of stability of dam section.	07	12
9.	**Torsion** 9.1. Theory of pure torsion-assumptions 9.2. Torsion equation, moment of resistance, polar modules 9.3. Shear stress distribution across solid and hollow circular shaft. 9.4. Strength of circular shafts & hollow circular shafts, No problems on comparison of circular & hollow circular shafts in terms of weight, strength 9.5. Power transmitted by shaft	05	10

TERM WORK: -

It shall consist of journal, based on the following experiments

Experiments: - Journal shall consist of any 10 experiments form the following list.

1) Tension test on mild steel specimen - to calculate weight per meter length, yield stress, ultimate stress and percentage elongation to check suitability of material as per BIS requirement
2) Tension test on deformed steel (tor steel) - to calculate weight per meter length, proof stress, ultimate stress and percentage elongation to check suitability of material as per BIS requirement.
3) Compression test on timber- to find the crushing strength along the grain and across the grain/ compression test on Metals
4) Flexural test on timber beam - to plot load deflection curve, to calculate the maximum bending stress at elastic limit, to calculate modulus of elasticity
5) Flexural test on roofing tiles and flooring tiles – to check their suitability as per BIS requirement
6) Field tests and Compression test on bricks - to calculate crushing strength and to classify the bricks as per BIS standards
7) Abrasion test on flooring tiles.
8) Water absorption test on bricks, roofing tiles and flooring tiles.
9) Shear test on any two metals
10) Cold bent test on mild steel and deformed steel.
11) Brinell hardness / Rockwell hardness test
12) Izod impact and Charpy impact test.
13) Torsion Test on mild steel and cast iron.

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
1.	Strength of Materials	Ramamrutham	Dhanpatrai publishing Co.
2.	Strength of Materials	R.S. Khurmi	S. Chand & Co., N. Delhi
3.	Strength of Materials	Sunil Deo	

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	Strength of Materials	Powpov	
2.	Strength of Materials	S.S. Ratan	Tata McGraw hill
	Strength of Materials	Alfred P. Poorman	Mc Graw Hill Book Co. Inc.
3.	Mechanics of Materials	Ferninand P. Beer, E.Russel Johnson	Mc Graw Hill Book Co. Inc.

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THEORY OF STRUCTURES (TOS) : 5C401

Teaching Scheme		Evaluation Scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	00	Max.Marks	20	80	--	--		100
TOTAL	04	Duration	1.15	4.00	--	--	--	--

RATIONALE: -

Civil engineering technician should be able to analyse behavior of components of structure under various types of loads, which will enable him to design the same. This course enables the technician to draw bending moment diagram, shear force diagram for indeterminate beams with different support conditions under various types of loads. This course will make student familiar with basic principles of structural analysis. Students will learn different methods of structural analysis and their suitability.

COMPETENCY STATEMENTS: -

The student shall be able to :

1. Descretise structure into components, understand structural mechanism under different types of loading.
2. Analyse structural components and frames by using basic principles of structural analysis.
3. Use different methods of structural analysis to analyse continuous beam and portal frame.

COURSE CONTENTS:-

Sr. No.	Name of the Chapter / topic / Content (Follow S.I. units)	Hours	Marks
1.	**Principal planes & principal stresses** **1.1** Concept of simple shear, normal & tangential stress, resultant stress, Definition of principal stresses & Principal planes, maximum shear stress. **1.2** Determination of normal, tangential & resultant stress, maximum shear stress & its position for a member subjected to uniaxial load/stress. **1.3** Determination of normal, tangential & resultant stress, maximum shear stress & its position for a member subjected to biaxial 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.	08	12
2.	**Slopes and Deflection** **2.1** Concept of slope and deflection, stiffness of beams. Relation between slope, deflection and radius of curvature, boundary conditions. **2.2** Methods for calculating slope & deflection, Double integration method , derivation of standard formulae for maximum slope and maximum defection for cantilevers & simply supported beams, application to cantilever & simply supported beams subjected to concentrated and uniformly distributed loads. **2.3** Macaulay's method, application to cantilever, simply supported beams subjected to concentrated and uniformly distributed loads.	10	12
3.	**Fixed Beams** **3.1** Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam, fixed end moments. **3.2** Principle of superposition, Using first principal derivation of formulae for fixed beam subjected to uniformly distributed	10	12

	load over entire span, central point load, point load at any position.. **3.3** Application of standard formulae in finding end moments and drawing shear force and bending moments diagram for fixed beams subjected to concentrated loads & uniformly distributed load over entire span only.		
4.	**Continuous Beams** **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 the theorem up to three spans only & two unknown support moment only, supports at same level, Beams of equal or unequal moment of inertia subjected to concentrated loads and U.D.L. **4.4** Drawing of shear force and bending moment diagrams.	10	14
5.	**Moment Distribution Method** **5.1** Introduction, sign convention, carry over factor, stiffness factor, moment distribution theorems, distribution factor. **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 moment of inertia, drawing shear force and bending moment diagrams (supports at same level). **5.3** Application of moment distribution method to non-sway, single bay, single story symmetrical portal frames, having same or different moment 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)	10	12
6.	**Columns** **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. **6.2** Euler's theory, assumptions, buckling load, factor of safety, safe load, application of Euler's theory calculating load and designing solid circular or hollow circular section, limittations of Euler's theory. **6.3** Empirical formulae – Rankin's formula for calculating load and designing solid circular or hollow circular section.	06	08
7.	**Analysis of Trusses** **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 joint. **7.3** Determination of axial forces in the members of the truss using method of section.	10	10

TEXT BOOKS:

Sr no.	Title	Author	Publisher
01	Theory of structures	R. S. Khurmi	S. Chand & company Ltd. New Delhi
02	Analysis of structures	V. N .Vazrarni & M. M. Ratwani	Khanna Publishers, Delhi
03	Mechanics of Structures – I & II	S. B. Junnarkar	Charotor Publishing House, Anand
04	Theory of structures	S. Ramamrurhum	Dhanpat Rai & Sons, Delhi
05	Theory of structures	B. C. Rangwala	Charotor Publishing House, Anand

REFERENCE BOOKS:

Sr no.	Title	Author	Publisher
01	Basic Structural Analysis	C.S. Reddy	Tata McGraw Hill Co., New Delhi
02	Theory of structures (Vol-I)	Gupta Pundit	Tata McGraw Hill Co., New Delhi
03	Theory of structures	Dr. B. C. Punima	SBH, New Delhi

SOIL ENGINEERING (SOE) : 5C402

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	5	Duration	1.00	3.00	--	--	--	--

RATIONALE: -

Civil engineer has to supervise construction of highways, canals, railways, earthen dams, check dams. He should be able to find out bearing capacity of soil, density of soil and other parameters required in deciding the type of foundation and extent of compaction, stability of slopes.

COMPETENCY STATEMENTS: -

1) Conduct tests on soil samples for its classification.
2) Conduct tests on soil to find its density, shear strength
3) To propose admixtures and chemicals to enhance strength of soil.

COURSE CONTENTS:-

	Name of the Chapter / topic	Hours	Marks
1.	**Overview Geotechnical Engineering** 1.1. Definition of soil, Importance of soil in civil engineering as construction material, as foundation bed for structures, field application of geotechnical engineering in foundation design, pavement design, design of earth structures, design of earthen dams.	04	06
2.	**Physical Properties of Soil** 2.1. Soil as a three phase system, Water content, Void ratio, porosity and degree of saturation, density index, Unit weight of soil mass-bulk unit weight, dry unit weight, unit weight of solid, saturated unit weight, submerged unit weight. 2.2. Specific gravity, consistency of soil, stage of consistency, Atterberg limits of consistency, plasticity index. Particle size distribution, mechanical sieve analysis as per IS code, particle size distribution cure, effective diameter of soil, uniformity coefficient and coefficient of curvature, well graded and uniformity graded soil. 2.3. Particle size distribution of soil and IS classification of soil.	10	16
3.	**Permeability of soil and seepage analysis.** 3.1. Definition of permeability, Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil. Factors affecting permeability, determination of Coefficient of permeability by constant head test, variable head test, simple problems on determination of coefficient of permeability.	06	12
4.	**Shear Strength of Soils. (H-06, M-06)** 4.1. Shear failure of soil, field situation of shear failure, concept of shear **s**trength of soil, components of shearing resistance of soil cohesion, internal friction Mohrs – Coulomb failure theory, strength envelope, strength equation, purely cohesive and cohesion less soil. 4.2. Laboratory determination of shear strength of soil, direct shear test, unconfined compression test, vane shear test	06	10
5.	**Bearing capacity of soil** 5.1. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure,	06	10

	5.2. Terzaghi's theory – assumption and analysis, effect of water table on bearing capacity, field method for determination of bearing capacity, plate load test and standard capacity test as per IS 1888 and IS 2131. 5.3. Typical values of bearing capacity from building code. 5.4. Types of foundations, Selection of foundations and their Comparison		
6.	**Soil Compaction** 6.1. Definition of compaction and its necessity, field situation where compaction is required, standard proctor test as per IS code, compaction curve, optimum moisture content, maximum dry density, zero air void line. 6.2. Modified proctor test, factors affecting compaction, field method of compaction - CBR test, significance of CBR value, difference between compaction and consolidation, concept of stabilization, necessity of soil stabilization	10	16
7.	**Site investigation and sub soil exploration** 7.1. Necessity of investigation and sub soil exploration, types of exploration – general, detailed. Methods of site exploration, open excavation and boring, criteria for deciding the location and number of test pits and bores. Disturbed and undisturbed soil samples for lab testing. 7.2. Soil sample of lab testing, field identification of soil, dry strength test, dilitancy test, toughness test. Empirical correlation between soil properties and SPT values	06	10

TERM WORK (PRACTICALS):

Laboratory work shall consist of following experiments.

1) Determination of Water content.
2) Determination of specific gravity of coarse soil by pycnometer.
3) Determination of bulk density of soil by sand replacement method.
4) Determination of dry density of soil in situ by core cutter method.
5) Determination of liquid limit, plastic limit and plasticity index
6) Determination of grain size distribution of given soil by mechanical sieve analysis and determination of C_c and C_u
7) Determination of permeability of soil by constant / variable head method
8) Determination of optimum moisture content and maximum dry density using standard proctor test
9) Direct shear test to find shear strength parameters (c and ϕ) and shear strength of soil sample collected from foundation strata.
10) Determination of shear strength of soil using Vane shear test.
11) Determination of California Bearing Ratio of a soil sample collected from proposed road.
12) Determination of shrinkage limit of a soil sample

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
1.	Soil mechanics and foundation engineering	B. C. Punmia	Standard Book House, Delhi
2.	Geotechnical Engineering	Banhatti/Upadhye	Tech-Max publication

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	Principles of Soil mechanics and foundation engineering	VNS Murty	UBS Publishers and Distributors
2.	Geotechnical Engineering	P.Purushottama Raj	Tata Mc GrawHill publishing co.ltd.
3.	Engineering properties of soil	Shashi K. Gulhati	Tata Mc GrawHill publishing co.ltd.
6.	Soil engineering (Teachers guide)	T. T. T. I. Chandigarh	T. T. T. I. Chandigarh

SURVEYING (SUR): 5C403

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	04	Max marks	20	80	50	50		200
TOTAL	07	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENTS:

1) Prepare contour maps & contour section and draw inferences.
2) Measurements using theodolite and prepare drawings,
3) Setting out of simple circular curve for roads.
4) Use latest / advanced survey instruments for speedy & quality survey works.

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. He should develop skills in identifying and making use of traditional as well as modern survey instruments to undertake survey works to highest degree of accuracy and quality output in shortest possible time.

Topic	Content	Hours	Marks
1	**Contouring**- 1.1Definition of contour & contour interval, horizontal equivalent, Uses of contours. Characteristics of contours. 1.2 Methods of contouring, Interpolation of contours-by arithmetic calculation, by estimation. 1.3 Grade contour –Location of grade contour on contour map, field location of grade contour.	07	12
2	**Area and Volume Calculation** 2.1 Polar planimeter -components, procedure of measurement of contour area, simple problem on calculation of area. 2.2 Digital planimeter- Study & use of Digital planimeter 2.3 Volume calculation between two contours by cone formula and prisomoidal formula.	04	08
3	**Theodolite Surveying**- 3.1Introduction, Technical Terms,-Essentials of transit theodolite, Reading vernier, Temporary adjustments of a theodolite. Measurement of horizontal angle by direct method and repetition method, Errors eliminated by method of repetition., 3.2Measurement of vertical angle. Measuring magnetic bearing of a line, measure deflection angle. Prolonging a straight line. Sources of error in theodolite work, 3.3Traverse survey -by method of included angles, By Fast needle method, By Deflection angles method, Checks by liner and angular measurements. Traverse computation- Gale's traverse table. Simple Numerical problem.	14	22
4	. **Tachometric surveying** 4.1Introduction and advantages of Tachometry, Principle of tachometry, Use of theodolite as a tachometer with a vertical staff fixed hair system (formula not to be derived), 4.2Determination of tachometric constants, Numerical on determination of distance and elevations from tachometric observations,	09	14

	4.3Contouring by Tachometric survey,		
5	**Advance Survey Instruments** 5.1 Micro-optic theodolite- Study of components ,use& advantages 5.2Electonics/Digital theodolite –Study of components , use& advantages 5.3 Total station- Study of components , use & advantages	03	06
6	**Curves-** 6.1 Types of curves, Their application, Notation & Elements of simple curve, 6.2 Methods of setting out of simple curves, - Offset from long chord & Rankine's method. Numerical problems.	06	10
7	**Route Survey & City Survey.** 7.1Reconnaissance survey, preliminary location survey, final location survey. 7.2 City Surveying- Procedure of topographic survey - representation of relief. Preparation of topographic map, street map, property map, water supply & sanitary map, electrification map. 7.3. Topo sheets and use.	05	08

TERM WORK:

Term work shall consists of a field book containing procedure ,neat sketches ,description of each of the practical, observations taken and results in the field during practical / project work.

List of Practicals :

1. Contouring of 30m X 20m area with block size 5m x5m by indirect contouring method.
2. To find area of contour by Polar planimeter.
3. To find area of contour by Digital planimeter and finding volume between two contours.
4. Identifying components and functions of various parts of theodolite and reading verniers
5. Measurement of included angle by theodolite .
6. Measurement of horizontal angle by repetition method.
7. Measurement of deflection angle by theodolite
8. Measurement of magnetic bearings by theodolite
9. Measurement of vertical angles by theodolite
10. Finding out the constants of tachometer.
11. Finding height of building / tower and horizontal distance using a tachometer.
12. Finding out horizontal and vertical angle by micro optic theodolite
13. Finding out horizontal angle, vertical angle, horizontal ,vertical and sloping distances by EDM/Total Station .
14. Setting out simple circular curve by offsets from long chord.
15. Setting out simple circular curve by Rankines Method using electronics theodolite.
16. Locating various features in a given topographical Map.

Mini - Project:

1) Block contouring project -for land of size.200mx200m with block size 10mx10m and preparation of contour map..

2) Theodolite traverse survey - A closed traverse of 5/6 sides for a small area computation by Gale's table.

Note: Mini Projects will require two days of work which will be arranged exclusively on separate days (One whole Day per Mini Project). Students will prepare drawings of above mini project on full imperial size drawing sheet.

TEXT BOOK

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

AUTOCAD FOR CIVIL ENGINEERING (AUC) : 5C404

Teaching Scheme		Evaluation Scheme						
TH	01		PT	TEE	TW	PR	OR	Total
PR	04	Max. Marks	--	--	25	50	--	75
TOTAL	05	Duration	--	--	--	3.00	--	--

RATIONALE: -

It is the age of most accurate and decent presentation of plans to satisfy the client. Use of computer software such as AutoCAD enables civil engineers to prepare quality drawings in shortest possible time without any human errors. This relives him of laborious, tedious work of draftsmanship. This helps also to generate all possible working drawings using the basic data and basic drawing. This will prove to be very handy in the supervision. Perspective view and Three dimensional views are handy tools for an engineer to explain the elevation of a structure / building to a common man for his better understanding,

COMPETENCY STATEMENTS: -

At the end of the course student will able to

1. To prepare the submission drawing with AutoCAD.
2. To prepare the service/working drawings with AutoCAD
3. To prepare contour map from available inputs
4. To prepare a three dimensional drawing of one room
5. To draw perspective view of small building

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COURSE CONTENTS:-

	Name of the Chapter / topic	Hours	Marks
1.	**Introduction:** 1.1. Definition, advantages and disadvantages compared to manual drafting, 1.2. starting up AutoCAD, AutoCAD graphics window, and command window, 1.3. Drop - down menus, toolbar. 1.4. Saving the drawing with save and save as command	01	--
2.	**AutoCAD:** 2.1. UCS icon, 2.2. coordinates, relative coordinates Cartesian coordinates and polar coordinates. 2.3. Drawing units, drawing size, grid, drawing limits, 2.4. Drawing with grid and snap, ortho feature. 2.5. Drawing Objects: Line, circle, rectangle, ray, polyline, multiline, polygon, arc, ellipse, object snap.	02	--
3.	**Editing commands:** 3.1. Use of following command with their option copy, move offset, fillet, chamfer, trim, lengthen, mirror, rotate.	02	--
4.	**Drawing strategies:** **4.1.** Laying out walls, external wall lines, internal wall lines, cutting wall openings, **4.2.** creating doors, drawing swinging doors, copying objects, mirroring object, drawing a sliding glass door. **4.3.** Drawing the steps & thresholds, **4.4.** Drawing balcony etc. **4.5.** Laying out the kitchen, the counter, the store & refrigerator, kitchens sink Laying the bathroom. **4.6.** Setting & running object snaps, drawing a shower unit, bathrooms sink, positioning a toilet.	01	--

