Government Polytechnic Aurangabad
(An Autonomous Institute of Government of Maharashtra)

Diploma in Artificial Intelligence and Machine Learning

Curriculum Document 2021-22
6th Revision (Outcome Based Education)

PREFACE

Government Polytechnic, Aurangabad, is one of the oldest institute in Maharashtra was established in the year 1995-96. Over the period of time the institute, through its untiring efforts has created its own niche and has been functioning as a Lead Technical Institute in the State of Maharashtra to serve the Industry and Society by producing excellent technical manpower.

Government Polytechnic, Aurangabad has expanded quantitatively from an intake of 180 in 1995 with three programmes to 720 Intake in eight programmes. The Institute has been striving relentlessly for achievement of excellence in technical education. Government Polytechnic, Aurangabad has been functioning with 'the Autonomous Institute status', since 1994.It is presently functioning in three shifts, by running Diploma Programmes in I Shift (Regular), II shift and Part Time Diploma programmes in evening shift. I am proud to share that, the Institute has been ably rewarded with three state level awards for its best performance in the state of Maharashtra.

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

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

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

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

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

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

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

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

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Principal
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Government Polytechnic Aurangabad

(An Autonomous Institute of Government of Maharashtra)

Vision

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

Mission

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

Department of Artificial Intelligence and Machine Learning (AIML)

Vision

To strive for the development of technocrats and empower them to face ever- changing challenges in the field of Artificial Intelligence and Machine Learning (AI & ML).

Mission

M1: To impart quality education with contemporary industry needs and emerging AI & ML techniques.

M2: To develop employability and entrepreneurial skills in students.

M3: To inculcate lifelong learning with ethical and sustainable practices.

Programme Educational Objectives:

PEO1: Provide socially responsible, environment-friendly solutions to AIML-related broad-based problems adapting professional ethics.

PEO2: Adapt state-of-the-art AIML broad-based technologies to work in multi- disciplinary work environments.

PEO3: Solve broad-based problems independently and collaboratively, communicating effectively in the world of work.

Programme Specific Outcomes (PSOs)

PSO-1: Ability to apply fundamental principles, algorithms, and techniques in artificial intelligence and machine learning.

PSO-2: Design cutting-edge AIML-based models by innovating, optimizing models, integrating data, and ensuring scalability.

Mission of the Department – PEOs matrix

PEO Statements	M1	M2	M3
PEO 1: Provide socially responsible, environment-friendly solutions to AIML-related broad-based problems adapting professional ethics.	3	3	1
PEO 2: Adapt state-of-the-art AIML broad-based technologies to work in multi-disciplinary work environments	3	2	1
PEO 3: Solve broad-based problems independently and collaboratively, communicating effectively in the world of work.	1	2	3

Justification

PEO Statements	M1	M2	M3	Justification
PEO 1: Provide socially responsible, environment-friendly solutions to AIML-related broad-based problems adapting professional ethics.	3	3	1	1. Mission M1 and M2 strongly support to achieve PEO1 as objective is to provide knowledge and problem-solving skills in AIML. 2. Mission M3 slightly support PEO1 to provide engagement in lifelong learning
PEO 2: Adapt state-of-the-art AIML broad-based technologies to work in multi-disciplinary work environments	3	2	1	1. Mission M1 strongly support to achieve PEO2 as objective is to provide knowledge in various domains and contemporary needs of industry. 2. Mission M2 moderately supports PEO2 to provide skills in entrepreneurship and employment. 3. Mission M1 slightly support PEO2 to provide engagement in values, and lifelong learning in the system environment.
PEO 3: Solve broad-based problems independently and collaboratively, communicating effectively in the world of work.	1	2	3	1. Mission M1 slightly support PEO3 as it deals with technical education. 2. Mission M2 moderately support PEO3 as it deals with technical education and entrepreneurial skills. 3. Mission M3 highly supports PEO3 as creating professional and ethical attitude as a part of life skills in multifaceted personality with social awareness.

OUTCOME BASED EDUCATION (OBE) PHILOSOPHY

Introduction:

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

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

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

As per research on curriculum in engineering and technology, education carried out in different parts of world it is concluded that philosophy, framework, approach and model that is to be used for developing technical manpower with such profile should be Interdisciplinary – integrated curriculum.

Therefore the philosophy of curriculum development used in revising sixth curriculum has been integrated – interdisciplinary in nature to achieve outcome based technical education.

Even though all prevailing & necessary apt theories of curriculum design are used in the curriculum development process the existing curriculum has been questioned for its ability to

provide clearly stated learning outcomes and therefore it is right time that the revised curricula requires that it should give enough clarity as regards intended learning outcomes to all concerned – first to the student, then to the teachers and the industry, followed by all the other stakeholders. This meant that the curriculum should explicitly state as to what are the observable and measurable 'competencies' expected by the industry. Such 'competencies' comprising of measurable 'Course outcomes' in the 'cognitive domain', measureable associated practical outcomes in the form of practical exercises in the 'psychomotor domain' and measurable social skills related to the 'affective domain' will help the students and teachers in knowing the 'length, breadth and depth' of the course necessary to achieve the competency.

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

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

i. Vision, mission and programme educational objectives
ii. Programme outcomes
iii. Programme curriculum
iv. Students performance
v. Faculty
vi. Facilities and technical support
vii. Academic support unit and teaching learning process
viii. Governance

ix.   Institutional support and finance resources

x.   Continuous improvement

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

Philosophy for Sixth Revision of Curriculum adopted at Government Polytechnic Aurangabad:

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

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

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

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

In line with above stages, the institute ,under the guidance of NITTTR Bhopal organized the search conference/workshop involving industry personnel from several industries in the region covering all sectors related to 8 programmes run in the institute .

This led to occupation analysis, knowing industry and society expectations as regards diploma graduate / engineer to arrive at profile of diploma engineers.

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

SKILL IDENTIFICATION/ JOB FUNCTION

Skill identification has been done after analysing the feedbacks of alumni, students and faculties, suggestions from search conference, PBOS members and industry persons.

Sr. No.	Type of skills	List of skills
1.	Technical Skills	1. Programming Skill 2. Web application development using computer languages 3. Apply database management concept 4. Test the software using automated tools 5. Apply Software Engineering concept to industry 6. Mobile application development. 7. Troubleshoot & Maintain network at workplaces. 8. Design desktop application according to requirements of users.
2.	Soft Skills	1. Communication (Oral & Written) 2. Team work 3. Problem solving 4. Develop lifelong learning 5. Multidisciplinary Practices 6. Recourse management 7. Time management 8. Creativity 9. Presentation skills 10. Leadership

Programme Outcomes (PO's)

1. Able to apply basic knowledge of courses like science, maths, basic engineering courses to solve engineering problems.

2. Able to analyze engineering problems using standard procedures/ methods.

3. Can design develop solutions for basic simple components processes to meet specified need.

4. Can proficiently use basic and modern tools/ equipment/ instruments/ softwares in different situations/ engineering applications.

5. Able to give Solutions with due consideration to environment and Society.

6. Can manage small medium engineering projects as team leader/ member.

7. Able to update latest technological knowledge continuously as per emerging needs.

PROGRAMME STRUCTURE

SR NO	LEVELS	COMPULSORY COURSES	OPTIONAL COURSES	CREDITS			MARKING SCHEME		
				COMPULSORY	OPTIONAL	TOTAL	COMPULSORY COURSES	OPTIONAL COURSES	TOTAL
1	Foundation	4	Nil	18	--	18	500	--	500
2	Basic Technology	10	Nil	49	--	49	1150	--	1150
3	Allied	08	02/15	31	04	35	775	--	775
4	Applied	10	02/06	52	10	62	1300	275	1575
5	Diversified	06	01/03	25	05	30	750	150	900
	TOTAL	**38**	**05/24**	**175**	**19**	**194**	**4475**	**425**	**4900**

Scheme at a glance:

Total number of courses offered   62

Number of Compulsory courses   38

Number of Optional course   : 05 out of 24

Total courses to be opted   43

Total Marks   4900

LEVEL- I: (FOUNDATION LEVEL COURSES)

Sr No	COURSE CODE	COURSE TITLE	TEACHING SCHEME					EXAMINATION SCHEME					
			TH	PR	TU	CR	TE RM	PT	TH	PR	TW	OR	TOTAL
01	**6G101**	Basic Mathematics (BMT)	03	--	01	04	I	20	80	--	--	--	100
02	**6G102**	Engineering Mathematics (EMT)	03	--	01	04	II	20	80	--	--	--	100
03	**6G103**	Engineering Physics (EPH)	03	02		05	I	20	80	@25	25	--	150
04	**6G104**	Engineering. Chemistry(ECH)	03	02		05	II	20	80	@25	25	--	150
								80	320	50	50	--	
	TOTAL		**12**	**04**	**02**	**18**		**400**		**100**		**--**	**500**

Scheme at a glance:

Total number of courses offered: 04

Number of compulsory courses: 04

Number of optional courses   : Nil

Total courses to be opted   : 04

Total Credits   : 18

Total Marks   : 500

LEVEL II: (BASIC TECHNOLOGY LEVEL COURSES)

Sr No	COURSE CODE	COURSE TITLE	TEACHING SCHEME					EXAMINATION SCHEME					
			TH	PR	TU	CR	TERM	PT	TH	PR	TW	OR	TOTAL
01	**6G202**	Workshop Practice (WSP)	00	03	0	03	II	--	--	--	50		50
02	**6G203**	Basics of computer System (BCS)	00	02	0	02	I	--	--	@25	25	--	50
03	**6S201**	Fundamental Computer and Internet Technology (FCIT)	01	04	00	05	I	--	--	@50	50	--	100
04	**6S202**	Elements of Electronics& Electrical (EEE)	4	02	--	06	II	20	80	--	25	@25	150
05	**6S203**	Digital Electronics (DE)	03	02	0	05	III	20	80	@25	25	--	150
06	**6S204**	C Programming (CP)	03	04	0	07	II	20	80	#25	25	--	150
07	**6S205**	Static Webpage Designing Lab (SWDL)	-	02	0	02	II	--	--	@50	50	--	100
08	**6N201**	Python programing (PP)	01	04	--	05	III	--	--	#50	50		100
9	**6N202**	Object Oriented Programming using Java(OOPJ)	03	04	0	07	IV	20	80	@25	25	--	150
10	**6S207**	Data Structure (DS)	03	04	0	07	III	20	80	#25	25	--	150
			18	31	00	49		100	400	275	350	25	
	TOTAL		18	31	00	49		**500**		**650**			1150

Scheme at a glance:

Total number of courses offered	: 10
Number of compulsory courses	: 10
Number of optional courses	: Nil
Total courses to be opted	: 10
Total Credits	: 49
Total Marks	: 1150

LEVEL- III: (ALLIED LEVEL COURSES)

Sr No	COURSE CODE	COURSE TITLE	TEACHING SCHEME					EXAMINATION SCHEME					
			TH	PR	TU	CR	TERM	PT	TH	PR	TW	OR	TOTAL
01	6G301	English (ENG)	2	2	0	4	I	20	80	--	25	--	125
02	6G302	Communication Skills (CMS)	1	2	0	3	II	--	--	--	50	@25	75
03	6G303	Development of Life skills (DLS)	00	02	00	02	I	--	--	--	25	@25	50
04	6G304	Environmental Science (EVS)	0	02	0	02	I	--	--	--	50	--	50
05	6G305	Industrial Organization Management (IOM)	3	02	00	05	VI	20	80	--	25		125
06	6G306	Entrepreneurship Development (EDP)	02	02	0	04	VI	--	--	--	50		50
07	6N301	Microprocessor (MP)	3	02	--	05	IV	20	80	@25	25	--	150
08	6N302	Natural Language Processing (NLP)	04	02	00	06	VI	20	80	#25	25	00	150
09	6G311 To 6G325	NON-EXAM	--	02	--	2	II & III	--	--	--	--	--	--
10	6G311 To 6G325	NON-EXAM	--	02	--	2	II & III	--	--	--	--	--	--
								80	320	50	275	50	
		TOTAL	15	20	00	35		400			375		775

Scheme at a glance:

Total number of courses offered   : 23

Number of compulsory courses   : 08

Number of optional courses   : 02 out of 15

Total courses to be opted   : 10 out of 23

Total Credits   : 35

Total Marks   : 775

LEVEL-IV: (APPLIED LEVEL COURSES)

Sr No	COURSE CODE	COURSE TITLE	TEACHINGSCHEME					EXAMINATION SCHEME					
			TH	PR	TU	CR	TERM	PT	TH	PR	TW	OR	TOTAL
01	**6S401**	Relational Database Management Systems (RDBMS)	03	04	--	07	III	20	80	#25	25	--	150
02	**6N401**	Web Programming with Python (WPP)	00	04	--	04	IV	--	--	#50	75	--	125
03	**6N402**	Operating Systems (OS)	03	04	--	7	IV	20	80	#25	25	--	150
04	**6N403**	Artificial Intelligence (AN)	04	02	--	6	IV	20	80	--	25	@25	150
05	**6N404**	Mathematics for Machine Learning (MML)	03	--	01	4	III	20	80	--	--	--	100
		Elective –I (Group-A)											
06	**6T403**	Open Source Technology Laboratory (OSTL)	1	04	--	05	IV	--	--	#50	75	--	125
	6S409	Android Programming (AP)	1	04	--	05	IV	--	--	#50	75	--	125
	6N405	R Programming (RP)	1	04	--	05	IV	--	--	#50	75	--	125
07	**6N406**	Data handling in Python (DHP)	01	4	--	5	V	--	--	#25	75	--	100
08	**6N407**	Data Story Telling and Visualization (DSTV)	03	02	--	05	III	20	80	@50	25	--	175
09	**6T402**	Network Management & Administration (NMA)	1	2	--	3	VI	--	--	--	25	@25	50
10	**6N408**	Cloud Computing (CC)	03	2	--	05	V	20	80	--	25	#25	150
11	**6N409**	Computer Network (CN)	04	2	--	06	V	20	80	--	25	#25	150
		Elective –II (Group-B)											
12	**6N410**	Big Data Analytics (BDA)	3	--	2	5	V	20	80	--	25	@25	150
	6N411	Data Mining and warehouse (DMW)	3	--	2	5	V	20	80	--	25	@25	150
	6N412	Advanced Database Management Systems (ADBMS)	3	--	2	5	V	20	80	--	25	@25	150
								160	640	225	425	125	
		TOTAL	**29**	**30**	**03**	**62**		**800**		**775**			**1575**

Scheme at glance:

Total number of courses offered	: 16
Number of compulsory courses	: 10
Number of optional courses	: 02 out of 06
Total courses to be opted	: 12 out of 16
Total Credits	: 62
Total Marks	: 1575

LEVEL-V: (DIVERSIFIED LEVEL COURSES)

Sr No	COURSE CODE	COURSE TITLE	TEACHING SCHEME					EXAMINATION SCHEME					
			TH	PR	TU	CR	TERM	PT	TH	PR	TW	OR	TOTAL
01	6S501	Seminar (SMR)	--	2	-	2	V	--	--	--	50	#25	75
02	6S502	Project Work (PRJ)	--	4	-	4	VI	--	--	--	100	#50	150
03	6S503	Vocational Training (VT)	0	2	-	4	V	--	--	--	50	@50	100
04	6N501	Network and Information Security (NIS)	03	02	-	05	VI	20	80	#25	25	--	150
05	6N502	Machine Learning	03	02	-	05	VI	20	80	#25	25	--	150
06	6N503	Software Engineering and Testing (SET)	03	2	-	05	V	20	80	--	25	--	125
07	**Elective- III (Group C)**												
	6N504	Internet of Things (IOT)	3	2	-	5	VI	20	80	--	25	#25	150
	6N505	Introduction to Deep Learning (IDL)	3	2	-	5	VI	20	80	--	25	#25	150
	6N506	Data science (DSC)	3	2	-	5	VI	20	80	--	25	#25	150
								80	320	50	300	150	
		TOTAL	**12**	**16**	**0**	**30**		**400**			**500**		**900**

Scheme at glance:

Total number of courses offered :   07

Number of compulsory courses :   06

Number of optional courses   : 01 out of 03

Total courses to be opted   : 07 out of 09

Total Credits   : 30

Total Marks   : 900

SAMPLE PATH (10TH PASS)

Year-I		Year-II		Year-III	
Odd	Even	Odd	Even	Odd	Even
6G101(BMT) Basic Mathematics (3+1+0)-4	6G102(EMT) Engineering Mathematics (3+1+0)-4	6S203(DE) Digital Electronics (3+0+2)-5	6N202 (OOPJ) Object oriented programming using Java (3+0+4)-7	6N502 (ML) Machine Learning (3+0+2)-5	6G306(EDP) Entrepreneurship Development (2+0+2)-4
6G103(EPH) Engineering Physics (3+0+2)-5	6G104(ECH) Engineering Chemistry (3+0+2)-5	6N201 (PP) Python Programming (1+0+4)-5	6N301 (MP)) Microprocessor (3+0+2)-5	6N406 (DHP) Data handling in Python (1+0+4)-5	6N302 (NLP) Natural Language Processing (4+0+2)-6
6G203 (BCS) Basic of Computer System (0+0+2)-2	6G202(WSP) Workshop Practice (0+0+3)-3	6S207(DS) Data Structure (3+0+4)-7	6N401 (WPP) Web Programming With Python (0+0+4)-4	6N408 (CC) Cloud Computing (3+0+2)-5	6T402 (NMA) Network Management and Administration (1+0+2)-3
6S201(FCIT) Fundamental of Computer and Internet Technology (01+0+4)-5	6S202(EEE) Elements of Electronics & Electrical Engineering (04+0+02)-6	6N407 (DSTV) Data Story Telling and Visualization (3+0+2)-5	6N402 (OS) Operating Systems (3+0+4)-7	6N409 (C) Computer Network (4+0+2)-6	6S502(PW) Project Work (0+0+4)-4
6G301(ENG) English (2+0+2)-4	6S204(CP) C Programming (3+0+4)-7	6S401(RDBMS) Relational Database System (3+0+4)-7	6N403 (AI) Artificial Intelligence (4+0+2)-6	6S501(SMR) Seminar (0+0+2)-2	6N501 (NIS) Network and Information Security (3+0+2)-5
6G303(DLS) Development of Life Skills (0+0+2)-2	6S205 (SWPDL) Static web page designing Lab (0+0+2)-2	6N404 (MML) Mathematics for Machine Learning (3+1+0)-4		6N503 (SET) Software Engineering and Testing (3+0+2)-5	6G305(IOM) Industrial Organization & Management (3+0+2)-5
6G304(EVS) Environmental Science (0+0+2)-2	6G302(CMS) Communication Skill (1+0+2)-3		E-I(1+0+4)-5	E-II (3+2+0)-5	E-III (3+0+2)-5
			6T403 (OSTL) Open Source Technology Laboratory	6N410 (BDA)) Big Data Analytics	6N504 (IOT) Internet of Things
			6S409 (AP) Android Programming	6N411 (DMW) Data Mining and warehouse	6N505 (IDL) Introduction to Deep Learning
			6N405 (RP) R Programming	6N412 (ADBMS) Advanced Database Management Systems	6N506 (DSC) Data science
	Any one From 6G311 to 6G325Non exam credit course (00+02)-2	Any one From 6G311 to 6G325 Non exam credit course (00+02)-2			
					6S503(VT) Vocational Training (0+0+2)-4
24	32	35	34	33	36
	56	91	125	158	194

SEMESTER-I (FIRST)

Sr. No.	COURSE CODE	COURSE TITLE	TEACHING SCHEME				EXAMINATION SCHEME					
			TH	TU	PR	CR	PT	TH	PR	TW	OR	TOTAL
1	6G101	Basic Mathematics (BMT)	03	01		04	20	80	--	--	--	100
2	6G103	Engineering Physics (EPH)	03	0	02	05	20	80	@25	25	--	150
3	6G203	Basics of computer System (BCS)	00	0	02	02	--	--	@25	25	--	50
4	6S201	Fundamental Computer and Internet Technology (FCIT)	01	00	04	05	--	--	@50	50	--	100
5	6G301	English (ENG)	02	00	02	4	20	80	--	25	--	125
6	6G303	Development of Life skills (DLS)	00	00	02	02	--	--	--	25	@25	50
7	6G304	Environmental Science (EVS)	00	0	02	02	--	--	--	50	--	50
		TOTAL	**09**	**01**	**14**	**24**	**60**	**240**	**100**	**200**	**25**	**625**

SEMESTER-II (SECOND)

Sr. No.	COURSE CODE	COURSE TITLE	TEACHING SCHEME				EXAMINATION SCHEME					
			TH	TU	PR	CR	PT	TH	PR	TW	OR	TOTAL
1	6G102	Engineering Mathematics (EMT)	03	01		04	20	80	--	--	--	100
2	6G104	Engineering Chemistry (ECH)	03	00	02	05	20	80	@25	25	--	150
3	6G202	Workshop Practice(WP)	00	00	03	03	--	--	--	50		50
4	6S202	Elements of Electronic & Electrical Engineering (EEE)	04	--	02	06	20	80	--	25	@25	150
5	6S204	C Programming (CP)	03	00	04	07	20	80	#25	25	--	150
6	6S205	Static Web Page Designing Lab (SWPDL)	-	00	02	02	--	--	@50	50	--	100
7	6G302	Communication Skills (CMS)	01	00	02	03	--	--	--	50	@25	75
8	6G311 To 6G325	NON-EXAM	--		02	02	--	--	--	--	--	--
		TOTAL	**14**	**01**	**17**	**32**	**80**	**320**	**100**	**225**	**50**	**775**

SEMESTER-III (THIRD)

Sr. No.	COURSE CODE	COURSE TITLE	TEACHING SCHEME				EXAMINATION SCHEME					
			TH	TU	PR	CR	PT	TH	PR	TW	OR	TOTAL
1	6S203	Digital Electronics (DE)	03	00	02	05	20	80	@25	25	--	150
2	6N201	Python programming (PP)	01	--	04	05	--	--	#50	50		100
3	6S207	Data Structure (DS)	03	0	04	07	20	80	@25	25	--	150
4	6N407	Data Story Telling and Visualization (DSTV)	03	0	02	05	20	80	@50	25	--	175
5	6S401	Relational Database Management Systems (RDBMS)	03	0	4	07	20	80	#25	25	--	150
6	6N404	Mathematics for Machine Learning (MML)	03	01	--	04	20	80	--	--	--	100
7	6G311 To 6G325	NON-EXAM	--		02	02	--	--	--	--	--	--
		TOTAL	**16**	**01**	**18**	**35**	**100**	**400**	**175**	**150**	**--**	**825**

SEMESTER-IV (FOURTH)

Sr. No.	COURSE CODE	COURSE TITLE	TEACHING SCHEME				EXAMINATION SCHEME					
			TH	TU	PR	CR	PT	TH	PR	TW	OR	TOTAL
1	6N202	Object oriented programming using Java (OOPJ)	03	00	04	07	20	80	@25	25	--	150
2	6N301	Microprocessor (MP)	03	00	02	05	20	80	@25	25	--	150
3	6N401	Web Programming with python (WPP)	00	00	04	04	--	--	#50	75	--	125
4	6N402	Operating Systems (OS)	03	00	04	07	20	80	#25	25	--	150
5	6N403	Artificial Intelligence (AI)	04	00	02	06	20	80	--	25	@25	150
6		**Elective –I (Group-A)**										
	6T403	Open Source Technology Laboratory (OSTL)	1	--	04	05	--	--	#50	75	--	125
	6S409	Android Programming (AP)	1	--	04	05	--	--	#50	75	--	125
	6N405	R Programming (RP)	1	--	04	05	--	--	#50	75	--	125
		TOTAL	**14**	**00**	**20**	**34**	**80**	**320**	**175**	**250**	**25**	**850**

SEMESTER-V (FIFTH)

Sr. No.	COURSE CODE	COURSE TITLE	TEACHING SCHEME				EXAMINATION SCHEME					
			TH	TU	PR	CR	PT	TH	PR	TW	OR	TOTAL
1	6N502	Machine Learning (ML)	03	00	02	05	20	80	@25	25		150
2	6N406	Data handling in Python (DHP)	01	00	04	05	--	--	#25	75	--	100
3	6N408	Cloud Computing (CC)	03	00	02	05	20	80	--	25	@25	150
4	6N409	Computer Network (CN)	04	00	02	06	20	80	--	25	@25	150
5	6S501	Seminar (SMR)	--	00	02	02	--	--	--	50	#25	75
6	6N503	Software Engineering and Testing (SET)	03	00	02	05	20	80	-	25	--	125
7	Elective –II (Group-B)											
	6N410	Big Data Analytics (BDA)	03	02	-	05	20	80	--	25	@25	150
	6N411	Data Mining and warehouse (DMW)	03	02	-	05	20	80	--	25	@25	150
	6N412	Advanced Database Management Systems (ADBMS)	03	02	-	05	20	80	--	25	@25	150
		TOTAL	17	02	14	33	100	400	50	250	100	900

SEMESTER-VI (SIXTH)

Sr. No.	COURSE CODE	COURSE TITLE	TEACHING SCHEME				EXAMINATION SCHEME					
			TH	TU	PR	CR	PT	TH	PR	TW	OR	TOTAL
1	6G306	Entrepreneurship Development (EDP)	02	00	02	04	--	--	--	50	--	50
2	6N302	Natural Language Processing (NLP)	04	00	02	06	20	80	#25	25	00	150
3	6T402	Network Management & Administration (NMA)	01	00	02	03	--	--	--	25	@25	50
4	6S502	Project Work (PRJ)	--	00	04	04	--	--	--	100	#50	150
5	6S503	Vocational Training (VT)	00	00	02	04	--	--	--	50	@ 50	100
6	6N501	Network and Information Security (NIS)	03	00	02	05	20	80	#25	25	--	150
7	6G305	Industrial Organization and Management (IOM)	03	00	02	05	20	80	00	25	--	125
8	Elective –III (Group-C)											
	6N504	Internet of Things (IOT)	03	00	02	05	20	80	--	25	#25	150
	6N505	Introduction to Deep Learning (IDL)	03	00	02	05	20	80	--	25	#25	150
	6N506	Data science (DSC)	03	00	02	05	20	80	--	25	#25	150
		TOTAL	16	00	18	36	80	320	50	325	150	925

Following is the list of courses for the award of diploma program Artificial Intelligence.

Sr. No.	Course Code	Course Name	Sem	Credit	Marks
1	6N402	Operating Systems (OS)	4	07	150
2	6N403	Artificial Intelligence (AI)	4	06	150
3	6T403 /6S409 / 6N405	Elective –I (Group-A)	4	05	125
4	6N502	Machine Learning (ML)	5	05	150
5	6N408	Cloud Computing (CC)	5	05	150
6	6N409	Computer Network (CN)	5	06	150
7	6S501	Seminar (SMR)	5	02	75
8	6N410-6N412	Elective –II (Group-B)	5	05	150
9	6N302	Natural Language Processing (NLP)	6	06	150
10	6S502	Project Work (PRJ)	6	04	150
11	6N501	Network and Information Security (NIS)	6	05	150
12	6N504-6N506	Elective-III	6	05	150
TOTAL				**61**	**1700**

COURSE TITLE	BASIC MATHEMATICS
COURSE CODE	6G101

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

1   RATIONALE

This course is classified under foundation level courses and intends to teach students basic facts, concepts and principles of mathematics, as a tool to analise engineering problems. Diploma engineers have to solve the problems in engineering.
Basic mathematics is an attempt to initiate the multi-dimensional logical thinking and reasoning capabilities of the students.

2   COMPETENCY

At the end of studying this course students will be able to
"**Solve engineering problems by using analytical and systematic approach."**

3   COURSE OUTCOMES

Students will be able to

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

4   TEACHING AND EXAMINATION SCHEME

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

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

5 COURSE DETAILS:-

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

		3.6 Different types of examples.
Unit IV Trigonometry	4a.Students will be able to Solve simple problems by applying using concepts of trigonometry.	4.1 Trigonometric ratios of allied, compound and multiple angles. 4.2 Trigonometric Ratios of allied angles. 4.3 Trigonometric Ratios of compound angles. 4.4 Trigonometric Ratios of multiple angle Product, sum and difference formulae. 4.5 Sub-multiple angles. 4.6 Definition of inverse trigonometric, ratios. 4.7 Principal value of inverse trigonometric ratios. Relation between inverse trigonometric ratios. 4.8 Examples on inverse circular functions.
Unit V Function	5a.Students will be able to Solve the problem of function using the concept of Function	5.1 Cartesian products of sets. 5.2 Definition of relation, definition of function, real value. Function, domain, co-domain of a function. 5.3 Types of Functions. 5.4 Value of the function at given point . 5.5 Composite function. 5.6 Different types of examples on functions .
Unit VI Limits	6a. Students will be able to Solve the problem of function using the concept of Limit	6.1Definition and concept of limit, limits of algebraic functions. 6.2 Limits of trigonometric functions. 6.3 Limits of exponential functions. 6.4 Limits of logarithmic functions.

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

Unit	Unit Title	Teaching	Distribution of Theory Marks

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

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

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

7 SUGGESTED EXERCISES/PRACTICAL/TUTORIAL

1) The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills so that students are able to acquire the competencies.

2) Form a batch of 20 students and at least 10 problems should be given to get necessary exercise.

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

5	Limits	Examples related to different types of function.	02

8. SUGGESTED STUDENT ACTIVITIES

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

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED LEARNING RESOURCES

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

11 Major Equipment/ Instrument with Broad Specifications

Sr.NO.	Name of the Equipment	Specification
	NA	

12. Software/Learning Websites

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

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

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

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

Member Secretary PBOS   Chairman PBOS   Co-coordinator
science and Humanities

COURSE TITLE   **ENGINEERING PHYSICS**
COURSE CODE   **6G103**

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

1. RATIONALE

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

2. COMPETENCIES

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

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

3. TEACHING AND EXAMINATION SCHEME

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

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

4. COURSE OUTCOMES:

Students will able to
1. Determine relevant physical properties of a given material.
2. Analyze thermal, optical and acoustical system using properties of heat, light and sound.

3. Apply fundamentals electrical laws.
4. Select different type of semiconductors, x-ray and optical fibre application.

5. COURSE DETAILS:-

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT-I Genral Propertis of Matter	1a. Measure Strength parameter. 1b. Measure automization and lubricity of given liquid.	**Elasticity:** 1.1 Definitions of deforming force, restoring force, elasticity, plasticity, Factors affecting elasticity.· 1.2 Stress Tensile, Compressive, Volumetric and Shear stress, Strain: Tensile, Volumetric and Shear strain. 1.3 Elastic limit, Hooke's law. Elastic co-efficient- Young's modulus, bulk modulus, modulus of rigidity and relation between them **Viscosity** 1.4 Viscous force, definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its SI unit. 1.5 Streamline and turbulent flow with examples, critical velocity, Reynold's number and its significance. **Surface tension** 1.6 Cohesive and adhesive force, Laplace's molecular theory of surface tension, Surface Tension: definition and unit, 1.7 effect of temperature and impurity on surface tension. Angle of contact, Capillarity and examples of capillary action 1.8 derivation of expression for surface tension by capillary rise method, applications of surface tension.

UNIT-II Heat Light And Sound	2a. Analyze thermal system. 2b. Analyze optical system. 2c. Analyze acoustic system.	**Heat** : 2.1 Three modes of transistor of heat , conduction convection Radiation , law of thermal conductivity 2.2 Coefficient of thermal conductivity , , expansion of solid and coefficient of linear , aerial and cubical expansion & relation between them **LIGHT** : 2.3 Introduction to reflection and refraction of light, Snell's Law, 2.4 Dispersion. Total internal reflection of light. Critical angle, Simple problems. **Properties of sound** : 2.5 Wave motion transverse & longitudinal wave 2.6 Free & forced vibration , Resonance formula calculate velocity of sound by resonance tube method
UNIT-III Electrostatics And Current Electricity	3a.Analyze electrical system.	3.1 Electric charge, Coulomb's Law of Charges, Unit charge, field, intensity of electric field, electric lines of forces (Properties) Electric Flux, Flux Density. 3.2 Concept of resistance, Specific resistance, Whetstone's network, meter bridge, balancing condition of meter bridge, measurement of unknown resistance using meter bridge. Problems. 3.3 Potential , Potential drop along the length of wire, Principle of Potentiometer, Potential gradient, E.M.F. Unit, Comparison of EMF using potentiometer

UNIT-IV Modern Physics	4a. Use modern materials 4b. Use X-ray	Semiconductor – 4.1 Classification of solids on the basis of band theory: forbidden energy gap, conductor, insulator semiconductor 4.2 intrinsic, extrinsic, semiconductor doping , P and n type semiconductor electrical conduction through p and n semiconductor .P-N junction diode semiconductor metal and insulator. 4.3 Optical fibre: principle, structure of optical fibre, propagation of light wave through optical fibre, derivation of numerical aperture and acceptance angle **X-rays:** 4.4 Origin of X-rays, production of X-rays using Coolidge's X-ray tube 4.5. Minimum wavelength of X-ray derivation, properties of X-rays, applications of X- rays: engineering, medical and scientific

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

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

Legends:

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

7. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

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

Sr. No.	Unit No.	Experiment /Practical Exercises	Approximate Hours
1	1	Know your Physics Laboratory and use of scientific calculator & interpretation of graph.	2
2	2	Measure the dimensions of given objects using vernier caliper.	2

3	3	. Determine Young's modulus of elasticity of metal wire by using Searle's apparatus	2
4	4	Measurement of unknown temperature using platinum resistance thermometer.	2
5	5	To determine critical angle using glass block	2
6	6	. Determine coefficient of viscosity of given liquid using Stoke's Method	2
7	7	To determine specific resistance of given wire using Ohm's Law	2
8	8	To verify the Law of Resistance in series by Meter bridge.	2
9	9	To study the forward characteristics of P-N junction diode	2
10	10	To understand the concept of resonance and determine the velocity of sound in air.	2
11	11	Comparison of EMF of two cells using Potentiometer	2
Micro Project (Any one of following will be opted by a group of 5-6 students)			
1	Survey of different diodes, resistances and capacitance		
2	Prepare current and voltage rating of home appliances		
3	To make the telescope using lenses		
4	Analyse the different toys and watch on the basis of property of Elasticity		
5	Analyse the different liquidator on the basis of property of surface tension		
6	To collect the information from internet regarding distribution of sound at Gowalkonda fort		
7	To collect the information from internet regarding distribution of sound at Golghumut at Vaijapur		

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities
a. Calculate acoustics of given class room.
b. Prepare a chart of applications of optical fibre in different fields.
c. Demonstrate different types of capacitors.
d. Seminar by student on any relevant topic.

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

10. Hours distribution for Physics Experiments :

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

11. SUGGESTED LEARNING RESOURCES LIST OF BOOKS

Sr No.	Title of Books	Author	Publication
1	Basic Science Physics	Pawar and Sutar	Nirali Publication
2	Applied Physics	B.G. Bhandarkar	Vrunda Publication
3	Engineering Physics	R.K. Gupta and S.L Gupta	Dhanpat Rai Publication
4	Applied Physics	Pawar, Umrani and Joshi	Nirali Publication
5	Basic Physics	B.G. Bhandarkar, S.N. Jumde	Vrunda Publication
6	Physics Text Book Part -1 for Class - 12	NCERT	NCERT; 2014 edition **ISBN-13:** 978-8174506313
7	Physics Text Book Part -2 for Class - 12	NCERT	NCERT; 2014 edition **ISBN-13:** 978-8174506719
8	A text book of applied physics		S Chand Publication

12. List of Major Equipment/ Instrument

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

13. E-learning resources

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

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

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

14. Name and Designation of Course Designer

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

Member Secretary PBOS　　　　　Chairman PBOS　　　　　　Co-coordinator

science and Humanities

COURSE TITLE-　　　**BASICS OF COMPUTER SYSTEM**

COURSE CODE　　　　**6G203**

PROGRAMME & SEMESTER

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

1.　RATIONALE

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

2.　COMPETENCY

"Use of computer and software application proficiently".

3.　TEACHING AND EXAMNATION SCHEME

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

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

4.　COURSE OUTCOMES

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

1. Connect and operationalize computer system with its peripheral devices.
2. Create and Format documents in Microsoft Word.
3. Create spreadsheets in Microsoft Excel by using formulae.

4. Create and edit basic power point presentations in Microsoft PowerPoint.
5. Use internet for creating email-id, receive and send email with attachment & search information on internet.

5. DETAILED COURSE CONTENTS

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

		2.12 Working with pictures, Inserting Pictures from Files, Wrapping it with image. 2.13 Finding & replacing text. 2.14 Using Drawings and WordArt; Lines and Shapes, Modifying Drawn Objects. 2.15 Printing: print preview, select printer & appropriate print options.
Unit- 3 Excel (Spreadsheets)	3a. Create, open, save and print worksheet with page setup and print options. 3b. Enter data and insert, delete and format cells, rows and columns. Use formula and functions 3c. Insert formulas, functions and named ranges in worksheet. 3d. Create chart of different types.	3.1 Introduction to Excel, 3.2 Introduction to data, Cell address, Excel Data Types, Concept of hyperlink 3.3 Introduction to formatting number, text and date. 3.4 Concept of worksheet and workbook. 3.5 Understanding formulas, Operators in Excel, Operators Precedence, Understanding Functions, Common Excel Functions such as sum, average, min, max, date, sqrt, power, upper, lower, count, countif, roundup, sin, cos. 3.6 Introduction to charts, overview of different types of charts available with Excel. 3.7 Hide, unhide rows and columns. 3.8 Concept of print area, margins, header, footer and other page setup options.
Unit- 4 Power Point Presentation	4a. Create a simple text slide using formatting, selecting a slide layout and insert pictures & backgrounds. 4b.Use different design templates for creating slides. 4c. Apply slide transitions and slide timings and animation effect for slide show. 4d. Insert hyperlink in the created slides.	4.1 Outline of an effective presentations 4.2 Starting a New Presentation Files, Saving work, 4.3 Creating new Slides, Working with textboxes. 4.4 Changing a slides Layout, Applying a theme, Changing Colours, fonts and effects, Creating and managing custom Colour & font theme, Changing the background. 4.5 Use of design template and auto content wizard. 4.6 Apply animation and transition to slides with timing effect. 4.7 Slideshow: from beginning slideshow, from current slideshow, custom slideshow. 4.8 Creating hyperlinks, Using action buttons
Unit- 5 Introduction to Internet	5a. Know different terms related to internet and browsers. 5b. Understand need & duty of ISP & List out different ISP in	5.1 What is the Internet? 5.2 Web pages, Home Pages. 5.3 Use of web sites 5.4 ISP: need & duties of ISP, different ISP

city. 5c. Use internet for searching information and create, receive & send email with attachment.	in city 5.5 Browsers 5.6 Universal resource locators (URL) 5.7 Browsing or surfing the web 5.8 Search engines 5.9 E-mail and Creation of E-mail ID. Sending & Receiving email with attachment. 5.10 Chatting & Video Conferencing tools: Skype and GTalk 5.11 Applications of the Internet	

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

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

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Connect the peripherals to a computer system. Get the information about the manufacturers and prices of various components of a PC and laptop.	2
2	1	Start and shutdown of windows, starting different applications. Use of accessories like calculator, paint, notepad	4

		& WordPad, Use of system tools like Disk Cleaner, Disk defragmenter, System Information, System Restore & Control panel.	
3	1	Perform file management operations such as copying, deleting, renaming, creating folders, renaming folders using My computer, Windows Explorer, searching files and folders.	2
4	1	Change windows format such as wall paper, date &time, installing printer, installing and removing programs by using add/remove programs.	2
5	2	Prepare a sample doc files such as resume, application, time table etc. using all word processor tools from menu bar.	6
6	3	Prepare sample spreadsheets such as sample result sheet, salary sheet of employees using all MS-Excel tools from menu bar. (applying excel formulae/functions)	6
7	4	Prepare sample power point presentation by applying MS-Power Point tools such as design template, background, transition and animation effect to slides.	6
8	5	Search information on internet .Use Internet to create email account, send email with attachment, receive email and management of email account.	2
9	5	Use of E-commerce sites, Mobile apps for various online transactions.	2
			32

8.   SUGGESTED STUDENTS ACTIVITIES

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

a.   Visit institute website.

b.   Manage files and folder using Windows.

c.   Prepare letter and project report using word processor

d.   Create result sheet by inserting student marks and show it in chart form on the same worksheet using Excel spreadsheet.

e.   Develop effective presentation of project report using PowerPoint Presentation.

f.   Use open source software like openoffice.org (latest version).

9.   SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

    a.   Group based.

    b.   Q & A technique.

    c.   Individual based.

    d.   Activity based learning

    e.   Self Line learning.

10. SUGGESTED LEARNING RESOURCE

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

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

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

12. LEARNING WEBSITE & SOFTWARE

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

a. https://www.youtube.com/watch?v=cXBVMyKQ3ZY

b. http://www.gcflearnfree.org/computerbasics/

c. http://www.homeandlearn.co.uk/word2007_2010/Word-2007-2010.html

d. http://www.homeandlearn.co.uk/excel2007/Excel2007.html

e. https://support.office.com/

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

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

Course Curriculum Design Committee

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

(Member Secretary PBOS)　　　　　　　　　　(Chairman PBOS)

6S201   **GPA**   **FUNDA. OF COMPUTER & INTERNET TECHN.**

COURSE TITLE-	**FUNDAMENTALS OF COMPUTER & INTERNET TECHNOLOGY**
COURSE CODE	**6S201**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CO/ IT / AN	First

1. RATIONALE

This is a basic technology level course. Computers are very useful in day to day life. This Course intends to develop basic hardware skills of computer system and internet in students, being laboratory course.

2. COMPETENCY

"Configure Computing device and peripherals on network."
"Use Internet for its application."

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE @ (PR)	PA (TW)	
1	-	4	05	--	--	@50	50	100
Duration of the Examination (Hrs)				--	--	2	--	

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

4. COURSE OUTCOMES

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

1. Select computer system as per requirements.

2. Select the application softwares and operating systems as per requirements.
3. Select the network topologies.
4. Change the network protocols as per requirements.
5. Use Information technology

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
UNIT I **Anatomy of Computer System**	1a. Identify various parts and devices of computer system.	1.1 Anatomy of computers: 1.2 Motherboard, CPU,SMPS, Expansion slots, Drives, Storage devices. Input devices: Keyboard, Mouse, Pen, Touch 1.3 Screen, Scanners Output devices: Monitors, LCD, LED, 1.4 Printers, tablets. Memory**:** RAM, ROM, Cache, Auxiliary Memory, HDD, CD, DVD, Blue ray and USB Drives 1.5 IT Infrastructure Components: Computer Hardware, Operating System, Software, 1.6 Network components
UNIT II **Types of Software**	2a. Select appropriate operating system and software.	2.1 Types of software: Overview of System software and application software, Operating system, Utility software, drivers, compilers and interpreters. 2.2 Operating system: Windows :Desktop, 2.3 Control Panel, Driver installation, 2.4 create users, rename computer, manipulate 2.5 taskbar, power management, screensaver, 2.6 Install new peripheral
UNIT III **Basics of Computer Networking**	3a. Identify suitable network with various devices.	3.1 Network advantages like resource sharing, file sharing, common Storage. 3.2 LAN, MAN, WAN, Internet, 3.3 Networking infrastructure: Repeater, Bridge, 3.4 Hub, Switch, Router, Firewall, Gateway, NIC, Cables, MODEM

UNIT IV **Basics of Internet, Its Applications & Security**	4a. select appropriate web connections and browsers.	4.1 Internet basics: Dial up Connection, DSL, Leased line connectivity, Wi-Fi Connection, 4.2 Browsers: IE, Firefox, Chrome. 4.3 Protocols : http, https, www, IP, setting up 4.4 Internet connection on DSL, setting up 4.5 Internet on local network. 4.6 DNS: types with examples 4.7 Search engines : Google, yahoo, bing: search 4.8 images, maps, news, search content using 4.9 Different criteria. 4.10 Applications of Internet : www, mail, news, 4.11 Chat, social networking. 4.12 Threats to IT infrastructure : Physical, 4.13 Access level : password breaks, hacking, web based threats like weak passwords, 4.14 social engineering, pirated software, 4.15 unethical websites, Malicious programs, 4.16 infrequent updates, protecting and mitigating 4.17 threats : Use of Anti Virus software, 4.18 scanning computer regularly, updating antiV
UNIT V **Introduction to Information Technology**	5a. use of ethics in Information technology	5.1 Information Technology: Understanding the need of Information, Data, Knowledge, Difference between Data, Information and Knowledge. 5.2 Benefits of IT infrastructure, Ethical issues : Plagiarism, Use of License Software, copyright infringement, Intellectual property 5.3Rights, its impact on IT. Downloading and installation of skype.

6.   SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	**Anatomy of Computer System**	**2**				
II	**Types of Software**	**2**				
III	**Basics of Computer Networking**	**3**	Not Applicable			
IV	**Basics of Internet, Its Applications & Security**	**3**				
V	**Introduction to Information Technology**	**6**				
	Total	**16**				

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

7.   LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1.	I	Install new application software using control panel.	02
2.	I	Shrink the hard disk partition for more partitions	04
3.	I	Create users with full control, limited control.	02
4.	I	Set screen savers and energy management in Windows.	04
5.	II	Set window resolution	02
6.	II	Perform configuration using CMOS setup.	04
7.	II	Dissemble and Identify Motherboard, CPU, SMPS, Expansion slots, Drives, storage devices.	04

8.	III	Identify IP address, Network mask, Computer Name in local Network.	04
9.	III	Study of different ports such as PS/2,NIC,Serial & parallel.	02
10.	III	Burn/Copy data on CD.	02
11.	IV	Perform Printer Installation and self test.	02
12	IV	Perform connection of speakers and microphones.	02
13	IV	Maintain keyboard and mouse.	02
14	IV	Perform scanner Installation and scanning procedure of scanning a document.	02
15	IV	Select network devices for given application.	04
16	V	Use E-mail.	04
17	V	Perform Download and install on skype.	04
18	V	Create a group mail, add class mates to group mail and send them 'Welcome e-mail'.	04
19	V	Use Google maps and find out location of your institute.	04
20	V	Apply passwords of your computer system.	02
21	V	Change the size of scanned images.	02
TOTAL			64

8.   SUGGESTED STUDENTS ACTIVITIES

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

Following is the list of proposed student activities like:

1. Students will prepare file for the above mentioned Practicals.
2. Students will prepare the tutorial book for tutorial sessions.The questions and assignments will be solved in that and progressive assessment will be done by the teacher.
3. Tutorials are to be conducted batchwise for better understanding of subject.
4. Study of different ports such as PS/2,NIC,Serial & parallel

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

1. Guide students in preparing charts and display boards.
2. Guide students in searching information regarding datasheets and electronic components.
3. Demonstrate practical thoroughly before the students perform.
4. Show Flash/Video/Animation clippings for functioning of instruments.
5. Observe continuously and monitor the performance of students in lab.
6. Assign different types of Mini-projects
7. Guide students in preparing Micro-projects.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Mr.David strone and Alfred Poor	Troubleshooting your PC.	Prentice Hall
2.	David Groth	A+ complete	PBP Publication
3.	Dennis P. Curtin, Kim Foley	Information Technology	Tata Mcgraw Hill

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Computer System with latest configuration and memory	As per Computer industry specification
2.	Network devices and cables.	As per Computer industry specification

12. LEARNING WEBSITE & SOFTWARE

1 www.nptel.com

2.Weleys computing Resources

3.Fundamentals of computer: http://www.w3schools.in

Software's:

1. **Any antivirus software .**

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

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Select computer system as per requirements.	-	3	-	-	-	-	-	-	-	-	-	-
2	Select the application softwares and operating systems as per requirements.	-	3	3	-	-	-	-	-	-	-	-	-
3	Select the network topologies.	-	3	-	-	-	-	-	-	-	-	-	-
4	Change the network protocols as per requirements.	-	3	3	3	-	-	-	-	-	-	-	-
5	Use Information technology	-	3	-	-	-	-	-	-	-	3	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Nilophar Masuldar	Lecturer in Computer Engineering, Govt Polytechnic, Aurangabad
2	Prajakta Sadafule	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE   **ENGLISH**
COURSE CODE   **6G301**

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

1. RATIONALE

English language has become a supreme necessity to pick up a solid core of knowledge. It has a power of linking us with the outside world. Competency in English is also important in business matters like transactions including e-mails, memos, reports and contracts in writingnot only for Indian industry, but also worldwide. Students having proficiency in reading, writing and speaking English has become a prospect of employment in the industry. Hence, this course is designed to help the students to communicate in English effectively.

2. COMPETENCY

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

3. TEACHING AND EXAMINATION SCHEME

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

(*): Out of 25 marks, 05 marks -micro-project assessment; 20 marks-progressive assessment.
Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **ESE** -End Semester Examination; **PT**- Progressive Test; OR-Oral Examination; **PA**- Progressive Assessment

4. COURSE OUTCOMES

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

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
UNIT-I Comprehension	1a. Understanding meaning of new words from the text.	**Text from the book &** **Vocabulary Building** 1.1.Man Versus Machine—

	1b.Write summary of the text 1c. Responding to the questions from the text 1d. Express ideas and views on learned topics	M..K..Gandhi 1.2. Say No to Plastic Bags 1.3. Interview of Dr.A.P.J.AbdulKalam 1.4. Dare to Dream- N.R.Narayan Murthy 1.5. The History Maker— MaltiHola
UNIT-II Functional Grammar	2a. Apply correct verbs in given sentences 2b. Use of correct structures in writing 2c. Identify different types of sentences 2d. Apply correct auxiliaries 2e. Use appropriate connectors in the given sentences 2f. Use appropriate prepositions in the given sentences 2g. Apply correct and exact rules and structures to transform the sentences 2h. Use of correct punctuations in writing	**Functional Grammar** 2.1.Tenses & Time 2.2. Sentence Patterns 2.3. Types of Sentences 2.4. Modal Auxiliaries 2.5. Connectors 2. 6. Prepositions 2.7. Voice, Degree and Reported Speech 2.8. Punctuation Marks
UNIT-III Craft of writing	3a. Writing a paragraph effectively 3b. Writing e-mail in proper formats 3c. Prepare resume in suitable format	3.1.Paragraph Writing 3.2.E-mail writing 3.3. Resume Writing
UNIT-IV Listening & Speaking Skills	4a. Formulate sentences using new words 4b. Enrich vocabulary through reading and listening 4c. Follow correct pronunciations, intonations & accents in communication	4.1. Importance of effective listening 4.2.Barriers in listening and how to overcome them 4.3Problems in speaking English faced by Indian Students

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Text from the book & Vocabulary Building	12	08	12	10	30
II	Functional Grammar	12	05	08	13	26
III	Craft of Writing	06	04	04	08	16
IV	Listening & Speaking Skills	02	02	02	04	08
	Total	**32**	**19**	**26**	**35**	**80**

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

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

7. **SUGGESTED EXERCISES/PRACTICALS**

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

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

8. **SUGGESTED STUDENT ACTIVITIES**

Following is the list of proposed student activities like:

     a.   Read newspapers daily.

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

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED TITLES FOR MICRO-PROJECTS

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

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

11.　SUGGESTED LEARNING RESOURCES

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

12.　Major Equipments/ Instruments with Broad Specifications

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

13.　E-learning resourses

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

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

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

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

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

Member Secretary PBOS   Chairman PBOS   Co-coordinator
                                                      science and Humanities

COURSE TITLE: DEVELOPMENT OF LIFE SKILLS

COURSE CODE: 6G303

Diploma Programme in which this course is offered	Semester in which course is offered
CE/ME/ETX/EE/AE/DDGM/CO/IT/AN	FIRST / SECOND

1 RATIONALE

The generic skills are lifelong skills which need to be developed continuously. These skills are necessary for diploma engineers for their professional career.

This course aims to develop interpersonal skills, problem solving, decision making, Professionalism with etiquettes, ethics and value system.

This course also aims at developing an engineer as a team leader, effective member of the team and to become sound personality. It will develop the abilities and skills to perform at highest degree of quality as an individual.

2 COMPETENCY

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

3.   TEACHING AND EXAMINATION SCHEME

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

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

4. COURSE OUTCOMES (COs)
   1. Develop interpersonal skills.
   2. Exhibit corporate etiquettes and professionalism.
   3. Enhance personal effectiveness and body language
   4. Practice time management and goal setting technique
   5. Develop presentation skills.
   6. Manage Stress at workplaces

5 COURSE DETAILS

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

		change.
		3.2 Polished personal habits
		3.3 Ethics & Etiquettes: a way of life, what are ethics, how ethics help to ensure positive interpersonal relations,
		3.4 Personal value system, Personal Attire & Grooming
		3.5 Cell phone manners
Unit IV **Time Management and goal setting.**	4a. Understand importance of time management. 4b. Apply time management skills. 4c. Set the goals for career growth.	**Time management and Goal Setting** 4.1 Time management skills in groups for completion of project 4.2 Factors that lead to time loss and how they can be avoided 4.3 Time matrix & urgent versus, Important jobs 4.4 Importance of goal setting 4.5 How to set SMART goals.
Unit V **Health and Stress Management**	4a. Manage health for personal efficiency. 4b. Describe Stress Management, 4c. Use strategies to overcome stress 4d Understand emotions	**Health and Stress Management** 5.1 Importance of health management, 5.2 Relevance of it, 5.3 Tips to maintain good health 5.4 Strategies to overcome stress, understanding importance of good health to avoid stress. 5.5 Stresses in groups,

Unit VI **Problem Solving Techniques and Creativity**	6a. participate in technical Quizzes and puzzles. 6b.Use problem solving techniques 6c. Describe factors enhancing creativity	**Problem Solving Techniques and Creativity** 6.1 definition of problem, types 6.2 solving Puzzles and technical quizzes. 6.3 Reducing conflict by preventing problems in the classroom. 6.4 Creativity concept, Tips and ways to increase creativity, importance of creativity.

(above table continued from previous page)

| | understand and identify emotions, how to control emotions, emotional intelligence. |

6 SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
VI	Problem Solving Techniques and Creativity	4	NA	NA	NA	NA

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

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

7. SUGGESTED EXERCISES/PRACTICALS

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

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.*

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

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
3	II	3) Deliver extempore (Topic will be given to the individual for a speech of 5 to 8 minutes. Here the individual speeches of students will be conducted and evaluated by group of students.)	04
4	II	4) Participate in Group Discussion (Teacher should form group of six to eight students and give topics for group discussion. Group discussions should be carried out and evaluated by teacher)	04
5	III	5) Exhibit Etiquettes in different situations (Visit to any one place like office/firm/development sites etc. and observe the communication and etiquettes.)	04

6	IV	6) Prepare your individual time table for a week -
		  a) List down your daily activities.
		  b) Decide priorities to be given according to the urgency and importance of the activities.
		  c) Find out your time wasters and mention the corrective measures.
		  d) Set short term and long term goal for PT/TEE/Gymkhana -sport/gathering event etc.
			04

7	V	7) Demonstrate simple Yoga postures and other stress relieving techniques by professional persons and narrate his/her experiences.	04
8	VI	8) Participate in Quizzes, puzzle- solving and educational games and narrate his/her experiences.	04
Total			**32**

8.   SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

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

- 1. Case studies to be discussed in a group and presentation of the same by group /group leader.

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

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED LEARNING RESOURCES
A) **Books**

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

S. No.	Title of Book	Author	Publication
11	Tandrust Raha ,Mast Jaga.(Marathi)	Dr. Rajiv Sharangpani	Continental Prakashan

B) Software/Learning Websites:
   Websites related to soft skills.

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	Develop interpersonal communication	-	-	-	2	-	-	-	2	3	-	-	-
CO2	Display corporate etiquettes and professionalism	-	2	-	-	2	-	-	2	-	-	-	-
CO3	Improve personality and body language	-	-	2	-	-	-	-	-	-	2	-	-
CO4	Practice time management and goal setting technique	2	-	2	-	-	-	-	2	2	-	-	-
CO5	Develop presentation and group discussion technique	-	2	-	2	-	-	2	-	-	-	-	-
CO6	Acquire Stress removing and Problem solving technique	-	2	-	-	2	-	-	-	-	2	-	-

Course Curriculum Design Committee

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

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE: ENVIRONMENTAL SCIENCE

COURSE CODE: 6G304

DIPLOMA PROGRAMME IN WHICH THIS COURSE IS OFFERED	SEMESTER
ME, CE, EE, E&TC, CO, IT, AE, AN	FIRST

1   RATIONALE:-

The present plight of the world as a victim to a number of environmental setbacks ranging from global warming, ozone layer depletion, acid rains led to alarmingly increase in world pollution levels. This has led to the dangerous situation threatening existence of biosphere on the earth. Diploma engineers also get confronted with this issue in their professional life.. Diploma engineers need to be aware of environment and associated issues so that he can help in protection and preservation of environment.

2   COMPETENCY: -

   "Contribute in overall preservation of eco system of organization."

3   TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PT	ESE (PR)	PA	
0	--	2	2	--	--		50	50
Exam duration			--	--	--	--	--	

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

   4   COURSE OUTCOMES:-
At the end of this course, students would be able to -

1. Identify elements of biodiversity.
2. Assess the impact of biodiversity
3. Apply provisions of various environmental protection acts in practice.
4. Undertake survey on environmental concerns and remedial measures

5   COURSE DETAILS:-

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I **Environment and studies**	1a. Write genesis of environmental concerns 1b. Identify the various types of environmental issues.	1.1 Definition , Scope and importance of Environmental studies 1.2 Meaning of environment, , Environment and its components, Segments of environment, scientific aspects 1.3 Global environment crisis and factors affecting it. Deforestation. aquatic life and tsunami effects ,Population, Carbon dioxide emissions, pollution, Extinction of species etc. Ecological Foot print
Unit– II **Environmental Natural Resources**	2a. Classify different resources 2b. Outline issues associated with different resources. 2c. Develop strategies to conserve of natural resources.	2.1. Renewable and Nonrenewable natural resources and associated issues as under, a. Forest resources b. Water resources c. Energy resources d. Land resources e. Food resources f. Energy resources 2.2. Role of individual in conservation of natural resources
Unit– III **Ecosystems**	3a. Outline ecosystem. 3b. Categorize various ecosystems .	3.1 Concept of Ecosystem 3.2 Structure and function of ecosystem 3.3 Structure and functions of following ecosystems, a. Forest Ecosystem b. Grassland Ecosystem

		c. Desert Ecosystem d. Aquatic ecosystem
Unit– IV **Biodiversity and Conservation**	4a. Outline Biographical classification of India 4b. Assess Biodiversity loss and its impact.	4.1 Introduction, Values of the Biodiversity, Biographical classification of India 4.2 Biodiversity loss and its impact 4.3 Conservation of Biodiversity, Efforts made in India.
Unit - V **Environmental Pollution**	5a. Describe pollution and its typs 5b. Describe cause, effect relationship. 5c. Conduct Survey on Environmental Pollution	5.1 Definition of pollution and its types 5.2 Causes, effects and control measures of following types of pollutions a. Air Pollution b. Water Pollution c. Soil Pollution d. Marine Pollution e. Thermal Pollution f. Nuclear hazards and pollution 5.3 Pollution norms, rules and bye laws 5.4 Solid waste management: Causes, Effects and control measures of urban and industrial waste.
Unit – VI **Social Issues and Environment**	6a. Identify social issues related to environment 6b. Suggest control measures to counter the issues, .	6.1 Urban problems related to Energy, Measures of water conservation including Rain water harvesting, Watershed Management 6.2 Climatic changes, Global Warming, Acid rain, Ozone layer depletion issue, Nuclear accidents and holocaust. Kyoto Protocol, Climate justice 6.3 Introduction to Environment (protection) act(prevention and control of pollution),Wildlife protection act, Forest protection act Air (Prevention and control of pollution) Act, Water related Environment laws ,issues in

		enforcement of environmental legislation, public awareness.
Unit – VII **Human population and environment**	7a. Use of ICT in environment and human health areas.	7.1 Concepts of Population Growth, Environment and human health, Role of information technology in environment and human health

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

Unit	Unit Title	Teaching Hours	Distribution of practical examination marks			
			R Level	**U Level**	**A Level**	**Total Marks**
I	Environment and studies	6	NA	NA	NA	NA
II	Environmental Natural resources	6	NA	NA	NA	NA
III	Ecosystems	6	NA	NA	NA	NA
IV	Biodiversity and conservation	6	NA	NA	NA	NA
V	Environmental Pollution	12	NA	NA	NA	NA
VI	Social issues and environment	6	NA	NA	NA	NA
VII	Human population and environment	6	NA	NA	NA	NA
Total		48	NA	NA	NA	NA

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

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

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

Here all the practical exercises are to be completed by students in a group. The group size should be 10 to 12. The groups should be formed by concerned teacher in consultation with students Every group should be assigned a group leader. All groups will complete the practical assignments in spare time and during Sundays and holidays. No separate time slots will be allotted to these practical exercises. Teacher will guide and give necessary inputs for modus operand of exercises.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	I	Prepare report on environmental issues of your institute / Selected Premises	04
2	II	Collect information related to natural resources of India and methods adopted for conservation of these resources	02
3	I, II	Prepare "Energy Audit Report" of a small home. And give suggestions for conservation of energy.	02
4	III, IV	Examine water usage of a small community/locality in city/Apartment /Your Institute and prepare a Report on actions that could be taken to conserve the water fron following point of view: How much water is consumed How much wastage of water occurs How can demand of water be reduced How can ecological footprint of water they get can be reduced What other environment friendly ways of getting water can one implement What is the quality of water and how can it be improved How reuse and recycling of water can be done How users can be educated for proper use of water	02
5	I,II,III, VI	Visit, "Roof water harvesting" system installed in nearby area and prepare a detailed report. Include local bodies legislation as regards roof water harvesting	02
6	I,II,III	Undertake "Tree plantation project" and plant at least 03 trees per student in your Institute. Prepare detailed report on tree plantation.	02
7	I,II,III	Visit ,study and analyze a "Solar systems" installed in nearby area and prepare a detailed report. Include following types of systems, a.Household Solar water heating systems b. Solar P-V Systems c.Solar roof top Net metering systems	02
8	IV	Preparation of Biodiversity Report: Select a small park or garden in your area.Prepare a Biodiversity register: list all the species found in place ,find their scientific names with the help of a botanist. Interview long term users of the place and find out about loss of	03

		biodiversity. Write a report describing your observations and your recommendations for conservation of biodiversity.	
9	V	Prepare a report on water pollution scenario in your institute and make a detailed report. Following activities can be undertaken with permission, Locating and studying water consumption locations in institute like Water coolers , R.O units, Filters, taps. Taking and checking drinking water samples periodically from testing authorities and keeping records. Preparing and executing schedule for cleaning water tanks, water filters, RO units etc.	06
10	V	Prepare report Vehicular pollution checking in your institute: Here sample check the two wheelers, four wheeler vehicles of employees, students with the help of Exhaust gas analyzer / Smokemeter periodically and check the levels of pollution.	02
11	V	Prepare report of Noise and Air pollution levels at a crowded square of city using Deciblemeter and Air sampling device	02
12	VI	Collect information on Global Warming,Acid rain, Ozone layer depletion issue,Nuclear accidents and holocaust. Kyoto Protocol, Climate justice, Environment protection laws and regulations.	02
		Total	32

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

1   Search different journals on Environment
2   Collect info of Environmental laws and regulations from websites.
3   Collect various news paper cuttings on the issues of environment
4   Observe and celebrate following important days on environment,
   • 22 April- Earth Day
   • 1 – 7 July – Vanamahotsava Week
   • 11 International Mountain day
   • 2 February –Worlds wetland day
   • 5 April – National Maritime day
   • 8 June – World Oceans day
   • 22 May – international Day of Biological diversity
   • 22 March – World Water day.
   • 21 March – World Forestry Day
   • 16 October –Worlds food day
   • 22 September –Car free day
   • 29 October-National disaster reduction day
   • 21 July – Worlds Population day
   • 8 March – Womans day

5 Prepare charts, banners, posters on environment and its protection and display in class, notice boards.
6 Participate in social campaigns concerning environment and its preservation.
7

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES
1. Q & A Techniques.
2. Field Visits
3. Expert Lectures.

10. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Environmental Studies	R.Rajgopalan	OXFORD university press
2	Environmental Studies	Anindata Basak	Pearson education
3	Air Pollution	M.N. Rao	Tata Macgrawhill
4	Elements of Environmental Science and Engineering	P. Meenakshi	Prentice Hall
5	Introduction to Environmental Engineering	P.AarneVesilind and Susan Morgan	Thomson

11. Major Equipment/ Instrument with Broad Specifications

Sr. No.	Major equipment/ Instrument with Broad Specification	Quantity
1	Biological Microscope	01
2	Air sample testing setup	01
3	Water sample testing setup	01
4	Exhaust gas Analyzer	01
5	Smoke meter	01
6	PC with Net connectivity	01
7	LCD Projector	01 et

12.. E-learning resources

(Please mention complete URL of the E- recourse CO wise)
1. www.unep.org
2. www.ipcc.ch
3. www.grida.no
4. www.wildlifeinindia.com
5. www.fsi.nic.in/sfr_2009.htm

6. www.unesco.org
7. www.chilika.com
8. www.foodfirst.org/media/opeds/2000/4-greenrev.html
9. www.cites.org
10. http://projecttiger.nic.in/
11. www.iwmi.cgiar.org/
12. www.worldwater.org
13. www.indiaenergyportal.org
14. http://www.lifeaftertheoilcrash.net/
15. www.mmpindia.org/
16. www.pcri.com
17. http://www.unwater.org/statistics_pollu.html

List of Films
1. The 11th hour
2. The many faces of madness
3. Planet Earth-BBC documentary
4. The childrens of Amazon
5. The Blue Planet-BBC documentary
6. End of Line
7. The State of planet – BBC Documentary
8. The truth about Tigers
9. Bringing home rain- A film by SushamaVeerappa.
10. Drinking the sky – BBC documentary
11. A Crude Awakening :The OIL Crash – A documentary by Basil Gelpke
12. Poison on a platter – Documentary by Mahesh Bhatt
13. The story of bottled water – A documentary by Annie Leonard on packaged water industry.(Download from www.storyofstuff.org)

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	Analyze and assess the impact of biodiversity and its loss on environment.	2	-	-	-	2	2	-	-	-	-	-	-
CO2	Identify causes of pollution in working system and apply control measures for prevention.	-	-	-	-	2	2	-	-	-	-	-	-

CO3	Apply provisions of various environmental protection acts in practice.	2	-	-	-	3	3	-	-	3	-	-	-
CO4	Appreciate correlation between Human population and its effect on environment.	2	-	-	-	2	2	-	-	3	-	-	-
CO5	Read, analyze and apply various laws and regulations concerning environmental issues.	2	-	-	-	3	3	-	-	-	-	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Prof.S.P.Shiralkar	Lecturer in Mechanical Engineering Department
2	Prof. A.B. Deshpande	Lecturer in Mechanical Engineering Department

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE	ENGINEERING MATHEMATICS
COURSE CODE	6G102

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

1. RATIONALE:

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

2.COMPETENCY STATEMENT:

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

    "Solve engineering problems using the principles of applied mathematics."

3. COURSE OUTCOMES

Students will be able to

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

4. TEACHING AND EXAMINATION SCHEME

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

   Legends:

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

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

5. CORSE DETAIL.

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT I Derivatives	1a.Differentiate various engineering functions	1.1 Definition of derivative, notation. 1.2 Derivative of standard functions. 1.3 Rules of Differentiation (without proof) such as sum, difference, product and quotient. 1.4 Derivative of composite functions. 1.5 Derivative of inverse trigonometric functions. 1.6 Derivative of implicit functions. 1.7 Derivative of parametric functions. 1.8 Logarithmic differentiation. 1.9 Second order derivatives.
UNIT II Applications of derivative	2a.Apply derivatives to find Velocity, Acceleration and Maxima & Minima	2.1 Tangent & normal. 2.2 Maxima & minima. 2.3 Radius of curvature.

UNIT III
Integration
	3a.Integrate various Functions using appropriate methods.	3.1 Definition of integration.
		3.2 Integration of standard function.
		3.3 Rules of Integration: sum, difference & multiplication.
		3.4 Methods of Integration
		    3.4.1 Integration by substitution.
		    3.4.2 Integration by partial fraction.
		    3.4.3 Integration by parts.
		3.5 Definition of Definite integral.
		3.6 Simple problems on definite integral

UNIT IV
Differential Equations
	4a.Solve various types of differential equations.	4.1 Definition of differential equation, order &degree.
		4.2 Formation of differential equation.
		4.3 Solution of Diff. equation.
		    4.4.1 variable separable.
		    4.4.2 Homogeneous equation.
		    4.4.3 Exact diff. equation.
		    4.4.4 Linear diff. equation.

UNIT V Statistics	5a.Measure Central Tendencies 5b. Measure Dispersion for given data.	5.1 Graphical representation: Histogram & o-give curve to find Mode and median. 5.2 Measures of dispersion : Range, mean deviation and Standard deviation.

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

Sr,no	Title/Topic	Teaching Hours	Distribution of Theory Marks			
			Remembrance levels	Understanding levels	Application levels	Total
1	Derivative	12	2	08	08	18
2	Applications of derivative	04	00	04	08	12
3	Integration	16	06	08	12	26
4	Differential Equations	10	04	04	08	16
5	Statistics	06	02	02	04	08
	TOTAL	48	14	26	36	80

7. SUGGESTED LIST OF TUTORIAL

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

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

8. SUGGESTED STUDENT ACTIVITIES
Following is the list of proposed student activities like:

Other than the classroom learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:
a. Collect the mathematical derivation based on curriculum from respective programme.
b. Identify mathematical problems related to respective programme and get them solved.
c. Find graphical software using internet and list them.
d. Identify problems based on applications of differential equations and solve these problems.

e. Prepare a seminar on any relevant topic based on curriculum.

9.   SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

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

10. SUGGESTED LEARNING RESOURCES

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

11. Major Equipment/ Instrument with Broad Specifications

Sr. No.	Name of the Equipment	Specification
1	NA	

12. Software/Learning Websites

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

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

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

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

Member Secretary PBOS   Chairman PBOS   Co-ordinator science and Humanities

COURSE TITLE   **ENGINEERING CHEMISTRY**

COURSE CODE   **6G104**

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

1 RATIONALE:

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

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

2. COMPETENCY:

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

"**Apply basic knowledge and principles of chemistry to solve different industrial problems.**"

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme					
				Theory Marks		Practical Marks		Term work	Total Marks
L	T	P	C	ESE	PT	ESE	PA	ESE	TOTAL MARKS
3	0	2	5	80~	20~	25@	00	25	150
Examination Duration				2Hrs	1/2Hr.	2Hrs.	--	--	--

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

3. COURSE OUTCOMES:

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

1. Draw the orbital configuration of different elements.
2. Represent the formation of molecules schematically.
3. Compare and use different types of cells.
4. Identify the properties of metals & alloys related to engineering applications.
5. Identify the properties of nonmetallic materials, related to engineering applications.

6.   Select a proper material for specific purpose.
7.   Select and use the lubricants at proper/ specific conditions of machines.

4. COURSE DETAILS:

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT-I Electronic Theory Of Valency & Molecule Formation	1a.Identification of structure and nature of atom, element and molecule.	1.1 Atomic no, atomic mass no. numerical problems on it , orbit & orbitals. 1.2 Electronic configuration, electronic configuration of first 30 elements. 1.3 Molecule formation: Valency, types of valency, electrovalency and covalency with suitable examples. Study of Formation of Electrovalent compounds e.g. $NaCl$, $CaCl_2$ & $MgCl_2$ and formation of Covalent Compounds examples H_2O, Cl_2, CO_2, N_2
UNIT-II Electrochemistry	2a.Verify Principle, construction, working and applications of different cells.	2.1 Arrhenius Theory of Ionization, Degree of ionization. 2.2 Basic concepts of Conductors, Insulators, Dielectrics, Electrolyte, Non Electrolyte 2.3 Electrolysis, Electrolytic Cell, Electrodes. 2.4 Electrolysis of $CuSO_4$ Solution by using Cu Electrode & Platinum Electrode 2.5 Faraday's first law of Electrolysis & numerical problems on it Application of Electrolysis such as Electroplating. 2.6 Electrochemical Cells & Batteries Types of cell Primary & secondary cell construction And Working of Dry cell & Lead – Acid Storage.

UNIT III Metals and Alloys	3a.Identify different mechanical properties and extraction methods of pure metal, Correlate properties, composition and applications of alloys with metal.	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. its flow sheet Crushing, Concentration, methods of concentration (physical and chemical). 3.4 Reduction of iron in blast furnace with chemical reactions, Reactions in zone of reduction. **Alloys** 3.5 Definition of Alloy, Purposes of Making alloy. 3.6 Methods of Preparation of alloy such as fusion method & compression method 3.7 Classification of Alloys, Ferrous alloys & Non Ferrous alloys, their examples. 3.8 Composition, Properties & Applications of some common alloys such as Alnico, Duralumin, Wood's Metal
UNIT-IV Corrosion of Metals And its Application	4a. Classify corrosion from action of surrounding environment and its protection methods.	4.1 Definition of corrosion 4.2 Atmospheric corrosion or dry Corrosion, corrosion due to oxygen , different types of film formation. 4.3 Electrochemical Corrosion Hydrogen evolution mechanism. 4.4 Appling protective Coatings like metal coating by galvanising, tinning
UNIT-V Water	5a. Recognize ill effect of hard water and methods for purification of water.	5.1 Hard water & soft water, types of hardness, causes of hardness 5.2 Effects of hard water in different industries (such as paper , sugar , dying and textile industries) and domestic purposes. 5.3 Softening of hard water by Permutit process and ion exchange process,. 5.4 Potable water & its condition for pot-ability. Different methods of purification of water for drinking purposes chlorination and ozonation 5.5 pH – value of water its applications Numericals on pH values.

UNIT-VI Non Metallic Materials	6a. Identification of types , preparation, properties and applications of plastic, rubber and thermal insulating material.	6.1 Plastics Definition of Plastic, Formation of Plastic by Addition Polymerisation with examples Polyethylene & PVC. 6.2 Formation of Plastic by Condensation Polymerisation with suitable example as Nylon 6, 6; Bakelite plastic. 6.3 Types of Plastics, Thermo softening & Thermosetting Plastic & difference between them. 6.4. Engineering properties of plastic and its related uses. **RUBBER** 6.5 Natural rubber its extraction from latex, drawbacks of natural rubber. Synthetic Rubber its examples 6.6 Vulcanisation of rubber with chemical reaction. 6.7 Properties of rubber such as elasticity, tack, resistant to abrasion, rebound capacity. 6.8 Engineering Applications of rubber based on its properties. 6.9 Thermal insulating materials Definition & characteristics of ideal thermal insulator. **Glass wool** preparation, properties & applications. **Thermocole** properties and its applications.
Unit-VII Lubricants	7a. Select proper lubricant for different types of machineries.	7.1 Definition of lubricant and Lubrication. 7.2 Functions of lubricants. 7.3 Classification of lubricants with examples, 7.4 Mechanism of Lubrication by Fluid Film, Boundary & Extreme Pressure, 7.5 Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, Cloud & Pour Point. 7.6 Selection of proper Lubricants for Various types of machines.

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

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

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

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

6. SUGGESTED EXERCISES/PRACTICALS

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

(Any TEN from following)

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

11	2	Qualitative analysis of given salt solutions, i.e. to determine one acidic and one basic radical from given salt solution. (At least 05 salt solutions.)	For each salt solution 2

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

7. SUGGESTED STUDENT ACTIVITIES

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

8. SPECIAL INSTRUCTIONAL STRATEGIES

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

9. SUGGESTED LEARNING RESOURCES

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

10. MAJOR EQUIPMENTS/ INSTRUMENTS WITH BROAD SPECIFICATIONS

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

11. E-LEARNING RESOURCES

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

Sr. No.	Web Address
1	http://www.webelements.com
2	http://www.chemtutor.com
3	http://www.chem1.com
4	https://phet.colorado.edu
5	www.visionlearning.com
6	www.onlinelibrary.wiley.com
7	www.rsc.org
8	www.chemcollective.org

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

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

| CO7 | Select and use the lubricants at proper/ specific conditions of machines. | 2 | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - |

13. Name and Designation of Course Designer:

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

Member Secretary PBOS   Chairman PBOS   Co-coordinator science and Humanities

COURSE TITLE- WORKSHOP PRACTICE

COURSE CODE:-6G202

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

1. **RATIONALE**

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

2. **COMPETENCY**

   "Prepare simple jobs on the shop floor of the engineering workshop."

3. **TEACHING AND EXAMNATION SCHEME**

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

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

4. **COURSE OUTCOMES**-

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

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

5.   DETAILED COURSE CONTENTS

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

Unit– IV **Metal Joining**	4a. Identify metal joining tools. 4b. Explain gas and arc welding procedure 4c. Use hand tools. 4d. Perform welding, soldering, brazing operations 4e. Maintain tools, equipment and machineries.	4.1 Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter and their Specifications 4.2 Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthling clamp, wire brush and their Specifications 4.3 Operation of machineries in welding shops- arc welding transformer their specifications and maintenance. 4.4 Welding Electrode, filler rod, fluxes, and solders. 4.5 Basic process welding, brazing and soldering.
Unit– V **Furniture Making**	5a. Select wood working tools as per job/ requirement. 5b. Explain operation of wood working machines 5c. Use hand tools 5d. Operate machineries. 5e. Perform wood working operations 5f. Maintain tools, equipment and machineries.	5.1 Types of artificial woods such as plywood, block board, hardboard, laminated boards, Veneer, fiber Boards and their applications. 5.2 Wood working hand tools carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares, and their specifications 5.3 Operation of wood working machineries - Wood turning lathe, circular saw, their specifications and maintenance. 5.4 Basic process- marking, sawing, planning, chiseling, turning, grooving, boring.
Unit–VI **Sheet Metal**	6a. Identify sheet metal tools. 6b. Explain operation of sheet metal machineries. 6c. Use hand tools 6d. Operate sheet metal machineries. 6e. Perform bending operations 6f. Maintain tools, equipment and machineries.	6.1 Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications 6.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance. 6.3 Basic process-marking, bending, folding, edging, seaming, staking, riveting.

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	General Workshop Practice	03	01	01	03	05
II	Fitting	12	-	03	06	09
III	Plumbing	06	-	02	07	09
IV	Metal Joining	09	01	02	06	09
V	Furniture Making	09	-	02	07	09
VI	Sheet Metal	09	-	02	07	09
	Total	48	02	12	36	50

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

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

7. SUGGESTED EXERCISES/PRACTICALS

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

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

	& V	as per given drawing (in group of 4 to 5 students)	
7	VI	Prepare sheet cutting, bending, edging, end curling, lancing, soldering and riveting operations. (in group of 4 to 5 students)	06
		Total	48

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

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

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

1. Demonstration

10. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Workshop Practice	Bawa, H.S.	McGraw Hill Education,Noida; ISBN-10: 0070671192 ISBN-13: 978-0070671195
2.	A Textbook of Manufacturing Process (Workshop Tech.)	Gupta, J.K.;Khurmi,R.S.	S.Chandand Co. New DelhiISBN:81-219-3092-8
3.	Workshop Practice Manual For Engineering Diploma & ITI Students	Hegde, R.K.	Sapna Book House, 2012, ISBN:13: 9798128005830

4.	Introduction to Basic Manufacturing Process & Workshop Technology	Singh, Rajender	New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7

11. Major Equipment/ Instrument with Broad Specifications

S. No.	Equipment Name with Broad Specifications	Experiment S.No.
1	Fire buckets with stand of medium size	I, II, III, IV,V, VI
2	Fire extinguisher A,B and C types	I, II, III, IV,V, VI
3	Wood Turning Lathe Machine, Height of Centre: 200mm, Distance between Centers: 1200mm, Spindle Bore: 20mm with Taper, Range of Speeds: 425 to 2800 with suitable Motor Drive. with all accessories	II
4	Circular Saw Machine, Diameter of saw blade 200 mm, Maximum Depth of Cut 50 mm, Table Size -350 x 450 mm, Table Tilting - 45^0	II
5	Wood working tools- marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares,	II
6	Carpentry Vice 200 mm	II
7	Work Benches- size:1800 x 900 x 750 mm	III
8	Bench Drilling machine (up to 13 mm drill cap.) with ½ H.P. Motor 1000 mm. Height.	III
9	Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories.	III
10	Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor.	III
11	Vernier height Gauge 450 mm	III
12	Surface Plate 600 x 900 mm Grade I	III
13	Angle Plate 450 x 450 mm	III
14	Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder	IV
15	Oxygen and acetylene gas welding and cutting kit with cylinders and regulators.	IV
16	Pipe Bending Machine	IV
17	Pipe Vice – 100 mm	IV
18	Pipe Cutter- 50 mm	IV
19	Bench Vice 100 mm	II,III,IV,V,VI
20	Portable Hammer Drill Machine 0-13 mm A.C. 230 V, 2.5Amp, Pistol type, having different types of bits	II, III, IV,V, VI
21	Sheet Bending Machine	VI
22	Sheet Cutting Machine	VI

23	Brazing Equipment	VI
24	Fitting tools - hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set.	III
25	Plumbing tools-pipe vice, pipe bending equipment, pipe wrenches dies.	IV
26	Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter	V
27	Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush.	V
28	Sheet metal hand tools-snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set	VI

12. E-learning recourses

(Please mention complete URL of the E- recourse CO wise)
1. http://www.asnu.com.au
2. http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf
3. http://www.weldingtechnology.org
4. http://www.newagepublishers.com/samplechapter/001469.pdf
5. http://www.youtube.com/watch?v=TeBX6cKKHWY
6. http://www.youtube.com/watch?v=QHF0sNHnttw&feature=related
7. http://www.youtube.com/watch?v=Kv1zo9CAxt4&feature=relmfu
8. http://www.piehtoolco.com
9. http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/
10. https://www.youtube.com/watch?v=9_cnkaAbtCM

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO 1	Prepare simple jobs on the shop floor of the engineering workshop	1	2	3	3	1	-	1	2	2	2		3
CO 2	Select tools and machinery according to job	1	2	3	3	1	-	1	2	2	2	2	
CO 3	Use hand tools in different shop for performing different operation.	1	2	3	3	1	-	1	2	2	2		3
CO 4	Operate equipment and machinery in different shops	1	2	3	3	1	-	1	2	2	2	3	3
CO 5	Prepare job according to drawing	1	2	3	3	1	-	1	2	2	2		
CO 6	Maintain workshop related tools, equipment and machineries	1	2	3	3	1	-	1	2	2	2	3	

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

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **ELEMENTS OF ELECTRONICS & ELECTRICAL ENGINEERING**

COURSE CODE   **6S202**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CO / IT / AN	Second

1. RATIONALE

It is necessary for the students of Computer Engineering and Information Technology to study and apply the basic principles, analyze and troubleshoot simple subsystems. To acquire this level of understanding, the basic knowledge of electronic devices and circuits is essential. Electrical engineering involves the conception, design, development, & production of the electrical or electronic products & systems needed by our technological society. This Course is one of the core subjects which is deals with construction, working principle of electronic devices, Electric circuits, different electrical machines with application of active components.