5.	**Using layers to organize drawing:** **5.1.** Layers as an organization tool, setting up layers, layer properties manager dialog box, **5.2.** Assigning objects to layers, freezing and turning off layers, drawing the headers, **5.3.** Drawing the roof, assigning a color or line type to an object making a color or line type current, **5.4.** Assigning an individual line type scale factor.	01	--
6.	**Using blocks in Drawing:** **6.1.** Making a block for a door, inserting the door block, **6.2.** Finding blocks in a drawing using grips to detect a block, using properties dialog box to detect a block, using list command to detect a block, using properties dialog box to detect a block, **6.3.** Creating a window block during insertion, using guidelines when inserting a block, using point filters to insert a block, using blips to help in inserting blocks, finishing the window, **6.4.** Revising block, inserting a block in drawing. DWG file into another DWG file..	01	--
7.	**Generating Elevations:** **7.1.** Drawing the front elevation **7.2.** Setting up lines for the heights, **7.3.** Trimming lines in the elevation, **7.4.** Drawing the roof in elevation, putting in the door, **7.5.** Step and windows, finishing touches. • **7.6** Making the rear, left and right elevations. **7.7.** Drawing scale considerations	01	--
8.	**Working with Hatches and fills:** **8.1.** Hatching the front elevations: looking at hatch pattern, special effects, modifying a hatch pattern. **8.2.** Using hatches in the floor plan: hatching the floors, finishing the hatches for the floors, hatching the walls in the floor plan. **8.3.** Modifying the shape of hatch patters.	01	--
9.	**Controlling text in drawing:** **9.1.** Setting up text styles: text and drawing scale, defining a text style for room labels **9.2.** Using single 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. **9.3.** Using multiline text.	01	--
10.	**Dimensioning a drawing:** Dimension styles: Making a new dimension style. **10.1.** Placing dimensions on the drawing: Horizontal dimensions, vertical dimensions, radial dimensions, leader lines, angular and aligned dimensions **10.2.** Modifying dimensions: Modifying dimension text, dimension overrides dimensioning short distances.	01	--
11.	**Using layouts to set up a print:** **11.1.** Drawing a border on a layout, **11.2.** Designing a title block for a layout, adjusting a view port, **11.3.** switching between model, **11.4.** Space and a layout Setting up multiple view ports, aligning view ports, setting up view ports in different scales, adding multiple view ports to a layout, **11.5.** Adding text to paper space, turning off view port.	01	--
12.	**Printing an AutoCAD drawing:** **12.1.** The plot dialog box: Paper size and paper units, drawing orientation and plot scale, plot offset and plot options, plot area. **12.2.** Printing a drawing: Determining line weights for a drawing, setting	01	--

	up the other parameters for a print previewing a print **12.3.** Printing a drawing using layouts: Printing a drawing with multiple view ports printing the site plan		
13.	**Preparing three dimensional Drawings in AutoCAD:**	01	--
14.	**Preparing Perspective Drawing in AutoCAD:**	01	--

TERM WORK: -

Term work shall consist of preparation of submission drawing / Working Drawing using drawing blocks and layers.

Assignments:

1) Single line plan (residential / public building.) --Four Nos.
2) Double line plan (residential / public building.) -- Four Nos.
3) Submission drawing of a residential building. --One No.
4) Submission drawing of a public building. -- One No.
5) Preparation of contour Map – One No.
6) Preparation of working Drawing – One No.
7) Drawing cross sections and longitudinal sections showing reinforcement details in slab, beams and columns.
8) Preparing 3-D view of a room
9) Preparing perspective view for small building

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
	Auto CAD	David Frey	
	AutoCAD	Raje	
	Teach yourself AutoCAD		

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1	Mastering a AutoCAD		

RAILWAY, BRIDGE & TUNNEL ENGINEERING (RBT): 5C405

COURSE STRUCTURE:

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max. marks	20	80	25	--	25	150
TOTAL	05	Duration	1 hrs	3 hrs	--	--	--	--

COMPETENCIES

The students will

1. Know component parts of railway, bridges and tunnels.
2. Understand methods of survey and investigation of alignment of railway, bridges and tunnels.
3. Organize, supervise and coordinate the construction activities related to railway, bridges and tunnels.
4. Understand, prepare and interpret the drawings related to work.

RATIONALE:

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

CONTENTS:

CHAPTER NO.	CONTENT	HOURS	MARKS
1	**RAILWAY ENGINEERING.** **Introduction :** **1.1** Classification of Indian railways, zones of Indian railway. **1.2** 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	4	6
2	**Permanent Way** **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.	8	12
3	**Railway Track Geometric** **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	4	8

	Turnout, Line Sketches Of Track Junctions Crossovers- Scissor, Diamond Crossing		
4	**Station and Yards :** **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 – its requirements, marshalling yard	2	6
5	**Laying and Maintenance of Railway Track :** **5.1**Purpose of laying of railway track, different method of laying **5.2** Maintenance of railway - necessity, types, tools required, duties of permanent way inspector.	2	4
6	**BRIDGE ENGINEERING :** **Site Selection and Investigation** **6.1**Factors affecting selection of site of a bridge. bridge alignment, collection of design data **6.2**Classification of bridges according to function, material, span, size, alignment, position of HFL	3	6
7	**Components Of Bridge :** **7.1**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., **7.2** Foundation –piers-function & types., abutment – function, types, **7.3** Wing walls – functions and types, **7.4** Bearing – functions, types of bearing for RCC & steel bridges, **7.5** Approaches –Functions & types Bridge flooring- open and solid floors	9	14
8	**Permanent and Temporary Bridge :** **8.1** Permanent bridges - Culverts, causeways, Steel bridges, RCC girder bridge, pre stressed girder bridge, cantilever, suspension bridge, flyover bridge **8.2**Temporary bridge – timber, flying, floating bridge. **8.3** Inspection & maintenance of bridges-routine & special maintenance.	8	12
9	**Tunneling :** **9.1** Tunnel – definition, advantages, necessary, classification of tunnel, surveying locating center line on ground, transferring center line inside the tunnel. **9.2**Construction method of tunneling in soft rock & hard rock, precaution in construction in tunnels, drilling, types of explosives used in tunneling, tunnel lining and ventilation.	8	12

PRACTICAL/TERM-WORK-

1) Identification of components, layout and drawing the sketches of components by arranging a visit to a railway station
2) Identification of components, layout and drawing the sketches of components by arranging a visit to a major bridge
3) Identification of components, layout and drawing the sketches of components by arranging a visit to a slab or pipe culvert.
4) Mini-Project: Under this following are the activities to be carried out for slab or culvert design..
   a)Road-nala crossing survey and Nala survey.
   b) Collection of data regarding catchment area and rainfall
   c)Preparation of drawing sheets-(i)L/S and C/S of Road-nala crossing survey and Nala survey.(ii) L/S and C/S of bridge.

d)Calculation of necessary hydraulic data.
e) Marking the layout of above slab/pipe culvert

TEXT BOOKS:

Sr. No.	Title and Edition	Author	Publisher
1	Tunneling	S. C. Saxena	Dhanpat Rai & Sons, New Delhi
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
6	Transportation Engineering	J. R. Muley	Vrinda Publications, Jalgaon

ROAD ENGINEERING (ROE) : 5C406

COURSE STRUCTURE:

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max. marks	20	80	25	--	25	150
TOTAL	05	Duration	1 hrs	3 hrs	--	--	--	--

COMPETENCY STATEMENTS:

1. Survey and investigation for location of new road.
2. Organize, supervise and co-ordinate construction activities on site.
3. Observe quality and reliability of roadwork.
4. Prepare & interpret the drawings related to the work.
5. Select & test materials on site and laboratory as per requirements.
6. Handle skilled workers and monitor quality control parameter related to work.
7. Improvement, maintenance and repairs of existing roads.

RATIONALE:

There is very much scope of road development and its maintenance in our country. The road is effective means communication. Student of Diploma in Civil Engineering works as technician in P.W.D. and road construction organization. Also under take the road works on contract basis. This subject gives the knowledge and skills required to carry investigation, design, construction, maintenance works related to the roads.

CONTENT :

Chapter No.	Content	Time Hrs	Marks
1	**. Introduction :** 1.1 Role of transportation in the development of nation. Classification of roads according to Nagpur road , Expressway features. 1.2 plan , Modes of transportation system – roads, railway, airways, waterways , Importance of each mode, 1.3 comparison and their relative merits and demerits, 1.4 Necessity & importance of Cross drainage works for roads, classification of urban roads. 1.5 Concept of BOT (Built, operate & Transfer) for MSRDC road construction.	**3**	**4**
2	**Investigation For Road Project :** 2.1 Reconnaissance survey, Preliminary survey for a road project. Fixing the alignment of road, Factors affecting alignment of road. 2.2Detailed survey for the road project – plotting L- Section and C/S sections of road, scale used. 2.3Survey for availability of construction material, location of quarry 2.4 Land acquisition procedure for road	**5**	**8**
3.	**Geometric Design Of Highways :** **3.1 Cross section elements-** Definition, purpose, types & IRC Specifications- Roadway, shoulder, right of way, carriage way, C/S in cutting and embankment. **3.2Gradient**– Definition, types, IRC specification. 3.3**Sight distance** – definition, types IRC	**10**	**16**

	Specification. 3.4**Curves** – Necessity, types of cures – horizontal, vertical, transition. General idea about providing horizontal curves. Widening of roads on curves **3.5Super Elevation** – definition, necessity & importance formula for calculating super elevation, minimum and maximum values of super elevation, methods of providing super elevation, Sketching of standard C/S of national highway in embankment and cutting. **Simple numerical Problem on geometric design of road.**		
4.	**Highway Materials & Testing.** 4.1 Type of road materials,- soil, Aggregates, Bitumen, cement concrete, test on soil sub grade, 4.2 Test on bitumen – penetration, ductility, softening point test. 4.3 Types of roads according to materials used. 4.4 Pavement – objective of pavement, types, structure of pavement, function of pavement components	**03**	**08**
5.	**Construction Of Earthen , Soil Stabilized Road & Water Bound Macadam Road :** **5.1 General terms used**- borrow pits, spoil bank, lead and lift, balancing of earthwork. Construction procedure – setting out construction limits, construction operation – clearing, stripping and storing top soil, placing of embankment, rolling and finishing (refer IRC 36-1970) **4.2 Soil Stabilized Roads** – Necessity, Methods of Soil Stabilization, Brief details of mechanical soil Stabilization only. **5.3 Water Bound Macadam Roads** – Materials Used, Size And Grading of aggregates and IRC recommendations detailed construction procedure including precautions in rolling, blind edge and blind age layers.	**06**	**10**
6	**Construction Of Bituminous Roads:** **6.1 Terms used** – bitumen, asphalt, emulsion, cutback, tar, common grades adopted for 6.2 **constructions.** Types of bituminous surface – prime coat tack coat, seal coat (IRC-16- 1965) 6.3 **Surface dressing**– procedure of construction and detailed specification refer IRC – 22 - 1966 and IRC – 17 – 1965. Penetration macadam 6.4 **bituminous macadam** – procedure of construction and detailed specifications (refer IRC-20–1966) 6.5 **Premixed-** Bitumen/Tar carpets –procedure, construction and detailed specifications.	**06**	**10**

7	**Cement Concrete Roads-** 7.1 Material, construction procedure, various equipments, joints – joint filler and joint sealer.	**03**	**04**
8	**Traffic Engineering** 8.1 Definition , scope of traffic engineering. , traffic characteristics, 8.2 traffic studies, volume studies, speed studies, counting the traffic volume, parking studies, accident studies, 8.3 Purpose & sketches-regulatory sign , warning sign, signal & Island.	**6**	**10**
9.	**Drainage & Maintenance Of Roads :** 9.1 **Surface drainage**–side gutter, catch water drains, surface drainage. Sub–surface drainage – L – drains, cross drains. 9.2 **Maintenance of roads**.- Necessity ,types , Defects in bituminous road and Cement Concrete. Road , maintenance, operation for bituminous road	**6**	**10**

TERM WORK
List of Practicals:

1. Road project for a road of minimum 0.5 km. Length, Site selection. Reconnaissance surveys, fixing the alignment, detailed profile survey along the alignment, prepare drawing of longitudinal section and typical cross sections of the road in cutting and filling. (Full Imperial sheet)

2. Identify the construction procedure of a road by visit to study construction procedure of WBM road / flexible pavement / rigid pavement roads for observing the various construction step and construction equipments.
3. 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)
4. Observe different types for observing defects in roads by Visit & report which consist of
   (a) Listing various defects observed in different types of roads.
   (b) Sketches of different defects
   (c) Suggestions regarding the possible remedial measure.

5. Visit to Bituminous hot mixed plant to see various operation of Premixed bituminous concrete and write a report on it.

6. Performing test on bitumen for determination of Ductility
7. Performing test on bitumen for determination of Penetration.
8. Performing test on bitumen for determination of Softening point test.

TEXT BOOKS:

Sr. No.	Title and Edition	Author	Publisher
1	Highway Engineering	Justo & Khanna	Nem Chand & Bros.
2	Transportation Engineering	N. L. Arora	Standard Publications, New Delhi
3	Road, Railway, Bridges	Birdee & Ahuja	Standard Publications, New Delhi
4	Road, Railway, Bridges and Tunnel Engineering	V. L. Gupta	Standard Publications, New Delhi
5	Transportation Engineering	Kamala.	Tata MaGraw

REFERENCE BOOKS:

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

IRRIGATION ENGINEERING (IRE) : 5C407

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	--	25	150
TOTAL	06	Duration	1 hrs	3 hrs				

COMPETANCIE(S): -

1. Plan and supervise construction and erection of different types of structures used for water retaining and distribution system in irrigation scheme.
2. Supervise operation and maintenance works of irrigation system.
3. Plan and design of simple and small hydraulic structures (canals and spillways or waste weirs)
4. Read and prepare construction/design drawing related to irrigation scheme.
5. Plan and design minor irrigation scheme.

RATIONALE: -

Civil engineering technician has to design elements of minor irrigation schemes. he has to supervise construction, operation and maintenance of irrigation structures of any type of irrigation schemes. he has to also ensure optimum use of water resources through effective distribution system and crop pattern in command area.

CONTENT

Chapter	Name of topic	Hours	Marks
01	**Introduction** 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, methods of irrigation. 1.3 Study of national water policy 2003, State water policy-2005	4	4
02	**Hydrology** 2.1 Definition of Hydrology 2.2 Defination of Rainfall, rain gauge and rain gauge station, types of rain gauge (only names), average annual rainfall and its calculation, Catchments – types, 2.3 Defination of runoff, Factors affecting run off, Determination of runoff by -Inglis formulae, Stranges and Binnie"s table. Estimation of maximum flood discharge by different methods, Concept of unit hydrograph. 2.4 Yield, dependable yield and its calculation.	4	6
03	**Water Requirement for Crops** 3.1 Crops in Maharashtra, cropping seasons in Maharashtra 3.2 Base period, crop period for a crop, duty and delta, factors affecting Duty, GCA,CCA and IA command, 3.3 Simple problems on water requirement Methods of assessment of water- their advantages and disadvantages, water user association (WUA)concept	4	6
04	**Water planning** 4.1 Preliminary and detailed engineering surveys undertaken for preparing preliminary and detailed irrigation project report. list of survey data to be attached with project report. 4.2 Selection of site for a reservoir. area capacity curves,	8	10

	silting of reservoir, factors affecting silting,. evaporation from reservoir, method of reducing evaporation, application of remote sensing for reservoir sedimentation calculations. 4.3 Calculation of dead storage, live storage, gross storage, fixing control levels, simple calculations of fixing of control levels.		
05	**Dams and spillways** 5.1 Classification of dams – according to use, material, design. 5.2 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. 5.3 Earthen dams – components of earthen dam and their functions, Typical cross section of earthen dam, causes of failure of earthen Dam, seepage through earthen dams, Methods to reduce seepage through embankment and foundation, Construction procedure of earthen dam. 5.4 Spillways – purpose, types of spillways. Spillways crest-Put logs, radial gates, vertical lift gate , Godbole gate Visvesvarya gate.	12	16
06	**Minor Irrigation scheme** 6.1 Bandhara – purpose, component parts and layout, advantages and disadvantage, solid and open bandhara 6.2 Percolation tank – necessity, selection of site, component parts 6.3 Open and tube well, yield of wells, method of determining yield and Recuperation test, Comparison of open well and tube well with respect to type of aquifer, dimension of well, rate of flow, stability of water table, cost of scheme	8	10
07	**Diversion Head Works** 7.1 Layout of diversion headwork with its components and their functions- divide wall, bunds, silt excluder, channel head regulator etc. 7.2 Weirs – functions, types, sloping weir, vertical drop weir, dry stone weir, pick up weir, situation favoring its constructions. Downstream protection – inverted filter and downstream protection work, vertical cut off- curtain walls/sheet piles. 7.3 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.	8	10
08	**Canal and Cross Drainage Works** 8.1 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 8.2 Cross drainage works, aqueduct, siphon aqueduct, super passage, level crossing, cross regulator, 8.3 Canal lining – purpose and common material used, advantages of canal lining, Maintenance of canal. Water logging-causes, effects, prevention and remedial measures. Salt efflorescence – methods of preventing salt efflorescence.	12	12
09	**Lift and Micro Irrigation** 9.1 Lift irrigation – lifting water from river, cannel, necessity,		

	layout of lift irrigation scheme, pump, rising main, storage tank, distribution system. 9.2 Micro irrigation – types of micro irrigation, layout of Drip/ Sprinkler irrigation scheme, component parts, merits and demerits, operation and maintenance of scheme.	4	6

TERM WORK:

Term work shall consists of the following assignment

Data should be collected from irrigation Engineering department or Irrigation project and process

1. Collection of information from department and prepare list of documents and drawing required for minor irrigation project.
2. Determination of yield from a topo sheet of a catchment, plot catchment area and determine catchment area by planimeter.
3. Canal capacity calculation from a given command area and cropping pattern.
4. Preparation of area, capacity elevation curve/ table from a given contour map of a reservoir..
5. From a given data Fixing of control levels for the reservoir.
6. Prepare drawings of a typical section earthen dam with drainage details.
7. Determine the balancing depth from given data of canal section and alignment. Prepare drawings of canal section in banking and cutting.
8. Prepare checklist for pre monsoon and post monsoon repairs/ maintenance for irrigation work.
9. 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.
10. Arrange expert lecture of Irrigation Engineering Department person current practices & prepare report of it.