2. COMPETENCY

Apply the basic electronic testing and fault finding of electronic and electrical components and circuits.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE @ (OR)	PA (TW)	
4	-	2	06	80	20	25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

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

4. COURSE OUTCOMES

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

1.   Identify electronic components in given electronic circuit.

2.   Select particular diode for different rectifier application, Filters and Regulator Circuits.

3.   Distinguish the functioning of Uni-polar devices & Bi-polar Junction Transistor.

4.   Use of electric machines & instruments for computer application

5.   Select the need and application of protective devices

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit – I **Electronic** **Components** **and Signals**	1a. Differentiate between active and passive electronic components 1b. Differentiate between voltage and current source. 1c. Explain the different types of signal Parameters with sketches. 1d. Differentiate various types of ICs.	1.1 Active and passive components, Voltage and Current Source, Symbols of various Semiconductor Components. 1.2 Amplitude, Frequency, Phase, Wavelength, Signal, waveform, Time and frequency domain representation, Types of Signals: sinusoidal, triangular and square 1.3 Integrated Circuits – Analog and digital
Unit– II **Diodes and** **Applications**	2a.Describe V-I characteristics of PN junction diode with sketches 2b.Describe the application of PN Junction diode. 2c. Describe the working and applications of Zener diode. 2d. Describe V-I characteristics of Zener diode. 2e. Describe the applications of LED. 2f.Compare -1.Types of Rectifiers 2.Types of Filters	2.1 Symbol , construction and working principle of P-N junction diode 2.2 Need of rectifiers,Half wave, Full wave and Bridge Rectifier, Working and block diagram of regulated power supply,Need of filters,'L', 'C' and 'π'' Filter working. 2.3 Zener diode, Zener diode as voltage Regulator, Symbol , construction and working principle and V-I characteristics of Light Emitting Diode

Unit– III **Bipolar junction** **Transistor** **& Field Effect Transistors(BJT & FET)**	3a. Differentiate unipolar and bipolar devices. 3b.Describe the applications of transistor. 3c. Determine the effect of Current gain on the performance of the transistor. 3d. List specifications and ratings of BJT 3e. Describe the applications of JFET and MOSFET. 3.f Differentiate BJT and JFET.	3.1 Introduction to Unipolar and Bipolar devices 3.2 symbol, construction and working principle of NPN transistor, Transistor as switch and amplifier,Input and Output characteristics of CE,CB and CC configurations, Regions – Cut-off, saturation and Active region,Transistor parameters- alpha, beta, input and output resistance and relation between alpha and beta 3.3FET-Types(JFET and MOSFET),Classification of JFET,Symbol, construction and working principle of N-channel and P-channel JFET
Unit – IV **Electric Circuit Fundamentals & Machines**	4a. State and explain Ohm's law. 4b. Explain different Circuit condition. 4c. Apply Kirchoff's law in different circuit. 4d. Give characteristics of Inductance & Capacitance. 4e. Analyze Series and Parallel combination of circuits Practical examples of these circuits. 4f. Describe the working principle of DC generator and alternator 4g. Classify induction motors 4h Describe the working Principle of given induction motor	4.1 Current, Voltage- EMF and Resistance, Ohm's Law, Equivalent resistance of resistors connected in series and parallel.,Circuit conditions – open, close and short circuit, Kirchhoff's voltage and current laws,Power and Energy, Meters used to measure Current. 4.2 Voltage, Resistance,inductance and capacitance Power and Energy, Simple problems on ohm's and kirchoff's law. 4.3DC generator and alternator, Classification of induction motors,Construction, working principle,Squirrel cage and wound rotor induction motor
Unit– V **Transformer and protective devices**	6a.Describe the construction of a simple transformer. 6b. Describe the types and uses of transformers 6c.List the types of transformers used in various devices 6d.State the differences of MCB and ELCB 6e.State the need of HRC fuses. 6f.Explain how to protecting computer against power transient. 6g. Describe how earthing is done for a domestic building	6.1 General construction and principle of Transformers., Emf equation and transformation ratio of transformers,Applications of Transformers, Construction and uses of auto transformers. 6.2 Different protective devices such as fuse, M.C.B. and ELCB. HRC fuses,Uninterruptible Power Supplies (UPS),Protecting computer system against power transients,Earthing principles and pipe earthing

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	**Electronic Components**	08	04	04	02	10

	and Signals					
II	Diodes and Applications	16	04	06	10	20
III	Bipolar junction Transistor & Field Effect Transistors(BJT & FET)	16	02	08	10	20
IV	Electric Circuit Fundamentals & Machines	14	04	06	08	18
V	Transformer and protective devices	10	02	04	06	12
	Total	64	16	28	34	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Measure parameters like amplitude, time period, frequency of sine wave and square wave using CRO and Function Generator	02
2	I	Measure the value of the resistance by using (i) Analog and Digital Multi-meters and (ii) by Colour coding.	02
3	II	Test the working of PN junction diode.	02
4	II	Test the working of Zener diode.	02
5	II	Use rectifiers to convert AC signal into DC signal using Half wave and Full wave rectifier. Use of filters to get regulated DC.	04
6	II	Use rectifiers to convert AC signal into DC signal using Bridge rectifier. Use of filters to get regulated DC.	04
7	II	Test the working of Zener regulator.	02
8	III	Check input and output characteristics of NPN Transistor in CE Mode.	04
9	III	Measure voltage between terminals of AC/DC.	02
10	IV	Apply ohm's law experimentally in a given circuit.	02

11	IV	Apply Kirchhoff's current& voltage law in a given circuit.	02
12	VI	Measure input & output quantities of single phase transformer.	02
13	VI	Measure ratings of various Protective devices.	02
TOTAL			32

8.   SUGGESTED STUDENTS ACTIVITIES

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

Following is the list of proposed student activities like:

1. Prepare journals based on practical performed in laboratory.
2. Study of datasheet of electronic components.
3. Prepare charts of symbols of Electronic components.
4. Search information about Ratings and specifications of Regulator, diode transistors, CRO, function generator.
5. List analog and digital ICs and prepare charts of the same.
6. Students may be asked to make a list of following items used in electric and electronics circuits. Comparetheir properties, usage, cost and availability. Collections can be made for small inexpensive items. Each of thesecan be offered as a project.
    a. Conductors - Copper, Aluminum, Graphite, Carbon, Nichrome, Tin
    b. Commonly used insulators
    c. Transistors
    d. Capacitors
    e. Resistors
    f. Diodes and Rectifiers
    g. Transformers
    h. SCRs, TRIACs, DIACs
    i. LEDs, LCDs
    j. Devices for industrial and residential illumination
    k. Heaters and furnaces
    l. Motors and Alternators
    m. Switches, micro-switches and relays
    n. Soldering, desoldering, welding devices and equipment.
    o. Fans, Blowers and pumps
    p. Smoke detectors, fire alarms used in electrical/electronics installations.
    q.High voltage devices and equipment used and their safety features.

    r. To study three phase induction motor parts & their identification & Study the UPS used in the electrical/electronics laboratory.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

1. Guide students in preparing charts and display boards.
2. Guide students in searching information regarding datasheets and electronic components.
3. Demonstrate practical thoroughly before the students perform.
4. Show Flash/Video/Animation clippings for functioning of instruments.
5. Observe continuously and monitor the performance of students in lab.
6. Assign different types of Mini-projects
7. Guide students in preparing Micro-projects.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	A text book of Applied Electronics	R.S.Sedha	S.Chand & Co., latest edition
2.	Electronics Principles	Albert Paul Malvino	McGraw Hill, latest edition
3.	Principles Of Electronics	V.K.Mehta Rohit Mehata	S.Chand & Co., latest edition
4.	B.L Theraja	Electrical Technology Vol. I & II	S. Chand & Co.
5.	Prasad P.V and Sivanagaraju S.	Electrical Engineering:Concepts and Applications	Cengage Learning India, New Delhi, 2012
6.	V. N. Mittle	Basic Electrical Engineering	Tata McGraw Hill, New

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Single/Dual regulated Power supply.	As per Electronics and Electrical industry specification

2.	Digital multimeter and ammeter, micro-ammeter.	As per Electronics and Electrical industry specification
3.	Dual trace CRO/DSO.	As per Electronics and Electrical industry specification
4.	Function generator.	As per Electronics and Electrical industry specification
5.	Trainer kits / breadboard for Rectifiers, regulator, Transistors, JFET and RC coupled single / two stage amplifiers.	As per Electronics and Electrical industry specification

12. LEARNING WEBSITE & SOFTWARE

   a. http://nptel.ac.in/courses/122104013/
   b. http://www.electronics-tutorials
   c. https://learn.sparkfun.com/tutorials/transistors
   d. http://www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
   e. http://faculty.cord.edu/luther/physics225/Handouts/transistors_handout.pdf
   f. http://www.technologystudent.com/elec1/transis1.htm
   g. http://www.learningaboutelectronics.com/Articles/N-channel-JFET
   h. http://www.electrical4u.com/jfet-or-junction-field-effect-transistor
   i.   http://www.electrical-technologies.com/
   j. http://electrical4u.com/
   k.   http://www.electronics-tutorials
   l. http://www.animations.physics.unsw.edu.au//jw/AC.html

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

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identify electronic components.	1	-	1	-	-	-	-	-	-	-	-	-
2	Use diodes in different applications	1	-	1	-	-	-	-	-	-	1	-	-
3	Test the functioning of of uni-polar devices & Bi-polar Junction	1	-	2	-	-	-	-	-	-	-	-	-

	Transistor.												
4	Measure the electric circuits fundamentals & Use the electric machines for computer application	3	-	-	-	-	-	-	-	-	-	-	-
5	Identify the need and use of protective devices	-	-	-	-	1	1	-	-	-	-	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Prajakta Sadafule	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad
2	Pawan Lahoti	Lecturer in Computer Engineering, Govt. Polytechnic,Aurangabad
3	Nilophar Masuldar	Lecturer in Computer Engineering, Govt Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **'C' PROGRAMMING (CP)**

COURSE CODE   **6S204**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CO / IT / AN	**SECOND SEMESTER**

1. RATIONALE

This Course intends to develop programming skills in the students, using a popular structured programming language `C'. The students will learn step by step procedure (i.e. flowcharting &Algorithm) of any program development process. The programming skills thus acquired can be used for developing programs with advance level programming features which in turn will be helping in developing practical applications for the scientific, research and business purposes.

2. LIST OF COMPETENCIES

At the end learning this course student will be able to:

"Develop structured, modular and memory efficient programs in 'C' using arrays, functions, pointers."

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	
3	-	4	7	80	20	#25	25	150
Duration of the Examination (Hrs)				3	1	2	--	

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

4. COURSE OUTCOMES

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

1. Develop algorithm and Draw the flowchart for 'C' Programming.
2. Develop a program using decision and loop statement.
3. Implement program using array.
4. Use functions and pointer in given problem statement.
5. Create structure for different data type in one head.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
UNIT-I **Basics of c programming**	1a. Draw flow chart to solve given problem logically. 1b. Develop Algorithm to solve given program. 1c. Comprehend general structure of 'C' program 1d. Declare and define variables 1e. Write and execute simple program in 'C' 1f. Use arithmetic, relational and logical operators for forming expressions. 1g. Format input and output using 'C' statements.	1.1 Introduction to C and General structure of 'C' program 1.2 Features and Advantages of C language. 1.3 Character set, 'C' tokens Keywords and Identifiers 1.4 Constants and Variables Data Types 1.5 Modifiers and type conversion 1.6 Input and Output statements in 'C' 1.7 Types of Operators and Expression: Arithmetic, Relational ,Assignment, Logical, conditional operators and expressions, Write, compile, execute a simple 'C' program
UNIT-II **Control and loop statements**	2a. Develop programs using decision making statements in 'C' language. 2b. Develop programs using structured loop control statements in 'C' language	2.1 Decision Statements 2.2 Unconditional branching: goto statement 2.3 Conditional branching statements: If statement, If-else statement, Nested If else statement

		2.4 If-else-if Ladder statement
		2.5 Break, continue and goto statements, switch statements
		2.6 Loop Control Statements: for loop, While loop, Do-while loop
UNIT-III **Introduction to Array**	3a. Declare and define array. 3b. Develop programs using array in 'C' language 3c. Develop, debug and execute programs which use reading, writing and manipulating Arrays. 3d. Describe string function	3.1 Array definition and Declaration 3.2 Concept of one dimensional and two dimensional array 3.3 Accessing and initialization an array 3.4 Characteristics of an array 3.5 Introduction of String 3.6 Declaration and Initialization of String 3.7 gets(), puts() functions in <String.h>: such as strlen(), strcmp(), strcpy(). Strrev(), strcat() and all.
UNIT-IV **Pointer and Function**	4a. Develop, debug and execute modular programs by writing and using Functions 4b. Develop, debug and execute programs using Pointers 4c. Declare and initialize pointer	4.1 Introduction and Features of Pointers 4.2 Declaration of Pointer, Pointer initialization, pointer arithmetic operation 4.3 Array using pointer and array of pointers. 4.4 Basics of Functions, Built-in and user defined functions 4.5 Advantages of using Functions 4.6 Working of a Function 4.7 Declaring, Defining and calling user defined Functions 4.8 Types of functions: i) no return type no argument list ii) no return type with

| UNIT-V
Structure and Union | 5a. Implement program for different Data types under a single structure
5b. Describe array of structure and pointer to structure.
5c. Describe union with its use
5d. Utilize memory effectively using Union | argument list iii) return type no argument list iv) return type with argument list.
4.9 Call by Value and call by Reference and recursive function

5.1 Introduction and Features of Structures
5.2 Definition and Declaration of Structures
5.3 Memory allocation of structure
5.4 Array of Structures and Pointers to Structure
5.5 Nested structure.
5.6 Declaration of Union, its use and how to access it
5.7 Create dynamic memory using <malloc.h> for structure variable. |

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R	U	A	Total
I	Basics of c programming	08	3	5	6	14
II	Control and loop statements	10	3	5	8	16
III	Introduction to Array	08	4	4	6	14
IV	Pointer and Function	12	4	6	10	20
V	Structure and Union	10	4	6	6	16
Total		48	18	26	36	80

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

7. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

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

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1.	1	Draw Flow Chart and write algorithm for at least four problems.	2
2.	1	i. Write programs using Constants, Variables & arithmetic expression. ii. Write program to calculate average of numbers using arithmetic operators	2
3.	1	Execute programs to create variable with different data types, Type modifiers and Type conversion.	2
4.	1	Execute programs providing insight to formatted and unformatted input and output in c	2
5.	1	Execute programs providing understanding of Relational operators.	2
6.	1	Execute programs using logical and bitwise operators.	2
7.	2	Make programs using If, If-else, If-else-if and Nested If statements.	4
8.	2	Make programs using break, continue, goto and switch statements.	4
9.	2	Execute programs to understand simple For loop and nested loops.	4
10.	2	Execute programs using While Loop and nested while loop.	2
11.		Execute programs using Do-while Loop and nested Do-while loop.	2

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
12	3	i. Execute program to display 1-D and 2-D array. ii. Execute programs on arrays. (Sorting, finding particular value etc.)	4
	3	Execute a program for matrix addition.	2
13		Execute a program for matrix multiplication	2
14	3	Execute programs using String functions strlen(), strcpy, strcmp(), strlwr(),strupr(), strchr(), strcat()	2
15	4	Execute a program for math and other functions like sqrt(), pow(), ceil(),round(), sin(), cos(), tan(), div(), abs() etc	2
16	4	Execute programs using functions and passing function arguments.	4
17	4	Execute programs for pointer.	2
18	4	Execute programs using recursive Functions.	2
19	4	Execute program for call by reference	2
20	5	Execute and execute programs with various features of Structures	2
21	5	Execute program for structure using pointer	4
22	5	Execute program for array of structure.	2
23	5	Execute program for structure within structure	2
24	5	Execute and execute programs using Union	2
25	5	Execute and execute programs for creating memory for structure variable using <malloc.h>	2
		Total	64

8. SUGGESTED STUDENT ACTIVITIES

LIST OF PROPOSED ACTIVITY:
1. Students will prepare file for the above mentioned Practical

2. Prepare presentation and deliver seminar on various topics covered like String functions, Pointers, Arrays, File Functions, Structures and Unions,

3. Students are expected to develop minimum one program of particular topic as an example to exhibit real life application.

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Demonstration

d. Seminars

e. Activity based learning

10. SUGGESTED LEARNING RESOURCES

List of Books

Sr.No	Author	Title of Books	Publication
1	Kamthane,A.N.	Programming in 'C	Pearson,2012
2	Balaguruswami,E.	Programming in ANSI C	TMH,2012
3	Kanetkar, Yashavant	Let us 'C'	BPB publications,2010

11. List of Major Equipment/ Software

S. No.	Name of equipment	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	C compiler	TurboC3 or latest version

12. List of Software/Learning Websites

1. 'C' Programming Language: http://www.w3schools.in/cprogramming- language/intro/
2. Learn C Online: http://www.learnconline.com/
3. 'C' Frequently Asked Questions: http://www.c-faq.com
4. 'C' Programming: http://www.cprogramming.com
5. Sams Teach Yourself C in 24 Hours: http://aelinik.free.fr/c/

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

CO. NO.	Course Outcome	POs										PSOS	
		1	2	3	4	5	6	7	8	9	10	1	2
1	Develop algorithm and flowchart for 'C' Programming	1	-	2	3	-	-	-	-	-	-	1	1
2	Develop a program using decision and loop statement	-	-	3	3	-	-	-	-	-	-	2	2
3	Implement program using array.	-	1	2	1	-	-	-	-	-	-	2	2
4	Comprehend and use the concept of functions and pointer.	-	1	3	3	-	-	-	-	-	-	2	2
5	Create structure for different data type in one head	-	2	1	1	-	-	-	-	-	-	2	2
6	Open a file using 'C' Program.	-	1	1	1	-	-	-	-	-	-	2	2

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Ms. R.S.Sindge	LIT, P.L.Govt. Polytechnic, Latur
2	Ms. V.B. Kundlikar	LIT, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **STATIC WEB PAGE DESIGING LANGUAGE**
COURSE CODE   **6S205**

PROGRAM & SEMESTER

Diploma Programmes in which this course is offered	Semester in which offered
CO / IT / AN	2nd Semester

1. **RATIONALE:**

this is basic level course aims at static web page desinging. World Wide Web is the basic technology for e-commerce and HTML is the medium for creating web pages. This language required for developing online educational applications such as organizational websites, educational website, virtual learning environments etc. and business applications in various fields such as products sale, banking, railways reservation, services etc.

2. **COMPETENCY STATEMENT:**

At the end learning this course student will be able to:

"Develop and host a static website using Hyper Text Markup Language with web technology features like Cascading Style Sheets etc."

3. **TEACHING SCHEME**

Teaching Scheme (Hours/Credits)			Total Credits	Examination Scheme (Marks)				Total Marks
				Theory Mark		Practical Mark		
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	100
0	0	2	2	0	0	@50	50	
Duration of the Examination (Hrs)				--	--	--	--	

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

4. **LEARNING OUTCOME**
   At the end learning this course student will be able to:
   ൧. Select Static and Dynamic Web Pages.
   2. Design web pages using basic HTML tags.

3. Design web pages containing hyperlink and different images.
4. Design web pages having frame consisting of table.
5. Design any kind of registration form.
6. Design and develop web pages using CSS styles, internal and/or external style sheets

5. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Website Development Essentials	1a.Identify website development essentials.	1.1 Information about web site, web page, Web Browsers and their types. 1.2 Working of different types of Web Pages, General structure of a Web Page, Scripting languages, URL, Popular Search Engines, WWW. 1.3 Static Web Pages, Dynamic Web Pages
Unit -II Introduction to HTML	2a.Use basic HTML tags	2.1 Introduce Web page structure and basic structure tags: !DOCTYPE, HTML, HEAD, TITLE, BODY with attributes. 2.2 Block Level Tags: Headings, aragraphs, Breaks, Divisions, Centered Text, Block Quotes, Preformatted text, HR tag. 2.3 Text Level Tags: Bold, Italic, Teletype, Underline, Strikethrough, Superscript, Subscript DIV Tag, Font Tag. 2.4 Lists: Ordered Lists, unordered Lists, Definition Lists, and Nested Lists.
Unit III: Linking Documents & Including Images	3a.linking of documents and images for given required link.	3.1 URL: Types of URLs, Absolute URLs, Relative URLs. 3.2 Anchor Tag: Linking various documents for internal and external links, Marquee Tag. 3.3 Image Formats: GIF,JPEG, BMP & PNG 3.4 Adding Image using Image tag, setting an image as background
Unit IV: Developing Table & Creating Frame	4a.use tables with given formatting.	4.1 TABLE tag with attributes. TABLE, TR, TH, TD tags, border, cell spacing, cell padding, width, align, bgcolor attributes. 4.2 Types of Frames with their attributes Creating frames: FRAMESET tag – rows, cols attributes. 4.3 FRAME tag –name, frame border, margin height, margin width, src, resize,

		scrolling attributes. Use of NOFRAMES tag, Frame targeting.
Unit V: Developing HTML Forms	5a.design forms for given systems	5.1 Creating basic form: FORM tag, action and method attributes. 5.2 Form fields: Single line text field, password field, multiple line text area, radio buttons, and check boxes. 5.3 Pull down menus: SELECT and OPTION tags. 5.4 Buttons: submit, reset and generalized buttons.
Unit VI: Introduction to Style sheets.	6a.make use of style sheets	6.1 Introduce Style Sheets with different types. 6.2 Adding style to the document: Linking to style sheets, Embedding style sheets, Using inline style. 6.3 Selectors: CLASS rules, ID rules. 6.4 Style sheet properties: font, text, box, color and background properties.

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

Unit No.	Unit Title	Teaching / Practical Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Website Development Essentials	06				
II	Introduction to HTML	12				
III	Linking Documents & Including Images	12	NOT APPLICABLE			
IV	Developing Table & Creating Frame	10				
V	Developing HTML Forms	14				
VI	Introduction to Style sheets.	10				

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

7. SUGGESTED EXERCISES/PRACTICALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	1	Study different static web site & dynamic web site.	02
2	2	Design a basic web pages using structure tag for displaying "My First Web Page" message.	02
3	2	Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag and different heading style	02
4	2	Create a page to show different character formatting (B, I, U, SUB, SUP) tags. $viz : log_b m^p = p \, log_b m$	02
5	2	Create a web page, showing an ordered list and unordered list of all second semester courses (Subjects).	02
6	3	Create a web page to link web page in the same directory, different Directory, in a subdirectory of a parent directory, any other directory, and link to Email ID.	02
7	3	Write a HTML code to create a web page with pink colour background and display moving message in red colour.	02
8	3	Write HTML code to create a WebPage that contains an Image at its centre.	02
9	3	Create a web page with an appropriate image towards the left hand side of the page, when user clicks on the image another web page should open.	02
10	4	Create a web page implementing all formatting and table tags. _(table shown below)_	02
11	4	Create a web page implements no. of frame in a single web page _(frame layout shown below)_	02
12	5	Create a web page for students Registration form using FORM tags.	04

Table for exercise 10:

Reg. Number	Student Name	Year/Semester	Date of Admission

Frame layout for exercise 11:

FRAME-1	FRAME-2
FRAME-3	

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
13	5	Write a program to demonstrate the use of GET, POST, developing a Feedback form with the use of <form> and <button> HTML tags.	02
14	6	Create a web page for demonstration of CSS applying Internal/External/Inline style.	02
15	6	develop a CSS program to set an image as the background	02
Total			**32**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:
- Analyze any 5 different website.
- Create our own website using online available templates.
- Develop a static website consisting of minimum five web pages usingDreamweaver

9. SUGGESTED LEARNING RESOURCES

Sr. No.	Author	Title of Book	Publication
1	Duckett Jon	Beginning Web Programming with HTML,XHTML & CSS	Wrox, 2008
2	Thomas Powell	HTML and XHTML –The complete reference	Tata McGraw Hill, New
3	Robbins Design	Learning Web	O'Reilly
4	Dick Oliver	SAMS Teach Yourself HTML & CSS in 24 Hours	Pearson Education Publication

10. LIST OF MAJOR EQUIPMENTS

Computer System with latest configuration & Dreamweaver software

11.   SOFTWARE/LEARNING WEBSITES
1. http://www.w3schools.com/html
2. https://www.tutorialspoint.com/html/
3. http://www.html.net/
4. http://www.2createawebsite.com
5. http://webdesign.about.com
6. https://www.codecademy.com/learn/web

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

CO. NO.	Course Outcome	POS										PSOs	
		1	2	3	4	5	6	7	8	9	10	1	2
1	Explain the Difference between Static and Dynamic Web Pages.	-	2	2	-	-	-	-	-	-	-	-	-
2	Design web pages using basic HTML tags.	-	3	3	-	-	-	-	-	-	3	-	-
3	Design web pages containing hyperlink and different images.	-	3	3	-	-	-	-	-	-	3	-	-
4	Design web pages having frame consisting of table.	-	3	3	-	-	-	-	-	-	3	-	-
5	Design any kind of registration form.	-	3	3	-	-	-	-	-	-	3	-	-
6	Design and develop web pages using CSS styles, internal and/or external style sheets.	-	3	3	-	-	-	-	-	-	3	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Mr. P.B.Lahoti	LCO, Govt. Polytechnic, Aurangabad
2	Ms. P.S. Sadafule	LCO, Govt. Polytechnic, Aurangabad
2	Ms. V.B. Kundlikar	LIT, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE   :   **COMMUNICATION SKILLS**

COURSE CODE   :   **6G302**

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

1. RATIONALE

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

2. COMPETENCY

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

"Communicate effectively at workplaces."

3. TEACHING AND EXAMINATION SCHEME

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

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

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

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

5. COURSE DETAILS

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

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

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

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

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

7. **SUGGESTED EXERCISES/PRACTICALS**

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

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

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities:

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

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED TITLES OF MICRO PROJECTS

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

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

11. SUGGESTED LEARNING RESOURCES

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

12. Major Equipment/ Instrument with Broad Specifications

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

13. E-learning resources

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

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

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

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

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

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

Member Secretary PBOS   Chairman PBOS   Co-coordinator
science and Humanities

COURSE TITLE-   **DIGITAL ELECTRONICS**
COURSE CODE   **6S203**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
CO / IT / AN	Third

1. RATIONALE

This is basic technology level course. It aims to enable the students to understand functioning of digital circuit using core structure of digital logic. This Course will enable student to solve various Boolean expressions, to design, develop and implement logic circuits.

2. COMPETENCY

After learning this course student will be able to
"Use Digital Systems and Logic Families to design Simple and combinational circuits of any electronic device."

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE @ (PR)	PA (TW)	
03	-	02	05	80	20	25@	25	150
Duration of the Examination (Hrs)				03	01	02	--	

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

4. **COURSE OUTCOMES**

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

1. Identification and conversion of number system.
2. Select appropriate gates and theorem to solve Boolean algebra.
3. Apply K-map to simplify Boolean expression.
4. Design digital combinational circuit including arithmetic circuit (half adder, full adder)
5. Design digital combinational circuit using multiplexer and demultiplexer.
6. Compare and contrast combinational & sequential circuit.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit – I **Introduction to Digital Principles**	1a. Define Digital System. 1b. Write advantage and disadvantage of digital system. 1c. Comprehend number system & binary codes. 1d. Convert number system and its complement	1.1. Digital signal, Digital systems-Positive and Negative Logic, Advantages, Disadvantages and Applications of Digital Systems. 1.2. Number system: Binary Number System, Signed Binary Number, Octal Number system, Hexadecimal Number system, Hexadecimal Number System, Binary Arithmetic. 1.3. 1's Complement & 2's Complement 1.4. Codes: BCD, EBCDIC, ASCII Codes, Gay Codes, Excess 3 Code
Unit -II **Logic Gate & Boolean Algebra**	2a. List and explain working of Logic Gates 2b. Solve Boolean algebra 2c. Define and solve various Boolean theorems	2.1. Working principles and Truth of AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR Gates 2.2. Boolean Algebra : Basic Boolean Operations, Laws of Boolean Algebra, De-Morgan's Theorems 2.3. Boolean Forms- Canonical OR Standard Form.

Unit III: **Boolean Expression Implementation**	3.a. Design and simplify expression using K-map for 2 variables. 3.b. Design and simplify expression using K-map for 3 variables. 3.c. Implementation and simplification. 3.d. Define Don't Care Condition.	3.1. Standard Representation for Logic Functions like Sum of product (SOP) & Product of Sum (POS) 3.2. K-map representation of logical functions minimization using 2, 3 & 4 Variables. 3.3. Minimization of Logic Functions Specified and not specified in interms /Maxterms or Truth Table, Don't Care Condition.
Unit IV: **Combinational Logic**	4.a. Design half adder, full adder, half Subtractor &full Subtractor 4.b. Convert BCD code to Excess 3 Code. 4.c. Implement Decimal to BCD encoder and BCD to Decimal decoder.	4.1. Realization of Half Adder & Full Adder. 4.2. Realization of Half Subtractor & Full Subtractor. 4.3. Code Conversion- BCD to Excess 3 Code Conversion 4.4. Encoder, Decimal to BCD encoder, Decoder, BCD-to- Decimal decoder.
Unit V: **Combinational Logic using LSI & MSI Circuit**	5.a. Design 4:1 Multiplexer with its logical expression and block diagram. 5.b. Design 1:8 Demultiplexer with its truth table and block diagram.	5.1. Multiplexer – Block diagram, Truth table, Logical expression and logic diagram of Multiplexers (2:1, 4:1, 8:1and 16:1), Multiplexer Tree. 5.2. Demultiplexer – Block diagram, Truth table, Logical expression and logic diagram of Demultiplexer (1:2, 1:4, 1:8and 1:16), Demultiplexer Tree.
Unit VI: **Introduction to Sequential Logic Circuit**	6.a. Differentiate Sequential & Combinational Logic Circuit. 6.b. Define 1-bit memory cell. 6.c. Define Flip flop. 6.d. Explain Working of any type of Flip flop	6.1. Introduction to Sequential Logic Circuit – Difference between combinational and sequential circuit. 6.2. Introduction to 1-bit memory cell and flip flop. 6.3. Introduction, truth table & Logic Diagram of: SR Flip flop, Clocked S-R Flip Flop with Preset & Clear, J-K Flip flop, Race around Condition in JK Flip flop, Master Slave J-K Flip flop, D Type Flip flop, T Type Flip flop.

6.   SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	R level	U Level	A Level	TOTAL
			Distribution Of Theory Marks			
I	Introduction to Digital Principles	08	02	04	06	12
II	Logic Gate & Boolean Algebra	07	04	04	04	12
III	Boolean Expression Implementation	09	04	04	06	14
IV	Combinational Logic	07	04	06	04	14
V	Combinational Logic using LSI & MSI Circuit	08	04	04	04	12
VI	Introduction to Sequential Logic Circuit	09	06	06	04	16
	Total	**48**	**24**	**28**	**28**	**80**

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

7.   LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Convert given Number system to another (HEX, OCTAL, DECIMAL, BINARY)	01
2	1	Calculate 2's and 1's Complements	01
3	2	To study and verify truth table of basic logic gates.	02
4	2	Realize OR, AND, NOT, EX-OR & EX-NOR using Universal gates.	04
5	2	Verification of Demorgan's theorem.	02

6	3	Simplify and design Boolean expression using basic logic gates	02
7	3	Simplify and design Boolean expression using Universal gates	02
8	3	Simplify the Boolean expression using Boolean algebra and verify.	02
9	4	Realize Decoder and Encoder circuit	02
10	4	Realize Decimal to BCD encoder & BCD to Decimal decoder.	02
11	4	Design and implement Half Adder and full adder circuit.	02
12	4	Design and implement Half Subtractor and full Subtractor circuit	02
13	4	Design & Realization of BCD to Excess 3 conversion.	02
14	5	Verification of Truth Table of 4:1 multiplexer & 1:4 demultiplexer	02
15	6	Build/Test function of S-R Flip flop.	02
16	6	Build/Test function of Master/Slave J-K Flip flop.	02
Total			**32**

8.   SUGGESTED STUDENTS ACTIVITIES

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

Following is the list of proposed student activities like:

1. Prepare journals based on practical performed in laboratory.
2. Observation of given Digital logic kit
3. Prepare charts of symbols of given Digital Circuit.
4. List and observe ICs for given Digital Circuit.
5. Students may be asked to make a list of following items used in Combinational Logic and Sequential logic Circuits.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

1. Guide students in preparing charts and display boards.
2. Use online tutorials to guide students in searching information regarding Digital Electronics.
3. Demonstrate practical thoroughly before the students perform.
4. Show Flash/Video/Animation clippings for given Logic Circuits.
5. Observe continuously and monitor the performance of students in lab.
6. Assign different types of Mini-projects
7. Show simulation to analyze working of given Logic Circuits

10. SUGGESTED LEARNING RESOURCE

S. No.	Name of Book	Author	Publication
1.	Mano M. Morris	Digital logic and Computer Design	Pearson publication, Latest Edition ISBN: 81-203-0417-9
2.	Malvino & Leach	Digital Principles and Applications	Tata McGraw Hill, New
3.	R P Jain	Modern Digital Electronics	Tata McGraw Hill, New
4.	Thomas L. Floyd	Digital Fundamentals	Pearson Education, ISBN:9788131734483

11. **LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED** :

S. No.	Name of equipment	Brief specification
1.	Binary to Decimal Converter & Decimal to Binary Converter	As per Electronics industry specification
2.	Binary to Gray code Converter & Gray to Binary code Converter	As per Electronics industry specification
3.	BCD to Seven Segment Decoder (Common Cathode Display)	As per Electronics industry specification
4.	Basic Logic Gates using Diode & Transistor	As per Electronics industry specification
5.	AND, OR, NOT Gate Characteristics kit	As per Electronics industry specification
6.	OR,NOR,EX-OR Gate Characteristics kit	As per Electronics industry specification
7.	De-Morgan's Theorem kit	As per Electronics industry specification
8.	NAND & NOR as Universal Gate	As per Electronics industry specification
9.	Multiplexer / De-multiplexer using Gates	As per Electronics industry specification
10.	Half & Full Adder & Half & Full Sub tractor	As per Electronics industry specification

12. **LEARNING WEBSITE & SOFTWARE**

   a.   http://www.asic-world.com/digital/tutorial.html
   b.   http://electrical4u.com/
   c.   http://www.electronics-tutorials.ws
   d.   http://www.vlab.co.in/http://www.electrical4u.com/jfet-or-junction-field-effect-transistor

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

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identification and conversion of number system.	3	3	1	1	-	-	-	-	-	-	-	-
2	Select appropriate gates and theorem to solve Boolean algebra.	3	1	2	1	-	-	-	-	-	-	-	-
3	Apply K-map to simplify Boolean expression.	3	-	-	-	-	-	-	-	-	-	-	-
4	Design digital combinational circuit including arithmetic circuit (half adder, full adder)	3	2	2	-	-	-	-	-	-	-	-	-
5	Design digital combinational circuit using multiplexer & demultiplexer.	3	3	3	3	-	-	-	-	-	-	-	-
6	Compare and contrast combinational & sequential circuit.	-	1	1	1	-	-	-	-	-	-	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Pawan Lahoti	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad
2	Prajakta Sadafule	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE   **Python Programming**

COURSE CODE   **6N201**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	Third Semester

1.   RATIONALE

Python is an easy to learn, powerful, interpreted, object-oriented, high-level programming language. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop the following

Competencies: "**Develop general purpose programming using python**"

3.   TEACHING AND EXAMNATION SCHEM

Teaching Scheme (Hours/ credit)			Total Creadits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	**T**	**P**	**C**	**ESE**	**PT**	**ESE(PR)**	**PA(TW)**	
1	**-**	**4**	**5**	**00**	**00**	**#50**	**50**	**100**
Duration of Examination				**--**	**--**	**2 Hrs**	**--**	

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

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

1. To acquire basic programming skills in core Python.
2. To acquire Object Oriented Skills in Python.
3. To develop the skill of designing Graphical user Interfaces in Python.
4. To develop the ability to write database applications in Python

5. DETAILED COURSE CONTENTS

Unit		Topics And Sub-Topics
UNIT-1: Introduction to Python	1.a Basics of Python 1.b Data Types in Python 1.c Operators and Expression	1.1 Installing Python, Simple program using Python. Python - interpreter and Interactive mode. 1.2 Python Identifiers - Reserved Keywords – Variables, Comments in Python. 1.3 Data types in python, 1.4 Operators in python, 1.5 Statement and Expression , Control statement, - Boolean Expressions. 1.6 Arrays in python, 1.7 String and Character in python, String Operations, String functions and methods, string slicing, immutable property, string Traversal, Escape Characters, string formatting operators 1.8 Lists – Creation of List, values and accessing elements, mutable property, Traversing a List, copying the list, altering values, deleting elements from list. Built-in List operators and built-in methods. Illustrative Programs 1.9 Dictionaries: dictionary functions, tuples.
Unit 2: Functions, Modules, Packages	2.a Decision making statement 2.b Control Statement 2.c Functions Built-in Function User define function	2.1 Built-in Functions - Composition of Functions - User Defined Functions – 2.2 Parameters and Arguments - Function Calls - The return Statement – 2.3 Python Recursive Function - The Anonymous Functions - Writing Python Scripts. **2.4 Modules**: Importing module, Creating & exploring modules, Math module, Random module, Time module **2.5 Packages:** Importing package, creating package
Unit 3: Files and Exception Handling	3.a Basic of File handling 3.b Directory methods 3.c Handling Exception	**3.1 Files:** Text files, opening a file, closing a file, reading from a file and writing into a file, file opening modes, closing a file, 3.2 File Object Attributes, File positions, renaming, deleting a file and files related methods. Directory: Directory methods – mkdir(), chdir(), getcwd(), rmdir(). 3.3 Exceptions in Python: Definition - Built-in exceptions 3.4Handling Exceptions-try…except, except with No Exception, except with Multiple Exceptions, try…finally; 3.5 User defined exceptions. Illustrative programs
Unit 4: Object Oriented Programming in Python:	4.a Baiscs of Object oriented programming 4.b class objects 4.c inheritance	4.1 Classes and Objects: Overview of OOP (Object-Oriented Programming)- 4.2 Class Definitions Creating Objects-Objects as Arguments - Objects as Return Values – 4.3 Built-in Class Attributes – 4.4 Inheritance – 4.5Method Overloading.