TEXT BOOK

Sr No	Title and Edition	Author	Publisher
1	Irrigation and water Power Engineering 12th Edition	Dr. Punmia B. C. & Dr. Pande B.B.	Laxmi Publication
2	Textbook of Irrigation Engineering 2nd Edition	J.G. Dahigaonkar	Wheeler Publication
3	Irrigation Engineering 1st Edition	Upadhya N.A.	Tech-Max Publication
4	Irrigation and Hydraulic structure	Garg S. K.	Khanna Publisher, New Delhi

REFERENCE BOOK

Sr No	Title and Edition	Author	Publisher
1	Study of national water policy 2003,		Govt. of India
2	State water policy-2005		Govt. of Maharashtra
3.	Hand book		Irrigation Dept.
4	Manual of Minor irrigation		Govt. of Maharashtra

WATER SUPPLY & SANITARY ENGINEERING (WSS): 5C408

COURSE STRUCTURE:

Teaching Scheme		Evaluation scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	02	Max. marks	20	80	25	--	25	150
TOTAL	06	Duration	1 hrs	3 hrs	--	--	--	--

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.

COMPETENCY STATEMENTS:

1. Understanding different units of water supply scheme.
2. Supervise construction, operation and maintenance of water supply Schemes
3. Perform tests on water sample to ascertain its potability
4. Perform tests on sewage sample to decide its harmlessness
5. Understanding different units of sewage treatment scheme.
6. Understanding water distribution system and sewage system for disposal of waste.

CONTENTS:

Topic No.	Content	Hours	Marks
1	**Sources of Water** 1.1 Surface water – River, lake, canal etc, Ground water-open well , tube well , Springs. 1.2 Intake – river , reservoir, canal, jack well - its purpose	3	4
2	**Estimation of Demand of Water** 2.1 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 2.2 Design period for water supply scheme. Forecasting of population, methods of Forecasting. Estimation of total quantity of Water for a town.	6	8
3	**Quality of Water and Analysis of water** 3.1 Potable water, impurities present in water and it classification. Need of water analysis. 3.2 Tests on water – Water sampling for test, precautions to be taken for collection of sample Physical tests, Chemical tests -total solids, hardness, chlorides, dissolved	5	8

	gases, pH ,Sulphate , Nitrogen and its compound, Bacteriological test – e – coli index , MPN. . Standards for potable water as per I.S. specification & WHO		
4	**Conveyance of water** 4.1 Schematic arrangement of water supply scheme, jack well, pump house, pumps, rising main, supply reservoirs 4.2 Different types of pipes used for conveyance of water, choice of pipe material, joints in CI , MS & concrete pipes. 4.3 Valves-sluice valve, air relief valve, pressure relief valve, their use, function and location on a pipeline	5	6
5	**Treatment of Water** 5.1 Necessity of treatment. Aeration – objects, methods of aeration. Sedimentation – objects of sedimentation, plain sedimentation, sedimentation with coagulation, types of coagulant, choice for Coagulants, process of coagulation. Jar Test, Sedimentation tanks, types, working principle, study of clarrifloculator 5.2 Filtration – objects, theory of filtration, filter media, classification of filters slow sand filter, rapid sand filter, pressure filter – construction, working, suitability, merits and demerits. 5.3 Disinfections – objects, methods of disinfection, chlorination, different forms of chlorination, break point of chlorination, residual chlorine, orthotolidine test flow diagram of water treatment plant.	10	12
6	**Distribution of water** 6.1 Method of distribution- Gravity, Pumping and Combined system. Service reservoir – purpose and types 6.2 Layout for distribution system – dead end, grid iron, circular ring, and radial system, their suitability, merits and demerits.	3	4
7	**Introduction to Sanitary engineering** 7.1 Necessity of building sanitation, terms – sewage, sullage, refuse, garbage, rubbish, storm water, sanitary sewage, domestic sewage 7.2 Solid Waste- Methods of Collection and Its Disposal- Classification & method of disposal of dry refuse – open dumping, landfill, incineration, burring in to sea, composting	4	6

8	**Sewerage System** 8.1 Types of sewerage system- water carriage system, systems of sewerage - separate system, combined system , partially separate system, comparison and their suitability. 8.2 Types of sewers – shape and material used, their suitability, Selection & Design of sewers – quantity of sewage, self-cleaning velocity, gradient of sewers, size of Sewers, Laying of sewers. Testing of sewers. Maintenance of sewers. 8.3 Sewer appurtenances- Manhole – components, location, spacing, construction, Drop man hole. Sewer inlet – street inlets. Flushing tanks.	10	10
9	**Analysis of sewage** 9.1 Characteristic of sewage (physical, chemical, bacteriological), B. O. D. , C. O. D. and its significance, strength of Sewage. 9.2 Aerobic and anaerobic process	5	6
10	**Sewage treatment** 10.1 Objective of sewage treatment,. General layout, flow diagram of sewage treatment plant, primary and secondary treatment. 10.2 Grit chamber, Skimming tank, Sludge digestion tank, Trickling filters, Activated sludge process, Oxidation pond –working principle & layout, Septic tank & soak pit – design & working., 10.3 Disposal of sewage – Digestion of sludge and its disposal. Gobar/Bio gas plant, working & construction	10	12
11	**Industrial waste** 11.1 Types of industrial waste, hazardous and non hazardous wastes, 11.2 Major characteristic of waste from following industries – Sugar, Milk dairy.	3	4

TERM WORK :

1) Collecting data regarding population and demand of water for small residential area / colony / village, forecasting the population of the area.
2) Determination of p^H of a given water.
3) Determination of turbidity of a given water.
4) Determination of Optimum dose of Coagulant.
5) Determination of chloride present in water / waste water.
6) Determination of fluoride present in water / waste water.
7) Determination of total dissolved solids.
8) Determination of hardness present in water.
9) Determination Residual Chlorine Present in a water sample.
10) Determination BOD / COD present in waste water.

11) Visit to a water Treatment plant and 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.
12) Design a septic tank & soak pit for small colony / hostel building. Drawing sketches of plan and section.

TEXT BOOKS:

Sr. No.	Title and Edition	Author	Publisher
1	Environmental Engineering	Kamala, A Kanthrao D. L.	Tata McGraw Hills Publications, Delhi
2	Water Supply And Sanitary Engg.	Gurucharan Signh	Standard Publications, New Delhi
3	Water Supply & Sanitary Engineering	G. S. Bridie, J.S. Bridie.	Dhanpat Rai & Sons, New Delhi
4	Water Supply & Sanitary Engineering (Vol.. I & II)	S.K.Garg	Khanna Publications
5	Water Supply & Sanitary Engineering (Vol.. I & II)	Dr. B.C.Punmia	Laxmi Publications, New Delhi

REFERENCE BOOKS:

Sr. No.	Title and Edition	Author	Publisher
1	Water Treatment -	Fair & Gyer	John Willey & Sons, London
2	Waste Water Treatment & Disposal	Eddy & Metcalf.	Tata Mc-Graw Hills Publications, New Delhi
3	Industrial Waste Treatment	Dutta	

CONTRACT, ACCOUNTS AND VALUVATION (CAV): 5C409

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25		25	150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCIES STATEMENTS: -

1. Make use of I. S. Codes and PWD code of practices in estimating quantities
2. Prepare Tender and contract documents for a project or civil engineering works.
3. Prepare proposals for getting administrative approval and technical sanction for a project.
4. Cost Analysis of materials and labours for the project.
5.Decide the value of property.

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 different items of the works of the project. He should have knowledge about various factors, which affects the total project cost. He is required to prepare proposals for getting various sanctions of project. The rent of building, taxes to be levied on building depends upon the values of the structure. This requires him to develop the valuation skills. This professional and technological subject is essentially required for the technician to work effectively for the projects.

CONTENTS

Topic	Contents	Hours	Marks
1	**Procedure of execution of works:** PWD procedure of execution of works and its application in private organizations. Meaning of different sanctions such as technical and financial sanction.	5	8
2	**Contracts:** Definition, Objects And Requirements of Valid Contracts. Types of Contracts- Lump Sum, Item Rate, Percentage Rate, Labour Contracts, And Sub Contract. Conditions of Contract, Earnest Money, Security Deposit, Time Limit And Its Importance. Govt policies, allotment of work & classes of registration.	6	10
3	**Contract documents**: Contract documents and its importance, Study of Some Important Conditions of Contract Such As Schedule A, B, and C, Defect Liability Period, Liquidated Damages, Extra Items, Escalation of Cost, Arbitration, Termination of Contracts. Violation of Contracts, Disputes, Arbitration, Penalties, Claims, Liquidity damages, Price Escalation advances, etc	6	10
4	**Tender:** Meaning of tender, tender notice and classification**.** Advantage and disadvantage of each type of tender. Comparative statement, unbalanced tender, Preparation and stages of tender pre and post tender planning	6	10
5	**Tender Documents:** Invitation Of Tenders, Tender Forms, Tender Notice publication, Tender Documents, Methods Of Preparing And Submitting Tenders, Scrutiny Of Tenders, rejection of tender and Acceptance Of Tender, comparative statement, negotiation, selection-tendering.	6	10
6	**Specification**: Definition and Purpose of Specification, Types of Specifications. General and Detailed Specification. Legal Aspects Of Specification	5	8
7	**Accounting Procedure:** PWD accounting procedure and different types of contractor's bills (R.A. bill, Final bill etc) and its payments.	5	8

	Classification of Works. Administrative Approval. Technical Sanction. Expenditure Sanction, Methods of Executing Works (Departmental Method) Piece Work. Rate List And Day Work. Care to be taken in measurements book, NMR, and in bills.		
8	**Store Keeping Procedure**: PWD store keeping procedure and records. Precautions to be taken in record keeping of materials and stocks. .Duties, role and responsibility of store officer.	3	4
9	**Valuation:** Definition, necessity, Importance, meaning of cost, price and value. Factors affecting the valuation of properties. Types of value Such As Book Value, Market Value, Salvage And Scrap Value, sentimental Value, distressed value, depreciation, methods of depreciation, computation of gross income, fixation of rent as per PWD, valuation of land and buildings. Valuation Based On Net Earnings Gross Income, Outgoing, Net Income, Year's Purchase And Capitalized Value. Simple numerical problems.	6	12

TERM WORK

1. Prepare tender and contract document and listing essential documents required of any civil work from department.
2. Collection of any five different types of tender notices.
3. Draft/Preparation of tender notice and of any on detailed estimate.
4. Web searching of tender notices especially of PWD.
5. Preparation of tender / contract documents of any one Civil Engg. Work/ project. (Schedule A. B, C & conditions)
6. Collection of different PWD account forms and attaching.
7. Preparing any three detailed specification of building work and any two civil work.
8. Expert lecture on any one area of the course.
9. Preparation of valuation report of Flat or Row house or residential bungalow.
10. One problem on rent fixation.
11. Awareness for different software.

TEXT BOOKS

Sr.N	Title and Edition	Author	Publisher	
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 & Valua.	Chakrraborty.	Calcutta	
4	Estimating & Costing	S C. Rangwala	Charotar Pub.	
5	Estimating & Costing	Mahajan	Sattya Pub New D.	
6	Estimating & Costing	Birdi	---	
7	Estimating and costing	J.R. Muley	Virnda Pub.	
8	Estimating	Gangarde	---	
9	Construction management	Vazrani V.N.	Khanna Pub.	

REFERENCES

Sr No	Title and Edition	Author	Publisher
1	Standard specification	PWD	PWD
2	Hand book /D.S.R. of Current year.	PWD	PWD
3	Professional Practice	Dre Roshan H Namavati	Lakhani

CIVIL ENGINEERING PROJECT (PRO) : 5C410

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	00		PT	TEE	TW	PR	OR	Total
PR	04	Max marks	--	--	100	--	50	150
TOTAL	04	Duration	-	-				

COMPETENCY STATEMENTS:-

1. Collect data from various sources- Indian standards. Data books, handbooks
2. Work independently & Work as member of a team
3. Prepare and present the report of activities
4. Analyze the problem, collect the data, plan and design the activities to solve the given problem
5. Use and integrate knowledge of different courses to produce working drawings of scheme.
6. Use skills to prepare maps and plans for a project
7. Design components with the help of handbooks, data books, etc
8. Develop a sprit of enquiry, learning to learn skill and thinking.

RATIONALE: -

Apart from supervising construction and maintenance of Civil Engineering works, a diploma technician has to do survey, collect data, refer handbooks and design some components on the basis of his knowledge of different subjects like applied mechanics, concrete technology, soil mechanics, hydraulic construction, irrigation, environmental engineering, etc. Thus if 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. And engineer it is involved for most of the time in activities of synthesis of integration rather than those of analysis.

The course of project work is included in the curriculum mainly with a view to provide students with an opportunity to develop synthesizing skills and to enable them to integrate knowledge of apparently disconnected course in producing a total meaningful scheme.

A student is given a real life problem and he has to provide a feasible solution for which he is supposed to collect suitable data thorough survey and contacting various resources through handbooks and data books design suitable components prepare drawings and write a detailed report of activities he undertook to reach to the solution. Through independent individual as well as group activities a student is made to interact with his colleagues and persons in the field take and justify his won decisions.

The project and seminar activity is intended to expose students to a real life situation and thus to prepare him to enter into the world of work.

TERM WORK:

Every student shall complete project prescribed by the Civil/APM department, which will be common and joint venture of a group 4-5 students. Group has to solve the problem assigned to them and to present on the given problem and its solution. Each project will consist of collection of data, presentation of data, interpretation, and solutions to a given problem / task. Each student in a group has to submit a report / drawings with simple design calculations and presentation of project report.

Project report shall consists of

		Suggested Hours
1. Topic and objective of the project,	-	8 hrs.
2. Literature surveyed, if any,	-	8 hrs.
3. Process of collecting data.	-	8 hrs.
4. Methodical presentation of data, if any		4 hrs.
5. Analysis and interpretation of data	-	4 hrs.
6. Presentation of salient points of the project	-	8 hrs.
7. Simple design calculations wherever necessary		8 hrs.

8. Solutions to given problem / work - 8 hrs.
9. Conclusion. - 8 hrs.

SUGGESTED AREAS FOR THE PROJECT WORK.

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.

INPLANT TRAINING & SEMINAR (IPT) :5C411

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	00		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	--	--	50	--	50	100
TOTAL	02	Duration	--	--				

COMPETENCIES:-

1. Prepare Organizational Structure of the industry.
2. Identify roles & responsibilities of site engineer and engineers working different sections.
3. List the activities of projects.
4. Calculate activities duration& Project duration.
5. Prepare bar chart and verify the progress.
6. Understand the processes involved in activities and inspect/monitor for quality assurance.
7. Identify the resources: manpower, material machines and money for completion of project.
8. Identify safety measures required for project and verify the availability/compliance of the safety measures, at the site.
9. Prepare report of material requirement ,procurement, its storage methods/practices, material handling, procedures of issue of material from store.
10. maintain daily dairy to note the observations at the sit /sections on daily basis
11. Prepare a detailed report based on the learning experiences during in plant training covering following aspects.

Aspects to be considered for report writing:

- Planning, preparation & quality control for various activities and processes.
- Management of materials, labors & equipments,
- To solve the minor industrial problems.
- Develop the Entrepreneurial skills.
- Develop ability to work in a team.
- To enhance the presentation skills
- Project reports preparations & cost analysis,
- To be familiar with financial institutes.

RATIONALE:-

Civil engineering technician program is mainly integrated with practical experiences. A technician is responsible 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 of materials, labours and equipments are also the role of a technician. In plant training program will help in enhancing the knowledge & skills of the technicians.

CONTENT:-

Student studying in the civil engineering program is expected to work parallel with a regular employed person as a trainee in a small industry /construction site / firms / consultation services or any specialized services for one week as decided by the department authorities under the guidance of faculty members. In plant Training (to be undertaken during semester break)

Activities to be considered for acquiring the knowledge & skills weightage may be given for the following activities during the in plant training work.

1. Planning, preparation & quality control aspects 4 hours.

2. Management of materials, labors & equipments aspects.	4 hours.
3. Solution of minor industrial problems.	2 hours.
5. Group discussion with industry personals	4 hours.
6. Project reports preparations & cost analysis,	4hours.
7. Information about financial institutes.	4 hours.
8. Preparation of layouts and drawings if necessary	2 hours.
9. Suggestive measures & conclusion of in plant training	4 hours.
10.Development of Seminar presentation skills	4 hours.
Total	32 hours

Finally the student shall prepare the report of his in plant training under the guidance of the teaching staff members which may consists of observations, drawings, sketches, sample calculations, processes, procedures, applications, managements, costing design aspects.Student should deliver a seminar on his experiences during in plant training.

STRUCTURAL DESIGN AND DRAWING (SDD) : 5C412

Teaching Scheme (Hr)		Evaluation Scheme						
TH	00		PT	TEE	TW	PR	OR	Total
PR	04	Max. Marks	--	--	50	--	50	100
Total	04	Duration (Hrs)	--	--	--	--	--	--

RATIONALE

Civil Engineering technician has to assist in design of structures. He is also required to design simple structures. While supervision, he should be able to effect the minor modifications and corrections or alteration as per the demand of situation. For effective supervision of construction, he should be able to develop ability of preparing, reading and interpreting structural drawings. Student shall be able to design the RCC structural elements by using limit state method of design and steel roof trusses for industrial shades. He should be familiar in using data books, design aids, relevant BIS codes for loads and designing structural elements.

COMPETENCY STATEMENTS

Students shall able to -

1. Plan and design structural elements of two storied building using design aids / data books.
2. Analysis and design industrial structural shade with steel roof trusses using design aids / data books / software.
3. Use of B.I.S. codes for structural designs.
4. Draw, read and interpret the structural drawings.

CONTENTS

The term work shall consists of –

1. Design of RC framed two storied building.

Analysis and design of RC framed two storied residential / commercial building, which includes load distribution on various members, their analysis and design of slabs, beams (singly and doubly reinforced), columns, footings, chajjas, staircase, etc.