Unit – 5 GUI programming using tkinter and SQLite database	5a. Import tkinter module to create window 5b Design GUI application using different widgets. 5c. Design GUI application using database connection	5.1 The tkinter module 5.2 Geometry Management: pack(),grid() and place() method 5.3 tkinter widgets(components/control) : button, canvas, checkbox, entry, frame, label, list box, menu, menu button, message, radio button, scrollbar, text , etc. 5.4 SQLite database: installation of sqlite database, sqlite3 module, create connection:sqlite3.connect(), create table, insert data, display and update data

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title of Unit	Teaching Hrs	Distribution of Theory Marks			
1	Introduction to Python	02	R	U	A	Total
2	Functions, Modules, Packages	02				
3	Files and Exception Handling	04				
4	OOP basics concept used in Python	04		Not Applicable		
5	GUI programming using tkinter and SQLite database	04				
	Total	**16**				

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

7. SUGGESTED EXERCISES/ PRACTICALS

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

Sr No	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	Exploring basics of python • Python Program to Check if a Number is Odd or Even • Python Program to Find the Largest Among Three Numbers	**4 Hr**
2	• Write a program in python to swap two variables without using temporary variable. • Python Program to Calculate the Area of a circle, rectangle, square & triangle.	**2 Hr**
3	• Python Program to Take the Temperature in Celsius and Covert it to Fahrenheit	**2 Hr**
4	Array • Python Program to find sum of array	**2 Hr**

	• Python Program to find largest element in an array	
5	List • Python program to interchange first and last elements in a list • Python program to swap two elements in a list • Python program to find length of list	**2 Hr**
6	Tuple: • Python program to Find the size of a Tuple • Adding Tuple to List and vice – versa	**2 Hr**
7	Write a Python program to compute following operations on String: • To display word with the longest length • To determines the frequency of occurrence of particular character in the string	**4 Hr**
8	Write a python program to find the sum of all items in a dictionary	**2 Hr**
9	Write a program to make a simple calculator (using functions).	**2 Hr**
10	In second year computer engineering class, group A student's play cricket, group B students play badminton and group C students play football. Write a Python program using functions to compute following: - a) List of students who play both cricket and badminton b) List of students who play either cricket or badminton but not both c) Number of students who play neither cricket nor badminton d) Number of students who play cricket and football but not badminton. (Note- While realizing the group, duplicate entries should be avoided, Do not use SET built-in functions)	**4 Hr**
11	Write a Python program to store marks scored in subject "Fundamental of Data Structure" by N students in the class. Write functions to compute following: a) The average score of class b) Highest score and lowest score of class c) Count of students who were absent for the test d) Display mark with highest frequency	**4 Hr**
12	Python Program to Find Factorial of Number Using Recursion	**4 Hr**
13	Exploring Files and directories • Python program to append data to existing file and then display the entire file	**4 Hr**
14	Python program to count number of lines, words and characters in a file	**2 Hr**
15	Python program to display file available in current directory	**2 Hr**
16	Develop programs to understand working of exception handling	**2 Hr**
17	Develop program for creating class and object • Write a python program to create Bank account class using Object-oriented techniques, demonstrate banking operation's	**2 Hr**
18	Execute a program on single inheritance	**2 Hr**
19	Execute a program on multiple inheritances	**2 Hr**
20	Creating GUI with python containing widgets such as labels, textbox, radio, checkboxes and custom dialog boxes.	**2 Hr**
21	Design a User Interface in Python. • Design GUI for login form	**2 Hr**
22	Design GUI application with database connectivity using SQLite	**2 Hr**

23	Write a python program to display next week date by using date time module.	**2 Hr**
24	Write a python program to represent complex numbers using class	**2 Hr**
25	Design a mini project using all concepts(maximum 2 group members)	**4 Hr**
		64 Hr

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

i. Prepare power point presentation showing relation between Python programming.

ii. Develop sample Application using Python.

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Demonstration

d. Seminars

e. Activity based learning

10. Text Books/Suggested References:

1. Introduction to Computing and Problem Solving using Python
2. Learning Python, 5th Edition, by Mark Lutz, O'Reilly Media, Inc., ISBN: 9781449355739
3. Programming in Python, R.S. Salaria, Khanna Book Publishing Co., Delhi.
4. Python Programming, Ashok Namdev Kamthane and Amit Ashok Kamthane, McGraw HillEducation(India) Pvt. Ltd.
5. Introduction to Computing and Problem Solving using Python, E.Balagurusamy, McGraw Hill Education(India) Pvt. Ltd.

11. List of Major Equipment/ Instrument with Broad Specifications

S. No.	Name of equipment	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	Python editor / IDE	Python editor 3.5 and above / IDE – pycharm/ Jupiter

12. List of Software/Learning Websites

Software: Wiindows 7 ,. Python 3.4.3

1 http://python.swaroopch.com/

2 Learn Basic of python programming Online**:**

 https://github.com/swaroopch/byte-of-   python /

1 Text books online

https:// www.**tutorials**point.com/**python/python_tutorial.pdf**

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	No. of hours allocated in curriculum
CO1	To acquire basic programming skills in core Python.	1	1	1	1	0	0	0	0	0	0	1	0	**02**
CO2	To acquire Functions, Modules, Packages	0	0	3	0	0	0	0	0	0	0	0	2	**02**
CO3	To acquire Files and Exception Handling	1	3	1	1	0	0	0	0	0	0	1	0	**04**
CO4	To acquire Object Oriented Skills in Python.	0	3	2	0	0	0	0	0	0	0	0	2	**04**
CO5	To develop the skill of designing Graphical user Interfaces in Python.To develop the ability to write database applications in Python	1	3	2	0	0	0	0	0	0	0	0	2	**04**

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Sr. No	Name of the faculty member	Designation and Institute
1	P S HIWALE	LECTURER CO
2	J P JOSHI	LECTURER IT

Member Secretary PBOS   Chairman PBOS

COURSE TITLE: DATA STRUCTURE (DS)

COURSE CODE: 6S207

Diploma programme in which course is offered	Semester in which course is offered
CO / IT / AN	Third / Fourth Semester

1. RATIONALE

Data structure is basic technology course for organizing and arranging data in given structure. Organizing or structuring data is important for implementation of efficient algorithms and program development. This course includes searching, sorting techniques and different algorithms to represent data. After learning this subject student will be able to identify the problem, analyse different algorithms to solve the problem & choose most appropriate data structure to store data and retrieve data.

2. LIST OF COMPETENCIES

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

"Develop C programs for arranging and manipulating data using given data structure."

3.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	**T**	**P**	**C**	**ESE**	**PT**	**ESE @ (PR)**	**PA**	
03	00	04	07	80	20	@25	25	150
Duration of the Examination (Hrs)				3	2	2	2	

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

4. COURSE OUTCOMES

1 Identify different data structures and operations on it.

2 Apply searching and sorting techniques on given problems.

3 Use the stack to evaluate given expressions.

4 Use Queue to store and manipulate data.

5 Develop the program for linked list.

6 Use tree and graph data structure to represent data.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
UNIT-I **Introduction to Data Structure**	1a Identify the approaches for designing the effective algorithms. 1b Identify operations on data structure. 1c Design and implement programs using arrays	1.1 Concept & Need of Data Structure, Abstract data Type, Types of data structure: Linear and nonlinear. 1.2 Time and space complexity. 1.3 Operations on data structure- Creation, traversing, insertion, deletion, merging, searching, sorting. 1.4 Arrays and its physical allocation: One dimensional and 2-D array and operations on them like Creation, Insertion, Deletion and Display.
UNIT-II **Sorting, searching and Hashing techniques.**	2a Identify and apply sorting techniques for sorting the data. 2b Identify and apply searching techniques for searching 2c Identify and apply various hashing techniques	2.1 Sorting Techniques (Concept, Example & algorithm): Bubble sort, Selection sort and Insertion sort. (Concept & Example) Merge sort, quick sort, Radix sort. 2.2 Searching Techniques: Linear search, Binary search. 2.3 Hashing Techniques: Hash functions- Division method, mid square method.

UNIT-III **Stack**	3a	Develop an algorithm for PUSH and POP operations.	3.1 Definition of stack, Stack as an ADT.
	3b	Evaluate various Expressions based on stack.	3.2 Array representations of stack 3.3 PUSH and POP operations on stack, Stack Underflow & Overflow.
	3c	Identify the areas where stack is applicable.	3.4 Applications of stack. 3.5 Expression Conversion: Infix to Prefix & Infix to Postfix. Evaluation of postfix & prefix Expression.
UNIT-IV **Queue**	4a	Implement queue with various operations on queue.	4.1 Define queue and its terms, Queue as an ADT 4.2 Array representation of Queue, Operations on Queue, Queue Overflow & Underflow.
	4b	Select appropriate queue for given problem.	4.3 Limitation of Single Queue. 4.4 Types of queue (Introductory approach only): Circular Queue, priority queue, double ended queue. 4.5 Applications of queue
UNIT-V **Linked List**	5a	Write algorithms for to insertion deletion at beginning, middle and end of list.	5.1 Define linked list and its terminologies. 5.2 Linked List representation using structure and array. 5.3 Operations on linked list: insertion and deletion at Beginning, middle and end of list. Count number of nodes in list.
	5b	Identify types of linked list.	5.4 Limitations of singly linked list. 5.5Concept of circular linked list and doubly linked list 5.6 Representation of Stack using Linked list.

UNIT-VI **Trees and Graphs**	6a	Identify types of tree.	6.1	Definition and terminologies in tree: root, leaf node, level, depth, degree, path and sibling.
	6b	Implement various tree manipulations algorithms.	6.2	Types of Tree: Binary tree, complete binary tree and full binary tree. Binary search tree: insertion and deletion of a node in binary search tree, Expression Tree.
	6c	Prepare adjacency matrices and adjacency list	6.3	Tree traversal: in-order, pre-order, post-order.
	6d	Find the Spanning tree using Kruskal algorithm.	6.4	Graph: Definition and its terminologies, Representation of Graph: adjacency matrices and adjacency list, spanning tree using Kruskal Algorithm.

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R	U	A	Total
I	Introduction to data structure	06	4	2	2	08
II	Sorting, searching and Hashing techniques.	09	4	4	8	16
III	Stack	09	4	4	6	14
IV	Queue	06	4	6	2	12
V	Linked List	08	4	6	4	14
VI	Trees and Graph	10	2	6	8	16
Total		**48**	**21**	**29**	**30**	**80**

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

7.   SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS
    (Practicals should implemented using C programming)

Sr.no.	Unit No.	Practical Exercises	Total Hrs.
1	1	Prepare chart for types of data structure and their operations	04
2		Write program for implementing operations on array like creating, inserting & deleting.	04
3		Write program for creating and displaying 2D array	02
4	2	Write program for bubble sort and insertion sort to sort given array list.	04
5		Write program for selection sort.	02
6		Write program for to search a particular item in array using Linear search.	02
7		Write program for to search a particular item in array using Binary search.	04
8	3	Write program for implementing PUSH & POP Operation of stack.	04
9		Write program to convert infix to postfix expression	04
10		Write program to convert infix to prefix expression	02
11	4	Write program for implementing Queue operations	04
12		Write program for implementing circular Queue.	04
13	5	Write program for adding and deleting data at the end of the linked list.	04
14		Write program for adding and deleting data at the beginning of the linked list.	04
15		Write program for adding and deleting data at the middle of the linked list.	04
16		Write program for counting number of nodes in Linked List	04
17	6	Write program for constructing Binary Search Tree and tree traversal (Inorder, Preorder & Postorder)	06
18		Solve problem for given graph for designing spanning tree.	02
		Total	**64**

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

1. Students will prepare chart/poster for given topics

2. Prepare presentation and deliver seminar on various topics covered like sorting, searching, stack, linked list, queue, tree

3. Students are expected to develop minimum one program of particular topic as an example to exhibit real life application.

4. Design and implement program for stack using linked list.

5. Design and implement program for queue using liked list

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Demonstration

d. Seminars

e. Activity based learning

10. SUGGESTED LEARNING RESOURCES

List of Books

Sr.No	Author	Title of Books	Publication
1	Yashwant Kanetkar	Data Structure using C	BPB Publications
2	Aaron M. Tenenbaum	Data Structures Using C	BPB Publications
3	Ellis Horowitz, Anderson-Freed, Sahni	Fundamentals Of Data Structures in C	Universities of Press

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S. No.	Name of equipment	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	C compiler	Turboc3.4 and above versions

12. LIST OF LEARNING WEBSITES

1. 'C' Programming Language: http://www.w3schools.in/cprogramming-language/intro/
2. Learn DS Online**:** http://www.learndsonline.com/

3. **'DS'** Frequently Asked Questions**:** http://www.ds-faq.com

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

Sr.No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Implement the algorithms of different data structure.	-	1	1	-	-	-	-	-	-	-	2	2
CO2	Apply searching and sorting techniques on problems.	-	-	3	3	-	-	-	-	-	-	2	2
CO3	Evaluate the stack expressions.	-	1	1	1	-	-	-	-	-	-	2	2
CO4	Develop the program for Queue.	-	-	2	3	-	-	-	-	-	-	2	2
CO5	Develop the program for linked list.	-	-	3	3	-	-	-	-	-	-	2	2
CO6	Construct the tree structure and graph structure.	-	2	2	3	-	-	-	-	-	-	2	2

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Mrs. R.S. Sindge	Lecturer In Information Technology
2	Mrs V.B.Kundlikar	Lecturer In Information Technology
3	Mr. P B Lahoti	Lecturer In Computer Engineering

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE	Data Story Telling and Visualization
COURSE CODE	6N407

Diploma Programme in which this course is offered	Semester in which offered
AN	Third Semester

1   RATIONALE

This course will cover basics of Data Story Telling and Data Visualization and also covers the constructing data stories, extracting meaningful data and representing data for effective visualization. This course gives better visualization to transfer the information to audiences. This course will enable the students to inculcate the concept of Data Story Telling and methodology / techniques to create various visual effects.

2   COMPETENCY

At the end of studying this course students will be able to:
"Construct Data Storytelling and create various effects for better visualization of Data"

3   COURSE OUTCOMES

Students will be able to:

1.   Prepare visual effects of data story telling.
2.   Eliminate clutter and focus audience attention.
3.   Prepare data storytelling according to the designer's view.
4.   Construct/Build data storytelling.
5.   Convert Data onto Aesthetics.
6.   Create data visualization- Distributions, Proportions, Uncertainty.

4   TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PT	ESE	PA	
03	00	02	05	80	20	@50	25	175
Exam Duration				03 Hrs.	01 Hr.	75		

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

5   COURSE DETAILS: -

Unit	Major Learning Outcomes (in cognitive domains)	Topics and Sub-topics
Unit-I Visual effects of Data Story Telling	a Understand the Importance of Context b Differentiate between exploratory vs. explanatory analysis c Explain audience d Describe 3- minutes story e Present storyboarding f Choose a better effective visual effect of data storytelling.	1.1 Importance of Context 1.2 Exploratory vs. explanatory analysis 1.3 Who - Your audience, You, What - Action, Mechanism, Tone, How, Example 1.4 The 3 minutes' story, Big Idea, Storyboarding. 1.5 Visual effects of Data Storytelling- Choosing an effective visual- Simple text, Tables, Graphs, Points, Lines, Bars- Vertical bar charts, Horizontal bar chart.
Unit-II Focus audience's Attention by eliminating clutter.	a Explain Cluster is our enemy b Define cognitive load c Explain Gestalt principles of visual perception d Explain Decluttering steps e Describe Preattentive attributes in text, graphs, page.	2.1 Cluster is our enemy- Cognitive load, Cluster 2.2 Gestalt principles of visual perception, Lack of visual order. 2.3 Decluttering: step-by-step 2.4 Focus audience's Attention- Preattentive attributes signal where to look 2.5 Preattentive attributes in text. 2.6 Preattentive attributes in graphs 2.7 Size, Color, Position on page.
Unit-III Storytelling from designers view	a Define Affordances, Accessibility, Aesthetics and Acceptance b Explain dissecting model visuals c Understand the magic of story d Explain the tactics to prepare data stories. e Explain power of repetition	3.1 Think like a Designers- Affordances 3.2 Accessibility 3.3 Aesthetics 3.4 Acceptance 3.5 Dissecting model visuals- line graphs, annotated line graph with forecast 3.6 Lessons in storytelling- The magic of story 3.7 Constructing the story 3.8 The narrative structure 3.9 The power of repetition 3.10 Tactics to help ensure that your story is clear
Unit-IV Pulling it all together for data storytelling	a Collect data altogether for data story telling b Present data storytelling c Explain various case studies for data storytelling	4.1 Pulling it all together for data storytelling- Understand the context, choose an appropriate display, eliminate clutter, draw attention where you want it, think like a designer, tell a story. 4.2 Case studies- Color considerations with a dark background, Leveraging animation in the visuals you present, Logic in order. 4.3 Final Thoughts - where to go from here, Building storytelling with data competency in your team or organization.
Unit-V Visualization Part- I	a Define data visualization b Visualize data onto aesthetics c Describe coordinate systems and axes.	5.1 From Data to Visualization- Introduction, Visualizing Data: Mapping Data onto Aesthetics. 5.2 Coordinate Systems and Axes

	d Explain Directory of visualizations. e Describe Visualizing Multiple Distributions f Define Highly skewed Distributions	5.3 Directory of Visualizations- 5.4 Visualizing Amounts- Bar Plots, Grouped and Stacked Bars, 5.5 Visualizing Distributions- Visualizing Multiple Distributions- Visualizing a Single Distribution, Visualizing Multiple Distributions at the same Time, Empirical Cumulative Distribution Functions, Highly skewed Distributions, Quantile- Quantile Plots.
Unit-VI Visualization Part-II	a Explain Visualize many distributions at once. b Visualize distributions along the axes. c Explain Proportions. d Explain visualizing trends. e Describe Visualizing Uncertainty f Balance the Data and the context	6.1 Visualizing Many Distributions at Once 6.2 Visualizing Distributions Along the Vertical Axis, Visualizing Distributions Along the Horizontal Axis. 6.3 Visualizing Proportions- A case for pie charts. 6.4 Visualizing Trends - Smoothing Showing Trends with a Defined Functional Form, Detrending and Times-Series Decomposition 6.5 Visualizing Uncertainty- Framing Probabilities as Frequencies, Visualizing the Uncertainty of Point Estimates. 6.6 Balance the Data and the context- Providing the appropriate amount of context.

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Visual effects of Data Story Telling	06	02	04	04	10
2	Focus audience's Attention by eliminating clutter.	08	04	04	06	14
3	Storytelling from designers view	08	04	04	06	14
4	Pulling it all together for data storytelling	06	02	04	06	12
5	Visualization Part-I	10	02	04	08	14
6	Visualization Part-II	10	04	04	08	16
	TOTAL	48	18	24	38	80

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

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

7 SUGGESTED EXERCISES/PRACTICAL/TUTORIAL

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

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

Sr. No.	Practical Exercises (Learning Outcomes to be achieved through practicals)	Unit No.	Approx.Hrs. Required
1.	To create a Three minutes story , Big idea and story boarding for given problem.	1	2
2.	By choosing an effective visual draw Three different visuals for given data.	1	2
3.	Remove clutter from the graph and redesign the given graph.	2	2
4.	Make a data story on Future Trends in Artificial Intelligence and Machine Learning in India.	1,2	2
5.	Create a data story in with respect to following observations: a. What are the most popular restaurants across the city for Food Order App? b. How does the average foods order vary across different age groups, locations, festivals and over time? c. Which age group order the most foods? d. Do factors like weather and festivals impact the average food order ?	1,2	2
6.	Create a video (up to 5 minutes) telling your story- (focus your audience's attention). You might want to record a video of yourself speaking, or narrate while showing visual props or sketches, or screencast a PowerPoint presentation etc (eliminate clutter, Select suitable pre attentive attributes). You get to choose how you present the story. You should produce a single video file (formatted as a .mov file)- think like a designer- affordances, accessibility and aesthetics.	1,2,3	2
7.	Identify a problem you are working on where you need to communicate in a data driven way. Reflect upon and write the answers of the following questions. 1) WHO IS YOUR AUDIENCE? a. List the primary groups or individuals to whom you'll be communicating. b. If you had to narrow that to a single person, who would that be? c. What does your audience care about? What action does your audience need to take ?	1,2,3	2
8.	Implement Color considerations with a dark background, Logic in order – to display information HTML/ Python.	4	2
9	Implement a python program that loads any dataset and plot.	5	2

10.	Implement python program that perform data cleaning on any dataset	5	2
11.	Implement a python program that performs data pre-processing, analysis and visualization.	5	2
12.	Apply data analysis using python for available data set. (Apply Supervised machine learning algorithm.)	5	2
13.	Implement a python program to apply Image Processing functions like display, plot and color by using sklearn or other libraries.	5	2
14.	Connecting to a Database and extracting data from database table in Python.	5	2
15	Develop a worksheet, add filters and create chart using a dataset in Python.	6	2
16	Develop the Different basic/ Advanced Graphical Shapes using HTML5 CANVAS/Python.	6	2

8. SUGGESTED STUDENT ACTIVITIES

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

a.   Prepare journals based on practicals performed in the laboratory.
b.   Library/E-Book survey regarding Python programming used in Computer industries.
c.   Prepare a powerpoint presentation for showing different types of Python Programming Applications.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1.	Storytelling with data - a data visualization guide for business professionals.	Cole Nussbaumer Knaflic	Wiley India Pvt.Ltd. ISBN: 978-1-119-00225-3
2.	Fundamentals of Data Visualization	Clause O. Wilke	O'Reilly Media, Inc. ISBN: 9781492031086
3.	Fundamentals of PYTHON	Kenneth A Lambert, B.L.Juneja	CENGAGE Learning, ISBN: 978-81-315-2903-4

11 Major Equipment/ Instrument with Broad Specifications

Sr. No.	Equipment Name with Broad Specifications	Expt. S. No.
1.	Hardware: Personal computer, (i3-i5 preferable), RAM minimum 2GB onwards.	For all Experiments
2.	Operating System: Windows 7 onwards	
3.	Software: Python	

12. Software/Learning Websites

a. https://nptel.ac.in/courses/106106182
b. https://careerfoundary.com/en/tutorials/data-analytics-for-beginners/storytelling-with-data/
c. https://blog.hubspot.com/marketing/great-data-visualization-examples

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	Visual effects of Data Story Telling	1	1	0	0	0	0	0	0	0	0	-	-	-
CO2	Focus audience's Attention by eliminating clutter.	3	1	1	-	-	-	-	-	1	-	-	-	1
CO3	Storytelling from designers view	1	1	1	-	-	1	-	-	-	-	-	-	-
CO4	Pulling it all together for data storytelling	3	2	1	-	-	1	-	-	-	-	-	1	-
CO5	Visualization Part-I	1	1	-	-	2	-	-	-	-	-	-	1	-
CO6	Visualization Part-II	1	3	-	-	-	-	-	-	-	-	-	-	-

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Sr. No	Name of the faculty member	Designation and Institute
1	J.P. JOSHI	LECTURER IT
2	P S HIWALE	LECTURER CO

Member Secretary PBOS   Chairman PBOS

COURSE TITLE-   **RELATIONAL DATABASE MANAGEMENT SYSTEM**
COURSE CODE   **6S401**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering & Information Technology	Third

1. RATIONALE

Relational Database Management System is applied level course aims to design and manipulate database. Database system plays a vital role to manage huge volume of data for commercial applications. This course includes data models, SQL commands, techniques, normalization concepts and queries performance.

2. COMPETENCY

Students will be able to

"Design, develop and manage databases for applications using Structured Query Language (SQL) in ORACLE."

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	
3	-	4	07	80	20	#25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

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

4. COURSE OUTCOMES

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

1. Select/Explore database management concepts and its applications.
2. Design relational data model using given Constraints.
3. Perform SQL queries and execute PL/SQL block.
4. Design database applying normalization rules.
5. Design Entity –Relation model.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Database Management Concepts	1a. Applications of database system 1b. Objective of database system 1c. Level of data 1d. Explain database languages 1e. List of database users and administrator 1f. Describe database architecture	1.1 Database system application 1.2 Purpose of Database systems 1.3 View of data 1.4 Database languages 1.5 Database design 1.6 Database users and administrators 1.7 Database architecture

Unit - II
Relational Model and Integrity Constraints
	2a Describe structure of relational database
	2b Concept of database schemas
	2c Types of keys
	2d Explain relational query languages and relational operations
	2e Types of Constraints on relational model
		2.1 Structure of relational databases
		2.2 Database schemas
		2.3 Keys
		2.4 Relational query languages
		2.5 Relational operations
		2.6 Relational model constraints
		    2.6.1 Domain entity constraints
		    2.6.2 On delete cascade
		    2.6.3 NOT NULL

Unit - III Introduction to SQL	3a. Overview of SQL query language and its data definition 3b. Explain structure of SQL queries 3c. Queries of modifying database 3d. Queries to execute set operations	3.1 SQL query language 3.2 SQL data definition 3.3 Basic structure of SQL queries 3.4 Modification of database 3.5 Additional basic operations 3.6 Set operations 3.7 Null values 3.8 Aggregate functions 3.9 String , Date and Time functions

	3e. Queries to execute aggregate functions 3f. Queries to execute string , date and time functions 3g. Introduction to PL/ SQL	3.10 PL/SQL introduction : control structures, cursors, triggers, functions, packages, procedures, error handling
Unit - IV Relational database design	4a. List features of good relational design 4b. Types of normal forms 4c. Differentiate between 3NF and BCNF 4d. Describe decomposition techniques using functional dependencies	4.1 Features of good relational designs 4.2 Atomic domains and First normal form 4.3 More normal forms 4.4 Comparison of 3NF and BCNF 4.5 Decomposition using functional dependencies 4.6 Decomposition using multivalued dependencies
Unit - V Entity relationship model	5a. Overview of E-R model 5b. Constraints 5c. Design E-R diagram 5d. E-R design issues 5e. Features of extended E-R	5.1 The entity relationship model 5.2 Constraints 5.3 Removing redundant attributes in entity sets 5.4 Entity relationship diagrams 5.5 Entity relationship design issues 5.6 Extended E-R features

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Database Management Concepts	08	5	5	4	14
2	Relational Model and Integrity Constraints	08	5	5	4	14
3	Introduction to SQL	12	4	6	8	18
4	Relational database design	10	6	6	6	18
5	Entity relationship model	10	5	5	6	16
	Total	48	25	27	28	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	03	Execute SQL query to create table and insert 10 records. 1. Execute DDL queries. 2. Execute DML queries. 3. Execute DCL queries. 4. Execute TCL queries.	04
2	03	Execute SQL queries for views and index	04
3	03	Execute SQL queries for 1. Date functions with all formats. 2. Time functions with all-time formats. 3.Conversion function	04
4	03	Execute SQL queries for all aggregate functions.	02
5	03	Execute SQL queries for all numeric functions.	04
6	05	Execute SQL queries for character/String functions.	04
7	03	Execute SQL queries to use operators. 1. Arithmetic 2. Relational 3.Comparison 4.Logical	04
8	03	Execute SQL queries using Group by, Having and Order by clause	04
9	03	Execute SQL queries to show the record in the table (Using 1.Like 2. Between 3.In 4.Any 5.All etc.)	04
10	03	Execute SQL queries using Set operators	02
11	03	Execute SQL queries using join operation.	04
12	03	Execute SQL queries to retrieve data from multiple tables using sub/correlated queries.	04
13	03	Execute PL/SQL block to find the greatest number amongst 3 numbers	02
14	03	Execute PL/SQL block to find Factorial of a number using FOR and WHILE	02
15	03	Execute PL/SQL block for error handling 1.Pre-defined 2.User defined	04
16	03	Execute PL/SQL block for cursors 1.Explicit 2.Implicit	04
17	03	Execute PL/SQL block for triggers 1.After and Before insert 2. After and Before delete	04

18	03	Execute PL/SQL block for Packages	04
		Total	64

8.   SUGGESTED STUDENTS ACTIVITIES

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

a. Creating database which can perform insert, update, and delete operations.
b. Design a model for any real time database system.
c. Draw an E-R diagram for any database system.
d. Design relational database at different levels of normalized form.
e. Mini project: Create any database system i.e. Hostel reservation, Air ticket reservation, Student database system etc.

9.   SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Designing real time entity relationship model.

d. Guiding students for designing real time database system.

e. Observe students and monitor the performance of students.

f. Activity based learning.

g. Assign mini projects.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Database system concepts	Henry Korth	MGH
2.	SQL / PL-SQL	Ivan Bayross	BPB
3	An Introduction to Database Systems	C. J. Date	Pearson Education
4	Oracle – The complete reference	Oracle Press	TMH

11. **LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED** :

   Hardware: Desktop Computer P-IV processor or higher
   Software: Microsoft 2003 /any higher version , Oracle, SQL Server, MySQL

12. **LEARNING WEBSITE & SOFTWARE**

   a. Ms-Access Tutorial : http://www.quackit.com/microsoft_access/tutorial/
   b. SQL Basic Concepts: http://www.w3schools.com/sql/
   c. SQL Tutorial : http://beginner-sql-tutorial.com/sql.htm
   d. DBMS:http://nptel.iitm.ac.in/video.php?subjectId=106106093

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

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Select/Explore database management concepts and its applications.	–	३	–	–	–	–	–	–	–	–	१	–
2	Design relational data model using given Constraints.	–	३	२	२	–	–	–	–	–	–	–	–
3	Perform SQL queries and execute PL/SQL block.	–	३	–	३	–	–	–	–	–	२	२	–
4	Design database applying normalization rules.	–	३	३	३	–	–	–	–	–	२	–	–
5	Design Entity –Relation model.	–	३	२	२	–	–	–	–	–	–	–	–

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Prachi P. Deshpande	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE   **MATHEMATICS FOR MACHINE LEARNING**

COURSE CODE   **6N404**

Diploma Programme in which this course is offered	Semester in which offered
AN	Third Semester

1) RATIONALE

This course is included in curriculum as Mathematics is foundation for AI and ML. This course is deals with the knowledge of probability, statistics and matrix. It aims to equip the student to deals with advance level of mathematics and its application.

2 COMPETENCY

At the end of studying this course student will be able to "to solve statistics and probability based problem."

3 COURSE OUTCOMES

Students will be able to

1. Apply the concept of probability theorem to real life problems.
2. Use probability distribution to solve engineering related problems.
3. Solve the given problem based on statistics.
4. Apply the statistics method to solve given problems.
5. Solve engineering related problems using concept of eigen value and eigen vector.

4 TEACHING AND EXAMINATION SCHEME

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

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

5   COURSE DETAILS

Unit	Major learning Outcome	Topic-sub-topic
Unit I Basic Probability (06 Hours)	a. Define permutation and combination, factorial notation. b. Define probability. c. State addition theorem of probability. d. Find probability using addition theorem of probability e. Find probability using multiplication theorem of probability.	1.1sets, Sub set, Null set, Intersection, Complement of set. 1.2 Permutation and combination, factorial notation. 1.3 Definition of Random experiments, sample space, simple event, 1.4 Probability of occurrence of an event, complement of an event, Theorem on probabilities on complementary events. 1.5 Definition of compound events – sum of two events, product of two events, addition theorem of probability, mutually exclusive events, conditional events, conditional probability, independent and dependent events, multiplication theorem of probability
Unit II Probability Distribution (06 Hours)	a Solve the given problem using Binomial Distribution. b Solve the given problem using Poisson Distribution. c Solve the given problem using Normal Distribution.	2.1 Binomial Distribution. 2.2 Poisson Distribution. 2.3 Normal Distribution.
Unit III Statistical Techniques (10 Hours)	a. Solve the problem base on frequency distribution. b. Calculate Harmonic, Geometric, combine mean for row data. c. Find Coefficient of skewness for the given data.	3.1 Definition basic term, classification of types of data. 3.2 Measure of central tendency – concept of quartile, deciles, percentiles. Harmonic, Geometric, combine mean 3.3 Skewness for the given data – types of skewness, test of skewness, measure of skewness, Karl-Person's method of skewness, Types of skewness in terms of mean and mode, Bowley's coefficient of skewness, measure of kurtosis.
Unit IV Statistical Methods (16 Hours)	a. Fit straight line and parabolic curve using least square methods. b. Calculate coefficient of correlation using Karl Person's and Spearman's rank method.	4.1 Method of least square – Fitting of straight line $(y = ax + b)$, Fitting of parabola $(y = a + bx + cx^2)$ 4.2 Correlation – correlation, types of correlation, Karl Person's and Spearman's rank method to calculate coefficient of correlation.

	c. Obtain the equation to the line of regression.	4.3 Line of Regression and equation to line of regression.
Unit V Eigen Values and Eigen vector (10 Hours)	a. Define various types of matrices. b. Perform all algebraic operations on matrices. c. Solve simultaneous equations in two and three variables d. Define rank, Eigen values. e. Solve examples using Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical	5.1 Inverse and rank of a matrix, rank-nullity theorem; 5.2 System of linear equations; 5.3 Symmetric, skew symmetric and orthogonal matrices; 5.4 Eigenvalues and eigenvectors; 5.5 Diagonalization of matrices; Cayley Hamilton Theorem, Orthogonal transformation and quadratic to canonical form.

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

Unit No.	Unit Title	Teaching Hours	R Level	U Level	A Level	Total Marks
1	Basic Probability.	06	04	06	04	14
2	Probability Distribution.	06	02	04	10	16
3	Statistical Techniques.	10	04	06	8	18
4	Statistical Methods	16	02	04	08	14
5	Eigen Values and Eigen vector	10	02	06	10	18
	TOTAL	**48**	**14**	**26**	**40**	**80**

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

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

7 SUGGESTED EXERCISES/PRACTICAL/TUTORIAL

1) The tutorial/practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills so that students are able to acquire the competencies.

2) Form a batch of 20 students and at least 10 problems should be given to get necessary exercise.

Sr. No.	Title/Topic	Exercises/Tutorial	Approx. hours
1	Basic Probability.	Problems on permutation and combination	02
		Problems on addition theorem of probability, conditional probability, independent and dependent events, multiplication theorem of probability	02
2	Probability Distribution.	Problems on binomial, Poisson and Normal Distribution	03
3	Statistical Techniques.	Problems on quartile, deciles, percentiles. Harmonic, Geometric, combine mean	01
		Problems on skewness, Karl-Person's method, Bowley's coefficient of skewness, measure of kurtosis.	02
4	Statistical Methods	Problems on curve fitting.	01
		Problems on co-relations.	01
		Problems on line of regression	01
5	Eigen Values and Eigen vector	Examples related Eigen Values and Eigen vector, Diagonalization of matrices, canonical form.	03

8. SUGGESTED STUDENT ACTIVITIES

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

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Higher Engineering mathematics	B.S.Grawal	Khanna Publication.
2	Statistical And Quantitative methods	Ranjeet Chitale	Nirali Publication.

11 Major Equipment/ Instrument with Broad Specifications

Sr.NO.	Name of the Equipment	Specification
	NA	

12. Software/Learning Websites

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS01	PSO2	PSO3
CO1	Apply the concept of probability theorem to real life problems.	3	1	0	0	0	0	2	0	0	0	-	-	-
CO2	Use probability distribution to solve engineering related problems.	3	1		-	-	-	2	-	-	-	-	-	-
CO3	Solve the given problem based on statistics.	2	1	1	-	-	-	1	-	-	-	-	-	-
CO4	Apply the statistics method to solve given problems.	1	2	1	-	-	-	2	-	-	-	-	-	-
CO5	Solve engineering related problems using concept of eigen value and eigen vector.	1	2	1	-	-	-	2	-	-	-	-	-	-

13. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Sr. No	Name of the faculty member	Designation and Institute
1	Ms. S.G.Jirewar	Lecturer in Mathematics, Government Polytechnic Aurangabad

Member Secretary PBOS   Chairman PBOS   Co-coordinator
                                                                                    science and Humanities

COURSE TITLE-   Object Oriented Programming using Java (OOPJ)

COURSE CODE   6N202

Diploma programme in which course is offered	Semester in which course is offered
AN	IV

1. RATIONALE

Java programming is applied level course which enhances and refines the object oriented paradigm. Java is rapidly becoming the dominant application development language and system programming language. Java being platform independent language and open source software is used to develop business & mobile applications. This course includes OOP concept, multithreading, java database connectivity and applet programming.

2. LIST OF COMPETENCY

At the end of studying this course student will be able to-
"Develop Java program for solving real world problems."

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PT	ESE (PR)	PA	
03	00	04	07	80	20	@25	25	150
Duration of the Examination (Hrs)				3	1	2	--	

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

4. COURSE OUTCOMES

1.   Identify Basic Java programing Language.

2.   Apply OOP concepts to Problem.

3.   Use Array, String and Vectors in java.

4.   Use interfaces and packages.

5.   Develop multithreaded program and handle runtime exception.

6.   Use connection between database and java program.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
Unit –I Introduction to Java	1a Explain the features of Java. 1b Write simple java program. 1c Write java programs using different operators. 1d Use decision making and looping statement in given programs. 1e Explain literal and comments.	1.1 Rules & Structure of JAVA, java features, 1.2 Variable and data types, declaring variables, variables assigning, literal, number literal, Boolean, literal, expression, comments. 1.3 Operators: - Arithmetic operator, Relational operator, Logical operator, Assignment operator, Increment & Decrement operator, operator precedence 1.4 Decision making statement: if statement, if-else statement, Switch statement. Loop statement: for loops, do while loops, while loops. Breaking out of loops.
Unit –II Object - Oriented Programming Concepts	2a Basic concept of Object-Oriented Programming 2b Create class and object for given application. 2c Explain types of constructor with example 2d Demonstrate method overloading in program. 2e Explain importance of Inheritance.	2.1 Define Objects and Classes and the relationship between them 2.2 Basics of OOP: Abstraction, Inheritance, Encapsulation, Polymorphism 2.3 Declare and Define classes, define member function of a class. Create instance/object of class. 2.4 Constructor and their types, , constructor overloading, this keyword. 2.5 Object as function arguments, Method overloading. 2.6 Inheritance: Need of inheritance, creating subclasses, types: single inheritance, multilevel inheritance, hierarchical inheritance. Use of super keywords.
Unit-III Arrays, String and Vectors	3a Creating an Array 3b Use various string functions in program. 3c Use wrapper classes in java.	3.1 Arrays: declaring array variable, creating One Dimensional Arrays and Two Dimensional Arrays. Accessing array elements. 3.2 Strings class. String Methods: string length, concatenation, comparison. 3.3 Vectors, Wrapper classes: Number: Double, Float, Byte, Short, Integer, Long

		3.4 Command line arguments, garbage collector.
Unit-IV **Interfaces and** **Packages**	4a. Demonstrate multiple inheritance using interface. 4b. Make use of built in packages in java. 4c. Describe Packages with example	4.1 Method overriding, final keyword, finalize method, abstract method & class. 4.2 Interface: Defining interface, extending interface, implementing interface, accessing interface variable. 4.3 Package: introduction to build in packages. 4.4 Creating user defined packages, accessing packages, adding class to a package, putting classes together. 4.5 Creating package within a package.
Unit-V **Exception handling and Multithreading**	5aIdentify exceptions occurred in a program. 5bDetect exception and manage that exception in a given application. 5cDevelop a threads for given program	5.1 Types of error, exception. 5.2 Exception handling mechanism using try-catch statements, throws exception. User defined exception. 5.3 Thread, thread life cycle. 5.3 Creating thread: by extending thread class and implementing runnable class. 5.4 Stopping & blocking a thread, thread exception. 5.5 Thread priority, synchronization.
Unit-VI **I/O Basics and JDBC**	6a. Identify the role of input stream and output stream. 6b. Use character byte stream classes for writing and reading data. 6c. Identify components of JDBC. 6d. Design a code to connect to database using java.sql. Connection. 6e. Develop an application to read and write data from and to database using statement and result set classes.	6.1 I/O stream classes: Input stream classes, Output stream classes, Byte stream classes, and Character stream classes. 6.2 Other I/O stream classes: random access file, stream tokenizer. 6.3 Introduction to JDBC: JDBC Architecture, Common JDBC Components. JDBC Driver types. 6.4 java.sql, Connection, Statement, and Result set, SqlException

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R	U	A	Total
1	Introduction to Java	8	3	5	4	12
2	Object -Oriented Programming Concepts	8	3	5	4	12
3	Arrays, String and Vectors	8	4	4	6	14
4	Interfaces and Packages	8	4	4	6	14
5	Exception handling and Multithreading	10	4	4	8	16
6	I/O Basics and JDBC	6	4	4	4	12
	Total	**48**	**22**	**26**	**32**	**80**

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

7.   SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

Sr.No	Unit No.	Practical/Exercises	App. Hours Required
1	1	Install JDK for java.	2
2		Write a simple java program compilation, executing using java compiler and interpreter	2
3		Implement programs using Arithmetic operators for given problem.	2
4		Implement programs using Relational operators.	2
5		Implement programs using Logical operators.	2
6		Write a program to determine the largest of three given numbers using Nesting if…. else statement.	2
7		Write a program using switch case statement.	2
8		Write a program to find factorial of 5 using for loop.	2
9		Write a program to reverse the digits of number using while loop.	2
10	2	Write Program To Create Instance & Class Variable and member function for given problem	2
11		Implement program for method overloading.	2
12		Implement program for constructor overloading.	2
13		Write a java program to demonstrate use of Command Line Argument	2
14		Write a java program to implement single level inheritance	2
15		Write a java program to implement multilevel inheritance	2
16	3	Demonstrate program using 1D array for given problem.	2

17		Demonstrate program using 2D array for given problem .	2
18		Write a java program to demonstrate string functions, vector data type.	2
19		Demonstrate a program for use of wrapper classes in given problem.	4
20	4	Write Program for multiple inheritance using interface	4
21		Write Program to use built in packages in given problem and write a program for creating user defined packages.	4
22	5	Write a java program for implementing multithreading using both methods	4
23		Write a java program to implement concept of Exceptional handling	4
24	6	Implement program for writing data from keyboard using I/O stream classes	4
25		1. Write a program to select data from database and display selected data. 2. Write a program to insert data in database and display inserted data.	4
		Total	**64**

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

1. Install different versions of JDKs

2. Install IDE for java such as Net beans, eclipse.

3. Install any one database (My SQL, SQL server, Oracle)

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Demonstration

d. Seminars

e. Activity based learning

10. SUGGESTED LEARNING RESOURCES

Sr. N	Author	Title	Publisher
01	Patrick Naughton, Herbert Schildt	Complete reference for java	Tata McGraw Hill
02	E. Balaguruswami.	Programming with java	BPB
03	Keyur Shah	Java2 Programming	Tata McGraw Hill
04	John R.Hubbard	Programming with Java	Tata McGraw Hill

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment/Software	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	JDKs or IDEs	jdk1.7 or higher version, NetBeans, Eclipse

12. LIST OF SOFTWARE / LEARNING WEBSITES

    a. **To Learn Java Programming**

        https://docs.oracle.com/javase/tutorial

    b. **JDBC Database Access**

        https://www.tutorialspoint.com/jdbc/index.htm

        https://www.tutorialspoint.com/jdbc/jdbc_tutorial.pdf

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

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Introduction to Java	-	3	3	-	-	-	-	-	-	-	-	-
CO2	Object-Oriented Programming Concepts	-	3	3	-	-	-	-	-	-	-	-	-
CO3	Arrays, String and Vectors	-	3	3	1	-	-	-	-	-	-	1	-
CO4	Interfaces and Packages	-	2	2	2	-	-	-	-	-	-	-	-
CO5	Exception handling and Multithreading	-	3	3	2	-	-	-	-	-	-	-	-
CO6	I/O Basics and JDBC	-	2	2	2	-	-	-	-	-	-	2	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	P S Hiwale	Lecturer In Computer Engineering
2	D S Sonwane	Head and Lecturer In Information Technology

    (Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE: Microprocessor

COURSE CODE: 6N301

Diploma programme in which course is offered	Semester in which course is offered
AN	IV

1. RATIONALE

A microprocessor is brain of computer where 8086 is the base of all upward developed processors till current processors. This course will cover the basics of 8086 and its architecture along with the instruction set, and assembly language programming with effective use of procedure and macros. This course also covers architectural issues such as instruction set programs and data types. On top of that, the students are also introduced to the increasingly important area of parallel organization.