Two full imperial size drawing sheets covering reinforcement details of all above designed structural components.

2. Ductile detailing

One full imperial size drawing sheets showing ductile detailing of reinforcement of RC members as per IS 13920-1993.

3. Design of Steel roof truss.

Analysis and design of steel roof truss for an industrial shade for gravity and wind loads.

Determination of nodal point loads and analysis by graphical method for getting member forces, member force combinations, critical design forces.

Design of angle sections for various members forces of truss. Design of riveted end connections. Design of angle purlin as per IS 800.

TEXT BOOKS

Sr. No.	Title and Edition	Author	Publisher
1.	RCC Theory and Design, First Edition	Dr. V.L. Shaha & Dr. S. R. Karve.	Structural Publications, Pune
2.	BIS Handbook SP – 16		BIS, New Delhi
3.	BIS Code 456 - 2000.		BIS, New Delhi
4.	Design of steel structures	L. S. Negi	TMH
5.	BIS 800-1984/2000		BIS, New Delhi
6.	BIS 13920-1993		BIS, New Delhi
7.	Earthquake Tips	C. V. R. Murty	NICEE, IIT Kanpur

PROFESSIONAL PRACTICE (PRP) : 5C413

COURSE STRUCTURE:

Teaching Scheme		Evaluation scheme						
TH	00		PT	THE	TW	PR	OR	Total
PR	02	Max. marks	--	--	50	--	50	100
TOTAL	02	Duration	--	--	--	--	--	--

RATIONALE:

Civil Engineer has diverse avenues to work / profession. Civil Engineer has to work as site engineer, designer, builder, contractor, architect and entrepreneur. Every industry requires unique competencies to succeed in the profession. Every profession has diverse organizational structure. Engineer working in different organization at different post has to carry out different roles and responsibilities. Every role requires different hard and soft skills. Understanding the job functions and roles and responsibilities is a ket to become successful professional. At the end of the course student will get acquaint with the roles and responsibilities and acquire some skills to perform those roles.

COMPETENCY STATEMENTS:

1. To know about the practices and standards used in civil engineering
2. To know the skills required in practice to perform the job functions as civil engineering professional
3. To understand the organizational structure, staffing pattern and duties of the staff/engineer working in different departments in variety of civil engineering organizations.
4. To get acquaint with standards and good practices used in construction company, Architectural consulting firm, Designers office and precast units.
5. To acquire some of the professional skills like market survey, identifying market scenario, site inspections and check lists for supervising a work, Specifications and standards, staffing and roles and responsibilities to be undertaken in running a professional civil engineering organization.

TERM WORK :

Term work shall consist of:

A] Objectives of site visits, usefulness of visit diary and its maintenance, observations and data collection during visits, methods of communication an behaviour during the visit, learning outcomes of visits.

B] Following visits are arranged

1) Visit to construction site and visit to site office (1 Nos.)
2) Visit to medium and major Architectural organization (01 No. each)
3) Visit to Builders Developer and Designers office (01 Nos.)
6) Visit to precast product industry (02 Nos.)
7) Visit to Building material / furniture shops (1 Nos.)
8) Visit to PWD office / MSRDC
9) Visit to Irrigation Office
10) Visit to Maharashtra Jeevan Pradhikaran and MIDC

After every visit student has to prepare visit report in his/her own words and considering following points

- Name of the site
- Organizational structure
- List of departments in the organization and no. of persons employed in each department
- Roles and responsibilities of staff/engineer working in the department.
- Special competanciesrequired to work in the organization / industry
- Cost of establishment
- Interpersonal relations and behavioral skills required

- Soft skills required

Student has to present and submit the report at the end of the term along with the visit diary.

C] Case studies related to following topics

- Goal setting and visioning
- Project planning
- Team work
- Risk Management
- Finance Management

D] Group Discussion

Oral Examination:

At the time of oral examination mock tests for role playing are arranged such as

Client visiting architects office (Architects Role)

Client visiting Structural Engineer(Designers Role)

Client Visiting Builder (Builders Role)

Site Engineer visiting Construction site (Site Engineers Role)

Client Visiting Construction Industry (Owner of Construction industry)

ADVANCED CONCRETE STRUCTURES AND DESIGN (ASD) : 5C414

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	25	--	150
TOTAL	05	Duration	1.00	3.00	--	--	--	--

RATIONALE: -

Infrastructure development is progressing area. Civil engineer has to supervise construction work of advanced structures along with the regular structures built for infrastructure development. Supervision of the concreting work has due importance because it is mainly used for load bearing elements. Prescriptive Concrete is one of the emerging area in which Design mix proportion of concrete with required properties of strength and durability is designed to satisfy specific requirement of the user. Chemicals, admixtures and secondary cementecious materials are used to derive required properties of concrete with strength and durability. Formwork is important aspect in constructing advanced structures. Computer aided analysis and design and use of software relieve designers from repetitive and tedious procedures of analysis and design. This course is aimed at giving overview of behavior and detailing of structural elements in advanced structures, Use of computer softwares in analysis and designing the structures, formwork and shuttering used for construction of advanced structures and insight for chemicals and admixtures used for preparing special types of concretes and repair and rehabilitation of damaged concrete structures.

COMPETENCY STATEMENTS: -

1) Understand the principles and behavior of structural elements with direct reference to its detailing
2) Specify and design the detailed techniques and/or concretes commonly used in regular and advanced structures
3) Appreciate the importance of temporary works involved with construction of advanced structure
4) Understand the most up to date off-site construction techniques involved in the construction industry today.
5) Understand the role of secondary cementing materials, admixtures and chemicals in preparing special types of concrete used for a specific purpose.
6) Understand the damages and failure of concrete members in structures and its repair and rehabilitation technique
7) Use Computer software in analysis and design of frames, truss, steel shed and residential building and use of excel worksheets for civil engineering applications

COURSE CONTENTS:-

Chapter No.	Name of the Chapter / topic	Hours	Marks
1.	**A] Advanced Structures** *Study of following Advanced Structures w.r.t. its types, use and applications, elements of structure, behavior of elements under the load, reinforcement / structural detailing and drawing* *(Theoretical Aspects only without analysis and Design)* 1.1. Retaining walls 1.2. Water Tanks 1.3. Box Girders 1.4. Bridges 1.5. Folded Plate Slab 1.6. Circular slabs 1.7. Flat Slabs	10	25

2.	**Special Concretes** 2.1. High density concrete 2.1.1. High density concrete for radiation shielding 2.2. Gap graded aggregate concrete 2.3. Sulphur infiltrated concrete and its application 2.4. Fibre reinforced concrete-use of steel fibres, polypropylene fibres, asbestos fibres, glass fibres, carbon fibres, 2.4.1. Factors affecting properties of fibre reinforced concrete 2.4.2. Applications fibre reinforced concrete 2.5. High performance concrete(HPC) 2.5.1. Concept of High Performance Concrete 2.5.2. Necessary ingredients to obtain HPC, 2.5.3. Use of secondary cementesious materials such as fly ash, G.G.B.S., Rice Husk Ash, Silica fume 2.5.4. W/C ratio 2.5.5. Aggregates for HPC 2.5.6. Introduction to Prescriptive Concrete 2.6. High volume fly ash concrete 2.7. Shotcrete 2.8. Polymer concrete 2.8.1. Types of polymer concrete 2.8.2. Properties of polymer impregnated concrete(PIC) 2.8.3. Application of PIC 2.9. Refractory concrete using high alumina cement 2.10. Self Compacting Concrete 2.10.1. Ingredients 2.10.2 Properties 2.10.3 Casting 2.10.4 Tests on self compacting concrete. 2.10.5 Applications 2.11. Ready mix concrete 2.12. Fluid Concrete 2.12.1. Necessity and Applications 2.12.2. Ingredients 2.12.3. Types of Pumps 2.12.4. Properties	08	25
3.	**Repairs and Rehabilitation of Concrete** 3.1.1 Difference between Repair and rehabilitation 3.1.2 Diagnosis of strength of Concrete 3.1.3 Causes of Cracking of concrete 3.1.4 Types of cracks, crack patterns and its causes 3.1.5 Methods for repair of concrete: surface preparation, crack filling, epoxy grouting, shotcreting, nailing, straping, meshing 3.1.6 Methods of Rehabilitation of Concrete structural components: : Beams, Columns, Column footing, Walls 3.1.7 Epoxy sheets and its uses 3.1.8 Health monitoring of structures	08	15
4.	**Admixtures and construction chemicals** 4.1. Plasticizers, basic products in plasticizers, mechanism of action of plasticizers, mixing procedure, effect on workability of concrete, dosage used 4.2. Superplasticizers, dosage used, effect on workability, site problems while using superplasticizers, effect on properties of hardened concrete, some brand names of plasticizers and superplasticizers and their functions/properties	08	15

	4.3. Retarders, retarding plasticizers 4.4. Accelerators, accelerating plasticizers 4.5. Air entraining admixture, types of air entraining agents, effect on fresh and hardened concrete, optimum air content in concrete, measurement of air content in concrete, some brand names available in market 4.6. Pozzolanic admixtures, natural, artificial 4.7. Damp proofing and waterproofing agents, damp proofers 4.8. Gas forming agents 4.9. Air detraining agents, 4.10. Grouting agentsCorrosion inhibiting agents 4.11. Bonding admixture 4.12. Fungicidal, germicidal and insecticidal admixture 4.13. Colouring agents 4.14. Surface hardeners **4.15.** Curing compounds-application procedure, Polymer bonding agents		
5.	**Analysis and Design of Structures using Computer Software** 5.1. Development of Model using STADD: 5.1.1 Preparation of Geometrical layout/ Geometry of structure 5.1.2 Applying end conditions and supports to the members 5.1.3 Specifying Member Properties 5.1.4 Types of loads and applying loads to the members of structure 5.1.5 Specifying member types 5.2. Type of structure and Analysis of Structure 5.3. Generating Reports of Analysis of Structure 5.4. Design of Structure 5.4.1 Selection of Code 5.4.2 Selecting and applying Design Parameters to members 5.4.3 Preparing Design Reports 5.4.4 Grouping of members 5.5. Analysis and Design Reports	14	00

TERM WORK: -

Term work shall consist of journal based on the following

1) Analysis of simply supported, fixed and continuous beams with STADD (2 problems each) and comparing results with hand run
2) Analysis of Portal frame and truss with STADD (2 problems each) and comparing results with hand run
3) Analysis and Design of steel roof truss for given loading with STADD
4) Analysis and Design of Reinforced Concrete Structure with STADD
5) Development of Project Report for analysis and design of Steel roof shed and Residential Building using STADD
6) Sketching 12 plates showing details of advanced structures given in chapter1
7) Visit to a RMC plant and construction site of any two advanced structures given in chapter1. and writing report on visit.

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
	Concrete Technology	M.S.Shetty	
	Concrete Technology	Gambhir	
	STADD Manual		

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1			
2			

PLUMBING SERVICES (PLS) : 5C415

COURSE STRUCTURE: -

Teaching Scheme		**Evaluation scheme**						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25		25	150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENT (S):

1. To understand the importance of standard plumbing practices.
2. To keep liaison between architect, designers and plumber.
3. To understand functions of each elements plumbing.
4. To read the drawings and execute the plumbing works.
5. To practice the consultancy works in plumbing area as per codes.
6. To avoid the wrong practice in pluming work at project site by supervision.

RATIONALE:-

It is most necessary to study various aspects of plumbing practices for a technician. Civil engineer has to work on various buildings, commercial projects and other complexes by way of site supervisor. The technicians are always deals with the supervision of various constructional elements project. Plumbing practices and services is an important study area of civil engineering. A structured programme may help the technician to work effectively on sites by referring the plumbing drawings, prepared as per the code of plumbing practices. The life of buildings may be increased by adopting the standard plumbing practices, designs, selection of recommended materials, choosing the specifications, norms and standards as well as employment of the trained skilled manpower in plumbing areas. Plumbing professional now has tremendous job opportunities as the quality constructional activities are increasing day by day. Student electing this area may have an additional opportunity in their carrier.

COURSE CONTENTS:-

TOPIC NO.	CONTENT	HOURS	MARKS
1	I**NTRODUCTION** 11 Meaning of plumbing services, need of services, and future scope of plumbing. 1.2 Standard plumbing practices and available code and manual in the plumbing area.	**3**	**4**
2	**JOB FUNCTION** 2.1 Role and responsibility of plumbing consultant & plumber. 2.2 Quality and workmanship expected in plumbing work. 2.3 Necessity of coordination between architect, contractor, RCC designer and plumbing consultant during planning and execution.	**4**	**8**
3	**MUNCIPLE LAWS AND PRACTICES** 3.1 Municipal standards and expectations of plumbing work 3.2 Recommended materials for plumbing work as per standard code of practices and municipal laws / rules.	**6**	**10**
4	**PLUNMBING TECHNIQUES** 4.1 Locations, labeling, colour codes, arrows and protections. 4.2 Plumbing fixtures and fittings in building and lavatories. 4.3 Traps, interceptors, joints and vents in plumbing work.	**8**	**12**

	4.4 Types and functions of Water supply valves.		
5	**NORMS AND STANDARDS** 5.1 Standard code of practices in plumbing area in India. 5.2 Standards / suggested minimum dimensions of important Plumbing fixtures and Fittings such as joint, sink, trap, wash Basin, water seal, W.C pan, bath tub, geysers, solar water heater, steam bath, vents size etc.	**8**	**12**
6	**DRAINAGE OF WASTES** 6.1 Types of waste form the building, system of piping. 6.2 Supports of pipes, direction of water flow, back flow, jump formation, Pipe grading, invert level, sewer pipe, and Cleanout.	**7**	**12**
7	**RECYCLING OF WASTE WATER** 7.1 Concept of waste water source and applications. 7.2 Recycling aspects of waste water for the different uses.	**4**	**8**
8	**PLUMBING LAYOUT** Necessity of preparation of plumbing layout, essential drawings such as elevation, plan and sections of a small unit.	**8**	**14**

TERM WORK

1. Collection and interpretation of plumbing drawing, prepared by the plumbing consultant / architect of any project.
2. Practices of plumbing by referring standard code of and tabulating the minimum norms for the components.
3. Group discussion and conclusions on municipal plumbing rules.
4. Draw sketches of important four plumbing fixtures and fittings on half size sheet.
5. Prepare a layout, plan and elevation of a small unit of Lavatory block of mall / field lab, on half size sheet.
6. Site visit to a multi storied building to observe the various components of plumbing work, and attaching / drawing of free hand sketches on half size drawing sheet.
7. Field visit to observe the flow and installations of various units.
8. Market survey of latest leaflets of different plumbing materials.

TEXT BOOKS:

Sr No	Title and Edition	Author	Publisher
1	Water supply Engineering	Punmia	
2	Water supply Engineering	Gharpure	
3	Sanitary Engineering	Gharpure	
4	Water supply and sanitary Engg	Birdie G.S.	
5	Environmental Engineering	Santosh Kumar Garg	

REFERENCES:

Sr No	Title and Edition	Author	Publisher
1	Municipal bye-laws	**----**	Aurangabad Municipal Corporation.
2	Uniform plumbing code of India 2008, (UPC-1) IAPMO.	IAPMO.	IAPMO.
3	Illustrated Training manual (ITM) 2008, IAPMO.	IAPMO.	IAPMO.
4	A to Z of Civil Engineering.	MANTRI	
5	Hand Book of Environmental	Dr Dravid.	

	Engineering		

NOTE: Students and staff shall refer the Proceedings of seminars, conferences and internet sites.

ADVANCE CONSTRUCTION METHODS AND EQUIPMENTS(ACM):5C416

COURSE STRUCTURE: -

Teaching Scheme -		**Evaluation Scheme**						
TH	03		PT	TEE	T W	PR	Oral	Total
PR	02	Max. Marks	20	80	25	-	25	150
TOTAL	05	Duration	1.00	3.00	-	-	-	-

COMPETENCY STATEMENT: Student should.

10) Set out a building as per the center line plan.
11) Supervise building construction activities as per standard practices.
3) Suggest the type of structure and building components as per requirement.
4) Maintenance & repair of the existing structure.

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.