2. LIST OF COMPETENCIES

At the end of studying this course student will be able to-
"Develop code, debug, test and execute various assembly language programs using 8086 instructions set."

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PT	ESE @ (PR)	TW	
03	00	02	05	80	20	@25	25	150
Duration of the Examination (Hrs)				3	1	2	-	

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

4. COURSE OUTCOMES

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented so that the student demonstrated the following industry-oriented COs associated with the above-mentioned competency:
1. Identify the functional block of the 8086 microprocessor.
2. Understand assembly language programming tools..
3. Execute instructions for different addressing modes.
4. Illustrate an assembly language program using an assembler.
5. Compare procedure and macros.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
UNIT-I Introduction to Microprocessor.	1.a Describe function of the given pin of 8086. 1.b Explain with sketches the working of a given unit in 8086 microprocessors. 1.c State functions of the given registers of 8086 microprocessors. 1.d Calculate the physical address for the given segmentation of the 8086 microprocessor.	1.1: Organization of microprocessor-based system, memory, input and output 1.2: Types of Buses 1.3: Features of an 8-bit microprocessor. 1.4: 8086 Microprocessor: Salient features, Pin descriptions. 1.5: Architecture of 8086: Functional Block diagram, Register organization. 1.6: Concept of pipelining. 1.7: Memory segmentation, physical memory address generation
UNIT-II The Art of Assembly Language Programming	2.a Describe the given steps of program development/execution. 2.b Write steps to develop a code for the given problem using assembly language programming. 2.c Use the relevant commands of a debugger to correct the specified programming error. 2.d Describe the function of the given assembler directives with an example.	2.1 Program development steps: Defining problems and constraints, Writing Algorithms, flowcharts, Initialization checklist, choosing instructions, and converting algorithms to assembly language programs. 2.2 Assembly Language Programming Tools: Editors, Assembler, Linker, Debugger. 2.3 Assembler directives.
UNIT-III Instruction Set of 8086 Microprocessor.	3a Determine the length of the given instruction. 3b Describe the given addressing modes with examples. 3c Explain the operation performed by the given instruction during its execution. 3d Identify the addressing modes in the given instructions.	3.1 Machine Language Instruction format. 3.2 Addressing modes. 3.3 Instruction set, Groups of Instructions: Arithmetic instructions, Logical Instructions, Data Transfer instructions, Bit manipulation instructions, String Operation instructions, Program control transfer or brunching instructions, Process control instructions.
UNIT-IV Assembly Language Programming.	4.a Use the given model of assembly-language programs for the given problem. 4.b Develop the relevant program for the given problem. 4.c Apply relevant control	4.1 Model of 8086 assembly language programs. 4.2 Programs using assembler: Arithmetic operations on Hex and BCD numbers, Sum of series, smallest and largest numbers from an array, Sorting numbers in Ascending and descending order,

	loops in the program for the given problem. 4.d Use string instructions for the given strings/block to manipulate its elements.	finding ODD, EVEN, Positive and Negative numbers in the array, Block transfer, String operations – Length, Reverse, Compare, Concatenation, Copy, and Count numbers of '1' and '0' in a 16-bit number.
UNIT V Procedure and Macros	5a. Apply the relevant 'parameter-passing' method in the given situation. 5b. Compare procedures and macros on the basis of the given parameters.	5.1 Procedure: Defining and calling Procedures – PROC, ENDP, FAR and NEAR directives; CALL and RET instructions; Parameter passing methods. 5.2 Macro: Defining Macros, MACRO and ENDM Directives, Macro with parameters.

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R	U	A	Total
I	Introduction to Microprocessor.	08	6	6	4	16
II	The Art of Assembly Language Programming	10	6	6	4	116
III	Instruction Set of 8086 Microprocessor.	10	4	8	4	16
IV	Assembly Language Programming.	10	4	8	8	20
V	Procedure and Macros	10	4	4	4	12
	Total	48	24	32	24	80

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

7. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

Sr.no.	Unit No.	Practical Exercises	Total Hrs.
1	I	Identify various pins of the given microprocessor	02
2	I	Use Assembly Language Programming Tools and functions.	02
3	III	Use different addressing mode instructions in the program a) Write an Assembly Language Program (ALP) to add two given 8 and 16-bit numbers. b) Write an Assembly Language Program (ALP) to subtract two given 8 and 16-bit numbers.	02
4	III	a) Write an ALP to multiply two given 8 and 16-bit unsigned numbers.	02

		b) Write an ALP to multiply two given 8 and 16-bit signed numbers.	
5	III	Write an ALP to perform block transfer data.	02
6	III	Write an ALP to compare two strings.	
7	III	a) Write an ALP to divide two unsigned numbers. b) Write an ALP to divide two signed numbers.	02
8	IV	Write an ALP to add, subtract, multiply, divide two BCD numbers.	02
9	IV	Implement loop in assembly language program a) Write an ALP to find the sum of a series of Hexadecimal numbers. b) Write an ALP to find the sum of a series of BCD numbers.	02
10	IV	a) Write an ALP to find the smallest number from array of n numbers. b) Write an ALP to find largest number from array of n numbers.	02
11	IV	a) Write an ALP to arrange numbers in an array in ascending order. b) Write an ALP to arrange numbers in an array in descending order.	02
12	IV	a) Write an ALP to arrange a string in reverse order. b) Write an ALP to find string length. c) Write an ALP to concatenate two strings.	02
13	IV	a) Write an ALP to check whether a given number is ODD or EVEN. b) Write an ALP to count ODD and/or EVEN numbers in an array.	02
14	IV	a) Write an ALP to check a given number is POSITIVE or NEGATIVE. b) Write an ALP to count POSITIVE and/or NEGATIVE numbers in an array.	02
15	IV	a) Write an ALP to count the number of '1's in a given number. b) Write an ALP to count the number of '0's in a given number.	02
16	V	An assembly language program using procedures. a) Write an ALP for addition, subtraction, multiplication and division. b) Write an ALP using procedure to solve equations such as: Z = (A+B) * (C+D).	02
17	V	Write an assembly language program using macros. a) Write an ALP for addition, subtraction, multiplication and division. b) Write an ALP using MACRO to solve equations such as: Z = (A+B) * (C+D)	02
			32

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

1. Students will prepare chart/poster for given topics

2. Develop programs related to unit wise topics in the computer laboratory

3. Multimedia presentation of module developed by the student

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

1. The subject requires both theory and practical emphasis simultaneously so that the student can understand the practical significance of the various application areas.

2. Students are assigned to prepare various comparative charts for register and counters

3. Students should be given enough exposure to a variety of simulation software also should be given to students

10. SUGGESTED LEARNING RESOURCES

List of Books

Sr.No	Author	Title of Books	Publication
1	Douglous V. Hall	Microprocessor & interfacing (programming & hardware) Revised Second Edition	Tata-McGraw Hill
2	Triebal, Walter A., Singh, Avtar	The 8088 and 8086 Microprocessors	Pearson Publication, New Delhi (India)
3	Latha, C., Murugeshwari, B	Microprocessors and Microcontrollers	SCITECH Publications, Chennai.

11. LIST OF MAJOR EQUIPMENT AND MATERIALS REQUIRED:

S. No.	Name of equipment	Broad Specifications
1	Hardware	Personal computer, (i3-i5 preferable), RAM minimum 2 GB onwards
2	Operating system	Windows XP/ Windows 7 onwards
3	Software	Editor: EDIT, NOTEPAD Assembler: TASM/MASM Linker: TLINK/LINK Debugger: TD/Debug of Windows Operating System

12. LIST OF LEARNING WEBSITES

1. Microprocessor 8086 architecture- Tutorialspoint :Link
https://www.tutorialspoint.com/microprocessor/microprocessor_8086_architecture.htm
2. Intel 8086 Wikipedia
https://en.wikipedia.org/wiki/Intel_8086

3. GNUSim8086 Download
https://gnusim8086.github.io/download

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

Sr.No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Identify the functional block of the 8086 microprocessor.	1	2	-	-	-	-	-	1	-	-	2	-
CO2	Understand assembly language programming tools..	3	3	-	-	1	-	-	-	-	-	1	-
CO3	Execute instructions for different addressing modes.	-	3	-	1	-	-	-	-	-	-	1	-
CO4	Illustrate an assembly language program using an assembler.	1	3	1	-	-	-	-	-	-	-	-	-
CO5	Compare procedure and macros.	2	2	3	-	-	-	-	-	-	-	1	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Mr A. S. Giri	Sr. Lecturer in Electronics and Telecommunication
2	Mrs M.S. Rajule	Lecturer in Electronics and Telecommunication

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   Web Programming with Python
COURSE CODE   6N401

PROGRAMME & SEMESTER

Diploma programme in which course is offered	Semester in which course is offered
AN	IV

1. RATIONALE

The main elements key to this are its frameworks, micro-frameworks, and libraries. This course, students will learn about the most advanced Web-app development environments with immense exposure on practicality. The course is designed for an aspiring developer to enrich the knowledge of different Web based Python Frameworks. The course has been designed in such a way that a candidate can handle both the Frontend and Back-end development processes. MySQL is also covered to connect our application with the Database.

2. COMPETENCY

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

" Develop Web Program using Python Framework to Solve Web Problems"

3. TEACHING AND EXAMINATION SCHEME

Teaching scheme (In hours)			Total credits (L+T+P)	Examination scheme				
				Theory Marks		Practical marks		Total Marks
L	T	P	C	ESE	PA	ESE (PR)	PA	
00	00	04	04	00	00	#50	75	125
Duration of the Examination (Hrs)				--	--	2	--	

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

4. **COURSE OUTCOMES:**
   1. Use the basic entities of python in programming.
   2. Use python data structures, function, modules, and packages in programming.
   3. Develop programs to show use Django view and Django templates.
   4. Develop models, forms, CRUD application using Django.
   5. Building website using python and flask.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
Unit –I Introduction and Syntax of Python Program	1a. Identify the given Variables, Keywords and constants in Python 1b. Use indentation, comments in the given program. 1c. Install the given Python IDE and editor. 1 d. Develop the python program to display the given text..	1.1 Features of Python — Interactive, Object — oriented, Interpreted, platform independent 1.2 Python building blocks — Identifiers, Keywords, Indention, Variables, Comments 1.3 Python environment setup — Installation and working of IDE 1.4 Running Simple Python scripts to display 'welcome' message. 1.5 Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of datasets.
Unit –II Python Functions, modules, and Packages	2a. Use the Python standard functions for the given problem. 2b. Develop relevant user defined functions for the given problem using Python code 2c. Write Python module for the given problem 2d. Write Python package for the given problem	2.1 Use of Python built — in functions (e.g. type/ data conversion functions, math functions etc.) 2.2 User defined functions: Function definition, Function calling, function arguments and parameter passing, Return statement, Scope of Variables: Global variable and Local Variable. 2.3 Modules: Writing modules, importing modules, importing objects from modules, Python built — in modules (e.g. Numeric and mathematical module, Functional Programming Module) Namespace and Scoping.
Unit –III Introduction to Django	3a. Introduction on Django, Django Project & server configuration 3b. File Upload, Database connectivity 3c. View, Template, URL Mapping, Static file Handling	3.1 Introduction on Django, install the Django framework and its dependencies. 3.2 Django project& server configuration. 3.3 Django Template: Django templates that represents the HTML GUI

Unit-IV **Model Form,** **Django Form,** **Form** **Validation**	4a File Upload, Database connectivity. 4b Creating CURD application in Django. 4c Develop given program to show use of session and cookies.	4.1 Django models, model relationships, quering models & connecting to MySql database 4.2 File upload, Database connectivity 4.3 Creating CRUD application in Django 4.4 Django Middleware, Session & cookies
Unit-V **Introduction to** **Flask**	6a. Build website using flask flask or Django. 6b. Describe process to deploy website using PaaS.	5.1 Introduction to Flask using python packages, web framework. 5.2 Building a basic dynamic site. 5.3 Deploying website using a platform as a service(PaaS).

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

Unit No.	Unit Title	Teaching Hours/ Practical Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction and Syntax of Python Program					
II	Python Operators and Control Flow statements: Data Structures in Python					
III	Python Functions, modules, and Packages		**Not Applicable**			
IV	Introduction to Django					
V	Model Form, Django Form, Form Validation					
VI	Introduction to Flask					

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

7. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

Sr.no.	Units	Practical Exercises	Hours
1	1	Install python editor or IDE. a) Running instructions in Interactive interpreter and a Python Script	02
2		b) Write a program to purposefully raise Indentation Error and Correct it	02

3		c) Develop &execute programs using while and do-while statement and for loop statement.	02
4	2	a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)	02
5		b) Write a program in Python to demonstrate following operations • a) Simple inheritance b) Multiple inheritance	02
6		c) Develop &execute programs on each function, module and packages.	02
7		d) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.	02
8	3	a) Write a Program for checking whether the given number is even number or not.	02
9		b) Write a program using a for loop that loops over a sequence. What is sequence?	02
10		Write a program in Python to demonstrate following operations: c) Method overloading d) Method overriding	04
11	4	a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure	02
12		b) Write a program combine lists that combines these lists into a dictionary	02
13		c) Write Python program to demonstrate string built — in functions	02
14	5	a) Develop and execute a program to create a Django view.	04
15		b) Develop and execute program to show use of database connection and internet service using python.	04
16		Develop and execute program on Django CRUD on create, retrieve.	04
17		Develop and execute program on Django CRUD on delete update.	04
18	6	Develop and execute a program to create a Django Template.	04
19		Develop and execute a program to create a Django template.	04
20		Develop and execute CRUD application using Django.	04
21		Develop and execute a program to create a Django form.	04
22		Build a dynamic website using flask and deploy it.	04
			64

8.   SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

1. Prepare power point presentation showing relation between python programming

2. Develop sample application using python.
3. Developing dynamic website using flask.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

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

10. SUGGESTED LEARNING RESOURCES
List of Books

Sr.No	Title of Books	Auther	Publication
1	Python Crash Course: A Hands-on, Project-Based Introduction to programming	Eric Matthes	Nostarch Press
2	Learning Python	Mark Lutz	O'Reilly
3	Head-First Python	Paul Barry	O'Reilly
4	Django for APIs: Build web APIs with Python & Django	William Vincent	Paperback
5	Learn Web Development with Python : Get hands-on with Python Programming and Django web development	Febrizio Romano	packt
6	Build your First Website with Python and Django.	Nigel George	Gnw Independent

11. LIST OF MAJOR EQUIPMENT/ SOFTWARE

S. No.	Name of equipment/Software
1	Computer (Dual Core or above)
2	Network printer.
3	Python Interpreter

12. LIST OF SOFTWARE / LEARNING WEBSITES

a) https://www.tutorialspoint.com/python/index.htm
b) nptel.ac.in/courses/117106113/34
c) https://www.w3schools.com/python/default.asp

d) https://www.programiz.com/python-programming
e) http://spoken-tutorial.org/
f) https://docs.python.org/3/tutorial/errors.html
g) https://www.w3resource.com/python-exercises/

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

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Use the basic entities of python in programming.	-	3	-	3	-	-	-	-	-	-	-	-
CO2	Use python data structures, function, modules, and packages in programming.	-	3	3	3	-	-	-	-	-	-	-	3
CO3	Develop programs to show use Django view and Django templates.	-	3	3	3	-	-	-	-	-	-	3	-
CO4	Develop models, forms, CRUD application using Django.	-	3	3	3	-	-	-	-	-	-	3	3
C05	Building website using python and flask.	-	3	3	3	-	-	-	-	-	-	-	3

Course Curriculum Design Committee-

Sr No	Name of the faculty members	Designation and Institute
1	Mr. J.P. Joshi	Lecturer In IT
2	Mr. P.S. Hiwale	Lecturer In CO

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE :   **OPERATING SYSTEMS**

COURSE CODE :   **6N402**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	IV

1. RATIONALE:

Operating system is the applied level course that makes a computer system operational so as to manage computer resources and to control users and software. This course obtains requisite knowledge about operating system concepts, it drives all the hardware parts of the computer and is the first piece of software to run on the machine when the system boots. Students will learn process concept, CPU scheduling, Memory Management, Storage Management.

2. COMPETENCY:

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

"Install, configure and Manage Operating Systems (Linux/Windows)"

3. TEACHING AND EXAMNATION SCHEME:

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

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

4. COURSE OUTCOMES:

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

1. Identify structure and component of different operating system.
2. Use of process and thread for inter-process communication.
3. Apply different algorithm for scheduling and deadlock avoidance.
4. Apply paging and segmentation for memory management.
5. Distinguish between various file access and allocation methods.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Operating System Concepts	1a. Identify operating system for given application. 1b. Compare operating systems. 1c. Arrange system components for given system. 1d. Identify architecture for given operating system. 1d. Use system calls.	1.1 Operating System- Evolution, Generation 1st, 2nd, 3rd. 1.2 Different Types of Operating system, Multi Programmed, Multitasking, Time shared OS, Multiprocessor System, Distributed Systems, Cluster Systems, and Real time Systems. 1.3 System components- main memory, file management, Input-output Management, Secondary storage management. 1.4 Simple structure, Layered, Monolithic, Microkernel. 1.5 System calls- uses, process control, file management, device management.
Unit – II Processes and Thread	2a. Modify process state using system calls. 2b. Compare schedulers. 2c. Synchronize process using semaphores. 2d. Select Thread model for given application.	2.1 The process model, process state, process control block, context switch. 2.2 Process scheduling- Scheduling Queues, Schedulers. 2.3 Interprocess communication- Introduction, shared memory system & message passing system, critical section problem, semaphores. 2.4 Threads- Benefits, users and kernel threads, Multithreading Models- Many to One, One to One, Many to Many.
Unit - III CPU Scheduling and Deadlocks	3a. Separate CPU and IO burst statements from given program. 3b. Compare scheduling algorithm. 3c. Arrange processes to avoid deadlocks.	3.1 Scheduling & its types- Objectives, concept, CPU and IO burst cycles, Pre-emptive, Non Pre-emptive scheduling, Scheduling criteria. 3.2 Types of scheduling algorithms- First come first served(FCFS), Shortest Job First (SJF), Shortest Remaining Time(SRTN), Round Robin (RR), Priority scheduling, multilevel queue scheduling. 3.3 Deadlock- System Models, Necessary conditions leading to Deadlocks, Deadlock Handling- Preventions, avoidance, Banker's algorithm.
Unit - IV Memory Management	4a. Utilize main memory. 4b. Compare paging and segmentation. 4c. Calculate page fault for	4.1 Main Memory: Background 4.2 Swapping, Contiguous Memory Allocation 4.3 Paging, Structure of the Page Table. 4.4 Segmentation

	given problem. 4d. Identify free space management techniques.	4.5 Virtual Memory: Background, Demand Paging, Copy on Write, Page Replacement algorithm, - LRU, FIFO, Optimal, Allocation of frames, Thrashing. 4.5 Partitioning, Fixed and Variable, Free space management Techniques- Bitmap, Linked List.
Unit - V Storage Management and Unix/Linux Operating System.	5a. Compare Unix and Linux Operating System 5b. Identify file system structure. 5c. Identify structure of Unix/Linux Operating system.	5.1 File system Interface- File concept, Access Methods, Directory and Disk structure, File System Mounting, File sharing, Protection. 5.2 File system Implementation: File system structure, File system implementation, Directory implementation, Allocation Methods, Free space Management, Efficiency and performance, Recovery. 5.3 Structure of Unix/Linux Operating system.Inodes,directory, Superblock.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Operating System Concepts	12	4	4	4	12
II	Processes and Thread	10	4	8	4	16
III	CPU Scheduling and Deadlocks	8	4	8	8	20
IV	Memory Management	6	8	4	4	16
V	Storage Management and Unix/Linux Operating System.	12	8	4	4	16
	Total	48	28	28	24	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS :

Sr.No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Installation of Linux Operating System-Fedora/Ubuntu/Centos	4
2	II	Execute program to create process in Linux using fork ( ) System calls.	2
3	II	Execute program to create thread in Linux using pthread library.	4
4	II	Execute program to understand multithreading.	2

5	III	Execute program to understand IO burst and CPU burst processes.	2
6	III	Execute program for FCFS Algorithm in C.	2
7	III	Execute program for SJF and RR Algorithm in C.	2
8	III	Execute program for Banker's Algorithm in C.	2
9	IV	Execute program for Memory Allocation method in C.	2
10	IV	Execute following command to display system memory information- free, cat /proc/meminfo, vmstat, top, htop,atop, pagesize, df -g.	2
11	IV	Execute program to understand disk allocation method in C.	4
12	IV	Modify and execute GRUB configuration files.	2
13	IV	Execute C program to modify inodes of given file.	2
14	IV	Execution of various file & directory handling commands.	2
15	IV	Execution of simple C and C++ programs using CC and GCC compiler.	2
16	IV	Create, mount & resize partition on disk.	2
17	IV	Write a shell script program calculate average of five numbers.	2
18	IV	Write a shell script program input-output statements and loops	4
19	IV	Write a shell script program using array & case statement	4
20	V	Implement Linux Commands to Inspect inodes and Files	2
21	V	Perform File Management Commands in LINUX	2
22	V	Implement methods of Killing Processes in LINUX -Process Termination,	4
23	V	Execute process management command in Linux/Unix.	4
24	V	Execute memory management commands in Linux/Unix.	4
		TOTAL	**64**

8. SUGGESTED STUDENTS ACTIVITIES:

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

SR.NO.	ACTIVITY
1	For Real time system suggests appropriate Operating System.
2	For Latest Mobile System suggest appropriate Operating System.
3	Collect Operating System specification for educational institutes.
4	Prepare List of System call for given situations in System Software.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES:

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

    a. Improved Lecture methods-

    b. Q & A technique.

    c. Demonstration.

    d. Activity based learning.

    f. Use of video, animation films to explain concepts, facts and applications of Operating System.

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Operating System Concepts	Silberschatz, Peter B. Galvin and Greg Gagne	WileyIndian Edition
2	LINUX with Operating System Concepts	Richard Fox	CRC Press
3	Modern Operating Systems	Andrew S Tanenbaum	Prentice Hall India
4	Principles of Operating Systems	Naresh chauhan	Oxford Press
5	Operating Systems	D.M. Dhamdhere	Tata McGraw Hill
6	Operating Systems- Internals and Design Principles	William Stallings	Prentice Hall India
7	UNIX Concepts and Applications	Sumitabha Das	Tata McGraw Hill.
8	Unix Shell Programming	Yashwant Kanetkar	BPB publications.

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr.No.	Name of equipment	Brief specification
1	Computer System	Computer System with latest configuration.
2	Linux	Fedora/Ubuntu/Centos.

12. LEARNING WEBSITE &SOFTWARE:

1. http://nptel.ac.in/courses/106108101/

2. https://onlinecourses.nptel.ac.in/noc17_cs29/preview

3. https://computer.howstuffworks.com/operating-system.htm

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

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identify structure and component of different operating system.	2	2	-	-	-	-	-	-	-	1	1	1
2	Use of process and thread for inter-process communication.	1	2	1	1	-	-	-	-	-	-	-	-
3	Apply different algorithm for scheduling and deadlock avoidance.	1	2	2	-	-	-	-	-	-	2	-	-
4	Apply paging and segmentation for memory management.	-	1	1	-	-	-	-	-	-	-	-	-
5	Distinguish between various file access and allocation methods.	-	1	2	-	-	-	-	-	-	-	-	-

Course Curriculum Design Committee:

Sr No	Name of the faculty members	Designation and Institute
1	D S Sonwane	Head and Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	J. P. Joshi	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE :   ARTIFICIAL INTELLIGENCE

COURSE CODE :   6N403

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	IV

1. RATIONALE:

Artificial Intelligence has grown to be very popular in today's world. The amount of data that is generated, by both humans and machines, far outpaces humans' ability to absorb, interpret, and make complex decisions based on that data. Artificial intelligence forms the basis for all computer learning and is the future of all complex decision making. Computers are extremely efficient at calculating these combinations and permutations to arrive at the best decision. Artificial intelligence and its logical evolution of machine learning are the foundational future of business decision making.

2. COMPETENCY:

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

"Implement Artificial Intelligence Algorithm using Python"

3. TEACHING AND EXAMNATION SCHEME:

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

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

4. COURSE OUTCOMES:

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

1. Solve given Problem using Agents.
2. Implement State Space Search Techniques.
3. Implement Heuristic Search Techniques.
4. Use optimal Path for given Problem.
5. Apply planning Artificial Intelligence Problems.
6. Use Logic and Interferences.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Artificial Intelligence Concepts	1a. Explain Artificial Intelligence 1b. Write History of Artificial Intelligence 1c. Write Intelligent Agent 1d. Use Nature of Environments. 1e. Demonstrate Problem solving Agents.	1.1 Artificial Intelligence- Introduction- What is AI, The foundations of Artificial Intelligence, The History of Artificial Intelligence, advantages and disadvantages. 1.2 Intelligent Agents- Agents and Environments, Good Behavior: The concept of Rationality, 1.3 The Nature of Environments, The Structure of Agents, Types of Agent. 1.4 Problem solving Agents 1.5 Human vs Artificial Intelligence.
Unit – II State Space Search Techniques	2a. Basic concept well defined problem. 2b. Demonstrate simple search. 2c. Explain Depth First Search (DFS) Techniques. 2d. Write Comparison of BFS and DFS 2e. Explain Quality of solution.	State Space Search 2.1 Well-defined problems and solutions, Formulating Problems. 2.2. Generate and Test- A high level search algorithm. 2.3. Simple Search- Algorithm Simple Search, The Problem of Visibility in Search. 2.4. Depth First Search (DFS), Breadth First Search (BFS) 2.5 Comparison of BFS and DFS- Completeness, Time Complexity, Space Complexity. 2.6 Quality of Solution.
Unit - III Heuristic Search Techniques	3a. Write Heuristic Functions 3b. Explain Local Maxima 3c. Describe Solution of Space Search 3d. Explain Variable Neighbourhood Descent	Heuristic Search- 3.1 Heuristic Functions- 3.2 Best First Search, Hill Climbing 3.3 Local Maxima 3.4 Solution Space Search 3.5 Variable Neighbourhood Descent. 3.6 Beam Search and Tabu Search-Techniques
Unit - IV Finding Optimal Paths	4a. Demonstrate Brute Force, Branch & Bound 4b. Explain Refinement Search and Dijkstra's Algorithm 4c. Explain IDA*	Finding Optimal Paths- 4.1. Brute Force 4.2 .Branch & Bound 4.3 .Refinement Search, Dijkstra's Algorithm 4.4. Algorithm A*, Admissibility of A* 4.5. Iterative Deepening A* (IDA*)

Unit - V Planning	5a. Describe The STRIPS Domain in detail 5b. Illustrate Forward State Space Planning 5c. Explain Backwards State Space Planning and Goal Stack Planning	Planning 5.1.The STRIPS Domain 5.2. Forward State Space Planning 5.3 Backwards State Space Planning 5.4 Goal Stack Planning 5.5 Plan Space Planning- Means Ends Analysis, NOAH, Hierarchical Planning 5.6. A Unified Framework for Planning
Unit - VI Knowledge Based Resonating and Logic	6a. Explain Knowledge Based Reasoning 6b. Write Facets of Knowledge Logic and Inferences 6c. Explain logics and their types 6d. Demonstrate Resolution Method in Propositional Logic 6e. Illustrate First Order Logic- FOL Syntax, FOL Semantics, FOL Rules	Knowledge Based Reasoning 6.1. Agents 6.2. Facets of Knowledge Logic and Inferences 6.3. Formal Logic- Entailment, Soundness and Completeness 6.4 Propositional Logic- Propositional Logic Semantics, Validity, Satisfiability and Unsatisfiability. 6.5 Resolution Method in Propositional Logic 6.6 First Order Logic- FOL Syntax, FOL Semantics, FOL Rules, Forward Chaining in FOL.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Artificial Intelligence Concepts	08	4	4	4	12
II	State Space Search Techniques	10	4	4	4	12
III	Heuristic Search Techniques	10	4	4	4	12
IV	Finding Optimal Paths	10	4	4	4	12
V	Planning	12	4	8	4	16
VI	Knowledge Based Resonating and Logic	14	4	8	4	16
	Total	64	24	32	24	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS :

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Develop PEAS descriptions for given AI tasks.	4
2	I	Write a program to implement simple Chatbot.	2
3	II	Write a program to implement Breadth First Search using Python.	4
4	II	Write a program to implement Depth First Search using Python.	2
5	II	Write a program to solve Tic-Tac-Toe problem using Python.	2
6	II	Write a program to solve 8-Puzzle problem using Python	2
7	III	Write a program to solve Water-Jug problem using Python	2
8	III	Write a program to solve Travelling Salesman problem using Python	2
9	III	Write a program to solve Tower of Hanoi problem using Python.	2
10	IV	Write a program to solve Monkey Banana problem using Python.	2
11	IV	Write a program to solve Missionaries-Cannibals problem using Python.	4
12	V	Write a program to solve 4-Queens problem using Python.	2
13	V	Write a program to implement decision networks using Python	2
		TOTAL	**32**

8. SUGGESTED STUDENTS ACTIVITIES:

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

SR. NO.	ACTIVITY
1	For Real time Problem system suggests appropriate Planning.
2	For AI Problem suggest Algorithm.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES:

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

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

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Artificial Intelligence: A Modern Approach", Fourth Edition,	Stuart Russel and Peter Norvig,	Pearson Education, 2020.
2	Artificial Intelligence: Foundation of Computational Agents	D Poole and Amckworth	Cambridge University Press
3	Introduction to AI and ES	Dan W. Patterson	Pearson Education, 2007
4	Artificial Intelligence	Kevin Night, Elaine Rich, and Nair B.	McGraw Hill, 2008
5	Artificial Intelligence, Third edition	Patrick H. Winston,	Pearson Edition, 2006
6	Artificial Intelligence	Deepak Khemani,	Tata McGraw Hill Education, 2013

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

Sr. No.	Name of equipment	Brief specification
1	Computer System	Computer System with latest configuration.
2	Linux	Fedora/Ubuntu/Centos.

12. LEARNING WEBSITE & SOFTWARE:

1. http://nptel.ac.in/courses/
2. https://onlinecourses.nptel.ac.in/
3. https://computer.howstuffworks.com/artificial-intelligence.htm

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

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Solve given Problem using Agents.	2	2	-	-	-	-	-	-	-	1	1	1
2	Implement State Space Search Techniques.	1	2	1	1	-	-	-	-	-	-	-	-
3	Implement Heuristic Search Techniques.	1	2	2	-	-	-	-	-	-	2	-	-
4	Use optimal Path for given Problem.	-	1	1	-	-	-	-	-	-	-	-	-
5	Apply planning Artificial Intelligence Problems.	-	1	2	-	-	-	-	-	-	-	-	-
6	Use Logic and Interferences.	1	1	1	-	-	-	-	-	-	2	2	2

Course Curriculum Design Committee:

Sr No	Name of the faculty members	Designation and Institute
1	J P Joshi	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	P S Hiwale	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad

    (Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE :   OPEN SOURCE TECHNOLOGY LABORATORY(OSTL)

COURSE CODE :   6T403

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Information Technology/AN	IV

1. RATIONALE:

Open Source Technology Laboratory is an applied level course explores students towards use of open source software and its related technologies. As open source software allow to modify source code, it is easy to design and develop customize application. This course includes basic Linux Commands, shell scripting and AWK programming and configure LAMP server.

2. COMPETENCY:

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

"Develop web application with the help of open source software and technology."

3. TEACHING AND EXAMNATION SCHEME :

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	125
1	-	4	5	--	--	#50	75	
Duration of the Examination (Hrs)				--	--	--	--	

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

4. COURSE OUTCOMES:
At the end of studying this course students will be able to: -
1. Identify components of Open Source Technology.
2. Develop shell script and AWK program in Linux.
3. Develop PHP program on apache server for a given problem.
4. Execute DDL & DML commands on MYSQL Server in Linux environment.
5. Insert documents into MongoDB database in Linux environment.

5. DETAILED COURSE CONTENTS:

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Open Source and Linux	1a. Identify open source technology. 1b. Modify user permission. 1c. Remove package using RPM utility. 1d. Set up LAMP server.	1.1 Open Source Definition, The distribution terms of open source software, open source technology, importance of Free and open source Software (FOSS). 1.2 Browsing the Linux File system, Users, Groups and Permissions, Introduction and working vi editor, Install, Update, and remove software packages with RPM, editing configuration files. 1.3 LAMP (Linux, Apache, MySQL, PHP) Server Basics. 1.4 Introduction of zend framework.
Unit – II Shell Programming	2a. Use wild cards. 2b. Select login shell. 2c. Use AWK functions. 2d. Apply control structure.	2.1 Introduction to csh shell, ksh shell, Bourne shell and their functionality, Meta characters, wild cards, redirection, pipes, login shell, login scripts, AWK Programming and functions. 2.2 Commands- umask, touch, uname, crontab. 2.3 Control structure: if, test, for, while, case.
Unit - III Apache and PHP	3a. Set http services. 3b. Prepare PHP scripts. 3c. Format output using PHP scripts. 3d. Select operators for given applications.	3.1 Introduction to Web server, Installing Apache on Linux: http service. 3.2 PHP: Basics of PHP scripts, Variables, Data types, Operators and Expressions, Constants, Flow control functions, If statement, Loops, Arrays, Strings, Dates and Times, Forms.
Unit - IV MySQL Server and Application	4a. Set up MySQL server in Linux. 4b. Perform CRUD operation. 4c. Maintain dynamic web pages using PHP scripts.	4.1 MySQL Server: Configuring MYSQL Server, working with MySQL Databases, SQL Standards- CRUD Operation, and DATE and Time functions in MYSQL. 4.2 PHP-MySQL Application Development: Connecting to MySQL Application Development: Connecting to MySQL with PHP, Inserting data and Retrieving data with PHP, Developing PHP scripts for dynamic web page.
Unit-V Introduction of PostgreSQL and MongoDB.	5a. Compare PostgreSQL and MySQL. 5b. Select data from databases. 5c. Prepare documents for MongoDB operations.	5.1 Introduction and Installation of PostgreSQL in Linux Operating System. 5.2 Creating and Populating a Database, Database Import and Export in PostgreSQL. 5.4 Introduction to NoSQL and MongoDB Databases, Creating Document and Saving it to Collection.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Open Source and Linux	3				
II	Shell Programming	4				
III	Apache and PHP	3	NOT APPLICABLE			
IV	MySQL Server and Application	3				
V	Introduction of PostgreSQL and MongoDB.	3				
	Total	16				

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

7. LIST OF PRACTICAL / LABORATORY EXPERIMENTS/ TUTORIALS:

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Install Linux Operating System (CentOS/Fedora/Ubuntu)	4
2	1	Execute commands to create and granting permission users.	2
3	1	Operate different modes of vi-editor (input mode, command mode) to use functionality of vi-editor.	2
4	1	Install, Update and Remove utilities using RPM packages in Linux.	4
5	1	Install LAMP (Linux, Apache, MySQL, and PHP) Server in Linux.	4
6	2	Execute following commands for to redirect input, output- Input Redirection (0<), Output Redirection (1>) and Error Redirection (2>).	2
7	2	Write and execute Sum of column value using awk script.	2
8	2	Write and execute Filtering lines using awk split function.	2
9	2	Execute following commands to granting permission, system information and job scheduling task- umask, uname, crontab.	4

10	2	Write and execute Shell script to check whether the given number is prime or not.	2
11	3	Execute PHP program to find area of triangle.	2
12	3	Execute PHP program to print alphabet triangle. A ABA ABCBA ABCDCBA ABCDEDCBA	2
13	3	Execute PHP program to find the sum of elements in an array.	2
14	3	Execute PHP program to create a simple Registration form.	4
15	3	Execute PHP program to remove the duplicated values from an array.	2
16	4	Execute PHP program for user authentication (Login Page) using MySQL.	4
17	4	Execute PHP program to Store an image in MySQL.	4
18	4	Execute CRUD operations using PHP and MySQL.	4
19	5	Install PostgreSQL in Linux Operating System.	4
20	5	Install MongoDB in Linux Operating System.	4
21	5	Execute mongodb command to creating, update, delete documents into Collection.	4
TOTAL			**64**

8. SUGGESTED STUDENTS ACTIVITIES:

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

SR. NO.	ACTIVITY
1	Download Linux source code from kernel.org and add new system call into source code then compile it.
2	For Given problem suggest appropriate Server (Web/ Application Server).
3	Develop web application using PHP-MongoDB database.
4	Develop Library Management System using PHP-PostgreSQL.
5	Develop Real-time Application using PHP-MySQL.

9. **SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES:**

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

  a. Improved Lecture methods-

  b. Q & A technique.

  c. Demonstration.

  d. Activity based learning.

  f. Use of video, animation films to explain concepts, facts and applications of

10. SUGGESTED LEARNING RESOURCE:

S.No.	Name of Book	Author	Publication
1	Learning PHP, MySQL, and JavaScript	Robin Nixon	O'REILLY
2	Linux : Complete Reference	Richard Pearson	Tata McGraw Hill
3	Beginning PHP and MySQL: From Novice To Professional	W. Jason Gilmore	APress
4	Beginning Linux Programming	Neil Mathew, Richard Stones	Wrox Publications
5	Unix Concepts and Applications	Sumitabha Das	McGraw-Hill Education
6	Red Hat Linux- A bible	Christophe Negus	Tech Media SAMS
7	PostgreSQL: Up and Running	Regina Obe and Leo Hsu	O'REILLY
8	MongoDB Basics	Peter Membrey , David Hows ,	APress

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Sr. No.	Name of equipment	Brief specification
1	Computer System	Computer System with latest configuration.
2	Linux	Fedora/Ubuntu/Centos.

12. LEARNING WEBSITE & SOFTWARE:

1. http://nptel.ac.in/courses/106108101/

2. https://onlinecourses.nptel.ac.in/noc17_cs29/preview

3. https://computer.howstuffworks.com/operating-system.htm

4. https://www.whoishostingthis.com/resources/linux-programming/

5. http://www.freeos.com/guides/lsst/

6. https://docs.mongodb.com/

7. https://www.postgresql.org/files/documentation/pdf/10/postgresql-10-A4.pdf

8. https://dev.mysql.com/doc/

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

Sr. No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identify components of Open Source Technology.	2	2	-	-	-	-	-	-	-	1	2	-
2	Develop shell script and AWK program in Linux.	2	1	2	-	-	-	-	-	-	1	1	2
3	Develop PHP program on apache server for a given problem.	2	2	2	-	-	-	-	-	-	1	2	-
4	Execute DDL & DML commands on MYSQL Server in Linux environment.	2	2	1	-	-	-	-	-	-	2	2	-
5	Insert documents into MongoDB database in Linux environment.	2	1	1	2	-	-	-	-	-	2	2	-

Course Curriculum Design Committee:

Sr No	Name of the faculty members	Designation and Institute
1	Jitendra Joshi	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	Shashikant Bankar	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
3	Om Varma	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE: ANDROID PROGRAMMING (AP)

COURSE CODE: 6S409

Diploma programme in which course is offered	Semester in which course is offered
CO/IT/AN	**IV**

1. RATIONALE

Android Programming is applied level course provides platform for mobile application development. This course is designed to enable student to build mobile applications on android operating system. This course covers the basics of Android along with required programming codes for developing necessary programming skills for mobile applications.

2. LIST OF COMPETENCIES

The student will be able to:

"Develop GUI based mobile applications with Eclipse Android SDK on open source Android and propriety platforms with database connectivity"

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PT	ESE # (PR)	PA	
01	00	04	05	00	00	#50	75	125
Duration of the Examination (Hrs)				00	00	2	00	

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

4. COURSE OUTCOMES

    I.   Identify the role of android framework in android platform.

    II.   Develop android user interface Layout.

    III.   Develop interactive event driven mobile application.

    IV.   Develop application using menus and dialog boxes using SQLite.

    V.   Find the error handling using exception with examples.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics and Sub-topics
UNIT– I Introduction to Android environment with architecture	1.a Identify components of Android Architecture and framework.	1.1 Overview of different mobile application development platforms. 1.2 Linux Kernel : Libraries ,Android Runtime ,Application Framework, Android Startup and Zygote, Android Debug bridge, Android Permission model, Android Manifest File . 1.3 Mobile technology : Overview of Android - An Open Platform for Mobile development 1.4 Open Handset Alliance , Use Android for mobile app development, Android Marketplaces , Android Development Environment setup . 1.5 Android development Framework - Android-SDK, Eclipse Emulators / Android AVD. 1.6 Creating & setting up custom Android emulator 1.7 Android Project Framework and its applications
UNIT – II Android Activities	2.a Describe Android application components and activity.	2.1 Android application components Intent, Activity, Activity Lifecycle, Broadcast receivers, Services and Manifest 2.2 Create Application and new Activities 2.3 Expressions and Flow control, Android Manifest.

UNIT – III **Advanced UI** **Programming and** **UI Design**	3.a Develop an Event driven programs on text edit and button clicked. 3.b.Develop simple UI layout. 3.c Describe GUI object in XML.	3.1 Event driven Programming in Android (Text Edit, Button clicked) 3.2 Creating a splash screen 3.3 Introduction to threads in Android 3.4 Simple UI -Layouts and Layout properties Fundamental Android UI Design Introducing Layouts Creating new Layouts Drawable Resources Resolution and density independence (px,dp,sp) 3.5 XML Introduction to GUI objects 3.6 Push Button Text / Labels EditText Toggle Button WeightSum Padding Layout Weight.
UNIT– IV **Toast, Menu,** **Dialog, List and** **Adapters Working** **with Database**	4a Design and develop menus, dialogs and toast 4b Create Android Manifest.xml File 4c Connect and create SQLite database.	4.1 Menu: Custom Vs. System Menus 4.3 Creating and Using Handset menu Button (Hardware) 4.4 Android Themes, Dialog, create an Alter Dialog 4.5 Toast in Android, List & Adapters ४.6 Android Manifest.xml File 4.7 SQLite: Open Helper and create database 4.8 Open and close a database

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R	U	A	Total
I	Introduction to Android environment with architecture	2				
II	Android Activities and UI	4				

	Design		
III	Advanced UI Programming and UI Design	4	NOT APPLICABLE
IV	Toast, Menu, Dialog, List and Adapters Working with Database	6	
	Total	16	

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

7. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

Sr.no.	Unit No.	Practical Exercises	Total Hrs.
1	1	Develop "Hello World" application to "Hello World" in the middle of the screen in the red color with white background.	04
2	1	Develop sample application with login module.(Check username and password), validate it for login screen or alert the user with a Toast.	04
3	2	Execute a login application using username as Email ID else login button must remain disabled.	02
4	2	Develop Login application and open a browser with any one search engine.	02
5	3	Develop an application to display "Hello World" string the number of times user inputs a numeric value. (Example. If user enters 5, the next screen should print "Hello World" five times.)	04
6	3	Develop spinner with strings from the resource folder (res >> value folder). On changing spinner value, change image.	04
7	3	Develop an application to change screen color as per the user choice from a menu.	04
8	3	Develop an application that will display toast (Message) at some regular interval of time.	04
9	3	Develop a background application that will open activity on specific time.	04
10	4	Develop an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayed below.	04
11	3	Develop an UI listing the diploma engineering branches. If user selects a branch name, display the number of semesters and subjects in each semester.	04
12	4	Use content providers and permissions by implementing read phonebook contacts with content providers and display in the list.	04
13	4	Develop an application to call a phone number entered by the user the Edit Text.	04
14	4	Develop an application that will create database to store username and password.	04
15	4	Develop an application to insert, update and delete a record from the database.	04

	Total	64

8. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

1. Students will prepare chart/poster for given topics
2. Prepare presentation and deliver seminar on Developed application on mobile device.
3. Students are expected to develop minimum one application of particular topic as an example to exhibit real life application.
4. Design and implement sample GUI.

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Demonstration

d. Seminars

e. Activity based learning

10. SUGGESTED LEARNING RESOURCES

List of Books

Sr.No	Author	Title of Books	Publication
1	Reto Meier	Professional Android 2 Application Development	Wiley India Pvt Ltd
2	Mark L Murphy	Beginning Android	Wiley India Pvt Ltd
3	Sayed Y Hashimi and Satya Komatineni	Professional Android	Wiley India Pvt Ltd

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED:

S. No.	Name of equipment	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	Android Open Source Project, Android SDK, Eclipse Environment	Android Open Source Project, Android SDK, Eclipse Environment with latest versions

12. LIST OF LEARNING WEBSITES

1. Developing Android Apps- Udacity https://www.udacity.com/course/ud853
2. Build your firs App http://developer.android.com/training/basics/firstapp/index.html
3. Android App Development Tutorial http://www.codelearn.org/android-tutorial
4. ADT Plugin http://developer.android.com/tools/sdk/eclipse-adt.html
5. Installing the Eclipse Plugin http://developer.android.com/sdk/installing/installing-adt.html
6. Eclipse Download https://www.eclipse.org/downloads/

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

Sr.No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Identify the role of Android framework in android platform for mobile application development.	2	2	2	1	-	-	-	-	-	-	2	-
CO2	Develop Android user interface Layout	2	3	2	-	-	-	-	-	-	-	-	-
CO3	Develop interactive event driven mobile application.	1	3	3	-	-	-	-	-	-	-	-	3
CO4	Develop an applications using menus and dialog boxes using SQlite databases	1	2	2	-	-	-	-	-	-	-	-	3
CO5	Find the error handling using exception with examples	-	3	3	-	-	-	-	-	-	-	-	3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	S.M. Bankar	Lecturer in Computer Engineering
2	P.B. Lahoti	Head of the Department Computer Engineering

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   R PROGRAMMING

COURSE CODE-   **6N405**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	IV

1. RATIONALE

R has emerged as a preferred programming language in a wide range of data intensive disciplines. R is the most popular programming language among data scientists. This course aims to provide a knowledge about R programming language and the students will learn how to use R for effective data analysis.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop the following competencies.
     "Develop general purpose programming using R"

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE @ (PR)	PA (TW)	
1	0	4	5	00	00	#50	75	125
Duration of the Examination (Hrs)				00	00	2	00	

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

4. COURSE OUTCOMES

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

1. Setup R Programming Environment

2. Understand and use R- Data Types.

3. Understand and Use R- Data Structure.

4. Develop Programming Logic using R- Packages.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
UNIT-1 Fundamentals of R	1a. Explain Features of R 1b Describe script file 1c. Identify Decision and control loop statements. 1d. Explain Objects.	1.1 Evolution of R – Features of R – Essentials of R -R-Environment setup – Basic syntax: command prompt, script file. 1.2 Variables in R – Reserved Words - Constants in R - Operators in R - Arithmetic Operators, Logical Operators, Relational Operators, Assignment Operators, Miscellaneous Operators – Data types and R 1.3 Objects - Accepting Input from keyboard 1.4 R-Decision and Control Loop Statements - if condition, if else condition, switch condition, repeat loop, while loop, for loop, break statement, Next statement.
UNIT –2 Basic Data Types Arrays , **Matrix , Functions**	2a. Explain Accessing Array elements. 2b. Identify operation on matrices 2c. Describe build in functions.	2.1 Arrays Creating arrays - Accessing array elements - manipulating array elements – Calculations across array elements. 2.2 Matrix Creating matrices - Accessing elements of a Matrix - Operations on Matrices - Matrix transpose 2.3 Functions Functions – Important Built-in functions - Formal and Actual arguments - Named arguments - Global and local variables - Recursive functions- Debugging in R.
UNIT– 3 Strings and Dates, Vectors, List	3a. Explain string manipulation using string package. 3b. Describe Arrays as Vector 3c. Identify general list of operations.	3.1 Strings and Dates Creating strings - Reading and Writing Strings – String manipulation using string package – Dates in R. 3.2 Vectors Classes Vectors: Generating sequences, Vectors and subscripts, extracting elements of a vector using subscripts, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing 3.3 List Creating Lists, General List Operations - List Indexing - Adding and Deleting List Elements - Getting the Size of a List - Accessing List Components and Values - merge list -converting List to Vector.

UNIT - 4 Data Frames and Packages	4a. Explain Factors and Table 4b. Identify Math function. 4c. Explain load package to library 4d. Describe merging data frames.	4.1 Factors and Tables Understanding factors - Common Functions Used with Factors - Working with Tables - atrix/Array-Like Operations on Tables - Extracting a Sub table - Finding the Largest Cells in a Table - Math Functions 4.2 Data Frames and Packages 4.3 Creating a Data Frame – Naming rows and columns – Sub setting a data frame – Packages – available R packages - install a new package – load package to library – Data reshaping – joining columns and rows in a data frame- merging data frames – melting and casting
UNIT – 5 Data Visualization in R	5a. Explain working with file 5b. Describe data visualization in R 5c. Explain Histogram, Line graphs 5d. State plotting categorical data.	5.1 Data and File Management Working with files: CSV file: input CSV, read CSV, analyzing CSV, writing into CSV - Excel file: install, load, input, read excel files – XML files: input and read XML files. MySQL package – connection R with MySQL – querying the table – table manipulation: create, insert, drop and update. 5.2 Data Visualization in R Need for data visualization - R Pie charts: Pie chart title, color - slice percentages and chart legend – 3D Pie chart - Bar charts – Histograms – Line graphs – Scatter plots : creating scatterplot, scatterplot matrices - Bar plot - Plotting categorical data

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Fundamentals of R	02				
2	Basic Data Types Arrays , Matrix , Functions	03				
3	Strings and Dates, Vectors, List	04	NOT APPLICABLE			
4	Data Frames and Packages	03				
5	Data Visualization in R	04				
	Total	**16**				

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

7. SUGGESTED EXERCISES/PRACTICALS

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

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	1	Write an R Program to Find the Factors of a Number.	02
2	1	Write a program to find list of even numbers from 1 to n using R-Loops.	02
3	1	Write an R Program to Make a Simple Calculator	02
4	2	Write an R Program to Find the Fibonacci sequence Using Recursive Function .	02
5	2	Create a function in R to print squares of numbers in sequence 6. Implement different String Manipulation functions in R PART -B.	02
6	2	Write an R Program to Create a vector v1 with elements 1 to 10. Add 2 to every element of the vector v1. Divide every element in v1 by 5 Create a vector v2 with elements from 11 to 20. Now add v1 to v2.	02
7	2	Write an R Program to create a list for the employee data (employee no., name, Salary – gross salary, net salary) fill gross and net salary Add the address to the above list display the employee name and address remove street from address Remove address from the List.	02
8	2	Write an R Program to create a Data Frame and access a Data Frame	02

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		like a List	
9	2	Write a program to join columns and rows in a data frame using cbind() and rbind() in R.	02
10.	2	Using the distance data present in the table below, create a Matrix "M" and find the pairs of cities with shortest distance	02
11	2	Write an R Program to create a Factor and Access and Modify Components of a Factor .	02
12	3	Write a program to read a csv file and analyze the data in thefile in R.	02
13	3	Write an R Program to check if the given Number is a Prime Number	04
14	3	Create pie chart using R.	04
15	3	Plot a bar plot with matrix using R	04
16	3	Create a data set and do statistical analysis on the data using R.	04
17	3	Write an R Program to check if the given Number is a Prime Number.	04
18	4	Execute a R program to create a simple bar plot of five subjects marks.	04
19	4	Execute a R program to multiply two vectors of integers type and	04

The distance matrix for exercise 10:

	C1	C2	C3	C4
C1	0	15	10	12
C2	11	0	25	21
C3	9	6	0	12
C4	11	10	14	0

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		length.	
20	4	Execute a R program to create a matrix from a given vectors.	04
21	4	Execute a R program to merge two given lists into one list.	04
22	4	Execute a R program to select second element of a given nested list.	04
Total			64

8. SUGGESTED STUDENT ACTIVITIES
Following is the list of proposed student activities like:
i. Prepare power point presentation showing relation between R programming.
ii. Develop sample Application using R.

9. SPECIAL INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.
a. Improved Lecture methods-
b. Q & A technique.
c. Demonstration
d. Seminars
e. Activity based learning

10. SUGGESTED LEARNING RESOURCE

S. No.	Title of Book	Author	Publication
1	The Art of R Programming: A Tour of Statistical Software Design	Norman Matloff	First Edition 2014, CBSE, India
2	R for Everyone: Advanced	Jared P. Lander	Addison-Wesley Data& Analytics

S. No.	Title of Book	Author	Publication
	Analytics and Graphics		Series.
3	Hands-On Programming with R: Write Your Own Functions and Simulations	Garrett Grolemund, Hadley Wickham.	Springer, 2000

11. List of Major Equipment/ Instrument with Broad Specifications

S. No.	Name of equipment	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	RStudio an Integrated Development Environment (IDE) for R	https://www.rstudio.com/
3	R statistical software program	https://www.r-project.org/

12. List of Software/Learning Websites

https://www.classcentral.com/report/best-r-programming-courses/#anchor-7
https://www.classcentral.com/report/best-r-programming-courses/#anchor-1

https://www.classcentral.com/report/best-r-programming-courses/#anchor-2

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	Analyze and design strategies for solving basic programming problems	1	1	1	1	0	0	0	0	0	0	1	0
CO2	Use primitive data types, selection statements, loops, functions to write programs.	0	0	3	0	0	0	0	0	0	0	0	2
CO3	Develop proficiency in creating based applications using the R Programming	1	3	1	1	0	0	0	0	0	0	1	0

	Language.												
CO4	Understand the various data structures available in R programming language and apply them in solving computational problems.	0	3	2	0	0	0	0	0	0	0	0	2
CO5	Make use of testing and debugging of code written in R.	1	3	2	0	0	0	0	0	0	0	0	2

Sr No	Name of the faculty members	Designation and Institute
1	P S Hiwale	Lecturer in Computer Engineering Government Polytechnic Aurangabad
2	J P Joshi	Lecturer in Information Technology Government Polytechnic Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **MACHINE LEARNING**

COURSE CODE   **6N502**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

Machine Learning is a branch of Computer Science that uses algorithms to imitate the way in which humans learn. It uses statistical methods to train algorithms and make predictions. Machine learning is one of the most in-demand Data Science skills, which allows data scientists to increase the accuracy of predictions of software applications, without explicitly programming them to do so. These algorithms make use of historical data to predict output values and these insights and predictions enable businesses to make smart decisions.

2. COMPETENCY

"To understand a range of machine learning algorithms along with their strengths and weaknesses"

3. TEACHING AND EXAMNATION SCHEME

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

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

4. COURSE OUTCOMES

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

1. Identify uses and applications of machine learning in real life.

2. Implement preprocessing steps on data to make it ready for analysis.

3. Apply classification algorithms & regression algorithm.

4. Apply clustering algorithms and association rule mining algorithms for real life problems.

5. Evaluate and Visualize performance of an algorithm.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
1. Introduction to Machine Learning	1. Compare the given types of machine learning on given points. 2. Differentiate between supervised and unsupervised learning 3. Describe applications of machine learning. 4. Classify the given data elements based on types of data	1.1 Introduction: What is learning? Why Machine Learning? 1.2 Types of machine learning,- Supervised Machine Learning, Unsupervised Machine Learning, Reinforcement Learning 1.3 Applications of machine learning 1.4 Machine learning Life cycle- Gathering Data, Data preparation, Data Wrangling, Analyze Data, Train the model, Test the model, Deployment 1.5 Languages and tools used in machine learning 1.6 Basic types of data-Quantitative & Qualitative, Exploring data structure, Data quality and remediation

2. Model & Feature Selection	1. Explain model selection process.
	2. Describe the model selection methods.
	3. Apply feature selection techniques on given features
	4. Describe need for feature selection
	5. Perform dimensionality reduction using PCA.
		2.1 Introduction, Model Selection Process
		2.2 Model selection methods:
		    2.2.1 Random Train/Test split
		    2.2.2 Resampling: Cross validation (k-fold method),
		2.3 What is Feature Selection? Need for Feature Selection.
		2.4 Feature Selection Techniques: Information gain, chi-square, forward feature selection and backward feature selection
		2.5 Dimensionality reduction: Principal Component Analysis (PCA)

3. Classification	1. Classify the given data using Bayesian method with stepwise justification. 2. Compare given algorithms on given points. 3. Select a suitable algorithm for classifying the given data. 4. Predict the output using logistic regression	3.1 What is classification? Types of classification: Binary classifier and Multiclass classifier, Types of learners: Lazy learners and Eager learners. 3.2 Types of machine learning classification algorithm: Linear Models and Non Linear Models. 3.3 Linear Models- Logistic Regression and Support Vector Machine (SVM) 3.4 Non Linear Models: K nearest neighbor (KNN), Naïve Bayes classifier- Why it called Naïve Bayes?, Bayes' Theorem, Working of Naïve Bayes' classifier algorithm

| 4. Clustering & Association | 1. Perform iterative distance based clustering using k-means algorithm
2. Perform density based clustering using DBSCAN

3. Describe the performance analysis of clustering for the given situation.
4. Describe applications of clustering
5. Describe application of Association Rule mining
6. Compare DBSCAN and k-means algorithm | 4.1 What is clustering? Types of clustering
4.2 Distance Measures: Euclidean Distance, Manhattan Distance, Minkowski Distance.
4.3 K means algorithm and DBSCAN
4.4 Difference between DBSCAN and K-means algorithm
4.5 Applications of clustering
4.6 Introduction to Association Rule mining
4.7 The applications of Association Rule mining: Market Basket, Recommendation engines, etc. |
| 5. Introduction to Deep Learning | 1. Describe ANN concepts
2. Learn Hyper parameter basics | 5.1 Introduction: Artificial neural network, Architecture of ANN, Advantages and Disadvantages of ANN, perceptron EX-OR problem, feed-forward and backpropagation,
losses, Activation function
5.2 Basics hyper parameter-Selecting number
of neurons, Activation functions,
Layers using greedy search and Random Access |

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	**Introduction to Machine Learning**	08	6	6	4	16
2	**Model Selection & Feature selection**	10	6	6	4	16
3	**Classification**	12	6	6	6	18
4	**Clustering & Association**	12	4	6	8	18
5	**Introduction to Deep Learning**	06	4	4	4	12
	Total	48				80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Study on different datasets such as iris, credit card fraud dataset, Twitter dataset etc.	02
2	I	Perform following operations :(Assume suitable data/dataset if needed). Write program to read dataset (Text, CSV, JSON ,XML) Which of the attributes are numeric and which are categorical? Performing Data Cleaning ,Handling Missing Data, Removing Null data	04
3	II	Perform following operations :(Assume suitable data/dataset if needed). Feature Selection and Dimensionality Reduction Implement Principle Component Analysis	04
4	III	Write a python /R Programming code to implement linear regression.	02
5	III	Write a python /R Programming code to apply Naive Bayesian algorithm for classification using suitable data/dataset.	04
6	III	Write a python /R Programming code to implement SVM for classification using suitable data/dataset.	04
7	III	Write a python /R Programming code to implement Logistic regression.(Assume suitable variables)	02
8	IV	Implement unsupervised machine learning algorithm (Clustering – K Means) in python/R Programming on dataset to cluster data. (Assume suitable dataset).	04
9	IV	Generating Association rule mining for following data set :(Assume suitable data/dataset if needed). <table><tr><td>1</td><td>Milk, Butter, Bread</td></tr><tr><td>2</td><td>Milk, Butter</td></tr><tr><td>3</td><td>Milk, Paneer, Cheese</td></tr><tr><td>4</td><td>Cheese, Paneer</td></tr><tr><td>5</td><td>Cheese, Bread</td></tr><tr><td>6</td><td>Milk, Paneer, Cheese</td></tr></table>	04
10	V	Implement Backpropagation/ feed forward neural network	02
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:

a. Case Study LAN setup in the institute.
b. Understanding configuration of LAN

SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Lecture and demonstration

b. Online animation/flash

c. Practical exercises, LAN implementation

d. Mini project related with industrial applications and house hold applications

e. Self-Line learning

f. Application for practical will be assigned to the students by the subject faculty and students will work in a group of 2 maximum

g. Assignment can be given based on above topics.

9. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Machine Learning ISBN: 13: 978-0070428072	Tom M Mitchell	McGraw Hill, First edition, 1997
2.	Data Mining: Concepts and Techniques ISBN: 978-0-12-381479-1	Jiawei Han, Micheline Kamber and Jian Pei	Morgan Kaufmann

10. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

- Computer (Dual CORE and above) with Internet connection.

- Windows 7 or 8 or latest (Professional Edition/Academic edition)

- Network printer.

11. LEARNING WEBSITE & SOFTWARE

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

a. Weka Tool

b. Pentaho Tool

c. R tool

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

SNo	Course Outcome	POs							PSOs	
									01	02
1	Use of basic concepts of networking for setting up computer network	-	3	1	-	1	-	-	3	-
2	Use appropriate network topology and networks.	-	3	2	-	2	-	-	2	-
3	Select transmission media for effective communication.	-	3	1	1	1	-	-	3	-
4	Classify IP addressing scheme.	-	3	1	-	-	-	1	3	-
5	Use protocols and IEEE standards for data transmission.	-	3	-	-	2	-	-	3	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Ms. J.V. PATIL	Lecturer in IT Dept., Govt. Polytechnic, Aurangabad
2	Mr. S.G. CHAVAN	Lecturer in IT Dept., Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE- DATA HANDLING IN PYTHON

COURSE CODE- 6N406

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

This curriculum on data handling in Python is designed to provide students with practical skills for working with data. It progresses from file handling and basic data manipulation to more advanced topics like numerical computing and data visualization. By incorporating industry-relevant tools like pandas, NumPy, Matplotlib, and databases, students gain versatile skills applicable in various domains. The curriculum emphasizes project-based learning, enabling students to apply their knowledge to real-world datasets and develop critical thinking and problem-solving abilities. Overall, it equips students with the essential skills needed for data analysis and empowers them for future careers in data-driven fields.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop the following competencies.

"Develop general purpose programming for data handling in python"

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE @ (PR/OR)	PA (TW)	100
1	0	4	5	00	00	#25	75	
Duration of the Examination (Hrs)				00	00	2	00	

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

4. COURSE OUTCOMES

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

1. Effectively handle and manipulate data stored in text files and CSV files using Python, demonstrating proficiency in reading, writing, and basic data operations.

2. Apply the pandas library to perform advanced data manipulation tasks, including cleaning and preprocessing datasets, filtering and sorting data, and visualizing data

3. utilize the NumPy library for numerical computing tasks, such as creating and manipulating arrays, performing mathematical operations on arrays

4. create visually appealing and informative plots using Matplotlib, customize plot attributes, and present data effectively through various plot types

5. Connect Python with databases, execute SQL queries to retrieve and manipulate data.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
UNIT-1 **File Handling and Data Manipulation Basics**	**1.a** Understand file handling concepts in Python. **1.b** Learn to read and write text files. **1.c** Gain familiarity with working with CSV files. **1.d** Explore libraries for file manipulation, particularly pandas.	**1.1 Introduction to File Handling:** Overview of file handling in Python, Different file modes (read, write, append), Opening and closing files, Reading and Writing Text Files **1.2 Reading data from a text file:** Writing data to a text file, Error handling and file exceptions **1.3 Working with CSV Files:** Introduction to CSV files and their structure, Reading data from CSV files and Writing data to CSV files, Handling CSV data using pandas **1.4 Introduction to pandas:** Overview of the pandas library, Data structures in pandas: Series and DataFrame, Essential pandas operations: indexing, slicing, filtering, Basic data cleaning and preprocessing with pandas

UNIT –2 **Data Manipulation with Pandas**	2.a Master the pandas library for data manipulation. 2.b Acquire skills in reading and writing data using pandas. 2.c Learn techniques for cleaning, preprocessing, and transforming data. 2.d Understand advanced data manipulation techniques like filtering and sorting. 2.e Develop basic data visualization skills with pandas.	**2.1 Reading and Writing Data using Pandas:** Reading data from various file formats (CSV, Excel, etc.), Writing data to different file formats, Handling missing data during reading and writing **2.2 Data Cleaning and Preprocessing:** Handling missing values, Removing duplicates, Data normalization and scaling, Dealing with outliers **2.3 Filtering and Sorting Data:** Conditional filtering of data, Sorting data based on multiple columns, Removing unnecessary columns **2.4 Aggregation and Grouping:** Grouping data based on one or more columns, Applying aggregate functions (sum, mean, count, etc.), Creating pivot tables **2.5 Basic Data Visualization with Pandas:** Line plots, scatter plots, and bar plots, Customizing plots (labels, titles, legends), Exploratory data visualization using pandas
Unit – 3 **Numerical Computing with NumPy**	3.a Gain proficiency in the NumPy library for numerical computing. 3.b Understand the creation and manipulation of arrays. 3.c Learn indexing, slicing, and basic mathematical operations with arrays. 3.d Develop skills in statistical computations using NumPy.	**3.1 Introduction to NumPy:** Overview of NumPy and its features, Installing and importing NumPy **3.2 Creating and Manipulating Arrays:** Creating one-dimensional and multi-dimensional arrays, Initializing arrays with different values, Reshaping and resizing arrays **3.3 Indexing and Slicing Arrays:** Accessing and modifying array elements, Slicing arrays to extract subsets of data, Boolean indexing and filtering **3.4 Basic Mathematical Operations with Arrays:** Element-wise operations (addition, subtraction, multiplication, etc.), Broadcasting and vectorized operations, Universal functions (ufuncs) in NumPy Statistical Computations with NumPy, Descriptive statistics (mean, median, variance, etc.), Aggregating data using reduction functions, Random number generation with NumPy

Unit - 4 **Data** **Visualization** **with** **Matplotlib**	4.a Learn the Matplotlib library for data visualization. 4.b Develop skills in creating various types of plots. 4.c Customize plots by adding labels, titles, legends, and annotations. 4.d Create subplots and multiple plots in a single figure. 4.e Understand advanced visualization techniques like histograms and heatmaps.	**4.1 Introduction to Matplotlib:** Overview of Matplotlib and its functionalities, Installing and importing Matplotlib **4.2 Basic Plotting with Matplotlib:** Line plots and scatter plots, Adding labels, titles, and legends, Formatting plot appearance (colors, markers, etc.) **4.3 Customizing Plots:** Adjusting axes limits and scales, Annotating plots with text and arrows., Working with multiple figures and axes **4.4 Advanced Visualization Techniques:** Bar plots and histograms, Pie charts and box plots, Heatmaps and 2D plots **4.5 Subplots and Multiple Plots:** Creating subplots and layout customization, Combining multiple plots in a single figure, Sharing axes and legends among subplots
Unit – 5 **Databases and** **Data Analysis**	5.a Understand the fundamentals of SQL and relational databases. 5.b Gain practical experience in connecting to databases using Python. 5.c Learn SQL queries for data retrieval and manipulation. 5.d Apply data handling techniques to real-world datasets through data analysis and visualization projects.	**5.1 Introduction to SQL and Relational Databases:** Overview of relational databases and their components , Introduction to Structured Query Language (SQL) **5.2 Basic SQL Queries:** SELECT statement for data retrieval, Filtering and sorting data using WHERE and ORDER BY clauses, INSERT, UPDATE, and DELETE statements **5.3 Connecting to Databases with Python:** Installing database connectors (e.g., psycopg2, SQLAlchemy), Establishing connections to databases, Executing SQL queries from Python **5.4 Fetching and Manipulating Data from Databases:** Retrieving and displaying data using Python, Modifying data through INSERT, UPDATE, and DELETE operations, Error handling and transactions , Applying data handling techniques to real-world datasets, Exploratory data analysis

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	**File Handling and Data Manipulation Basics**	02				
2	**Data Manipulation with Pandas**	03				
3	**Numerical Computing with NumPy**	04	NOT APPLICABLE			
4	**Data Visualization with Matplotlib**	04				
5	**Databases and Data Analysis**	03				
	Total	**16**				

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

7. SUGGESTED EXERCISES/PRACTICALS

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

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	1	Read a text file and display specific information from it.	02
2	1	Execute a program to Read a CSV file and calculate statistics on the data.	02
3	1	Develop a program to Load a dataset into a pandas DataFrame and perform basic operations like indexing and slicing.	04
4	2	Develop a program that reads multiple files, combines the data, and performs data manipulation tasks.	04
5	2	Execute a program to Read data from an Excel file and perform data analysis tasks.	04
6	2	Execute a program to Clean a dataset by handling missing values, removing outliers, and normalizing data.	04

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
7.	2	Execute a program To Filter and extract specific rows or columns from a DataFrame based on given conditions.	02
8.	2	Execute a program to Group data based on one or more columns and apply aggregate functions.	02
9.	2	Execute a program to Create arrays with different shapes and perform basic operations on them.	04
10.	2	Execute a program to Access and modify specific elements of an array using indexing and slicing techniques.	02
11	2	Execute a program to Perform mathematical operations on arrays and calculate statistics.	02
12	3	Develop a program Use NumPy functions to compute descriptive statistics on a dataset.	04
13	3	Execute a program to Plot line graphs and scatter plots to visualize datasets with Matplotlib.	02
14	3	Execute a program to Customize plots by adding labels, titles, legends, and annotations using Matplotlib.	04
15	3	Execute a program to Generate histograms and heatmaps to visualize dataset characteristics.	02
16	3	Execute a program to Create subplots and combine multiple plots in a single figure.	04
17	3	Develop programs to Connect Python to a database and retrieve data using SQL queries.	02
18	4	Develop program for Fetching data from a database, perform data manipulation operations, and update the database.	02
19	4	Develop program to Choose a real-world dataset, perform exploratory data analysis, and present findings and insights.	04
20	All	Design a mini project using all concepts(maximum 2 group members)	08
Total			64

8. SUGGESTED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

i. Prepare power point presentation showing relation between data handling in python.

ii. Develop sample Application using Python.

9. SPECIAL INSTRUCTIONAL STRATEGIES

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

a. Improved Lecture methods-

b. Q & A technique.

c. Demonstration

d. Seminars

e. Activity based learning

10. SUGGESTED LEARNING RESOURCE

S. No.	Title of Book	Author	Publication
1	Computer Science With Python-II CBSE board	CBSE board	First Edition 2014, CBSE, India
2	Introduction To Programming Using Python	Y. Daniel Liang	*Armstrong Atlantic State University*
3	Hands-on Python Tutorial	Dr. Andrew N. Harrington.	Loyola University Chicago

11. List of Major Equipment/ Instrument with Broad Specifications

S. No.	Name of equipment	Brief specification
1	Desktop Computer	i5 processor or higher,4gb RAM
2	Python editor / IDE	Python editor 3.5 and above / IDE – pycharm/ Jupiter

12. List of Software/Learning Websites

Software: Wiindows 7 ,. Python 3.4.3

1 http://python.swaroopch.com/

2 Learn Basic of python programming Online**:**

 https://github.com/swaroopch/byte-of-   python /

4 Text books online
https:// www.**tutorials**point.com/**python/python_tutorial.pdf**

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	No. of hours allocated in curriculum
CO1	Analyze and design strategies for solving basic programming problems	1	1	1	1	0	0	0	1	0	**8**
CO2	Use primitive data types, selection statements, loops, functions to write programs.	0	0	3	0	0	0	0	0	2	**12**
CO3	Develop proficiency in creating based applications using the Python Programming Language.	1	3	1	1	0	0	0	1	0	**14**
CO4	Understand the various data structures available in Python programming language and apply them in solving computational problems.	0	3	2	0	0	0	0	0	2	**10**
CO5	Make use of testing and debugging of code written in Python	1	3	2	0	0	0	0	0	2	**12**

Sr No	Name of the faculty members	Designation and Institute
1	S. M. Rudsamudra	Lecturer in Information Technology Government Polytechnic Aurangabad
2	J. P. Joshi	Lecturer in Information Technology Government Polytechnic Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **CLOUD COMPUTING**

COURSE CODE-   **6N408**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	FIFTH

1. RATIONALE

This course provides a comprehensive study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS),Software as a Service (SaaS). It consists of topics like cloud service models, virtualization and cloud infrastructure, and security and management of cloud.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop the following competencies.

   1. To provide students with the fundamentals and essentials of Cloud Computing.

   2. Recognize the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE #(OR)	PA (TW)	
3	00	02	05	80	20	25	25	150
Duration of the Examination (Hrs)				03	1	2	00	

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

4. COURSE OUTCOMES
1. Examine NIST and cloud cube model along with service and deployment model.
2. Identify the appropriate cloud services for given application.
3. Assess various Amazon web services and Windows Azure platform.
4. Analyze taxonomy, types, advantages and disadvantages of virtualization technology.
5. Identify security implication in cloud computing.
6. Understand the relationship of cloud with ERP and CRM.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
UNIT– I **Introduction to Cloud Computing**	1.a Identify cloud computing and the characteristics 1.b Illustrate NIST and Cloud cube model 1.c Compare deployment and service model 1.d Compare grid and cloud computing 1.e Illustrate characteristics , benefits and limitations of cloud computing	1.1. Introduction to Cloud Computing: Defining Cloud computing, 1.2. Grid Computing, Utility Computing Grid vs Cloud Computing 1.3.Cloud Types: NIST Model,Cloud Cube Model, 1.4.Deployment model: public cloud , private cloud , hybrid cloud ,community cloud 1.5.Service model: Infrastructure as a Service (IaaS), Software as a Service (SaaS), Platform as a Service (PaaS) 1.6 Characteristics of Cloud Computing 1.7 Benefits of cloud computing 1.8 Disadvantages of cloud computing
UNIT– II **Cloud architecture and Services**	2.a Illustrate the cloud computing stack 2.b Identify the following cloud service model : a. SaaS b. PaaS c. IaaS	2.1 Exploring cloud computing stack – Compos ability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications. 2.2 Defining Infrastructure as a Service (IaaS): IaaS workloads, Pods, aggregation, and silos 2.3 Defining Platform as a Service (PaaS): 2.4 Defining Software as a Service (SaaS): SaaS characteristics
UNIT– III **Cloud Service Providers**	3.a Illustrate Amazon web services , Google AppEngine and Microsoft Azure	3.1 Amazon web services: Compute services, Storage services, Communication services ,Additional services 3.2Google AppEngine : Architecture and core concepts, Application life cycle, Cost mode 3.3 Microsoft Azure: Azure core concepts: Compute services, Storage services, Core infrastructure: AppFabric, SQL Azure, Windows Azure platform appliance.

UNIT– I V **Virtualization**	4.a Illustrate virtualization and its characteristics 4.b Illustrate advantages disadvantages and examples of virtualization 4.c Illustrate taxonomy of virtualization technique	4.1 Introduction 4.2 Characteristics of virtualized environments: Increased security, Managed execution, Portability, 4.3 Taxonomy of virtualization techniques: Execution virtualization , Machine reference mode, Hardware-level virtualization, Programming language-level virtualization, Application-level virtualization 4.4 Other types of virtualization 4.5 Virtualization and cloud computing 4.6 Advantages of virtualization 4.7 Disadvantages of virtualization 4.8 Examples of Virtualization: Xen: paravirtualization,VMware: full virtualization Microsoft Hyper-V
UNIT– V **Cloud Security**	5.1 Illustrate cloud security and data security 5.2 Illustrate capacity planning	5.1 Capacity Planning :Defining Baseline and Metrics:Baseline measurements ,System metric 5.2 Securing the Cloud : The security boundary , Security service boundary , Security mapping , 5.3 Securing Data : Brokered cloud storage access , Storage location and tenancy , Encryption , Auditing and compliance 5.4 Establishing Identity and Presence: Identity protocol standards, Presence.
UNIT– VI **Cloud Applications**	6.a Illustrate cloud application : a. Scientific application b. Business and consumer application 6.b Illustrate federated cloud	6.1 Scientific applications: Healthcare: ECG analysis in the cloud, Biology: protein structure prediction, Biology: gene expression data analysis for cancer diagnosis ,Geoscience: satellite image processing 6.2 Business and consumer applications: CRM and ERP, Productivity, Social networking, Media applications, Multiplayer online gaming. 6.3 Federated clouds: Characterization and definition.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R Level	U Level	A Level	TOTAL
I	Introduction to Cloud Computing	6	4	4	2	12
II	Cloud architecture and Services	8	4	4	4	12
III	Cloud Service Providers	10	4	4	10	16
IV	Virtualization	10	4	6	8	18
V	Cloud Security	8	4	4	4	12
VI	Cloud Applications	6	2	4	4	10
	Total	48	22	26	32	80

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

7. SUGGESTED EXERCISES/PRACTICALS

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

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1.	I	Assignment on Grid Computing vs Cloud computing.	2
2.	II	Assignment on Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS)	4
3.	III	Create Virtual Machine instance on Google Cloud and access the same using VNC Viewer	4
4.	IV	Create Virtual Machine instance on Amazon Web Services and access the same using VNC Viewer	6
5.	V	Create a Virtual Machines using Vmware Workstation	4
6.	IV	Install and Configure Microsoft Hyper-V	6
7.	V	Installation and Configuration of virtualization using KVM.	6
Total			32

8. SUGGESTED STUDENT ACTIVITIES

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

a. Internet Survey of various Cloud Platforms like SaaS, IaaS and Paas.

b. Creating local cloud on Desktop.

c. Install and configure virtual machine using VMware or any other application.

d. Study various cloud security algorithms.

9. SUGGESTED LEARNING RESOURCE

A) **List of Books***

S. No.	Title of Book	Author	Publication
1	Cloud Computing Bible	Barrie Sosinsky	Wiley India Pvt Ltd
2	Mastering Cloud Computing	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi	Morgan Kaufmann ,Elseivier

B. List of Major Equipment/ Instrument with Broad Specifications
   i. Computer System with latest configuration OS-Windows 10, UBUNTU 14.04 DESKTOP
   ii. Internet
   iii. Open Source Software
   vi. VMware Player
   V. Eclipse latest version

C Additional Resources of CLOUD that can be used for conducting Practical as well as case studies
   - http://www.amazon.com/tracks/web

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

CO. NO.	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	1	2
CO1	Examine NIST and cloud cube model along with service and deployment model.	3	3	-	-	3	-	-	2	-
CO2	Identify the appropriate cloud services for given application.	1	3	-	1	1	-	-	3	-
CO3	Assess various Amazon web services and Windows Azure platform.	1	3	-	-	-	-	-	2	-
CO4	Analyze taxonomy, types, advantages and disadvantages of virtualization technology.	-	2	-	-	-	-	-	3	-
CO5	Identify security implication in cloud computing.	-	3	1	-	-	-	-	3	-
CO6	Understand the relationship of cloud with ERP and CRM.	1	1	-	-	-	-	-	2	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	V. B. Patil	Lecturer in Computer Engineering
2	S. G. Chavan	Lecturer in Information Technology

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **COMPUTER NETWORK (CN)**

COURSE CODE   **6N409**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

Computer Network is applied level course. It aims to apply different communication media and techniques for sharing information world wide web (WWW). This course covers basics of computer network, network devices and network topologies, transmission media, and OSI reference model and TCP/IP model.