CONTENTS:

Topic No.	**Topic**	**Hours**	**Marks**
01	**A) Advanced Construction Materials** . **1.1 Fibers and plastics**. 1.1.1 Types of fibers – Steel, Carbon, Glass fibers. Use of fibers as construction materials. 1.1.2 Properties of fibers. 1.1.3 Types of Plastics – PVC, RPVC, HDPE, FRP, GRP etc. Colored plastic sheets. Use of plastic as construction material. **1.2 Artificial Timber** 1.2.1 Properties and uses of artificial timber. 1.2.2 Types of artificial timber available in market, strength of artificial timber. **1.3 Miscellaneous materials** 1.3.1 Properties and uses of acoustics materials, wall Claddings. 1.3.2 plaster boards, Micro-silica, artificial sand, Bonding agents, adhesives etc. 1.3 .3 Energy efficient materials	**10**	12
02	**B) Advanced Construction Methods.** **2.1 Formwork** 2.1.1 Steel Formwork, H frames, Steel plates, Steel props, Telescopic props, Girders or trestles. Tubular formwork. 2.1.2 Slip formwork- meaning, use of slip formwork. . **2.2 Prefabricated Construction** 2.2.1 Meaning of prefabrication and precast. Methods of prefabrication- plant prefabrication and site Prefabrication. 2.2.2 R.C. Doors and windows, wall panels, Jointing of structural members... **2.3 Soil Reinforcing techniques** 2.3.1 Necessity of soil reinforcing, Use of wire mesh and	**10**	12

	geosynthetics. Strengthening of embankments, 2.3.2 slope stabilization in cutting and embankments by soil reinforcing techniques.		
03	**C) Construction of Multistoried Buildings** 3.1 Use of lifts, belt conveyors, Pumped concrete, 3.2 Equipments and machinery required for construction of Multistoried Buildings. 3.3 Precautions and safety measures.	**07**	08
04	**D) Energy Efficiency Structures &Techniques** **4.1 Introduction** 4.1.1 Definition, necessity 4.1.2 Methods & resources **4.2 General Considerations** 4.2.1 Orientation, building envelope, 4.2.2 Equipments & systems, lighting. 4.2.3 Feasibility study as per standards & checklist.	**10**	12
05	**E) Hoisting and Conveying Equipments** **5.1 Hoisting Equipments** 5.1.1 Principle and working of Tower cranes, Crawler cranes, 5.1.2 Truck mounted cranes, gantry cranes, Mast cranes, Derricks. **5.2 Conveying Equipments** 5.2.1 Working of belt conveyors. Types of belts and conveying mechanism. 5.2.2 Capacity and use of dumpers, tractors and trucks.	**05**	06
	Earth Moving machinery **5.3 Excavation Equipments** 5.3.1 Use, Working and output of bulldozers, scrapers, 5.3.2 Graders, and power shovels, JCB, draglines. **5.4 Compacting Equipments** 5.4.1 Use of rollers, Roller types- Plain rollers, Sheep footed rollers, 5.4.2 Vibratory rollers, pneumatic rollers. Rammers- use and working.	**05**	06
06	**Concreting Equipments** **6.1 Concrete Mixers** 6.1.1 Types of concrete mixers. Weigh batching equipments, 6.1.2 Equipments for transportation of concrete- trolleys lift. Transit mixers, 6.1.3 Concrete vibrator- Needle vibrators, Screed vibrators. 6.1.4 Automatic concrete plants – layout, process and Working. **6.2 Stone Crushers** 6.2.1 Types of stone crushers, 6.2.2 Capacities and working. 6.2.3 Equipments for production of artificial sand.	**08**	12
07	**Miscellaneous Equipments and Equipment management** **7.1 Miscellaneous Equipments** 7.1.1 Pile driving equipment, Pile hammers, selection of Hammers. 7.1.2 Working of hot mix bitumen plant, Bitumen pavers. 7.1.3 Grouting equipments	**09**	12

	7.1.4 Floor polishing machine. **7.2 Equipment Management** 7.2.1 Standard equipment, Special equipment, Selection of equipment, 7.2.2 Owning and operating cost of construction Equipment. 7.2.3 Economic life of construction equipment. 7.2.4 Preventive maintenance of equipment, Break down maintenance of equipments.		

List of Practical:

1. Collect Specifications/ properties of at least five advanced materials of Construction and write the report on the same.
2. Writing report on Tremie method of concreting for piles/ Bridge piers.
3. Writing a report on method of preparation and conveyance of ready mix concrete.
4. Writing a report on working and output of any three earth moving machinery.
5. Observing at site/ Video/ LCD demonstration of bitumen paver and writing report of the process and equipments observed.
6. Preparing a detailed account of types, numbers and drawings of steel formwork required for a two-storied framed structured residential building.
7. Observing multi- story building construction & Equipments required.
8. Preparation of economics, for any two machinery (Weather machinery is to hire or Purchased)
9. Study of energy efficiency with help of model.

Learning Resources:

Books :

Sr. No	Title	Author	Publisher
01	Construction Technology Vol. I to IV	R. Chudly	ELBS- Longman Group
02	Construction Planning equipment and methods	R.L. Peurifoy	McGraw-Hill Co. Ltd.
03	Construction Engineering and management	S. Seetharaman	Umesh Publication, New Delhi.
04	Construction management and Planning	B. Sengupta and Guha	Tata McGraw Hill
05	Materials of construction	R. C. Smith	McGraw-Hill Co. Ltd.
06	Building Technology and valuation	TTTI Madras	TTTI Madras
07	Construction Planning and Equipment	R. Satyanarayana and S. C. Saxena	Standard Publication New Delhi
08	Civil Engineering materials	TTTI Chandigarh	TTTI Chandigarh
09	Construction of structures and Management of Works	S. C. Rangawala	Charotar Publication
10	A to Z of Building Construction	Mantri	Mantri Publication
11	Construction Materials	D.N. Ghose	

Handbooks:

Sr. No	Title	Author	Publisher
01	PWD Handbooks for -Materials Foundation & Construction equipments	Govt. of Maharashtra	Govt. of Maharashtra
02	Practical Civil Engineering Handbook	Khanna	Khanna Publication

BIS/ International Codes of Practice:

Sr. No. Title
01 National Building Code
02 BIS 962-1973 Code of Architectural and Building Drawing
03 BIS 1256-1967 Code for Building Byelaws
04 BIS 1038- 1983 Steel Doors, Windows and Ventilators

Software:

01 SuperCivil CD
02 MSBTE CAI Learning Package

MICRO IRRIGATION ENGINEERING (MIE): 5C417

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	--	25	150
TOTAL	05	Duration	--	--				

COMPETENCY STATEMENT:

1. Plan and Design Micro Irrigation Systems.
2. Supervise Installations and Commissioning of Micro Irrigation Systems.
3. Supervise Maintenance of Micro Irrigation Systems.

RATIONALE: -

The conventional methods of irrigation lead to considerable losses or wastage of water. Water resources are becoming more and more scarce. Civil Engineer has to explore different methods irrigation which ensure productive use of water. Micro Irrigation system are best alternatives for country like India where water is not available in abundance. He should learn 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.

CONTENTS:

Sr. No	Content	Hour	Marks
1	**Introduction** **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.	10	16
2	**Design of 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 lay out of drip irrigation system in field Determination of crop water requirement, irrigation schedule, irrigation cycle, Emitters types & selection ,selection of micro jet, , pump, 2.4Design of laterals, sub main, main, filter unit, pump etc by using plot mainline chart and pump chart. preparation of cost estimate. Simple numerical on above	14	20
3	**Installation of drip irrigation system** 3.1Introduction, Installation drawing, trenching work for main, sub main, foundation work for filter and pump unit. 3.2Installation 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.	08	14
4	**Application of Chemical/ fertilizer Treatment and Maintenance of drip irrigation system**	06	10

	4.1Function 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, 4.2Necessity of maintenance, general maintenance and maintenance of filters.		
5	**Design of Sprinklers** 5.1Selection of sprinklers, selection and design sprinkler and laterals, design of sub main, design of main line, design of pump, determination of water requirement, irrigation schedule, irrigation cycle, preparation of estimate/ cost. 5.2Operation of sprinkler Irrigation Systems. Principle and Operating System as per Field and Crop Requirement	10	20

TERM WORK

Term work shall consist of undertaking of a mini project by students. The mini project will be consist of ,Block Contouring for 1-2 acres of agriculture/ horticulture plot for planning/ Designing for Drip/ Sprinkler Irrigation System.

1. Design Drip irrigation system for 1-2 acres of agriculture/ horticulture plot for which block contouring is already done as above considering the crop water requirements.
2. 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.
3. Prepare estimate for Drip irrigation system
4. Prepare estimate for Sprinkler irrigation system
5. Undertake Testing of drippers- for the Performance (pressure v/s discharge).
6. Understand Installation procedure of laying main submain, laterals, drippers, fillers and Venturi for Drip/ Sprinkler system.
7. Undertake Testing and commissioning of drip irrigation system
8. Visit report on visit to working site for practical installation at farms.

Text Books

Sr. No.	Title and Edition	Author	Publisher
1	Micro Irrigation Engineering	R.Suresh	Standard Publisher
2	Principles of Sprinkler Irrigation	M.Mane	Jain Publisher
4	Water Management	Dinesh kumar	Sunset Publisher
5	Irrigation engineering 5th edition	Gajre	Nirali Publisher

Reference Books

Sr. No.	Title and Edition	Author	Publisher
1	Micro Irrigation Manuals	-	WALMI
2	Micro Irrigation Manuals	-	Jain Publisher

ADVANCE SURVEYING (ADS) : 5C418

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	25		150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENT (S)

1) Carry out survey work with total station
2) Carry out setting out work of various road curves.
3)Carry out setting out of layout of building & bridges
4Carry out project survey work of road ,railway &airport.

RATIONALE :

Every civil project involves collection, presentation and interpretation of data for execution of works. Diploma civil engineer should acquire competencies to undertake various project survey works. He should develop skills in identifying and making use of modern survey instruments to undertake survey works to highest degree of accuracy and quality output in shortest possible time.

Topic No.	Content	Hours	Marks
1	**Total Station** 1.1 Features of total station, component parts ,Display & keyboard-various operation keys. 1.2 Centering &leveling ,leveling with electronic vial ,Angle & distance measurement-prism(reflector) mode and non-prism (normal)mode ,slope measurement 1.3 File management-Station set up by rectangular co-ordinate, point code, view &edit data, surface area calculation	11	18
2	**Curves** 2.1 Compound and reverse curves-Meaning, notations, calculation of data & setting out. 2.2 Transition curves--Meaning, requirements, notations, conditions of ideal transition curve, calculation of required length.	12	18
3	**Hydrographic Survey** 3.1Introduction,application of hydrographic survey, Equipments & accessories 3.2River gauging-necessity, selection of discharge site, measurement of depth of water by sounding, method of two angular measurement from shore. 3.3 Measurement of velocity of flow, determination of cross sectional area of river and discharge. survey map. .	6	10
4	**Project survey** 4.1 Mass diagram, balancing line, lead, lift, haul distance, preparation of mass diagram 4.2 Railway project survey, Road project survey,	6	12

5	**Aerial survey and Remote sensing** 5.1 Aerial survey- Meaning, equipments required, operations, ways of taking aerial photographs, uses of aerial photographs 5.2 Remote Sensing-Meaning, elements of remote sensing process, Remote sensing system-Passive & Active, stages in remote sensing system, applications of remote sensing	7	12
6	**Setting out works.** 6.1Introduction, reference pillars, offset setting over a foundation. Setting out building with a theodolite 6.2Setting out sewer.	06	10

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TERM WORK :

List of Practicals

1) Study of total station-measurement with normal (non-prism)mode
2) Total station- measurement with prism mode
3) Setting out compound curve.
4) Setting out reverse curve.
5) Profile leveling- preparation of mass diagram.
6) Setting out a small building

Above practical's shall be performed by advance instruments like micro-optic theodolite, electronic theodolite &total station.

TEXT BOOK

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

AIRPORT ENGINEERING (AIE) : 5C419

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25		25	150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENT (S):

1. To understand importance of airport transportation.
2. To know planning aspects of airport construction.
3. To understand functions of each elements of airport.
4. To supervise the air traffic signaling.
5. To increase awareness of the obstructions of airport.

RATIONALE:-

Efficient system of transportation is an important factor for the social and economic development of any region or country. Resource utilization, regional specialization and savings in travel time are the important considerations tor the economical benefits. The modern and technological world of transportation includes airways. It is most necessary to study various aspects of these modes of transport. Civil engineer has to work for the planning, elements design and maintenance of the airport structures. The technicians are always deals with the supervision of various constructional elements of the airport work. With all past considerations and the need of the society the course of airport engineering is to be introduced at diploma level to have the basic knowledge of Airport transportation which has a tremendous employment potential in future.

AIRPORT ENGINEERING

TOPIC	CONTENT	HOURS	MARKS
1	**INTRODUCTION** 11 Importance of air transportation**,** Air transportation in India And Development of air Transportation.	**1**	**4**
2	**ARICRAFT CHRACTERISTICS** 2.1 Areoplane component parts, types, classification of flying activities, National / International aviation relation of aircraft to landing facilities. 2.2 Air craft characteristics and Controlling agencies.	**4**	**8**
3	**AIRPORT SURVEYS AND SITE SELECTION** 3.1 Need of surveys of land, soil, materials and labors. 3.2 Factors affecting the airport site selection. 3.3 Survey for airport site, Municipal Bye laws for airport site	**7**	**12**
4	**AIRPORT PLANNING** 4.1 Regional planning, Development of new air port, data required, feasible sites, essential drawings, Amenities and facilities of air port. 4.2 Estimation of future traffic needs. 4.3 Planning for amenities (such as Parking, Fire escape, Water supply , Restaurant, shops , Toilet)	**7**	**8**
5	**AIRPORT OBSTRUCTIONS** 5.1 Zoning laws, Classification of obstructions, Imaginary surface, Approach Zone and turning zone. 5.2 Climatic factors affecting the planning.	**5**	**8**
6	**RUNWAY AND APRON CONSTURCTION** 6.1 Orientation of runway, Runway length, need for corrections, Apron, Apron Layout, Simple calculations for geometric design of runway with standards,	**7**	**12**

	runway configuration and runway intersections. 6.2 Construction material &Construction procedure of runway (Flexible Pavement) and apron (Concrete Pavement) .		
7	**AIRPORT CONTROL AND LAYOUT** Terminal area, airport buildings, circulation, Aircraft Parking and system, apron use and hangers, visual aids, lighting of runway and taxiway and airport markings.	**7**	**8**
8	**AIRPORT DRAINAGE** 8.1 Airport drainage, soil conditions, need and necessity of drainage and requirements for the good drainage. 8.2 Types of drainage such as surface and subsurface drainage.	**6**	**12**
9	**MAINTENANCE OF AIR PORT** 9.1 Necessity of maintenance of airport and maintenance aspects. 9.2 Types of maintenance of various elements of airport and buildings.	**4**	**8**
	Total	**48**	**80**

TERM WORK

AIRPORT ENGINEERING

	<u>DRAWING WORK</u> **(On half size drawing sheet)**		
1	**Sheet No 1.** Free hand sketch of aircraft showing the different component parts and sketch of turning radius, and imaginary surface view.		
2	**Sheet No 2.** Typical Drawing of cross section of runway pavement and apron, runway basic patterns and intersections, Taxiway widening separation clearance, Turnaround or bypass taxiway.		
3	**Sheet No 3.** Typical layout of air port terminal building. (Line Diagrams) Functional Planning for various units of airport		
4	**Sheet No 4.** Typical Drawing of Air craft Parking system and pattern Typical Drawing of different types of runway layout.		
5	**Sheet No 5.** Drawing of lighting systems of air port. Line sketch of Instrumental landing system view.		
6	**Sheet No 6.** Free hand sketches of Surface and subsurface drains.		
7	**Visit to Airport.** Visit to nearest air port / heliport and draw the observed free hand sketches during visit. Searching on internet for new Air – Buses / Aeroplanes.		

TEXT BOOKS:

Sr No	Title and Edition	Author	Publisher
1	Transportation Engineering (Vol. II) :	By V.N.Vazirani & S. P. Chandola	Khanna Pub
2	Airport Planning & Design :	By S.K. Khanna and M.G. Arora	
3	Airport Engineering :	S.C. Rangwala	Chartor Pub.

DESIGN OF REINFORCED CONCRETE STRUCTURES (DRS):5C501

Teaching Scheme (Hr)		Evaluation Scheme						
TH	04		PT	TEE	TW	PR	OR	Total
PR	02	Max. Marks	20	80	25	--	25	150
Total	06	Duration (Hrs)	1.15	4.00	--	--	--	--

Note – Carrying of IS 456-2000 is not permitted in the examination.

RATIONALE

Civil Engineering technician has to assist in design of structures. He is also required to design simple structures. While supervision, he should be able to suggest the minor modifications and corrections or alteration as per the demand of situation. For effective supervision of construction, he should be able to develop ability of preparing, reading and interpreting structural drawings. Student shall be able to design the structural elements by using limit state method of design. He should be familiar in using data books, design aids, relevant BIS codes for designing structural elements.

COMPETENCY STATEMENTS

Students shall be able to -

1. Plan and design simple structural elements by limit state method of design.
2. Plan and design structural elements, using design aids / data books.
3. Supervise R.C.C. works of the buildings.
4. Use of B.I.S. codes for R.C.C. construction of buildings
5. Read and interpret the structural drawings.

CONTENTS

Chapter No.	Contents	Hours	Marks
1.	**Fundamentals of Reinforced Concrete Design** **1.1** Introduction to reinforced concrete, aspects of structural design, role of a structural engineer. Advantages and disadvantages of R.C.C. structures with reference to steel structures. **1.2** Structural elements, load bearing and framed structures, objective and basic requirements of structural design, R. C. Sections and their behavior. **1.3** Grades of concrete and steel. Types of steel.	**06**	**08**
2.	**Limit State Method** **2.1** Definition, Types of limit states, partial safety factors for materials strength, Characteristic strength, characteristic load, design load. Loading on structure as per I.S. 875-1987. **2.2** Ultimate design strains in concrete and steel, cover to reinforcement and exposure conditions as per IS 456-2000.	**04**	**04**

3.	**Analysis and Design of Singly Reinforced Sections** **3.1** Limit state of collapse (Flexure), Assumptions, Stress strain relationship for concrete and steel. **3.2** Neutral axis, stress block diagram and strain diagram for singly reinforced section. **3.3** Concept of under reinforced, over reinforced and balanced section, **3.4** Neutral axis coefficient, limiting value of moment of resistance and limiting percentage of steel required for balanced singly R. C. Section. **3.5** Determination of design constants. **3.6** Determination of moment of resistance of a given section. **3.7** Design of RC section for given bending moment.	**08**	**10**
4.	**Analysis and Design of Doubly reinforced section** **4.1** General features, necessity of providing doubly reinforced section, reinforcement limitations **4.2** Analysis of doubly reinforced section, strain diagram, stress diagram, **4.3** Depth of neutral axis, moment of resistance of the section. **4.4** Determination of moment of resistance of a given section. **4.5** Determination of area of steels required for given bending moment.	**07**	**08**
5.	**Analysis and Design of T- Beam** **5.1** General features, advantages, effective width of flange as per is 456 – 2000, code provisions, arrangement of steel, calculating effective flange width. **5.2** Analysis of singly reinforced T-beam, strain diagram and stress diagram, depth of neutral axis, moment of resistance of T-beam section with neutral axis lying within the flange only. **5.3** Determination of moment of resistance of a given T section with neutral axis within or up to flange bottom. **5.4** Determination of area of steel required for given bending moment. (No problem shall be asked in written examination on the T beam with N.A. out of the flange.)	**07**	**08**
6.	**Shear, Bond and Development length** **6.1** Nominal Shear stress in R.C. Section, design shear strength of concrete, maximum shear stress, forms of shear reinforcement. **6.2** Minimum shear reinforcement, code provisions for shear reinforcement, Design of shear reinforcement using bent up bars and vertical stirrups. **6.3** Bond and types of bond, Bond stress, check for bond stress **6.4** Development length in tension and compression, anchorage value for hooks 90 degree bend and 45 degree bend, standard lapping of bars, check for development length.	**08**	**08**

7.	**Design of Slabs** **7.1** Types of slabs - one way and two way, supporting conditions, philosophy for classification, check for deflection control and shear, code provisions for reinforcement detailing. **7.2** Design of one way simply supported slabs, check for deflection, development length and shear. **7.3** Design of cantilever slabs and cantilever chajja for flexure, check for deflection, development length and shear. **7.4** Design of two way simply supported slabs for flexure with corner free to lift up. **7.5** Introduction to one way continuous slabs, two way slab with corners held down and continuous supports. (No problem shall be asked in written examination.)	**08**	**14**
8.	**Design of doglegged staircase** **8.1** Introduction, planning principles for rise, trade, numbers, width, headroom, landings, loads. **8.2** Design of dog legged staircase spanning longitudinally and reinforcement detailing.	**04**	**06**
9.	**Design of Axially loaded column** **9.1** Assumptions in limit state of collapse in compression, Definition and classification of columns, effective length of column, minimum eccentricity. **9.2** Specification for minimum reinforcement, maximum reinforcement, Number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties. **9.3** Analysis of axially loaded short, square, rectangular columns, check for minimum eccentricity. **9.4** Design of axially loaded short, square, rectangular columns, check for minimum eccentricity. **9.5** Design of short circular columns with helical reinforcement as per IS 456-2000.	**06**	**08**
10.	**Column Footings** **10.1** Types of footings, ultimate and safe bearing capacity, upward pressure intensity, critical sections for design considerations. **10.2** Design of isolated square pad footing for flexure, one way and two way shear, check for bond length.	**06**	**06**

TERM WORK

Term work shall consist of sketch book of about ten plates from RCC design, it shall include important information and clauses of IS 456-2000, typical sketches of components, members / stress distribution and strain distribution diagrams, RCC section / detailing of reinforcement in joints / members, etc.

TEXT BOOKS

Sr. No.	Title and Edition	Author	Publisher
1.	RCC Theory and Design, First Edition	Dr. V.L. Shaha & Dr. S. R. Karve.	Structural Publications, Pune
2.	Limit State R.C.C. Design	A. K. Jain.	
3.	Limit State Design	Varghese	PHI learning Pvt. Ltd. Delhi
4.	Limit State Method of Design	Ramchandra	Standard Publications, New Delhi.

REFERENCE BOOKS

Sr. No.	Title and Edition	Author	Publisher
1.	BIS Handbook SP – 16		BIS, New Delhi
2.	BIS Code 456 - 2000.		BIS, New Delhi

DESIGN OF STEEL STRUCTURE (DSS): 5C502

Teaching Scheme (Hr)		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max. Marks	20	80	25	--	25	150
Total	05	Duration (Hrs)	1.15	4.00	--	--	--	--

Note – Carrying of IS 800-2007 and IS875-2002 is not permitted in the examination.

RATIONALE

Civil engineering technician has to assist in design of steel structures. He is also required to design simple structures. While supervision he should be able to effect the minor modifications and corrections or alteration as per the demand of situation. For effective supervision of construction, he should be able to develop ability of preparing, reading and interpreting structural drawings. Student should be able to design the structural elements of steel roof trusses for industrial shades, other components such as beams, columns, bases, connections of components, etc. He should be familiar in using IS 800- 2007 for designing members and use of IS 875-2002 part I, II, III for loading calculations.

COMPETENCTY STATEMENT(S)

Students shall be able to –

1. Read, interpret, sketch and draw structural drawings of structural components showing sections and connections.
2. Calculate design values for members.
3. Plan and design structural elements, using design aids, data books.

CONTENTS

Topic No.	Contents	Hours	Marks
1.	**Materials and Specifications** **1.1** Types of structural steel, Standard rolled steel sections, their properties and use, use of steel tables. **1.2** Use of IS 875-2002, Dead load, live load, wind load, snow load, seismic load, load combinations, tensile stress, compressive stress, bearing stress, working stress, permissible stress, factor of safety, method of design.	**03**	**04**
2.	**Connections** **2.1** Riveted connections - Assumptions in theory of riveted joint, types of rivets and their use, nominal diameter, gross diameter, pitch, gauge, edge distance, tack rivets. **2.2** Types of joints, lap and butt joints, failure patterns of riveted joints, types of riveting and permissible stresses. **2.3** Rivet value, strength and efficiency of a riveted joints, chain riveting, zig-zag riveting, and diamond riveting. **2.4** Design of riveted joint for axially loaded member. **2.5** Welded connections: Introduction, advantages and limitations of welded connections, types of welds and their symbols. **2.5** Permissible stress in weld, minimum and maximum size of welds, strength of weld, types of welded joints – lap and butt, design of fillet welds for flat and angle sections subjected to axial loads. **2.6** Butt welds, permissible stresses, strength of weld, design of welds carrying axial loads.	**08**	**12**

3.	**Tension members** **3.1** Introduction, forms of tension members, net area of flats, net area of angle sections connected by one leg in various arrangements by rivets, provision of tack rivets. **3.2** Permissible stress in axial tensions, strength of riveted member in axial tension. **3.3** Design of axially loaded riveted tension members. **3.4** Net area of flats, net area of angle sections connected by one leg in various arrangements by welds. **3.5** Strength of welded member in axial tension. **3.6** Design of axially loaded welded tension members.	**08**	**12**
4.	**Compression members** **4.1** Introduction, effective length, slenderness ratio, permissible stresses, common sections of compression members. **4.2** Maximum slenderness ratio, effective lengths for angle struts, **4.3** Load carrying capacity of single rolled steel sections in compression. **4.4** Analysis and design of double angle struts for axial compression. **4.5** Analysis and design of compound columns for axial compression. **4.6** Introduction to lacing and battening, code provisions. (No numerical problem)	**08**	**14**
5.	**Steel roof truss** **5.1** Types of steel roof trusses, loads – dead load, live load, wind load. **5.2** Calculating nodal point loads, analysis of truss by graphical method for gravity and wind loads. **5.3** Design of truss members for tensile and compressive forces with end connections. **5.4** Design of purlins by BIS code method.	**08**	**16**
6	**Beams** **6.1** Different steel sections used, Simple and built-up sections, permissible bending stresses. **6.2** Design of simply supported symmetrical laterally restrained simple beams, check for deflection and shear. **6.3** Design of symmetrical I built-up beams with cover plates, check for deflection and shear. **6.4** Introduction to Plate Girder, Various components and their functions. (No numerical problem on Plate Girder)	**08**	**14**
7	**Column Bases** **7.1** Types of column bases – slab base and gusseted base, their components. **7.2** Design of slab base and concrete block for axially loaded columns. **7.3** Introduction to gusseted base (No numerical problem on gusseted base)	**05**	**08**

TERM WORK

Term work shall consist of sketchbook containing sketches of steel structural elements including -

1. Various sections used as structural members.
2. Types of rivets used for structural connections.
3. Types of welds used for structural connections.
4. Typical sketches of sections of tension member.
5. Typical sketches of sections of compression member.
6. Types of roof trusses for different spans.
7. Typical sketches of sections of beams.
8. Slab base.
9. Gusseted base.
10. Beam to beam and beam to column connections.

TEXT BOOKS

Sr. No	Title and Edition	Author	Publisher
1.	Design of steel structures	L. S. Negi	TMH
2.	Design of steel structures	S. K. Duggal	TMH
3.	Design of steel structures Vol.1	Ramchandra	Standard Publications New Delhi.
4.	Design of steel structures	M. Raghupati	TMH

REFERENCE BOOKS

Sr. No	Title and Edition	Author	Publisher
1.	BIS 800-2007		BIS, New Delhi
2.	Design of Steel Structures	Arya and Ajmani	
3.	Design of Steel Structures	Vazarani and Ratvani	

ESTIMATING AND COSTING (ESC) :5C503

COURSE STRUCTURE: -

Teaching Scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	04	Max marks	20	80	25		25	150
TOTAL	07	Duration	1 hrs 15mints	4 hrs				

COMPETENCIES STATEMENTS: -

1. Make use of I. S. 1200 Codes in estimating.
2. Able to calculate the quantities of items of works.
3. Prepare approximate estimates for a project or civil engineering works.
4. Prepare proposals for getting administrative sanction for a project.
5. Prepares the detailed estimates on the basis of calculated quantities.
6. Analyze the rates of materials and labours of an item.
7. Understand valuation and decide the value of property.

RATIONALE: -

Civil engineering technician has to find out the 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. This also requires him to develop the skill in referring the rates of various items of works and item wise costs. He should have knowledge about various factors, which affects the total project cost. He is required to prepare proposals for getting sanction to the approximate costs of project to decide its feasibility and economy. The present value of properties is also an important concept of his profession. This requires him to develop the valuation skills. This core technological subject is essentially required for the civil engineering technician to work on the field.

CONTENTS

Topic	Contents	Hrs	Mark
1	**Introduction:** 1.1 **Estimating and Costing**: Meaning and purpose of estimate and costs, necessity, stages of preparations, types of estimates, Approximate, detailed, supplementary, revised and annual maintenance estimates. 1.2 **Mode of measurement:** Standard modes of measurements / unit of measurements of different items of Civil Engineering Works as per I.S. 1200. General principles, accuracy expected Deductions rules for plastering, pointing and masonry works.	4	8
2	**Approximate Estimates** 2.1 Meaning and Purpose, Methods of Approximate estimates for building. Plinth area method, Service unit method. 2.2 Approximate estimate of a small project such as road, railway, irrigation, and water supply project.	5	8
3	**Detailed Estimate** 5.1 Methods of detailed estimate such as Unit quantity, total quantity method, steps in detailed estimates, affecting factors, and data required, Provision 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 Fans, electrification, drainage and water supply in the estimate. Check List of Items Estimates. 5.2 Methods of taking out quantities, such as Long wall and short wall method and Center line method. Calculation of quantities of different	18	28

	items of works and abstracting for probable cost of the work by referring latest schedule of rates of load bearing / framed structure small building plan.		
4	**Analysis Of Rates:** 3.1 Meaning, steps and factors affecting the cost of the work. 3.2 Task work, category of labours, factors affecting the task work, transportation capacities and schedule of rates. Lead & Lift. 3.2 Analysis of important Items of Civil Engineering Works	8	12
5	**Earthwork computation:** 4.1 Meaning, necessity, applications and methods of earthwork computation. 4.2 Taking out quantities of Road earthwork for a small portion of road / canal / percolation tank / railway embankment from the given drawing in a tabular form by using method.	7	12
6	**Reinforcement Computation:** 6.1 Meaning, necessity, and procedure of calculation of steel reinforcement. 6.2 Steel reinforcement quantities of lintel, slab, beam, column and footing form the given small plan / drawing, with bar bending schedule preparations. (Overlap and bent, stirrups)	6	12

Term work

1. Referring:
   i) I.S. 1200 for mode of measurements and deduction rules, listing /drafting and attaching Xerox.
   ii) District schedule of rates and drafting rates with brief specifications of important Materials, labours, and sample items of work lead & lift.
2. Approximate Cost for a building on plinth area basis from given drawing and refereeing proforma estimate of PWD
3. Estimating quantities of earthwork for road/canal from given drawing. (Small problem is preferred)
4. Rate analysis of any three important items from works.
5. Taking out quantities:
   5.1) Prepare Check list of any one of the following of Civil works.
   a) Load Bearing type residential Building
   b) Framed structure type building
   c) W. B. M. Road
   5.2) Taking out quantities of main items of works of two / three/four- room load bearing structure by center line method and entering them in standard measurement sheet.
   5.3 Taking out quantities by long wall and short wall method of following items of the works of load bearing structure as per IS 1200.
   i) Earthwork ii) PCC bed concrete iii) UCR masonry iv) DPC
   v) Brickwork in superstructure vi) Flooring & Filling vii) Plastering
   viii) RCC slab ix) wood work for doors and windows.
6. Calculation of RCC concrete quantity and reinforcement quantity of one/two room frame of framed structure building, such as footing, column, beam, and slab and preparing bar bending schedule from given drawing.
7. Detailed estimate of ground floor only for Frame type residential building 1BHK and calculation of per sq.m. Cost. (RCC component / steel quantities on percentage basis)
8. Taking out quantities of work for a Community well / Septic Tank or renovation work.
9. Group discussion :
   i) Referring PWD / Irrigation dept etc ready estimates and conclusion.
10. Use of software in estimating and costing.

TEXT BOOKS

Sr No	Title and Edition	Author	Publisher
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 & Valua.	Chakrraborty.	Calcutta
4	Estimating & Costing	S C. Rangwala	Charotar Pub.
5	Estimating & Costing	Mahajan	Sattya Pub New D.
6	Estimating & Costing	Birdi	---
7	Estimating and costing	J.R. Muley	Virnda Pub.
8	Estimating	Gangarde	---

REFERENCES

Sr No	Title and Edition	Author	Publisher
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

BUILDING SERVICES (BUS): 5C504

COURSE STRUCTURE: -

Teaching Scheme -		Evaluation Scheme						
TH	03		PT	TH	T W	PR	Oral	Total
PR	02	Max. Marks	20	80	25	-	25	150
TOTAL	05	Duration	1.00	3.00	25	-	25	-

RATIONALE: -

Building can not 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. Knowledge and understanding of various building and plumbing services is required to provide comfort to the users of the building. This course gives the information regarding codal requirements to provide building and plumbing services. With these requirements the student will be able to plan and design the plumbing and building services.

COMPETENCIES:-

After studying this course, students will.

1. Plan and design a water supply, sanitary and rain water drainage system for multi storied residential building. Prepare estimate for the same.
2. Plan or Extract data of an auditorium / cinema hall considering acoustics.
3. Plan or Extract data of a building for natural ventilation and artificial ventilation.
4. Preparation of electrical drawing for an apartment
5. Planning fire fighting services for a building
6. Market survey for water proofing, termite proofing, acoustical materials and fixtures and appurtenances of fixtures.
7. Plan and design a roof rainwater harvesting.

CONTENTS: -

Topic No.	Topic	Hours	Marks
01	**Part–A) Water Supply Arrangements in Buildings:-** 1.1Introduction, terms- water main, service pipe, communication pipes, supply pipe, distribution pipe, consumer's pipe, stop tap, air gap. 1.2 Principles for conveyance and distribution of water with in the premises. 1.3Application 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. Calculation of water demand for a building and campus. 1.5 Distribution systems in multistoried buildings 1.6 Multiple overhead storage system. Break pressure tank & hydro pneumatic systems. 1.7 Design of distribution system for a building. Laying of mains and pipes on site Excavation and refilling. 1.8 Materials used for pipes, Laying, Surface box, Water Meter, Laying service pipes, 1.9 Precautions Preparing pipes for laying underground, Testing of pipeline.	**08**	12
	Part-B) Drainage And Sanitation in Buildings. 1.1 Introduction**,** Definition of terms – Drain, Building drain, Building sewer, soil waste, soil pipe, Branch soil waste pipe. Waste water, waste pipe, main waste pipe, stack, Branch waste pipe. Trap- Gully trap, floor trap, intercepting trap, ventilating pipe, branch	**06**	10

	ventilating pipe, main ventilating pipe. 1.2 Sanitary Appliances- Water closet – Indian, European. Flushing appliance, Urinals, inspection chamber 1.3 Aims and principles of building drainage plumbing pipe systems – one pipe system, two pipe system. Single stack system, choice of plumbing system. 1.4 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. 1.5 Maximum number of fixture units to building drains and sewers. 1.6 Gradients and pipe sizes. Inspection and Testing. Maintenance. 1.7 Design of sanitary system for residential and public building. 1.8 Roof rain water harvesting		
02	**2. Fire Protection** 2.1 Definition, purpose, important consideration in fire protection, Fire resting materials. 2.2 Fire resisting construction. Classification of building based on occupancy. Types of construction and degree of fire resistance 2.3 Fire Zones. General measures of fire safety in building (fire fighting services) 2.4 Alarm system Fire extinguishing arrangements—normally operated equipments, fire hydrants, automatic sprinkler system. 2.5 Escape routes- fire separation, fire tower, and roof exist. 2.6 Sketches for typical arrangement of wet riser cum down comer for Apartment house above15 meter and above 24 meter height	**04**	08
03	**Acoustics** 3.1 Characteristics of audible sound. Behavior of sound and its effects. 3.2 Acoustical defects. 3.3 Acoustics of buildings. 3.4 Acoustical materials.	**08**	14
04	**Termite Proofing Water Proofing, Damp Proofing** *4.1 Anti-termite – general, essentials of termite proofing.* 4.2 Termite proofing methods. 4.3 Water proofing – introduction, materials, chemicals required. 4.4 Water closet water proofing -preparation for w.c. socketing for w.c., base coat for w.c., brick bat coba for w.c., water proofing, and topping coat for w.c. water proofing. 4.5 Bathroom water proofing - preparation, base coat, brickbat coba, toping coat for bathroom water proofing. 4.6 Terrace water proofing - preparation, brickbat coba, final coat for terrace water proofing. 4.7 Underground water tank and overhead water tank water proofing 4.8 Damp proofing - introduction, causes of dampness effect of dampness, remedies for the dampness in walls, damp proof course (DPC) in plinth.	**07**	10

05	**Ventilation Air Conditioning** 5.1 Definition & necessity of ventilation. 5.2 Functional requirement of ventilation system 5.3 Ventilation system & their choice 5.4 Purposes and classification of air conditioning. 5.5 Principles of comfort air conditioning. 5.6 Systems of air conditioning 5.7 Essentials of air conditioning system.	**09**	16
06	**Electrification of Buildings.** 6.1Materials fittings required for electrical works. 6.2 Planning of electrical works. Positions and requirements of electrical point, 6.3 Heights of electrical points Sizes of boards, Gauges of wires, Colors of codes of wires 6.4 Planning for external electrical works, Flow chart for electric supply from electricity board to consumer. 6.5 Electrical meter cabinet. Earthing - procedure of the earthing. 6.6 Types of wiring used in building construction. Temporary C.T.S./PVC wiring casing -capping wiring, conduct wiring, Conduit wiring. - Open conduit wiring procedure and open, Conduit wiring concealed conduit wiring in slab and in wall. 6.7 Single phase supply, three phase supply. Protection against short circuits, Fuses, Introduction to protective instruments, Miniature circuits breaker (M.C.B.)	**06**	10

TERM WORK

1. Market survey of latest material for water proofing, termite proofing, acoustical material & latest development.
2. Visit report for knowing plumbing details, air conditioning systems
3. Plan and design a water supply, sanitary and drainage system for multi storied residential building.
4. Plan and design a roof rainwater harvesting
5. Plan or Extract data required for fire fighting services for a building
6. A Visit report for knowing auditorium or cinema theater for acoustic and sound insulation
7. Plan or Extract data required for acoustics for conference hall/ lecturer hall, /small Auditorium hall or case study of above any type of halls.
8. Plan or Extract data required for natural ventilation and artificial ventilation.
9. Preparation of electrical drawing for an apartment.

REFERENCE BOOKS: -

Sr. No	Title	Author	Publisher
01	Building Construction	S.P. Arrora & Bindra	Dhanpat Rai & sons, Delhi
02	Water Supply And Sanitary Engineering	S.K. Garg	Tata McGraw Hills Publications, Delhi
03	Building Drawing	Kale, Shaha, Patki	Dhanpat Rai & sons, Delhi
04	National Building Code		New Delhi
05	A to Z practical Building Construction	Sanjay Mantri	Mantri House publication, Pune
06	Environmental Engineering-	Kamala	Khanna Publications
07	Plumbing Engineering.	Subhash Patil	Seema publication Mumbai

PRECAST AND PRESTRESSED CONCRETE STRUCTURES (PPS):5C505

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	05	Duration	1.00	3.00	--	--	--	--

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. He should be well conversant with the method of casting, physical properties and use of precast components.

COMPETENCY STATEMENTS: -

At the end of the course student will able to

1) Appreciate and understand casting of precast structural units.
2) Know and Find physical properties of precast components conforming to relevant BIS standards to check its suitability.
3) Understand principles, types and applications of prestressed concrete constructions.
4) suggest the precast components for speedy and economical construction

COURSE CONTENTS:-

	Name of the Chapter / topic	Hours	Marks
1.	**Introduction:** 1.1. Advantages and disadvantages of precast structures, 1.2. Principles of prestressing. 1.3. Quality control, handling stresses, transportation of prestressed components. 1.4. Institutions involved in Development and promotion of precast components and their economy 1.5. Modular Co-ordinations and prefabrication	04	06
2.	**Building Materials and Specification:** Study of following building materials with respect to the material, dimensions and tolerance, classification, physical characteristics, sampling criteria and testing 2.1. lime silicate, Calcium silicate, bricks. 2.2. Fly ash, Lime bricks, Clay fly ash bricks. 2.3. Clay flooring tiles. 2.4. Burnt clay flat terracing tiles. 2.5. fibrous Gypsum plaster Boards	08	12
3.	**Building Components and Specifications** Study of following building components and its specifications In accordance with dimensions and tolerance, Materials used for manufacture, moulds, method of casting and curing, physical properties, method of construction, use and applications 3.1. Precast solid cement concrete Blocks. 3.2. Precast concrete stone masonry blocks. 3.3. Hollow and solid light weight concrete masonry units. 3.4. Precast reinforced concrete door and window frames 3.5. Precast concrete manhole covers and frames 3.6. Marble mosaic tiles 3.7. R.C.C pipes 3.8. Precast piles **3.9** Cement Jali **3.10**Asbestos sheets	10	14

4	**Light weight Concrete Components** **4.1** Methods of preparation of light weight concrete **4.2** Advantages and uses of light weight concrete. **4.3** Aerated concrete, foam concrete. **4.4** Study of precast components such as blocks, wall panels, roofing unit manufactured with the help of Aerated and foam concrete. Study of these components with reference to Dimensions and tolerance, materials used for construction, method of casting and curing, properties, quality control and specification, assembly, fittings and fixtures. **4.5** SIPOREX	05	10
4	**Ferrocement** **6.5.** Ferrocement, its properties, advantages and applications. **6.6.** Materials used in manufacture of ferrocement. Types of meshes, its use. **6.7.** Methods of casting ferrocement products. **6.8.** Manufacture of ferrocement precast components such as water tank, boat, roofs, walls. **6.9.** Costing of ferrocement products.	05	10
5	**Composites** **7.1.** Composites: its types, classification, **7.2.** Properties and advantages of composites. **7.3.** Fibres used in composites, Matrix materials. **7.4.** Precast components made up of various composite	05	10
	PRESTRESSED CONCRETE		
6	**8.1.** Basic concepts of prestressing, **8.2.** Assumptions in design of members. **8.3.** Basic terminology, Advantages and disadvantages of pre stressed concrete, **8.4.** Different materials used and their properties, **8.5.** Principle of pre stressed concrete. **8.6.** Necessity of high-grade concrete and steel, high strength concrete mixes, **8.7.** Strength requirements permissible stresses in concrete, shrinkage of concrete, creep of concrete, High tensile steel: types of high tensile steel, strength requirements, permissible stresses in HT steel, relaxation of stress in steel.	05	10
7	**Methods of pre stressing and Loss of Prestress** **9.1.** Types of pre tensioning and post tensioning systems Hoyer system, Freyssinet system, Magnel Blaton system, Gifford Udall system, Lee Maccall system,BBRV Baur-Leonhardt system **9.2.** Thermoelectric prestressing, **9.3.** Chemical prestressing, **9.4.** Various losses in pre-tensioning and post-tensioning(Theoritical aspects only) **9.5.** Precast pre-stressed poles, sleepers and pipes	06	08

TERM WORK: -

Term work shall consist of

1. Sketches of details of moulds and specifications of any seven pre cast concrete products.
2. Experiment of casting of any one pre cast structural unit.
3. Assignment of comparing the cost and time for construction of watchman cabin with the use-pre cast components with construction of house with cast in-situ construction
4. Experiment to find physical properties of any three pre cast components conforming to relevant BIS standards to check its suitability
5. Sketches of systems of pre stressing – Hoyer system, Freyssinet system, Magnel Blaton system, Gifford Udall system, P.S.C. Mono wire system, C.C.I. standard system, Lee Maccall system.
6. Sketches of stress distribution diagrams for different prestressed sections.
7. Calculating loss of stresses in prestressed beams – 2 No.
8. Report writing on Visits to at least three pre cast manufacturing units such as blocks, tiles, RCC hume pipes, prestressed pipes , slabs , bridges.

TEXT BOOKS"

S.No.	Name of Book	Author	Publication
	Pre stressed Concrete structures	T.Y.Lin	
	Pre stressed Concrete	N. Krishna Raju	
	Pre stressed Concrete	S. Ramamrutham	

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1	Relevant BIS codes		
2	Precast Concrete Products		BMTPC

WATER CONSERVATION ENGINEERING (WCE) : 5C506

COURSE STRUCTURE: -

Teaching Scheme		**Evaluation scheme**						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	--	25	150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENTS: -

1. Understand and interpret the water shed plans.
2. Site selection for proposing water and soil conversion measure in water shed.
3. Identify the suitable measures for soil or water conversion for water sheds.
4. Select suitable type of water / soil conservation structures
5. Preparation project of roof rainwater harvesting of a building.
6. Understand the different aspects watershed development project.

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. Water resources need to be conserved at all cost keeping in mind the future demands. It will be unwise to think of water conservation in isolation without conserving soil. Different measures to conserve water and soil need be undertaken in an integrated manner to manage the resources effectively.

CONTENTS :

Chapter	**Name of topic**	**Hours**	**Marks**
01	**Introduction** 1.1 Water resources-types & its availability, its use, classification of water resources, 1.2 Quantity of water resources (category wise), importance of water resources, 1.3 Concept of water shed, watershed characteristics, watershed management- factors affecting watershed management, watershed management practices, approaches to soil conservation, soil conservation in India, 1.4 Concept of rain water harvesting, types of conservation measures,	5	8
02	**Run off from water shed** 2.1 Runoff cycle, types of runoff, factors affecting runoff, 2.2 Methods of runoff computation of runoff by Rational method, Cook's method, Unit hydrograph method.	5	8
03	**Erosion of soil**, 3.1 Definition, erosion problem in India, types of water erosion, factors affecting soil erosion. 3.2 mechanics of soil erosion, factors affecting water erosion. 3.3 Gully erosion, classification of gully, problems caused by erosion, preventation of erosion.	5	8
04	**Water harvesting** **4.1** Water Harvesting - importance , harvesting principles , 4.2 Water Harvesting techniques –different types , roof rain water harvesting –different methods of collection and design aspects	5	8

05	**Agronomic Water Conservation Measures.** 5.1 Contour farming, strip cropping and tillage practices. 5.2 Supportive practices-mulching, pastures, grazing practices,	4	8
06	**Mechanical Measures-** 6.1 Bunding- types, contour bunding and graded bunding, design criteria, alignment & construction, surplus arrangement, 6.2 Contour trenching-graded trenches and staggered trenches, 6.3 Grassed water ways –location, selection of suitable grasses, construction and maintenances, 6.4 Terraces- Classification, bench terraces- types, design, construction , limitations, maintenance , Terraces system-Planning, construction , maintenances, broad based terraces, conservation ditches, 6.5 Gully control measures-Vegetation, Gully control structures-gully plugging check dam- classification-temporary check dam, semi permanent check dam and permanent check dams -cement bandhara, earthen bandhara, gabion structure, biological bandhara, underground ground bandhara, 6.6 Farm ponds- types, Components, selection of site, construction.	16	24
07	**Artificial recharge of ground water** 7.1 Spreading method , induced recharge method, recharge – well method , subsurface dams, 7.2 Waste water recharge, recharge by urban storm runoff.	4	8
08	**Planning of watershed works-** 8.1 Watershed description, watershed problems, proposed watershed management programmes, effect of watershed works, comparison of benefit cost ratio, 8.2 Formulation of project proposal for watershed management work, steps of watershed management, evaluation.	4	8

TERM WORK

1. Literature & collection of various articles/photographs/sketches related to water shed developments works.
2. Prepare a report on roof rainwater harvesting of a building.
3. Visit to a water shed area & report writing
4. Locate and identify the various structures on watershed map and draw sketches of it
5. Prepare a project report on a Case study of planning and design of development of small water shed including data, drawings and simple calculations, with suggestive conservative structures as per various given conditions with its layout.

TEXT BOOK

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 12th Edition	Dr. Punmia B. C. & Dr. Pande B.B.	Laxmi Publication

REFERENCE BOOK

Sr No	Title and Edition	Author	Publisher
1.	Evaluation & development of ground water	Mahajan.	Standard Distributer, New Delhi

TOWN PLANNING & MUNICIPAL ENGINEERING (TPME):5C507

COURSE STRUCTURE: -

Teaching Scheme		**Evaluation scheme**						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	--	25	150
TOTAL	05	Duration	--	--				

COMPETENCY STATEMENT:

1. Assist Town Planner in preparing the development plan of a town
2. Prepare Housing lay outs on the basis of Neighborhood Planning Principles and Bye laws.
3. Assist Town Planner in preparing renewal plan of existing towns.
4. Collect data, analyze data and interpret data related with socio economic aspects of town planning

RATIONALE: -

Urbanization and industrialization are complementary to each other and are instrumental in the socio economic growth of a nation. Systematic planning of towns will ensure a most comfortable living, otherwise it will lead to haphazard development of towns, & it may to formation of slums making town life miserable.

Diploma civil engineer who is to assist in several activities related to town planning is required to understand modern day towns & town planning. He /She is required to develop basic competencies related to town planning so as to make himself/herself competent to assist town planner.

Sr. No.	Content	Hours	Marks
1	**1. Introduction** **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** Forms of town planning. System of town planning. **1.5** Growth of existing towns, types -. Horizontal and vertical, satellite towns, garden city,	3	4
2	**Elements of Town** **2.1** Main parts of town such as town center, suburbs, industrial areas, communication networks, open spaces. **2.2** Elements of town: Communication, built up area, open areas, public services, public amenities distribution of land, with the help of pie diagram..	3	4
3	**Surveys** **3.1** Necessity of surveys, objectives of surveys, **3.2** Types of survey: physical survey, social survey, economic survey, **3.3** Collection of data/ information using survey instruments or questionnaire methods of data collection suitability of survey instrument. **3.4** Tabulation of data, presentation of data, analysis and inference of data Reporting of survey work	4	6

4	**Zoning** **4.1** Definition, importance of zoning **4.2** Classification of zoning- Use zoning , residential, commercial zone, civic zone, imitational zone, recreational zone, **4.3**Height zoning- 45^0 rule, $631/2^0$ rule, Density zoning- gross density, net density, estimating net and gross density. **4.4** Zoning powers, color coding to indicate different types of zones.	4	6
5	**Housing:** **5.1** Introduction, housing, housing policies, housing problems, housing schemes, Classification of housing, **5.2**Neighborhood planning, principles, Typical Neighborhood, **5.3** Layout of housing, Reilly plan, Radburn plan, Cul De sac, **5.4** calculating area for neighborhood amenities in neighborhood.	4	8
6	**Slums:** **6.1** Concept of slum, causes of slum formation, **6.2** A layout of a typical slum, precautions against formation slum. **6.3** slum Clearance, slum development schemes. Improvement method, complete removal method.	3	6
7	**Parks and Play Grounds** **7.1** Necessity , types- active, passive recreation, **7.2** Selection of site for parks. **7.3** Forms of recreation amenities, park layout, park recreation amenities. **7.4** Park layout, park design, standards of open spaces, Design of a park for a neighborhood.	4	6
8	**Public Buildings & Town Center** **8.1** Types, site selection, grouping, public building complex, **8.2** Typical layout of a complex of public buildings, **8.3** Town center- elements, Markets, Shopping center ,amenities, .	4	8
9	**Industries** **9.1** Types, classification, **9.2** Selection of site for an industrial estate, **9.3** typical layout of an industrial estate, planning for an industrial estate, industrial township,	2	4
10	**Communication & Traffic System** **10.1** Need for communication and transportation facilities, **10.2** Functions of communication system, **10.3** Requisites of city roads, factors in town road design, **10.4** Classification of town roads- arterial, sub arterial, local roads, ring roads, other roads, **10.5** street systems, types, layout. **10.6** Traffic management, necessity, objectives traffic	8	12

	surveys, **10.7** Traffic congestion- causes, remedies, **10.8**Traffic control- traffic segregation, road junction, types, **10.9** Parking signs, facilities, space requirement, traffic signs, signals, marking, **10.10** Street lighting, lighting patterns.		
11	**Master Or Development Plan** 11.1 Definition, objective, necessity of Master plan, 11.2 Data to be collected, maps to be prepared, 11.3 Stages in preparation of master plan, 11.4 Typical master plan, features of master plan, 11.5 Urban renewal and re planning the existing towns, 11.6 Objects of re planning, data to be collected, 11.7 Sanction of development plan,	6	10
12	**Municipal Bye Laws** 12.1 Building byelaws, provision of building regulation, 12.2 functioning of local authority, 12.3 Land acquisition act, payment to damage, compensation, betterment contribution, 12.4 Bombay town planning act, model town planning act 1957.	3	6

TERM WORK:

1. Preparation of a simple questionnaire for socio economic survey
2. Data collection for socio economic survey of a slum, or a village, analysis and presentation of results
3. Identify Various Units of Neighborhood , Percentage area of different types houses, other amenities and Open areas, from a given neighborhood/ housing lay out 4.
4. Prepare a housing layout for a colony or a township on the basis of Neighborhood principles for an area of 1 -1.5 Ha.
5. Prepare project Proposal for renewal plan for a small congested area or a slum in a town.
6. Prepare a detailed report of Various units/ Elements/ Communication System of a Town on the basis of visit to a planned township/MHADA/CIDCO/HUDCO.

TEXT BOOK:

Sr. No.	Title and Edition	Author	Publisher
1	Fundamentals of Town Planning	Hiraskar	Dhanpat rai &Sons
	Text book of Town Planning	Rangwala	Charotar

REFERENCE BOOKS: -

Sr. No	Title and Edition	Author	Publisher
1	Town and country planning and housing	N.V.Modak	
2	Town and country planning	Gandhi.	
3			

EARTHQUAKE ENGINEERING (EAE) : 5C508

COURSE STRUCTURE: -

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	05	Duration	1.00	3.00	--	--	--	--

COMPETENCY STATEMENT (S):

6. To understand basics of earthquake engineering.
7. To understand causes of structural failure due to earthquake & its effects
8. Study of guidelines for earthquake resistant non- engineered construction.
9. To develop the knowledge and capacity level of students about earthquake engineering education with a view to mitigate earthquake losses in the country.

RATIONALE:-

The recent Earthquake caused large devastation of property & untold inserts and hardship to the affected population. All past earthquake have established that structure which are properly planned and adequately designed to resist earthquake forces can escape this natural calamity. With all past considerations the course is introduce to have basic knowledge of earthquake engineering and to understand earthquake tips & should have knowledge of code provisions.

COURSE CONTENTS:-

CHAPTER NO.	CONTENT	HOURS	MARKS
1	**Introduction** **1.1** General, Causes of earthquake, Plate Tectonics, Types of earthquake and Faults & their characteristics **1.2** Changes in earth crust during earthquake, Effects due to the changes **1.3** Performance of building during past Earthquake, Socio-economic Constraints of earthquake.	**4**	**8**
2	**General Concept Related to Earth quake** **2.1** Technical Terms -Focus, Epicenter, Focal depth, Epicentral distance, Magnitude, Richter scale, Intensity, Modified Mercalli Intensity(MMI) scale, MKS scale, isoseismals, basic difference between Magnitude & Intensity, Intensity scale for Earthquake with its magnitude **2.2** Effect of site conditions on building damage, Other factors affecting damage, Building configuration, Size of Opening, Rigidity distribution, Ductility, Type of foundation, Quality of construction	**7**	**12**
3	**Seismic Waves & Its Effects** **3.1** Seismic waves - Body waves, P waves, S waves, Surface waves, Characteristics and effects of seismic waves, **3.2** Measuring instruments-seismograph , Types of Seismograph **3.3** Strong ground motions & its characteristics,	**5**	**10**

	Basic geography and tectonic features of India, **3.4** Seismic zones of India, Characteristics of each zone, ,Related Maps, Prominent Cities in these zones.		
4	**Non - Engineered Buildings** **4.1** Concept of non-engineered building , **4.2** General planning and design aspect- symmetry, regularity, simplicity, enclosed area, separate building for different function, stability of slope, ductility, deformability, damageability, effect of firm soil & soft soil	**4**	**10**
5	**Building In Fired- Brick Masonry Units** **5.1** Typical damage and failure of masonry building, Causes of damage in masonry building, **5.2** Typical strengths of masonry construction, **5.3** General construction aspect- mortar, Wall enclosure, Openings in walls, Types of failure in Masonry, Masonry bond, Horizontal bands, Section of bands, Dowels at corners and junctions, vertical reinforcement in walls .	**7**	**8**
6	**Stone Building** **6.1** Typical damage and failure of Stone building, **6.2** General construction aspect - Overall dimensions, mortar, openings in walls, masonry bond, horizontal& vertical reinforcing of wall	**5**	**6**
7	**Causes Of Structural Failures** **7.1** Causes of structural failure, Soft storey effect, Beam-Column joint, Behavior of joints in Earthquakes Poor reinforcement detailing, **7.2** Liquefaction- Causes & effects, **7.3** Non- Structural elements, Shear wall- Function, location & advantages, Strong column-weak beam condition, Causes of failure of column	**6**	**10**
8	**Evaluation Of Earthquake Resistance Of Buildings** **8.1** Evaluation steps of earthquake resistance of building, Precautions against the possible failures **8.2** Evaluation of existing buildings, Rehabilitation, Retrofitting- Necessity, Methods **8.3** Earthquake resistant building code Provisions.	**5**	**8**

9	**Lesson from recent earthquakes** **9.1** Lessons from Recent Earthquake, Prominent past earthquake in India, Koyna, Latur, Jabalpur, Bhuj , Assam , Killari, Chamoli, etc. Prominent recent past earthquake in the World (brief discussion on any three Earthquakes) **9.2** Post earthquake handling of buildings, Lifelines, Roads & Bridges, Pipelines, Civic Amenities **9.3** Guidelines for Earthquake preparedness Before, During and After earthquake , Individual, Family, Home & Community Planning guide. Awareness measures taken by the Govt to cope up with E.Q.	**5**	**8**

TERM WORK :

TUTORIAL:

Tutorial shall consist of :

1) Three assignment based on the above Theory content.
   a) writing a report on damages and causes of damages due to earthquake based on a case study
   b) Students shall suggest the corrective non engineering measures in above type of situations to prevent damages in future.
   c) Making village houses earthquake resistant on the basis of non engineered earthquake resistant construction practices.
   d) Study and writing a report on structural failures of buildings/bridges/roads; due to earthquake.
   e) Prepare a write up on architectural planning for making the building earthquake resistant.
   f) Prepare sketches to show the retrofitting of parts of building affected due to earthquake.
2) Study of books & CDs under NPEEE grant through department library (Writing a summarized report on any one book and any one C.D., by a group of min. 3 students each)
3) Write & Study recent development and techniques of earthquake resistant structures and repairs of earthquake affected non engineered buildings; by referring books, journals, articles or internet.etc.
4) Study of IS 13828(1993) codes / Indian standard guidelines for improving earthquake resistance of low- strength masonry building.(referring I.S.Code) and writing a report of the same
5) Write & study – Detailed Report …… on any one earthquake taken place in India or world over in the recent years , by a group of 3-4 students each.

REFERENCES :

1) *EARTHQUAKE TIPS* - Learning Earthquake Design and Construction by C.V.R.Murty (IITK-BMTPC) ,Ministry Of Urban Development & Poverty Alleviation, Government Of India, New Delhi , March 2005
2) Guidelines For Earthquake Resistant Non- Engineered Construction - by IAEE (International Association for EQ Engg) & NICEE (National Information Centre of EQ. Engg.) 2004
3) Indian Standard- IMPROVING EARTHQUAKE RESISTANCE OF LOW STRENGTH MASONRY BUILDINGS- GUIDELINES (IS 13828:1993)
4) *PROTECTION AGAINST EARTHQUAKES*- By Dharam V. Mallick
5) *EARTHQUAKES*- By A.K.R. Hemmady
6) EARTHQUAKES – By Bruce A. Bolt

Web. : www.bmtpc.org
www.nicee.org
www.home.iitk.ac.in
www.concretehomes.com
www.asc-india.org

HYDRAULIC STRUCTURES (HYS) : 5C509

COURSE STRUCTURE: -

Teaching Scheme		**Evaluation scheme**						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	--	25	150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCY STATEMENT:-

1. Apply the design aspects of different hydraulic structures used in irrigation Engineering.
2. Estimate hydrostatic pressure on hydraulic structures
3. Planning and Design of canals, canal structures.
4. Design aspects of weirs, barrages, spillways etc.
5. Draw the sketches of canal drainage works, spillway show component parts.

RATIONALE: -

A Civil engineer occupied in irrigation department or became consultant in this area, they should posses the knowledge of different hydraulic structure. He should plan the distribution system of irrigation. He has to prepare the design 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

CONTENTS :

Chapter	**Name of topic**	**Hours**	**Marks**
01	**Planning and layout of distribution system** 1.1 Introduction, 1.2 Types of distribution system 1.3 Masonary structures on a canal system 1.4 Classification of canals 1.5 Investigation for distribution system 1.6 Factors affecting the canal alignment Factors affecting the alignment of a water course or field channel.	4	8
02	**Design of channels** 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 2.6 Comparison and drawback of Kennedy's theory and Lacey's theory 2.7 Longitudinal and cross section of unlined and lined channel	8	12
03	**Canal Regulation Works** 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	4	8

04	**Canal outlets , Escapes and Meter flumes** 4.1 Canal outlets, requirements of good canal outlet, types, criteria for selection of outlet capacity, Non modular outlet, semi modular and rigid modular outlet. 4.2 Escape –types-surplus water escape, canal scour escapes, tail escape. 4.3 Meter flume-Venturi and Standing wave flume.	6	8
05	**Cross- drainage Works** 5.1 Introduction, types of cross drainage works, 5.2 Selection of suitable type and Selection of suitable site 5.3 Design discharge of drainage and required waterway 5.4 Types of structures of cross drainage works.	4	8
06	**Spillways** 6.1 Essential requirements of a spillway, required spillway capacity, component parts 6.2 Classification of spillways, functioning, construction details and advantages of different types of spillways, 6.3 Energy dissipation below spillway, measures adopted for dissipation of energy. 6.4 Spillway crest gates- types, working principle, components and functions.	8	12
07	**Dam outlets and Sluiceways** 7.1 Introduction, location of dam outlet 7.2 Classification of outlets, component parts of outlet works, 7.3 Discharge through an outlet , required capacity of outlet , 7.4 Trash rack, intake structure.	4	8
08	**Basic design principles of Hydraulic Structure** 9.1 Theories of subsurface floor, Blighs' creep theory, Khosla's theory, Khosla's's solutions for horizontal floor,Exit gradient, 9.2 Lacation of hydraulic jump, water surface profile,suction pressure in hydraulic jump profile, Scour due to surface flow.	6	8
09	**Design of Diversion headworks** 10.1 Introduction , basic factors for design. 10.2 Effect of weir and the regime of river, pond level, crest level, discharge formula. 10.3 Causes of failure of weirs on permeable foundations, 10.4 Regulation of a weir or a barrage.	4	8

TERM WORK:

Term work shall consists of the following assignment,

1. Identify the type of distribution system & masonary structures on a canal system
2. Prepare layout of distribution system for a minor irrigation scheme by arranging visit.
3. Design canal to carry irrigation water passing through alluvial soil and lined canal from given data, check economic feasibility.
4. Design canal outlets capacity and draw the sketches four types of canal outlets.
5. Draw the sketches four different types of canal drainage works.
6. Draw the sketches of two to three types spillway and show component parts.
7. 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.

TEXT BOOKS

Sr No	Title and Edition	Author	Publisher
1	Irrigation water power and Water resources engineering	K. R. Arora	Standard Publishers Distributors, New Delhi-6
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

REFERENCE BOOK

Sr No	Title and Edition	Author	Publisher
1	Irrigation and Power Engineering	Dr. Punmia B. C. & Dr. Pande	Laxmi Publication

ARCHITECTURAL PRACTICE & INTERIOR DESIGN (API):5C510

COURSE STRUCTURE: -

Teaching Scheme		**Evaluation scheme**						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max marks	20	80	25	--	25	150
TOTAL	05	Duration	1 hrs	3 hrs				

COMPETENCIE(S) :

1. Use the basic architecture principles for working drawings.
2. Prepare working drawings of buildings.
3. Design landscape for a institutional / commercial campus.
4. Understand basic principles of interior design for drawing interior plans.
5. Prepare innovative sketch plans for presentation to customer as per requirements.
6. Design interior for a commercial buildings or flats.

RATIONALE :

Keeping in view the fact that the civil engineering some technicians have to work under architectural and interior decorators office. He should be able to prepare draw working drawings and supervise the building works effectively. He should be able to utilize the space effectively by using the principles of interior design. He should be able to prepare innovative and economic plans considering the functional utility as per the requirements of the customer.

CONTENTS :

Chapter	**Name of topic**	**Hours**	**Marks**
01	**Review of Architectural Planning Aspects** 1.1 Review of principles of architecture. 1.2 Site selection, 1.3 Climatic conditions, sun control, 1.4 Orientation of building & site.	3	4
02	**Building Aesthetics :** 2.1 Feeling for aesthetics and utility, 2.2 Composition, Mass composition 2.3 Unity 2.4 Order, expression, 2.5 Proportion, scale, 2.6 Accentuation & rhythm	6	8
03	**Design of Projects :** 3.1 A case study of residential building. 3.2 A case study of public / commercial building. 3.3 Aspect of working drawing – plan, elevation section.	6	10
04	**Land Scaping :** 4.1 Soft and hard land scaping. 4.2 Basic principle of land scaping. Assessment of land. 4.3 Design procedure. 4.4 A case study of land scape for public / commercial building campus.	7	12

05	**Elements and Principles of Interior Design** 5.1 Elements such as form, texture, light, colour, effect of light on Colour and texture, 5.2 Space organization in space design, Space pattern. 5.3 Importance of colour as art element. various colour scheme. 5.4 False ceiling, flooring, paints.	7	12
06	**Anthropometrics Data :** 6.1 Relation of human measurement to furniture 6.2 Movement and circulation patterns.	4	6
07	**Interior Materials :** 7.1 Different interior materials paneling, 7.2 Partitions, 7.3 Finishing materials, 7.4 Furniture.	3	6
08	**Interior of Residential Building :** 8.1 Use of space, circulation, 8.2 Standard size of furniture. 8.3 Plans and elevation of interior with furniture for living space, dining space, kitchen, bed room, guest room etc.	6	12
09	**Interior of Small Commercial Building :** 9.1 Planning of interior for small commercial units such as offices, consulting chambers, shops etc. 9.2 Furniture arrangement details such as executive table, architectures table etc. used in commercial units.	6	10

TERM WORK:

1. Prepare innovative plans, elevations, sections, considering the thickness of plastering with micro details and working drawings for a residential building with scale 1:50 special details of components (minimum 2 components such as kitchen otta details, compound wall gate, grill, front door, windows, staircase etc.) with scale 1:20 / 1:15 .
2. Design a landscape for any existing public building campus
3. Prepare interior plan for 1/2 BHK residential bunglow / flat.
4. Prepare interior plan of any one commercial unit such as office, bank, restaurant, shop etc.

TEXT BOOK

Sr No	Title and Edition	Author	Publisher
1	Building Drawing	M. G. Shah, C.M. Kale ,S.Y. Patiki	Tata McGraw hill Publications, Delhi
2	Architecture	Briggs M.S.	
3	Architects Working Details	Boyne (1 To 9)	
4	Architectural Building Construction	Juggard & Dirury.	
5	The Use Of Colours In Interiors	Albert O. Halse	Mc Graw Hill Publication
6	Time Saver Standard for building, Building types	Joseph De Chiara, Michael CrosBie	Mc Graw Hill International Publication, Singapore
	Design & Space Planning	Joseph De Chiara, ulins Panch, Martin Zelnik	Mc Graw Hill Publication

REFERENCE BOOK

Sr. No	Title and Edition	Author	Publisher
1.	Indian Architecture	Percy Brown	D. B. Taraporewala Sons & Co. Pvt. Ltd. Mumbai.
2	Code Practice for Architectural & Building Drawing	IS 962:1989	Bauru of Indian Standards
3	Science & Technology in Ancient India	Keshav Srushti	Vijnan Bharti, Sion Mumbai.
4	Nwtert – Architects Data	Bousmaha Baiche & Nicholes Walliman	Black Well Science Publication
5	A manual of essential architectural Data	Time saver Standards	Tata McGraw hill Publications,

Government Polytechnic Aurangabad

Civil Engineering Department

No.CED/CDC/ EQU/2012/
Date:28/8/12

Ref: - CDC/APM/Equivalent courses/2011/1743 Dated 07-06-2011

Sr. No.	**Existing Curriculum (Third Revision)**					**Proposed Curriculum (Fourth revision)**					**Difference in credits**	
	Course code	**Course name**	**Th. Cr.**	**Pr. Cr.**	**To. Cr.**	**Course code**	**Course name**	**Th. Cr.**	**Pr. Cr.**	**To. Cr.**	**Plus**	**Minus**
01	GE151	CMS	2	2	4	5G301 5G302	ENG CMS	2 1	2 2	4 3	0 3	-
02	GE152	BMT	4	-	4	5G101	BMT	4	-	4	-	-
03	GE153	EMT	4	-	4	5G102	EMT	4	-	4	-	-
04	GE154	BSC	3	2	5	5G103 5G104	ECH EPH	3 3	2 2	5 5	- -	- -
05	GE155	ASC	3	2	5	5G103 5G104	EPH ECH	4 4	2 2	6 6	1 6	- -
06	GE156	WSP	-	4	4	5G105	WSP	-	3	3	-	1
07	GE157	EGR	1	2	3	5G106	EGR	2	2	4	1	-
08	GE158	BCS	1	2	3	5G107	BCS	1	2	3	-	-
09	CE251	APM	4	2	6	5C201	APM	4	2	6	-	-
10	CE252	CM	2	2	4	5C207	FCE	2	2	4	-	-
11	CE253	BC	3	4	7	5C203	BUC	4	2	6	-	1
12	CE254	SUY-I	2	4	6	5C204	BAS	3	4	7	1	-
13	CE255	SUY-II	3	4	7	5C403	SUR	3	4	7	-	-
14	CE256	CED	2	6	8	5C206	BUD	2	4	6	-	2
15	CE257	HYD	4	2	6	5C205	HYD	4	2	6	-	-
16	CE258	CTSE	6	4	10	5C202 5C402	COT SOE	3 3	2 2	5 5	-	-
17	CE259	MOS	4	2	6	5C301	SOM	4	2	6	-	-
18	CE260	TOS	4	2	6	5C401	TOS	4	2	6	-	-
19	CE261	ROE	3	2	5	5C406	ROE	3	2	5	-	-
Sr. No.	**Existing Curriculum (Third Revision)**					**Proposed Curriculum (Fourth revision)**					**Difference in credits**	

	Course code	**Course name**	**Th. Cr.**	**Pr. Cr.**	**To. Cr.**	**Course code**	**Course name**	**Th. Cr.**	**Pr. Cr.**	**To. Cr.**	**Plus**	**Minus**
20	CE371	PM	3	2	5	5G305	INM	3	2	5	-	-
21	CE372	PP	2	2	4	5C409	CAV	3	2	5	1	-
22	CE376	DM	3	2	5	5C508	EAE	4	2	6	1	-
23	CE451	TRE	3	-	3	5C405	RBT	3	2	5	2	-
24	CE452	IRG	4	2	6	5C407	IRE	4	2	6	-	-
25	CE453	WSSE	4	2	6	5C408	WSS	4	2	6	-	-
26	CE454	DOS	4	4	8	5C412 5C501	SDD DRS	- 4	4 2	4 6	2	-
27	CE455	QSC	4	4	8	5C503	ESC	3	4	7	-	1
28	CE456	BS	4	2	6	5C504	BUS	3	2	5	-	1
29	CE457	ACAD	1	4	5	5C404	AUC	1	4	5	-	-
30	CE458	EAE	3	2	5	5C508	EAE	4	2	6	1	-
31	CE459	CEP	-	4	4	5C410	PRO	-	4	4	-	-
32	CE460	DSS	4	2	6	5C502	DSS	4	2	6	-	-
33	CE461	IPT	-	2	2	5C411	IPT	-	2	2	-	-
34	CE465	TPME	3	2	5	5C507	TPM	4	2	6	1	-
35	CE552	PPS	3	2	5	5C414 5C505	ASD PPS	4 4	2 2	6 6	1 6	- -
36	CE553	ASS	3	2	5	No Equivalent course						
37	CE554	MI	3	2	5	5C417	MIE	4	2	6	1	-
38	CE555	WCE	3	2	5	5C506	WCE	4	2	6	1	-

With reference to your above letter herewith list of equivalent courses is submitted.

HEAD

CIVIL ENGG.DEPARTMENT

To,

In charge CDC,

G.P. Aurangabad