COMPETENCY

     "Identify various network topologies, transmission media and use protocols for computer networking"

2. TEACHING AND EXAMNATION SCHEME

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

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

3. COURSE OUTCOMES

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

1. Use of basic concepts of networking for setting up computer network

2. Setup of computer network for basic requirement.

3. Select relevant transmission media and switching techniques as per need

4. Explain functions of OSI Reference model

5. Configure TCP/IP Services.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit – I **Basics of Computer Network** **(14)**	1a. List the applications of Computer Networks. 1b.Classify computer network based of given criteria 1c.Elaborate given feature of NOS 1d. Explain use of various types of server.	1.1 Definition, and Need of Computer Network, Application of Computer Network, Advantages/Benefits of Computer Network: Sharing of information, Sharing Resources, Centralized management Resources, Backing up of data 1.2 Network Classification 1.2.1 Geographic classification: PAN, CAN, LAN, MAN,WAN 1.2.2 Based on Transmission Technology: Point to Point, Broadcast 1.2.3 Based on Network Relationship: Peer to Peer Network, Client Server Network : Advantages and Disadvantages 1.3 Network Operating System: its types, features 1.4 Applications and features of different types of server: File server, Print Server, Mail Server, Web Server, Proxy Server
Unit – II **Network Devices &** **Network Topologies** **(16)**	2a. Outline the significance of given networks component. 2b. Explain the function of given network connecting device. 2c. Explain the merits/demerits of specified type of topology. 2d. Write the cable/ connector/ connecting device requirement to implement the given network topology.	2.1 Basic Components of Computer Network: cables, Host, connector, NIC 2.2 Network Devices and their roles: Hub, Switch, Router, Bridge, Gateway, and Modem. Wireless Infrastructure Component: Access Point, Clients 2.3 Network Topologies: Bus, Star, Ring, Tree, Mesh, Hybrid
Unit – III **Transmission Media & Switching** **(18)**	3a. Explain the given type of transmission media. 3b. Select appropriate transmission media for given network 3c. Explain the cellular telephone communication. 3d. Compare different switching technique on given parameter.	3.1 Types of Transmission Media: Wired and Wireless 3.2 Guided Media: Twisted Pair Cable, Coaxial and Fiber Optic Cable 3.3 Unguided media: Types of Communication Band-Microwave Communication, Radio wave Communication, Satellite Communication, Infrared Communication 3.4 Cellular (Mobile) Telephone - Band in Cellular Telephony, Calls

		using Mobile Phones, Transmitting receiving / Handoff operations 3.5 Switching: Circuit switched networks. Packet switched network
Unit – IV OSI Reference Model (12)	4a. Explain functions of given OSI model layer 4b. Describe the significance of the given design issue for layering in Protocol.	4.1 OSI Reference model: Layered Architecture, Peer-to-peer processes, Interfaces between Layer, Protocols, Encapsulation 4.2 Layers of OSI Reference Model (Functions and features of each layer: Physical Layer, Data Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, and Application Layer)

Unit - V TCP/IP Reference Model & Internet Addressing (20)	5a. Explain functions of given layer of TCP/IP model
	5b. Explain given protocol in brief
	5c. Calculate address range of hosts on each subnet for the given IP address.
	5d. Calculate subnet mask for given subnet
		5.1 TCP/IP Model: Layered Architecture,
		5.2 Layers of TCP/IP Model
		 5.2.1 Application Layer
		  5.2.1.1 DNS, Working of DNS.
		  5.2.1.2 HTTP, FTP
		 DHCP (Static and Dynamic Allocation)
		5.2.2 Transport Layer:
		  5.2.2.1 TCP and UDP Protocol. Difference between TCP and UDP
		5.2.3 Internet Layer
		  5.2.3.1 IP
		  5.2.3.2 1 ARP,RARP,ICMP protocols
		5.2.4 Host-to-Network Layer:
		  5.2.4.1 Token Ring, SLIP,PPP
		5.3 Addressing: Physical Addressing, Logical Addressing
		5.4 OSI Model Vs TCP/IP
		5.4 IP Address: Concept, Notation
		5.5 IPv4 Addressing: Classes, Subnet Mask, Subnetting, Supernetting, Classless Addressing
		5.6 IPv6 address, basic structure
		5.7 IPv4 vs IPv6

5. **SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Basics of Computer Network	12	4	6	4	14
2	Network Devices & Network Topologies	14	4	6	6	16
3	Transmission Media & Switching	14	6	6	6	18
4	OSI Reference Model	08	4	6	2	12
5	TCP/IP Reference Model	16	6	8	6	20
	Total	64				80

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

6. **LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS**

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Study network classification (LAN, MAN, WAN)	02
2	I	Configure Peer to Peer network with atleast three hosts.	02
3	II	Create small physical network using computers, network connecting devices and cable.	04
4	II	Install and Configure Network Interface Card and identify its MAC address.	02
5	II	Draw the network layout for your laboratory and configure it.	04
6	III	Prepare a Straight Cable and Network Cross over Cable and test by Line Tester.	04
7	III	Connect two hubs/switch by creating crossover connection	02
8	IV	Run the following commands with Options and record their output: ping, ipconfig, tracert, arp, whois, host, netsat, nslookup, ftp, telnet etc.	04
9	IV	Use Wireshark packet sniffer software and capture TCP,IP, UDP, ARP, ICMP, Telnet, FTP packets.	02
10	IV	Locate MAC address of Computer and configure TCP/IP Protocols (Version 4)	02
11	V	Identify and perform subnetting of IP addresses of each class.	02
12	VI	Configure IPv6 network using any network simulator.	02
		Total	32

7. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:

a. Case Study LAN setup in the institute.
b. Understanding configuration of LAN

SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Lecture and demonstration
b. Online animation/flash
c. Practical exercises, LAN implementation
d. Mini project related with industrial applications and house hold applications
e. Self Line learning
f. Application for practical will be assigned to the students by the subject faculty and students will work in a group of 2 maximum
g. Assignment can be given based on above topics.

8. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Data Communications and Networking	Behrouz Forouzan	TMH
2.	Computer Networks	Bhushan Trivedi	OXFORD
3.	Data communication and computer networks	ISRD group	TMH
4.	Computer Networks	Tannebaum Andrew S Wetherall David J	Pearson, New Delhi, 5th Edition, 2011

9. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Computer systems	
2.	Network Cable & Connector	Cat 5/Cat 6 & RJ45,RJ11
3.	Crimping Tool	
4.	UTP Cable Tester	Lan Tester
5.	Layer 2 Switch, Hub	24 port,48 port switches
6.	Wireless Access point and Wireless router	IEEE standard

10. LEARNING WEBSITE & SOFTWARE

a. http://nptel.iitm.ac.in/courses.php?disciplineId=106

b. http://www.edrawsoft.com

c. Network Simulator Tool: GNS3 v0.8.5, NetSimK

d. www.learnerstv.com

e. Cisco packet tracer or any other software

f. Wireshark or any other similar software to capture and investigate packets.

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Use of basic concepts of networking for setting up computer network	-	3	1	-	1	-	-	3	-
2	Setup of computer network for basic requirement.	-	3	2	-	2	-	-	2	-
3	Select relevant transmission media and switching techniques as per need	-	3	1	1	1	-	-	3	-
4	Explain functions of OSI Reference model	-	3	1	-	-	-	1	3	-
5	Configure TCP/IP Services.	-	3	-	-	2	-	-	3	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Ms. J.V. PATIL	Lecturer in IT Dept., Govt. Polytechnic, Aurangabad
2	Mrs. S.S. JAISWAL	Lecturer in CO Dept., Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE- **SEMINAR**

COURSE CODE **6S501**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering / Information Technology/ AIML	Fifth

1. RATIONALE

Seminar is the important aspect of any curriculum. Here the students has unlimited scope to integrate his knowledge and skills. This course is essential to understand the recent developments and latest trends in the field. This will help the students to acquire the skill like mining for information, analysis, communication, presentation skills etc. For effective presentation student must have good communication skill. With a given time limit student should be able to express his ideas and concepts, thoroughly in front of faculty members and other students, student should be able satisfy the queries raised by them as well as student should learn to take any feedback positively.

2. COMPETENCY

After learning this course student will be able to
"Deliver presentation to expose to recent development in technologies, researches, products, algorithms, protocols and so on"

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	75
00	-	02	02	00	00	#25	50	
Duration of the Examination (Hrs)				--	--	--	--	

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

4. COURSE OUTCOMES

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

1. Collect the information on selected topic.

2. Prepare the synopsis on the identified content.

3. Make use of internet / book / research paper to assimilate information

4. Deliver presentation on selected topic.

5. Prepare report on seminar topic.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Literature Survey**		1.1. Detailed Survey of any three seminar topics which are a recent trend in the field of information technology and coputing technology. 1.2. Seminar topic should not be a part of any course which student has already studied or will study in final semester of diploma. Also topic should not be repeated in last three batches. 1.3. No two students are allowed to take same topic. Also contents of seminar of no two students should match more than 30%.
Unit -II **Topic selection**		2.1. Each student has to make synopsis of three topic selected by student. 2.2. Submit this entire synopsis to the seminar coordinator. 2.3. Finalize a topic from seminar coordinator after the confirmation from panel of faculty from dept.

Unit III: **Collection and Assimilation of Information**		3.1. Student should gather/collect all information related to final topic either from internet, book or from any research / journal paper. 3.2. Assimilate the information so that student gets to know that how they were applied these concepts into existing technology.
Unit IV: **Prepare and Deliver Presentation of Seminar**		4.1. Each student will prepare a seminar presentation in the term making use of audio/visual aids for duration of 10-15 minutes and deliver it on the assigned date only. Every student is required to give presentation independently. 4.2. All students must attend seminars and it is expected that they should listen it carefully and take part in questioning actively. 4.3. A panel of faculty members along with guide will assess the seminar internally during the presentation. Faculty members should ask questions.
Unit V: **Preparing Seminar Report**		5.1. Each student should prepare seminar report containing at least 35 pages as per the format prescribed by department. Student should submit the seminar report in the form of spiral bound journal duly signed by the Guide, Head of Department and Principal.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching / Practical Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Literature Survey	06				
II	Topic selection	06				
III	Collection and Assimilation of Information	08	NOT APPLICABLE			
IV	Presentation of Seminar	06				
V	Preparing Seminar Report	06				

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Literature Survey	06
2	2	Topic selection	08
3	2	Collection and Assimilation of Information	08
4	2	Presentation of Seminar	06
5	2	Preparing Seminar Report	04
		Total	**32**

8. SUGGESTED STUDENTS ACTIVITIES

i) Aspects to be considered for report writing

- To study recent developments and technological advances in current technology.
- Develop communication skills.
- To enhance the presentation skills
- Seminar reports preparation.

II) SUGGESTED AREAS FOR THE SEMINAR:

AREA OF COMPUTER ENGINEERING / INFORMATION TECHNOLOGY	1. Image Processing
	2. Cloud Computing
	3. Networking
	4. Software Engineering
	5. Internet of Thing
	6. Computer, Information, Web & Network Security
	7. Computer Vision
	8. Machine Learning
	9. Data Warehousing & Mining
	10. Soft Computing
	11. Artificial Intelligence
	12. Parallel Computing
	13. Web Mining
	14. Semantic Analysis
	15. Optimization Technique
	16. Mobile Computing

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

i.   Do literature survey and identify area of interest for seminar preparation.

ii.   Visit the site if required.

iii.   Search on internet for information gathering.

iv.   Do comparative study of methods, identify case study etc

v.   Prepare report of seminar as per above instructions.

vi.   Prepare power point presentation of Seminar topic.

Seminar Report Format

1.   Seminar report shall be in the print form on A-4 size white bond paper.

2.   Typing shall be in Times New Roman with spacing of 1.5 using one side of paper.

3.   Margins: Left = 37.5 mm   Right, Top and Bottom = 25mm.

4.   Front page: Titles - TNR   18 bold, other – TNR 14 bold. With Institute Logo.

5.   Inner Pages: Titles –TNR – 14 Bold, other TNR 12.

6.   Page Nos: Should appear on the right hand top corner of each page starting after index page.

7.   Tables to be preferable in the Text format only.

8.   Sketches to be drawn on separate sheet / pages in black ink.

9.   The Last content in the index to be of references. Acknowledgement to be added in the report.

10. Binding: Spiral binding is preferred for the seminar report. The number of copies are to be prepared by the student are 3 nos. (Student + Guide + Department copy)

10. SUGGESTED LEARNING RESOURCE

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Desktop PC	Computer Systems with minimum i-3 intel pentium processor (or equivalent) and 1 GB RAM.
2.	LCD Projector	

12. LEARNING WEBSITE & SOFTWARE

1. http://www.seminarsonly.com/
2. http://a4academics.com/be-seminar-topics
3. http://www.seminarstopics.com/branch/latest-seminar-topics-for-cse-2017
4. http://www.collegelib.com/t-71-topics-for-computer-engineering-and-cse-technology-seminars-listed-latest-topics.html

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

S No	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Collect the information on selected topic.	--	3	--	3	--	--	--	--	2
2	Prepare the synopsis on the identified content.	--	1	--	---	--	--	--	--	2
3	Make use of internet / book / research paper to assimilate information	---	--	3	3	---	---	1	1	--
4	Deliver presentation on selected topic.	--	2	3	--	--	--	---	2	2
5	Prepare report on seminar topic.	--	3	--	--	--	--	2	2	2

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	P B Lahoti	Head of the Department, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **SOFTWARE ENGINEERING AND TESTING**

COURSE CODE-   **6N503**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

Software Engineering deals with reliability and quality assurance of the software under development. It provides framework for development of quality software product. Software testing helps in testing the software application or product against user requirements for the assurance of bug free software. The course enables the students to write specifications for software system, design and develop test plans according to design specifications and the process to deploy software.

2. COMPETENCY

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

"Apply software development lifecycle phases and process framework activities with automated software test plans and test cases to uncover errors for assuring the quality of software."

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE @ (PR/OR)	PA (TW)	125
3	0	2	5	80	20	--	25	
Duration of the Examination (Hrs)				3	1	--	--	

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

4. COURSE OUTCOMES

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

1. Use software process, models and framework to develop software.
2. Apply principles of software and requirement engineering.
3. Understand reactive and proactive risk strategies.
4. Apply Black Box and White Box Testing with testing type
5. Design the test plan for given application.
6. Estimate risk arises with project scheduling and maintain its quality

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
UNIT-I Software Development Process	1a. Able to understand software and software engineering 1b. Know the process framework of software; 1c. Learn the different process models.	1.1. Software- Definition, evolving role, characteristics, types of software 1.2. Changing nature of software, Software Myths 1.3. Software Engineering.- A layered Technology approach 1.4. A Process Framework- CMMI, Process Patterns, Process Assessment 1.5. Process Models- Waterfall, Incremental, RAD, Prototype, Spiral 1.6. Agile Software Development-Difference between prescriptive and agile process Model, Feature of the Agile Software Development Approach, Agile Scrum, Agile XP
UNIT-II Software Engineering Practices, Requirement and Design	2a. Recognize the basic Principles of software engineering and engineering phases; 2b. Able to understand the requirement engineering. 2c. Use design concept of software engineering	2.1. Software engineering core Principles Communication Practices, Planning Practices, Modeling Practices, Construction Practices 2.2. Deployment- Principles, Concept of Delivery cycle, support cycle and feedback cycle 2.3. Requirement Engg.-Concepts, Tasks, Initiating the requirement Process, Eliciting requirements, Building the analysis model, Negotiating requirements, Validating requirements 2.4. SRS (Software Requirement Specification): Concept of SRS, General Format of SRS, Need/Importance of SRS. 2.5. Design approaches of software engineering, Design process and quality: Design concept, Design Model

UNIT-III Risk Management	3a.Understand the different Risk Strategies 3b. Comprehend the Risk Management	3.1 Reactive vs. Proactive Risk Strategies 3.2 Software Risks 3.3 Risk Management Activities: Risk Assessment, Risk Control 3.4 Software Scope and Feasibility 3.5 Resources

UNIT-IV
 	
Basics of software Testing and methods
	4a. Describe Software testing Term
	4.b. Explain Black Box Testing
	4.c Explain White box testing
	4.d Able to understands various testing levels and type of software testing
		4.1 Introduction to Software Testing- Testing fundamentals, Testing objectives, testing principles
		4.2 The box approaches:
		    4.3.1 **Black Box Testing** - Concept of dynamic black box testing, Test-to-pass and Test-to-fail, Equivalence partitioning, Data testing: Boundary conditions, Sub-boundary condition, default, empty, wrong, incorrect & garbage data.
		    4.3.2 **White Box Testing- Concept of White box testing, Formal reviews**: Peer reviews, Walkthroughs, Inspections, Coding standards and guidelines
		4.3 Generic code review checklist
		4.4 Testing Levels: Unit/Component Testing, Module Testing, Integration Testing, System Testing, Acceptance Testing
		4.5 Type of Testing- Smoke Testing, Interface Testing, Usability Testing, Alpha Testing, Beta Testing, Stress Testing, Security Testing, Acceptance Testing

UNIT-V Automated Testing, Test Tools and Test Cases Writing	5.a Benefits of automation & tools 5.b.List of Testing tools 5.c Writing test cases 5.d Overview of test case planning	5.1 The benefits of Automation & Tools 5.2 List of Testing tools 5.3 Test Tools: Viewers and Monitors Programmed Macros, Stubs, and Stress & Load Tools. 5.4 Software Test Automation: Macro Recording & Playback, Programmed Macros, Fully Programmable, Automated testing tools 5.5 Writing Test Cases: The goals of Test Case Planning, Test Case Planning overview, Test Design, Test Cases. Test Procedures.
UNIT-VI Software Estimation and Quality Management	6a. Comprehend the Risk Management; 6b. Know the actual estimation of software Project. 6c. Appreciate the software project structure and its need 6d. Know the Quality concept of software	6.1 Software Project Estimation, Empirical Estimation Models: The COCOMO II Model, The Software Equation 6.2 Software project Management and its need, The management spectrum-4P's and their significance 6.3 Project Scheduling; Concept, Gantt Chart, Defining Task Network, Earned Value Analysis 6.4 Software configuration management 6.5 Basic Quality concept: SQA, Software Reviews, Software Reliability

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Software Development Process	08	6	4	4	14
2	Software Engineering Practices, Requirement and Design	10	3	7	6	16
3	Risk Management	06	2	4	4	10
4	Basics of software Testing and methods	10	6	6	4	16
5	Automated Testing , Test Tools and Test Cases Writing	06	3	3	4	10
6	Software Estimation and Quality Management	08	4	6	4	14
	Total	**48**	**24**	**30**	**26**	**80**

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Overview of Traditional Software process models such as Waterfall, Incremental, RAD, Prototype	02
2	I	Working of Agile Software Development Models like Agile Scrum, Agile XP	02
3	II	Create a full SRS document for any application e.g. Railway reservation System, College management system etc.	02
4	III	Design Risk management strategies on any software project e.g. school management system, Admission Registration system etc.	02
5	IV	Introduction to Software Testing and software Testing Tools	02
6	IV	Implement black box data testing for Simple calculator Application	02
7	V	Write test case to login a specific web page.	02
8	V	Write test cases for any application e.g. Railway reservation System, Library management etc	02
9	VI	Perform Software Project Estimation using The COCOMO II Model.	02
10	VI	Develop Project Scheduling of any software project using Gantt Chart, Task Network and measure the project performance using Earned Value Analysis	02
		Total	20

8. SUGGESTED STUDENTS ACTIVITIES

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

a. Internet Survey of various testing tools.

b. Test case and test plan management

c. Bug reporting and management

d. Presentations on advanced topics in software testing. Topics include: mutation testing, database testing, performance/load testing, and security testing, and automated test generation tools.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Improved Lecture methods

b. Q & A technique.

c. Designing test cases

d. Guiding students for writing test plans.

e. Activity based learning

f. Assign mini projects

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Roger Pressman	Software Engineering	Mc-Graw Hill
2.	Software Testing	Ron Patton	SAMS Tech Media
3.	Elias Awad	System Analysis and Design	Galgotia Publications
4	Software Testing: Principles & Practicals	Srinivasan Desikan, Gopalswamy Ramesh	Pearson Education

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Hardware : Desktop Computer P-IV processor or higher Software : Microsoft 2003 /any higher version , Winrunner, Test Director

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

S.No	Course Outcome	POs							PSOs	
									01	02
1	Use software process, models and framework to develop software.	3	3	-	-	3	-	3	-	-
2	Apply principles of software and requirement engineering.	1	3	-	1	1	-	1	-	-
3	Select appropriate software models for designing software.	1	3	-	-	-	-	-	-	-
4	Apply Black Box and White Box Testing with testing type	-	2	-	-	-	-	-	-	-
5	Design the test plan for given application.	-	3	1	-	-	-	-	1	-
6	Estimate risk arises with project scheduling and maintain its quality	1	1	-	-	-	-	3	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Mr. S.G.Chavan	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	Mrs. P.V.Sontakke	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **BIG DATA ANALYTICS**

COURSE CODE   **6N410**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

Big Data Analytics subject focuses on the fundamentals of data analysis, Hadoop Mapreduce Framework and Graph Analytics. At the end of this course the students will be understand statistical and predicative analysis.

2. COMPETENCY

Students will be able to:

"In Data Analyst course, you will gain understand in data analysis techniques along with data mining tools and data analysis tools."

Execute Advance SQL queries related to transaction processing."

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	
3	2	0	05	80	20	@25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR

– Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

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

1. Identify Big Data and understanding Data Architecture Design.
2. Get Conceptual Understanding of Hadoop Core and Mapreduce Framework.
3. Analyze NoSQL and Shared-Nothing Architecture for Big Data.
4. Understand the working of Big Data Analytics tools like Hive and Spark.
5. Use various Data Analysis tools for Data Analytics.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I **Introduction to Big Data Analytics**	1a. Identify the need of big data. 1b. Understand classifications and characteristics of big data. 1c. Comprehend Data Architecture Design. 1d. Prepare list of Big Data Analytics Applications.	1.1 Introduction – Need of Big Data 1.2 Big Data – Classification of Data, Definitions, Characteristics, Types, Classifications and Big data handling techniques 1.3 Designing Data Architecture – Data Architecture Design, Managing Data for Analysis 1.4 Data Sources, Data Quality and Data Preprocessing 1.5 Data Storage and Analysis – Data store with structured or semi-structured data, Big Data Storage, Big Data Platform, Big Data Analytics 1.6 Overview of Big Data Analytics Applications.
Unit - II **Hadoop**	2a. Write down core components and features of Hadoop. 2b. Use HDFS Commands to understand HDFS Data Storage. 2c. Identify Mapreduce Framework and its Programming Model 2d. Draw the diagram YARN based Hadoop Execution Model	2.1 Hadoop and its Ecosystem – Hadoop Core Components, Features of Hadoop, Hadoop Ecosystem Components 2.2 Hadoop Distributed File System – HDFS Data Storage, HDFS Commands 2.3 Mapreduce Framework and Programming Model – Hadoop Mapreduce Framework, Mapreduce Programming Model 2.4 Hadoop Yarn – Hadoop 2 Execution Model

Unit - III NoSQL	3a. Get the knowledge of NoSQL Data Architecture Pattern 3b. Identify NoSQL Solutions for Big Data. 3c. Compare Single Server Model, Master-Slave Distribution Model and Peer-to-Peer Distribution Model of Shared-Nothing Architecture for Big Data.	3.1 Introduction – Features of distributed computing architecture 3.2 NoSQL – Big Data NoSQL, CAP Theorem, Schema-less models 3.3 NoSQL Data Architecture Pattern – Key Value Store, Document Store, Tabular Data, Object Data Store, Graph Database 3.4 NoSQL to Manage Big Data – NoSQL Solutions for Big Data, Types of Big Data Problems 3.5 Shared-Nothing Architecture for Big Data – Single Server Model, Sharding very large databases, Master-Slave Distribution Model, Peer-to-Peer Distribution Model
Unit - IV Hive and Spark	4a. Learn Features and Characteristics of Hive. 4b. Distinguish between Hive and Traditional RDBMS. 4c. Understand the Applications of Pig. 4d. Study and use big data tool – Spark.	4.1 Hive – Features, Characteristics and Limitations. 4.2 Hive Architecture, Comparison with RDBMS, Hive Data types and File Formats, Hive Integration and Workflow Steps, Hive Built-in Functions 4.3 Pig – Overview, Applications and Features of Pig 4.4 Pig Architecture 4.5 Introduction to Big Data tool – Spark, Features of Spark, Data Analysis with Spark, Spark SQL.
Unit - V Web Mining and Overview of Data Analysis Tools	5a. Define Web Mining. 5b. Understand Page rank and Web Communities. 5c. Provide hands on Data Analysis Tools like Excel, Python, R, Tableau etc.	5.1 Web Mining, Web Content Mining, Web Usage Mining 5.2 Page Rank Definition, Web Structure, Topic Sensitive PageRank and Link Spam, Hubs and Authorities, Web Communities, Limitations of Link & Rank & Web graph analysis 5.3 Overview of Data Analysis Tools: Excel, Tableau, Power BI, R & Python, Hive, Pig, Spark

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introduction to Big Data Analytics	10	8	4	4	16
2	Hadoop	10	4	4	8	16
3	NoSQL	12	4	6	8	18
4	Hive and Spark	10	4	8	6	18
5	Web Mining and Overview of Data Analysis Tools	06	4	4	4	12
	Total	48	24	24	30	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1, 2	To study Big Data Analytics and Hadoop Distributed File System and HDFS Commands.	2
2	2	Install and configure Apache Hadoop.	4
3	2	Install 'MovieLens 100K Dataset' into HDFS using the Command line.	4
4	3	Install MongoDB and use MongoDB shell.	2
5	4	Analyze dataset with Pig.	4
6	4	Process dataset using RDD's in Spark	2
7	4	Process dataset with DataFrames in Spark	4
8	3,4	Integrate Spark with MongoDB	2
9	4	Use Hive to analyze dataset	4
10	5	Install Tableau, Understand User Interface, Dimensions, Measures, Pages, Filters etc.	4
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

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

   a. Installing Python and R on windows system
   b. Creating different Dataframes in python using pandas
   c. Data Analysis Tools like Excel, Tableau, Power BI, R & Python, Hive, Pig, Spark

9. Mini project: Create any Dataframe with at least 10 columns and perform various operations on that Dataframe like Filtering, GroupBy, Aggregation, Joining etc.

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

   a. Improved Lecture methods-
   b. Q & A technique.
   c. Designing Dataframe and reading CSV files in Python.
   d. Guiding students for designing Machine learning algorithms in python.
   e. Observe students and monitor the performance of students.
   f. Activity based learning.
   g. Assign mini projects.

11. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Big Data Analytics	Raj Kamal, Preeti Saxsena	McGraw Hill
2.	Data Analytics	Dr Anil Maheshwari	McGraw Hill
3	Data Analytics: The Complete Beginner's Guide	Byron Francis	Create Space Independent Publishing Platform

12. **LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED** :

Hardware: Desktop Computer P-IV processor or higher
Software: Windows 10 or higher, Python, R, MS-Excel, Apache Hadoop, Spark, Pig, Hive

13. LEARNING WEBSITE & SOFTWARE

   a. https://www.geeksforgeeks.org/data-analysis-with-python/
   b. https://www.nexsoftsys.com/articles/beginners-tutorial-for-hadoop-file-system-with-python.html
   c. https://www.geeksforgeeks.org/mongodb-and-python/
   d. https://www.w3schools.com/python/python_ml_linear_regression.asp
   e. https://www.geeksforgeeks.org/linear-regression-python-implementation/

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

SNo	Course Outcome	POs							PSOs	
									01	02
1	Identify Big Data and understanding Data Architecture Design.	2	-	3	-	3	2	-	2	-
2	Get Conceptual Understanding of Hadoop Core and Mapreduce Framework.	3	-	3	-	3	2	-	3	-
3	Analyze NoSQL and Shared-Nothing Architecture for Big Data.	2	-	2	-	3	2	-	2	-
4	Understand the working of Big Data Analytics tools like Hive and Spark.	3	-	3	-	3	2	-	3	-
5	Use various Data Analysis tools for Data Analytics.	3	-	3	-	3	2	-	3	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	M.B. Dahiwal	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	S.G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **DATA MINING AND WAREHOUSE**

COURSE CODE   **6N411**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

The course introduces the elements of the data warehouse development and Mining methodology (design, acquisition, management, analysis, query, mining, and visualization), focusing on serving the informational and analytical needs of an enterprise.

2. COMPETENCY

Learning these course students will be able to use Data Mining techniques for data analysis to maintain data warehouse.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	150
3	2	0	05	80	20	@25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. COURSE OUTCOMES

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

1. Design a data warehouse solution that serves informational and analytical needs of an enterprise.
2. Establish Scope and Necessity of Data Mining for various enterprise applications.
3. Build data warehouse to populate with data, and extract useful information.
4. Use the data warehouse solution to perform simple data mining tasks.
5. Apply one or more basic data mining techniques to identify frequent patterns, associations, and correlations in the data.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I **Introduction to data warehouse and Data mining**	1a. Identify Need of Given Data Warehouse. 1b. Analyse the benefits of designing data warehouse solution for given enterprise. 1c. Describe the various functionalities of Data warehouse. 1d.Differences between operational database and data warehouse in relation to given points. 1e. Explain the Issues in Data Warehouse designed for given scenario.	1.1 Concepts of Data warehouse and Data mining ,Social impacts of data, Data Mining from a Database Perspective 1.2 The Need for Data Warehousing Increasing Demand for Strategic Information, Inability of Past Decision Support System 1.3 List Features of a Data Warehouse and Data Mining. 1.4 Functionalities of Data warehouse 1.5 Differences between operational database and data warehouse 1.6 Issues in Data Warehouse and Data Mining 1.7 Application of Data Warehouse and Data Mining.
Unit - II **Datawarehouse and OLAP Technology-I**	2a. Differentiate between DBMS vs. Data Warehouse on the basis of given points. 2b. Identify types Data Mart in given application. 2c. Design Multidimensional data model for given problem statement. 2d. Describe Data Cube for given application. 2e. Describe metadata repository for given application. 2f. Design Data Warehouse Architecture for given enterprise.	2.1 Data Warehouse and DBMS 2.2 Data marts, types, Steps in Implementing a Data mart 2.3 Multidimensional data model 2.4 Data Cube and its significance 2.5 Types of data, Role of Metadata, Classification of Metadata 2.6 Data Warehouse Architecture Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations. Fact Tables and Dimension Tables 2.7 Dimensional Model Vs. ER Model 2.8 Distributed and Virtual Data Warehouse 2.9 Need for Online Analytical Processing OLTP V/s OLAP ,OLAP and Multidimensional Analysis, OLAP Operations in Multidimensional Data

		Model
Unit – III **Datawarehouse** **and OLAP** **Technology-II**	3a. Illustrate Design process for given Data Warehouse Design. 3b. Describe given OLAP Operation. 3c. Analyze the benefits of using OLAP tool for given scenario. 3d. Design Data Cube for given application.	3.1 Data Warehouse Design & usage , Design Approaches- Inmon's approach & Kimball's approach, Data Warehouse Implementation, Need of metadata in data warehouse , Concept Hierarchy 3.2 From Online Analytical Processing to Multidimensional Data Mining 3.3 Data Warehouse Implementation - Efficient Data Cube Computation: An Overview. 3.4 Indexing OLAP Data: Bitmap Index and Join Index, Efficient Processing of OLAP Queries.
Unit - IV **Data Mining**	4a. Identify Need of Data mining in given application areas. 4b. Distinguish between KDD versus Data mining on the basis of give criteria. 4c. Analyze Major issues in data mining solution designed for given business. 4d. Illustrate methods of Data preprocessing for given data. 4e. Demonstrate Data mining knowledge representation in selected scenario.	4.1 Data Mining definition and Task 4.2 KDD versus Data Mining, KDD Steps 4.3 What Kind of data can be mined, issues in data mining 4.4 Data Objects and Attributes types 4.5 Data Preprocessing need and methods Data cleaning ,Data transformation ,Data reduction ,Discretization and generating concept hierarchies 4.6 Task relevant data, Interestingness measures ,Visualization techniques 4.7 Describe the Data mining Techniques, tools 4.8 Noisy Data, Missing Values, Data Cleaning as process.
Unit - V **Mining Frequent** **Patterns and** **Classification**	5a. Describe Association Rule mining for given application domain. 5b. State why Association Mining is necessary in given application domain. 5c. Formulate the Association Rule obtained from given sample dataset. 5d. Apply Apriori Algorithm on given suitable dataset. 5e. Compare classification & prediction on the basis of given points.	5.1 Association Rule Mining-Basics Frequent Itemset, Market Basket Analysis. 5.2 Need of Association Rule Mining Algorithm examples, characteristics 5.3 Pros and Cons of Association Rules 5.4 Apriori Algorithm-Finding frequent itemset using candidate generation. 5.5 Classification & Prediction 5.6 Decision Tree Algorithm- ID3 , Attribute Selection Measures Entropy(H) and Information gain(IG), Construction of Decision Tree 5.7 Issues in Classification and Prediction

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	R level	U Level	A Level	TOTAL
			Distribution Of Theory Marks			
1	Introduction to data warehouse and Data mining	10	8	4	4	16
2	Data warehouse and OLAP Technology-I	10	4	4	8	16
3	Data warehouse and OLAP Technology-II	12	4	6	8	18
4	Data Mining	10	4	8	6	18
5	Mining Frequent Patterns and Classification	06	4	4	4	12
	Total	48	24	24	30	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1,2	Design simple data warehouse using SQL Server.	4
2	2	Execute OLAP operations such as Roll Up, Drill Down, Slice, and Dice through SQL- Server.	4
3	2	Apply preprocessing on dataset Weather. ARFF (Specify the name of the dataset chosen by each individual, instead of Weather) includes creating an ARFF file and reading it into WEKA using the WEKA Explorer.	4
4	3	Implement Data Cleaning (Data Transformation- Transforming data from one format to. another format) on sample data set in WEKA.	4
5	3	Apply various types of pre-processing on dataset Customer.arff and draw various graph using WEKA.	4
6	4	Apply Preprocessing, Classification and Visualization techniques on Agriculture dataset.	4
7	5	Apply Association rule based on (Apriori algorithm) on Dataset using WEKA.(Select suitable dataset)	4
8	5	Apply Association technique on Agriculture dataset	4
		Total	32

8.   SUGGESTED STUDENTS ACTIVITIES

 Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.
    a.   Identify what are the current Trends of Data Mining in given application domains.
    b.   Analyze Issues in Classification and Prediction for given dataset.

9.   Mini project: Analyze the need of Data cleaning for Agriculture dataset.

10. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES
These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.
    a.   Improved Lecture methods-
    b.   Q & A technique.
    c.   Designing Dataset and reading CSV files in WEKA.
    d.   Guiding students for designing Data Mining algorithms.
    e.   Observe students and monitor the performance of students.
    f.   Activity based learning.
    g.   Assign mini projects.

11. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Data Warehousing	Reema Thareja	Oxford,2009
2.	Data Warehousing Fundamentals	Paulraj Ponnian	John Willey, 2001.
3	Data Mining Techniques	Arun K pujari	Universities Press, Second Edition, 2010

12. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Hardware: Desktop Computer P-IV processor or higher
Software: Windows 10 or higher, WEKA, MS-Excel

13. LEARNING WEBSITE & SOFTWARE

• https://docs.oracle.com/cd/B28359_01/datamine.111/b28129/process.htm, accessed on20/1/2022
• https://www.oracle.com/in/database/what-is-a-data-warehouse/ accessed on20/1/2022
• https://towardsdatascience.com/data-warehouse-68ec63eecf78 accessed on20/1/2022
• https://www.ibm.com/cloud/learn/data-warehouse accessed on20/1/2022
• https://sites.pitt.edu/~hirtle/DataMineRefs.html accessed on20/1/2022

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Design a data warehouse solution that serves informational and analytical needs of an enterprise.	3	-	3	3	-	-	-	-	3
2	Establish Scope and Necessity of Data Mining for various enterprise applications.	3	-	3	3	-	-	-	-	3
3	Build data warehouse to populate with data, and extract useful information.	3	-	3	3	-	-	-	-	3
4	Use the data warehouse solution to perform simple data mining tasks.	3	-	3	3	-	-	3	-	3
5	Apply one or more basic data mining techniques to identify frequent patterns, associations, and correlations in the data.	3	-	3	3	-	-	3	-	3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	D S Sonwane	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	S.G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   ADVANCE DATABASE MANAGEMENT SYSTEM
COURSE CODE   6N412

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	V

1. RATIONALE

Advanced database management system is a diversified level course aims at designing of database for business, scientific and engineering application. At the end of this course the students will be able to develop simple and advanced PL/SQL code blocks also able to design relational database for industrial and educational projects.

2. COMPETENCY

Students will be able to:

"Design a relational database system with appropriate functionality to process the data and with constraints to maintain data integrity and avoid data redundancy. Execute Advance SQL queries related to transaction processing."

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	
3	2	-	05	80	20	@25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR – Oral Examination, TW - Term Work, # External, @ Internal

4. **COURSE OUTCOMES**
    At the end of studying this course students will be able to: -

    1. Design object oriented Data Model.
    2. Types of transactions and implementation of Atomicity and durability.
    3. Design of parallel database systems.
    4. Design distributed transaction model.
    5. Methods of recovery systems.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I **Object Oriented Database**	1a. New Applications of database system 1b. Design object oriented data model 1c. Explain object oriented languages	1.1 New database application 1.2 The object oriented data model: object structure, object classes, Inheritance, Object identity, Object containment 1.3 Object oriented languages 1.4 Persistent programming languages 1.5 The ODMG C++ object definition language
Unit – II **Transactions**	2a. Describe transaction concepts 2b States of transaction 2c Explain concurrent execution of transaction 2d Explain Serializability and recoverability	2.1 Transaction concepts 2.2 Transaction state 2.3 Implementation of atomicity & durability 2.4 Concurrent execution 2.5 Serializability 2.6 Recoverability
Unit - III **Parallel Database**	3a. Overview of parallel database 3b. Explain I/O parallelism 3c. Describe Interquery parallelism 3d. Describe Intraquery parallelism 3e. Describe Intraoperation parallelism	3.1 Introduction 3.2 I/O parallelism 3.3 Interquery parallelism 3.4 Intraquery parallelism 3.5 Intraoperation parallelism 3.6 Interopeartion parallelism 3.7 Design of parallel system

Unit - IV **Distributed** **Database**	4a. Overview of distributed data storage 4b. Explain distributed query processing 4c. Describe distributed transaction model 4d. Explain concurrency control 4e. Concept of deadlock handling 4f. Explain Multidatabase systems	4.1 Distributed data storage 4.2 Distributed query processing 4.3 Distributed transaction model 4.4 Commit protocols 4.5 Coordinator selection 4.6 Concurrency control 4.7 Deadlock handling 4.8 Multidatabase systems
Unit - V **Recovery System**	5a. Overview of recovery systems 5b. Explain log based recovery 5c. Describe shadow paging 5d. Describe advanced recovery technique	5.1 Failure classification 5.2 Storage structure 5.3 Recovery & Atomicity 5.4 Log based recovery 5.5 Shadow paging 5.6 Recovery with concurrent transactions 5.7 Advanced recovery technique

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Object oriented database	12	8	4	8	20
2	Transactions	12	8	4	10	22
3	Parallel database	10	4	4	4	12
4	Distributed database	08	4	4	6	14
5	Recovery system	06	4	4	4	12
	Total	48	28	20	32	80

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

7.   LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Implementation of Object Oriented database – Extended entity relationship	2
2	2	Implementation of parallel database	4
3	2	Implementation of parallel join and parallel sort	4
4	3	Implementation of triggers and assertion for bank database.	2
5	3	Construction of knowledge database	4
6	3	Study and working of WEKA tool	2
7	4	Query processing – Implementation of efficient query optimizer	4
8	4	Designing XML schema for company database.	2
9	5	Implement Distributed database for bookstore.	4
10	5	Deadlock detection algorithm for distributed database using wait for graph.	4
		Total	32

8.   SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided cocurricular
student's activities which need to be undertaken to facilitate the attainment of
various course outcomes of this course. The students are required to maintain portfolio of
their experiences which he/ she will submit at the end of the term.
a. Creating object oriented database
b. Design a parallel database model for any real time database system.
c. Discuss Advanced recovery techniques

9.   Mini project: Create any distributed database system for real life application.

10. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES
These are sample strategies, which a teacher can use to facilitate the attainment of course
outcomes.
a. Improved Lecture methods.
b. Q & A technique.
c. Designing real time object oriented data model.
d. Guiding students for designing real time parallel database system.
e. Observe students and monitor the performance of students.
f. Activity based learning.

11. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Database system concepts	Henry Korth	MGH
2.	SQL / PL-SQL	Ivan Bayross	BPB
3	An Introduction to Database Systems	C. J. Date	Pearson Education

12. **LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED** :

Hardware: Desktop Computer P-IV processor or higher
Software: Windows 10 or higher, Oracle, SQL Server, MySQl

13. LEARNING WEBSITE & SOFTWARE
a. Ms-Access Tutorial : http://www.quackit.com/microsoft_access/tutorial/
b. SQL Basic Concepts: http://www.w3schools.com/sql/
c. SQL Tutorial : http://beginner-sql-tutorial.com/sql.htm
d. DBMS:http://nptel.iitm.ac.in/video.php?subjectId=106106093

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Design object oriented Data Model.	-	3	3	3	-	-	2		
2	Types of transactions and implementation of Atomicity and durability.	-	3	3	3	-	-			
3	Design of parallel database systems.	-	3	2	3	-	-			
4	Design distributed transaction model.	-	3	3	2	-	-	1		
5	Methods of recovery systems.	-	3	-	-	-	-	3		

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	M. B. Dahiwal	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad
2	S.G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **ENTREPRENEURSHIP DEVELOPMENT**
COURSE CODE   **6G306**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
All Programmmes	Sixth

1. RATIONALE

In the post liberalization era significant growth in industrial sector has led to creation of huge opportunities in manufacturing and service sector. In such a scenario especially in Indian contest it has led to innumerable opportunities for first generation entrepreneurs on a large scale. Therefore it is expected that engineers need to be developed for manufacturing, service sector and entrepreneurship development. This course, which represents Allied level of courses, aims at imparting entrepreneurial skills amongst engineers of all disciplines.

2. COMPETENCY

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

"Design a project proposal for an enterprise"

3. TEACHING AND EXAMNATION SCHEME

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

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

4. COURSE OUTCOMES

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

1 Apply business/enterprise principals and characteristics.
2 Design information and supporting system related to start a business.
3 Estimate and record   financial requirements.
4 Develop detailed project report.
5 Use various software related to business.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Basic Concepts of Entrepreneur	1a. Describe Entrepreneur. 1b. Identify Risk Use Creative skills 1c. Describe Risk Situation. 1d. Generate Business Idea Methods and techniques to generate Business. 1e. Plan for Transforming Ideas in to opportunities. 1f. Carryout of SWOT Analysis.	**Basic Concepts** of Entrepreneur 1.1. Concept, Classification & Characteristics of Entrepreneur. Creativity and Risk taking, Concept of Creativity & Qualities of Creative person. Risk Situation, Types of risk & risk takers. 1.2 Business Idea Methods and techniques to generate business idea. 1.3 Transforming Ideas in to opportunities- transformation involves Assessment of idea & Feasibility of opportunity, 1.4 SWOT Analysis.

Unit– II **Information And Support Systems**	2a. Use Information data for business. 2b. Information related to support system. 2c. Lay down the Procedures and related to Information. 2d. Identify Govt. Support Systems related to EDP. 2e. Explore subsidies to entrepreneur.	2.1 Information Needed and Their Sources. Information related to project, Information related to support system, Information related to Procedures and formalities. 2.2 Support Systems: • Small Scale Business Planning, Requirements. • Govt. & Institutional Agencies, Formalities • Statutory Requirements and Agencies. Government Support and subsidies to entrepreneur.
Unit– III **Market Assessment**	3a Undertake Market survey. 3b Use Marketing skills and Survey. 3c Assess market for business opportunities.	**Market Assessment** 3.1 Marketing -Concept and Importance 3.2 Market Identification, Survey Key components. (Market Segmentation) 3.3 Market Assessment.
Unit– IV **Business Finance & Accounts**	4a. Determine product cost. 4b. Analyze for breakeven of business proposal. 4c. Maintain Business finance and accounts.	**Business Finance & Accounts** **4.1 Business Finance** • 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

Unit - V
 	
Business Plan & Project Report
	5a. Prepare Business proposal.
	5b. Undertake project appraisal.
	5c. Undertake cost benefit analysis. Cost benefits analysis.
		Business Plan & Project Report
		
		5.1 Business plan steps involved from concept to commissioning
		
		    Activity Recourses, Time, Cost
		
		5.2 **Project Report**
		
		    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.

Unit – VI
 	
Enterprise Management And Modern Trends
	6a. Manage resources.
	6b. Prepare plan for productivity.
	6c. Assure Quality.
	6d. Explore Govt facilities (Industrial zones and SEZ.)
	6e. Explore E-Commerce avenues for business.
		Enterprise Management And Modern Trends
		
		6.1 Enterprise Management: -
		
		  1) Essential roles of Entrepreneur in managing enterprise
		  2) Product Cycle: Concept And Importance
		  3) Probable Causes Of Sickness
		  4) Quality Assurance, Importance of Quality, Importance of testing
		  5) Industrial zones and SEZ.
		6.2 E-Commerce, Concept and process.
		
		6.3 Global Entrepreneur: role and opportunities.

Unit – VII **INTRODUCTION**	7a. Use business related software's. 7b. Survey Software's used in Mall , industries. 7c. Identify Software's	**INTRODUCTION BUSSINESS RELATED SOFTWARES**

BUSSINESS RELATED SOFTWARES	used For accounting.	7.1 Software's used in Mall. 7.2 Software's used in Medical shops. 7.3 Software's used in industrial stores such as SAP, ERP. 7.4 Software's used for accounting such as FICO, FINNACLE

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	R Level	U Level	A Level	Total Marks
I	Basic Concepts of Entrepreneur.	04	NA	NA	NA	NA
II	Information And Support Systems	05	NA	NA	NA	NA
III	Market Assessment	05	NA	NA	NA	NA
IV	Business Finance & Accounts	05	NA	NA	NA	NA
V	Business Plan & Project Report	05	NA	NA	NA	NA
VI	Enterprise Management And Modern Trends	04	NA	NA	NA	NA
VII	Introduction business related software's	04	NA	NA	NA	NA
	Total	**32**	NA	NA	NA	NA

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required

1	I	Literature survey of Financial Banks for Industries– MSFC/IDBI/MSSIDC/CIDBI/MSME/DIC/ ROLE OF DIFFERENT COMMERCIAL BANKS etc.	04
2	II	Administration of readymade tools like questionnaires, opinionative, Interview schedule for product identification purpose (decision making process)	04
3	III	Development of "Business Ideas". Take any product and develop the business idea for it.	04
4	IV	Visit to MCED/MITCON- going through the product related library.	04
5	VI	Preparation of Preliminary / Detailed project report in the formats recommended by MCED/MITCON Prepare project report and study its feasibility.	04
6	VI	At least one case study of successful entrepreneur.	04
7	---	Assess yourself-are you an entrepreneur?	04
Total			**28**

8.   SUGGESTED STUDENTS ACTIVITIES

1. Prepare journals based on assignments.
2. Carry out Literature survey of Financial Banks for Industries.
3. Analyze the specifications, costs, quality and availability for various types of engineering components and find the business opportunity for it.
4. Interact with supplier/trader and discuss about business opportunities available in market.
5. Designing software for requirements to start business or similar type of issues. .
6. preparing project report for any product to be manufactured.
7. Search online PPT's, PDF's, video's on the design and software's for business.

9.   SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

1. Group discussion among students.
2. Arrange visits to industries and show various industrial jobs.

3. Motivate students to use internet and collect name, addresses, catalogues, rates, specifications of institutes and industries working in the area of business promotions.
4. Arrange expert lecture on various opportunities in business.

10. SUGGESTED LEARNING RESOURCE

Sr.No.	Title of Book	Author	Publication
1	Entrepreneurship Development	----	NITTTR, Bhopal
2	The Seven Business Crisis& How to Beat them	V.G.Patel	S.Chand and Co. New Delhi
3	A handbook of New Entrepreneurs	P.C.Jain	,Dhanpat Rai and Sons
4	Entrepreneurship development	E.Gorden, K. Natrajan	Charotar Publication House
5	New Initiatives in Entrepreneurship Education And training	Gautam Jain, Debmuni Gupta	Tata Mc- Graw Hill
6	Entrepreneurship Theory and Practice	J.S.Saini,B.S.Rathore	Tata Mc- Graw Hill
7	Enterpreneurship Development and management	A.K.Singh	Laxmi Publications
8	The Beer mat Entrepreneur	South on D F	Pearson Education limited

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Computers for Practical's with internet facility
1. Software's used in Mall.
2. Software's used in Medical shops.
3. Software's used in industrial stores such as SAP, ERP.
4. Software's used for accounting such as FICO, FINNACLE.

12. LEARNING WEBSITE & SOFTWARE

   i.   http://www. product-list. php
  ii.   http://www.SAP.com/products/faro-software
 iii.   http://www.ERP.com
 iv.   http://www.fico.com
  v.   http://finnacle.com
 vi.   Visit www.ediindia.org.
vii.   http://www.project reports.com

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

CO. NO.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	No. of hours allocated in curriculum
CO 1	Apply business/enterprise principals and characteristics.	3	3	-	-	-	-	2	-	3	-	2	6
CO 2	Design information and supporting system related to start a business.	3	3	-	-	-	-	3	-	3	-	-	8
CO 3	Estimate and record financial requirements.	3	3	-	-	-	-	3	-	3	-	2	6
CO 4	Develop detailed project report.	3	3	-	-	-	-	-	-	3	2	-	6
CO 5	Use various software related to business.	3	3	-	-	-	-	-	-	3	3	-	6

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	Prof. A. W. Nemade	Lecturer in Mechanical Engineering, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **NATURAL LANGUAGE PROCESSING**

COURSE CODE   **6N302**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	VI

1. RATIONALE

This course is about a variety of ways to represent human languages (like English) as computational systems, and how to exploit those representations to write programs that do useful things with text and speech data, like translation, summarization, extracting information, question answering, natural interfaces to databases, and conversational agents. This field is called Natural Language Processing or Computational Linguistics, and it is extremely multidisciplinary. This course will therefore include some ideas central to Machine Learning

2. COMPETENCY

Students will learn how to process written text from basic of fundamental knowledge starts with Finite automata, Regular expression and probabilistic model with n-grams.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	
4	0	2	05	80	20	#25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR

– Oral Examination, TW - Term Work, # External, @ Internal

4. **COURSE OUTCOMES**
   At the end of studying this course students will be able to: -

   1. Use basic concepts of Natural Language Processing.
   2. Use the language model to perform various task related to NLP.
   3. Understand the working of Automatic Tagging and N-gram tagging for categorizing words.
   4. Apply Supervised Classification and Decision Trees for Information Extraction.
   5. Examine the meaning of sentences using Propositional Logic.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I Language Processing, Accessing Text Corpora and Lexical Analysis	1a. Describe various language techniques. 1b. Describe the given type of regular expressions 1c. Enlist different types of language text. 1d. Describe Senses and Synonyms in context to Wordnet. 1a. Describe Text Corpora.	1.1 Introduction to NLP, Regular Expressions 1.2 Computing with Language: Texts and Words, Getting Started with NLTK, Searching Text, Counting Vocabulary 1.3 Computing with Language: Simple Statistics, Frequency Distributions, Collocations and Bigrams 1.4 Automatic Natural Language Understanding: Word Sense Disambiguation, Pronoun Resolution, Machine Translation, Spoken Dialogue Systems, Limitations of NLP 1.5 Accessing Text Corpora: Gutenberg Corpus, Web and Chat Text, Brown Corpus, Reuters Corpus 1.6 Lexical Resources 1.7 WordNet: Senses and Synonyms
Unit - II Processing Raw Text	2a. Select a method to access text form web and explain it. 2b. Apply basic string operations using nltk. 2c. Describe the process of Normalizing text. 2d. Describe the process of Segmentation and	2.1 Accessing Text from the Web and from Disk: Electronic Books, Dealing with HTML, Reading Local Files 2.2 Strings: Text Processing at the Lowest Level - Basic Operations with Strings, Printing Strings, Accessing Individual Characters, Accessing Substrings, More Operations on Strings

	formatting.	2.3 Normalizing Text: Stemmers, Lemmatization 2.4 Segmentation: Sentence Segmentation, Word Segmentation 2.5 Formatting: From Lists to Strings
Unit - III **Categorizing and Tagging Words**	3a. Understand how to read tagged corpora. 3b. Explain n-gram tagging and unigram tagging. 3c. Compare Automatic and N-gram tagging.	3.1 Using a Tagger: Representing Tagged Tokens, Reading Tagged Corpora 3.2 Automatic Tagging: The Default Tagger 3.3 N-Gram Tagging: Unigram Tagging 3.4 Transformation-Based Tagging 3.5 How to Determine the Category of a Word: Syntactic Clues, Semantic Clues
Unit - IV **Classification and Extraction of Information from Text**	4a. Explain the supervised classification technique for NLP. 4b. Describe Precision and Recall and Confusion Matrices. 4c. Describe Noun Phrase Chunking technique.	4.1 Supervised Classification 4.2 Evaluation: The Test Set, Accuracy, Precision and Recall, Confusion Matrices 4.3 Decision Trees 4.4 Information Extraction 4.5 Chunking: Noun Phrase Chunking
Unit - V **Analyzing the Meaning of Sentences**	5a. Describe Semantics and logic. 5b. Classify Propositional Logic and First-Order Logic 5c. Describe Principle of Compositionality	5.1 Natural Language Understanding: Querying a Database 5.2 Natural Language, Semantics, and Logic 5.3 Propositional Logic 5.4 First-Order Logic: Syntax 5.5 The Semantics of English Sentences: Principle of Compositionality 5.6 Applications of NLP

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	R level	U Level	A Level	TOTAL
			Distribution Of Theory Marks			
1	Language Processing, Accessing Text Corpora and Lexical Analysis	14	6	8	4	18
2	Processing Raw Text	14	6	6	4	16
3	Categorizing and Tagging Words	12	6	4	6	16
4	Classification and Extraction of Information from Text	10	6	4	4	14
5	Analyzing the Meaning of Sentences	14	6	6	4	16
	Total	64	30	28	22	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Study Natural language toolkit (NLTK).	2
2	1	Download and install Natural Language Toolkit.	2
3	1	Write Python code for Tokenizing by word using NLTK.	2
4	2	Import the relevant parts of NLTK in order to filter out stop words.	4
5	2	Implement the concept of Stemming using Python and NLTK.	4
6	3	Implement the concept of Tagging Parts of Speech using Python and NLTK.	4
7	4	Implement the concept of Lemmatization using Python and NLTK.	4
8	4	Perform Basic Operations with Strings using Python and NLTK.	4
9	5	Implement Synonym processing using WordNet and NLTK.	4
10	5	Implement the concept of Chunking using Python and NLTK.	2
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

- Import nltk and download the 'stopwords' and 'punkt' packages.
- Develop and execute a program to tokenize tweets.

9. Mini project
- Develop and execute a program to computer Word Mover Distance
- Develop and execute a program to create bigram, trigram using ngrams.
- Develop and execute a program to do text generation starting from a given piece of text.
- Develop and execute a program to create a question-answering system from given context.
- Develop and execute a program to convert documents into JSON format.

10. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Improved Lecture methods-
b. Q & A technique.
c. Reading CSV files in Python.
d. Guiding students for designing NLP algorithms in python.
e. Observe students and monitor the performance of students.
f. Activity based learning.
g. Assign mini projects.

11. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Natural Language Processing with Python	Steven Bird, Ewan Klein and Edward Loper	O'Really
2.	Speech and Language Processing	Daniel Jurafsky, James H. MMartin	Pearson

12. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Hardware: Desktop Computer P-IV processor or higher
Software: Windows 10 or higher, Python, R, MS-Excel, NLTK

13. LEARNING WEBSITE & SOFTWARE
i) https://realpython.com/nltk-nlp-python/
ii) https://medium.com/ml-research-lab/beginner-practical-guide-of-natural-language-processing-nlp-dfb04648783f
iii) https://www.nltk.org/book/ch10.html
iv) https://www.machinelearningplus.com/nlp/nlp-exercises/
v) https://towardsdatascience.com/a-practitioners-guide-to-naturallanguage-processing-part-i-processing-understanding-text-9f4abfd13e72

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Use basic concepts of Natural Language Processing.	3	--	3	3	--	--	--		3
2	Use the language model to perform various task related to NLP.	3	--	3	3	--	--	--		3
3	Understand the working of Automatic Tagging and N-gram tagging for categorizing words.	3	1	3	3	--	--	--		3
4	Apply Supervised Classification and Decision Trees for Information Extraction.	3	--	3	3	2	2	2		3
5	Examine the meaning of sentences using Propositional Logic.	3	--	3	3	2	2	2		3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	S. G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Chhatrapati Sambhajinagar
2	N. V. Patil	Lecturer in Computer Engineering, Govt. Polytechnic, Chhatrapati Sambhajinagar

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   NETWORK MANAGEMENT & ADMINISTRATION

COURSE CODE   **6T402**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Information Technology / AN	SIXTH

1. RATIONALE

Network Management & Administration is an applied level course to connect workstation to other computers for sharing peripherals such as printers, data, software, hardware. With the proper configuration of operating system on the server, the students will manage and administrate the network resources or devices such as printers, scanner, driver and also software like files, folders, directories, applications, programs. This subject covers the installation and configuration of network operating system.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:
     " Plan, install, configure, administer and manage network".

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)					Total
				Theory		Practical			
L	T	P	C	ESE	PT	ESE (PR)	PA (TW)	OR	50
1	0	2	3	0	0	0	25	@25	
Duration of the Examination (Hrs)				--	--	--	--		

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

4. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

> Students will be able to:-
> 1. Identify directory Services and Remote Access for computers over network.
> 2. Configure network and DNS.
> 3. Configure Network server(windows server 2008/2012/2013) operating system.
> 4. Configure various services of network on Windows server platform.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit – I **Exploring Directory Services**	1.1 State & explain types of Network related jobs 1.2 Explain Directory Services 1.3 Explain Active Directory Architecture 1.4 Explain Virtual private network	1.1 Network Related Jobs – Network Administrator, Network Engineer, Network Architecture / Designer, Other Network Related Jobs. 1.2 Directory Services - Define Directory Services, Definition of Novelle Directory, Windows NT domains, 1.3 Active Directory Architecture – Object Types, Object Naming, Canonical Names, LDAP Notation, Globally unique identifiers,User Principle Names, Domain, Trees & Forests. 1.4 Virtual Private Network – VPN Protocols, Types of VPNs, VPN Clients,SSL VPNs.
Unit – II **Network Connection and Printing Services.**	2.1 Explain Dynamic Host Configuration (DHCP) 2.2 Explain Domain Name Service 2.3 Demonstrate Understanding	2.1 Dynamic Host Configuration Protocol (DHCP) – DHCP Origins, Reverse Address Resolution Protocol (RARP), The Bootstrap Protocol (BOOTP), DHCP Objectives, IP Address Assignment, DHCP Architecture. 2.2 Introduction to Domain Name System(DNS) - DNS Objectives, Domain Naming, Top Level Domains, Second

	of Network printing	Level Domains, Sub domains, DNS Functions, Resource Records, DNS Name Resolution, Resolves, DNS Requests, Root Name Servers, Resolving a Domain Name, DNS Name Registration. 2.3 Understand Network Printing Concepts - Understand Network Printing Concepts, Locally connected print devices, Setting up local print devices, Shared print devices, Sharing Locally Attached Print Devices, Describe Windows Network Printing, Add Print Wizard.
Unit -III **Implementation of Network**	3.1 Demonstrate understanding of various networks need, Applications 3.2 Demonstrate Installation and configuration of Windows 2008 Server 3.3 Explain Domain controller	3.1 Designing Network – Accessing Network Needs, Applications, Users, Network Services, Security and Safety, Growth and Capacity Planning, Meeting Network Needs – Choosing Network Type, Choosing Network Structure, Choosing Servers. 3.2 Installing and Configuring Windows 2008 Server - Preparing for Installation, Creating windows 2008 server boot disk, Installing windows 2008 server, Configuring server/ client 3.3 Setting windows 2008 server - Creating Domain controller, Adding the DHCP and WINS roles, Adding file server and print server, Adding Web based Administration.
Unit - IV **Administering Windows 2008 Server (The Basics)**	4.1 Competency of account handling related to Server system. 4.2 Demonstrate group maintenance 4.3 Explain shares security 4.4 Demonstrate and understanding of server backup	4.1 Working With User Accounts - Adding a User, Modifying User Account, Deleting or Disabling a User Account. 4.2 Working With Windows 2008 Security Groups – Creating Group, Maintaining Group Membership. 4.3 Working with Shares – Understanding Share Security, Cresting Shares, Mapping Drives 4.4 Administering Printer Shares – Setting up Network Printer, 4.3 Working with Windows 2008Backup –

		Using Windows 2008 Servers Backup Software

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	**Exploring Directory Services and Remote Network Access.**	04	**Not Applicable**			
II	**Network Connection and Printing Services.**	04				
III	**Implementation of Network**	05				
IV	**Administering Windows 2008 Server (The Basics)**	03				
	Total	**16**				

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Identify directory services for remote access of a system.	02
2	I	Identifying and recognizing network components.	02
3	I	Installing Active Directory.	02
4	I	Creating Active Directory Objects.	02
5	II	Installing Windows XP Professional within Windows 2008 domain.	02

6	II	i. Set up a Local Print Device. ii. Installing and Configuring a Network – Capable Print Device.	02
7	II	Create new Users & give the Permission	02
8	III	Installing Windows 2008 Server.	02
9	III	Installation of Linux operating systems.	02
10	III	Installation and configuration Samba server.	02
11	IV	Configure IPv4/IPv6 and advance TCP/IP settings.	02
12	IV	Install IIS server.	02
13	IV	Installing and Configuring DHCP Server.	02
14	IV	Perform Linux system administration commands such as Managing file system, Disk management utilities, mounts, umount, df, du, fdisk, su, useradd etc.	02
15	IV	Configure Linux using DHCP Server.	02
16	IV	Configuration of FTP Services/Mail Services/Web Server.	02
		Total	**32**

8. SUGGESTED STUDENTS ACTIVITIES

i.Student should submit a term work in the form of journal containing at least 12 (Twelve) experiments and /or assignments conducted during the course from the List of Experiments.
ii .Each experiment / assignment has to be well documented
iii.Diagram, and Conclusion (as applicable).

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

i. Use online tutorials to guide students for desk top computer system, laptops, servers with latest configuration.
ii. Demonstrate practical thoroughly using windows server version.

10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	The Complete Reference Networking	Craig Zacker	Tata McGraw-Hill
2.	Networking A Beginner's Guide	Bruce Hallberg	Tata McGraw-Hill
3	Introduction to Networking	Richard A. McMohan,Sir	Tata McGraw-Hill
4	Networking + Certification Training Kit		Microsoft Press
5	Linux Lab: Hands on Linux	Dayanand Ambawade and Deven N.Shah	Wiley Dreamtch Pvt. Ltd

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Desk top computer system, laptops	with latest configuration.
2.	Software	windows 2008 server

12. LEARNING WEBSITE & SOFTWARE

i.   http://www.w3school.com

ii. Software: Microsoft windows operating system from XP/vista/7/8 to latest version available in market, Windows server, linux/ubuntu/centos, server operating system

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

SNo	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
CO1	Compare different types of network.	2	1	-	-	-	-	-	-	-	-	2	-
CO2	Describe the different types of network directory services.	3	3	3	-	-	-	-	-	-	-	1	-
CO3	Ability to install and configure Windows 2003 Server.	-	3	3	3	-	-	-	-	-	-	1	-
CO4	Configure the networking resources and software from the server.	-	3	3	1	-	-	-	-	-	-	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	N.M.Masuldar	Lecturer in Computer Engineering, Govt. Polytechnic,Aurangabad
2	P.S.Hiwale	Lecturer in Computer Engineering, Govt. Polytechnic,Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **PROJECT**

COURSE CODE   **6S502**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering / Information Technology / AIML	Sixth

1. RATIONALE

One of the basic aim of "Project " is to develop the ability of "learning to Learn " on his own and work in team. Project course provides opportunities for students to keep pace with future changes in technology and in the acquisition of knowledge and skills as and when needed. The course of the "Project" is designed with an aim to all these requirements of the students which will include planning of the Programme, which must be completed within the time allocated. The Project should never have a single solution and process of arriving at a particular solution, the student must be required to make number of decisions after study information as he has gathered from experiments, surveys, analysis etc.

The programme aims at developing in the student, knowledge and skills to match the current and projected needs of industry/ user systems, social awareness and professional attitudes. In relation to the course and topics to be taught, the student will have to constantly update himself and keep pace with the changing technologies and the current and projected needs of user systems.

2. COMPETENCY

After learning this course student will be able to
"Apply the knowledge of various courses to solve real life problems of society and to develop team work, leadership and entrepreneurship skills to make students professionally competent"

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	150
00	-	04	04	00	00	#50	100	

| Duration of the Examination (Hrs) | -- | -- | 02 | -- | |

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

4.   COURSE OUTCOMES

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

1.   Conduct literature survey for project selection.

2.   Design problem statement according the need of Project.

3.   Implement the project using modules

4.   Test the project as per the requirement.

5.   Write report in prescribed formats.

5.   DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Information Gathering and Literature Survey.**		1.1. Detailed Survey of any three Project topics which are a recent trend in the field of information technology and computing technology and Selection of Project Option and Framing the Problem to solve as a Project for the group of 3 to 4 students. 　　Option A: Industry Sponsored Project 　　Option B: Application Project 　　Option C: Study Based Project 1.2. Project must be based on knowledge acquired within three years of Diploma. Students must be aware with languages, packages hardware, he/ she is using in his/her project.
Unit -II **Project Design**		2.1. This is Second phase in which students will actually start collecting detail information about their project.

		That is project selection formalities must be completed before registering for project course.
		1. Group must visit concern persons in the field to collect the system requirement. A practical design and development is to be achieved.
		2. They must adopt standard procedures, rules, regulation used in the real system and no imaginary model should be developed.
		3. Group can collect information about any other package, software currently under development on same subject or already developed and group should study what facilities the available software provide and what are its drawbacks.
		4. If any such software is implemented / installed at some industry students must visit and collect on site information.
		5. Taking into consideration all requirements, design total system in top down fashion.
		6. Design must be modular and there must be clear distribution of task among group members.
Unit III: Project Development		3.1 In Third Phase students are expected to utilize their time for actual coding, testing, of project.
		1. Independent module development is necessary.
		2. Enough time must be provided in time-table for project development
		3. There must be continuous assessment of project development.
		4. Prototype model may be developed and tested.
		5. Taking into consideration shortcoming and suggestions final Software/Hardware should be

		developed by the end of sixth semester
Unit IV: **Project Testing**		4.1. Testing of problem statement using generated test data (using mathematical models, Function testing principles) selection and appropriate use of testing tools, testing of UML diagram's reliability. (recommended submission date:- two weeks before term end)
Unit V: **Project Report**		5.1. Each group should prepare project report containing at least 35 pages as per the format prescribed by department. Student should submit the Project report in the form of hard bound journal duly signed by the Guide, Head of Department and Principal. 5.2. Project Report Must Include: 1. Title page of the project 2. Acknowledgement Page 3. Certificate page of college (certificate must be included for a project if it is a sponsored project form industry or organization) 4. Abstract of the project (One Page) 5. Introduction of Project (two to three pages) 6. Feasibility analysis of Project (as per point no. 4 in Project selection). 7. Scope of the project 8. Project design. 9. Algorithms. 10. DFDs /E-R Diagrams/Flowchart, wherever applicable. 11. User manual 12. Limitations/Future development. 13. Costing. 14. Bibliography. 15. Project source code with entire set of accessories such as database, drivers etc. in form of CD. 16. Data sheets of only uncommon,

		(main Integrated Circuits) Main I/C e.g. Speech synthesiser IC and not of common I/C like 8085. There is no need of any explanation of common I/C and their interfacing.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching / Practical Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Information Gathering and Literature Survey.	08				
II	Project Design	12				
III	Project Implementation	30	NOT APPLICABLE			
IV	Testing	06				
V	Project Report	08				

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Information Gathering and Literature Survey.	08
2	2	Project Design	12
3	3	Project Implementation	30
4	4	Testing	06
5	5	Project Report	08
		Total	**64**

8. SUGGESTED STUDENTS ACTIVITIES

- Form the group of 4/5 student for a project activity.
- Allot the guide (faculty) for each group.
- Decide the topic of project
- Conduct survey/experimentation
- Report writing and presentation

I) SUGGESTED AREAS FOR THE SEMINAR:

AREA OF COMPUTER ENGINEERING / INFORMATION TECHNOLOGY	1. Image Processing 2. Cloud Computing 3. Networking 4. Software Engineering 5. Internet of Thing 6. Computer, Information, Web & Network Security 7. Computer Vision 8. Machine Learning 9. Data Warehousing & Mining 10. Soft Computing 11. Artificial Intelligence 12. Parallel Computing 13. Semantic Web Mining 14. Optimization Technique 15. Mobile Computing 16. Recent Technology / Latest Trends in technology

9.   SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

- The project topic/ title should not repeated by group.
- Guide should be Senior or experienced faculty
- The project topic should selected such that, it should complete in a semester.

Seminar Report Format

1. Seminar report shall be in the print form on A-4 size white bond paper.

2. Typing shall be in Times New Roman with spacing of 1.5 using one side of paper.

3. Margins: Left = 37.5 mm   Right, Top and Bottom = 25mm.

4. Front page: Titles - TNR   18 bold, other – TNR 14 bold. With Institute Logo.

5. Inner Pages: Titles –TNR – 14 Bold, other TNR 12.

6. Page Nos: Should appear on the right hand top corner of each page starting after index page.

7. Tables to be preferable in the Text format only.

8. Sketches to be drawn on separate sheet / pages in black ink.

9. The Last content in the index to be of references. Acknowledgement to be added in the report.

10. Binding: Spiral binding is preferred for the seminar report. The number of copies are to be prepared by the student are 3 nos. (Student + Guide + Department copy)

10. SUGGESTED LEARNING RESOURCE

11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Desktop PC	Computer Systems with minimum i-3 intel pentium processor (or equivalent) and 1 GB RAM.
2.	LCD Projector	

12. LEARNING WEBSITE & SOFTWARE
1. **http://www.opensource.org**
2. **http://www.linux.org/lessons**
3. **http://www.php.net**

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

S N o	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Conduct literature survey for project selection.	-	3	-	-	-	-	-	3	2	-	3	-
2	Design problem statement according the need of Project.	-	2	-	-	-	-	-	3	2	-	3	-
3	Implement the project using modules.	-		3	2				3	2	-	-	3
4	Test the project as per the requirement.	-		-	-	-	-	2	3	2	-	-	3
5	Write report in prescribed formats.	-	2	-	-	-	-		3	2	-	-	3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	P B Lahoti	Head of the Department, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **VOCATIONAL TRAINING(VT)**

COURSE CODE   **6S503**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering / Information Technology / AIML	Sixth

1. RATIONALE

Computer Engineering & Information Technology technician program is mainly integrated with practical experiences. A software developer & tester are responsible gathering requirement, planning, designing, coding, testing & deploying the software in various areas of software industry. While working in the industry a technician is employed for planning, preparation, supervision, and maintaining quality of sofrware/ web sites/ networking.. In plant training program will help in enhancing the knowledge and skills of the software developer & tester.

2. COMPETENCY

After learning this course student will be able to
"Establish or relate theoretical knowledge with practical site situations to enhance career and professional skills"

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	
00	-	04	04	00	00	@50	50	100
Duration of the Examination (Hrs)				--	--	02	--	

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

4. COURSE OUTCOMES

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

1. Identify the area like development, h/w maintenance, networking in industry.

2. Identify the problem statement and process to resolve the problem

3. Select appropriate tools/software.

4. Maintain daily dairy to note the observations at work place on daily basis.

5. Prepare a detailed report based on the learning experiences during vocational training

5. DETAILED COURSE CONTENTS

Following are the general guidelines for implementation of Vocational training

Final year students of Computer Engineering & Information Technology program are expected to work individually for vocational training. Every student shall work parallel with a regular employed person of the permitted industry as a trainee in an industry for at least one week as decided by the department authorities under the guidance of faculty members. (Preferable, to be undertaken during previous semester break i.e at the end of V Semester exam for 4 weeks duration).

Further vocational Training work is to be continued weekly and shall be the part of time table for completion of different activities in the further semester as per the curriculum.

Finally, the student shall prepare the report of his vocational training under the guidance of the teaching staff members (Maximum 35 pages) which may consists of requirement, flow diagrams, process/steps, s/w & h/w requirements, test cases (if any), logs to be maintained for maintenance, simple designs, processes, applications, managements, costing aspects. Student should deliver a seminar on his experiences during in plant training.

Preferable Period : Vocational Training is to be undertaken during previous semester break i.e in vacation after Fifth Semester examination or in vacation before start of Sixth semester for 4 weeks duration)

6. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
1	A	**Term work** 1. Identify the industry. 2. Take concerns and depute the student along with faculty members. 3. Maintain the record of all visits and work done by student during training on daily basis	**32* Hrs**- Min) Semester Break Activity. 32 Hours in sixth semester.
2.	B- I	Review of literature survey and Analysis of data collected during training.	**08**
3	B-II	Preparing of rough draft along with collected information, facts & findings.	**08**
4	B-III	Group discussion in presence of guide Give presentation - ppts / models / charts / drawings etc.	**08**
5	B-IV	Prepare Final report with all attachments. (Spiral Binding of the vocational training work and term work completion.)	**08**
Total Hours.			**32* + 32 = 64 hrs**

7. SUGGESTED STUDENTS ACTIVITIES

I. Aspects to be considered for Vocational training / report writing of it.

- 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 sources.

II. SUGGESTED AREAS FOR THE SEMINAR:

AREA OF COMPUTER ENGINEERING / INFORMATION TECHNOLOGY	1. Image Processing
	2. Cloud Computing
	3. Networking
	4. Software Engineering
	5. Internet of Thing
	6. Computer, Information, Web & Network Security
	7. Computer Vision
	8. Machine Learning
	9. Data Warehousing & Mining
	10. Soft Computing
	11. Artificial Intelligence
	12. Parallel Computing
	13. Semantic Web Mining
	14. Optimization Technique
	15. Mobile Computing
	16. Recent Technology / Latest Trends in tecnology

8.   SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

1   Consider Local / Institute problem or problem related to society for providing technical solution.

2   Visit the site.

3   Take permission of concerned authority.

4   Follow Instructions.

5   Write daily dairy regularly at site.

6   Prepare sketches on dairy / on plain pages.

7   Collect drawings and leaflets.

8   Group discussions.

9   Prepare report.

10   Prepare power point presentation for final assessment of vocational training

Vocational Training Report Format

1.   Vocational Training report shall be in the print form on A-4 size white bond paper.

2.   Typing shall be in Times New Roman with spacing of 1.5 using one side of paper.

3.   Margins: Left = 37.5 mm   Right, Top and Bottom = 25mm.

4.   Front page: Titles - TNR   18 bold, other – TNR 14 bold. With Institute Logo.

5.   Inner Pages: Titles –TNR – 14 Bold, other TNR 12.

6.   Page Nos: Should appear on the right hand top corner of each page starting after index page.

7.   Tables to be preferable in the Text format only.

8.   Sketches to be drawn on separate sheet / pages in black ink.

9.   The Last content in the index to be of references. Acknowledgement to be added in the report.

Binding: Spiral binding is preferred for the seminar report. The number of copies are to be prepared by the student are 3 nos. (Student + Guide + Department copy)

9.   LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Desktop PC	Computer Systems with minimum i-3 intel pentium processor (or equivalent) and 1 GB RAM.
2.	LCD Projector	

A) DAILY DAIRY FORMAT

GOVERNMENT POLYTECHNIC, AURANGABAD
Civil Engineering Department

VOCATIONAL TRAINING DAILY DAIRY

Period of Vocational training (4 Weeks)   : From :   **to:**

Address of Industry / Site:--

DAY NO :   **Date:**

OBSERVATIONS OF THE DAY

Signature of Student   **Signature of Engineer In-charge**

Signature of Guide   **Signature of Head of Dept.**

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

S No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identify the area like development, h/w maintenance, networking in industry.	--	3	--	3	--	--	--	---	--	--	--	2
2	Identify the problem statement and process to resolve the problem	--	1	--	---	--	--	--	---	---	--	--	2
3	Select appropriate tools/software.	---	--	3	3	---	---	--	1	--	--	1	
4	Maintain daily dairy to note the observations at work place on daily basis.	--	3	--	--	--	--	--	2	--	--	2	2
5	Prepare a detailed report based on the learning experiences during vocational training	--	3	3	---	--	---	---	---	--	--	--	2

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	P B Lahoti	Head of the Department, Govt. Polytechnic, Aurangabad
2	V B Kundlikar	Lecturer in Information Technology

(Member Secretary PBOS)　　　　　　　　　　(Chairman PBOS)

COURSE TITLE-   **NETWORK AND INFORMATION SECURITY**

COURSE CODE-   **6N501**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Artificial Intelligence & Machine Learning	VI

1. **RATIONALE**

   Information Security is an applied level course aims to understand the various threats to secure computing and the basic security design principles and techniques. This course will introduce basic cryptography, network security; risks faced by computers and networks, data recovery, operating system security also focuses on concepts and methods associated with planning managing and auditing security at all levels including networks. Students will learn to secure the system and internet world.

2. **COMPETENCY**

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

   "Apply the security techniques for information protection."

3. **TEACHING AND EXAMNATION SCHEME**

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

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

4. COURSE OUTCOMES

1. Recognize importance of information security.
2. Select information security model.
3. Use encryption and decryption techniques.
4. Identify Security needs for network world.
5. Identify cyber laws for cyber-crime.
6. Apply accepted security policies; procedures are necessary to secure Operating Systems and applications.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
UNIT-I Introduction to Information Security	1a.Describe the information security concept in detail.	1.1. Information, Need and Importance of Information, information classification, criteria for information classification 1.2. Security, need of security, Basics principles of information security 1.3. Three pillars of information security, data obfuscation, event classification.
UNIT-II Information security architecture and model	2a.Know the information security architecture. 2b.Explain the security models.	2.1. Information security and Risk Management, Security policies, guidelines, standards 2.2. Trusted computing base, Rings of Trust, Protection Mechanisms in a trusted Computing Base 2.3. System security assurance concepts, Trusted computer security Evaluation Criteria 2.4. Information Technology security Evaluation Criteria, Confidentiality and Integrity Models.
UNIT-III Cryptography	3a. Describe the different types of cipher. 3b.Know the application and techniques of Cryptography.	3.1. Introduction, Application of cryptography, Classical encryption Techniques, Symmetric cipher 3.2. Substitution cipher • Ceasor cipher • Playfair cipher • Hill cipher

		3.3. Transposition cipher • Row transposition cipher • One Time Pad 3.4. Stenography, Digital Signatures, Authentication Protocols, Digital Signature Standards. 3.5. Public Key infrastructure- Basics, digital certificates, certificate authorities, registration authorities, steps for obtaining a digital certificate, steps for verifying authenticity and integrity of a certificate
UNIT-IV Network Security in Perspective	4a. Explain the Network Security concepts in detail.	4.1. Need for Security in the networked world 4.2 Net-Centric Information Systems 4.3 Basic Concepts of Network Security 4.4 Network Security Dimensions
UNIT-V Cyber Crime & Security	5a. Describe various cybercrimes. 5b. Get the knowledge of Hacking, Cracking and attacks. 5c. Explain the Cyber Law's.	5.1. Introduction to Cyber Crimes – Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Mail Bombs, Bug Exploits, Cyber Crime Investigation 5.2 Introduction Cyber Laws- Introduction to IT act 2000 and IT act 2008, Introduction to the cyber laws
UNIT-VI Access, physical control and compliance standards	6a. Know the different access and access control. 6b. Describe the compliance standards.	6.1. Identification, Authorization , Authentication, Biometrics, Single Sign –on, Kerberos, Remote user access and Authentication 6.2. Physical access control, Physical access threats, providing physical security 6.3. Compliance standards: Implementing and Information Security Management System, ISO 27001, ISO 20000, BS 25999, PCI DSS, ITIL framework, COBIT framework.

7. **SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introduction to Information Security.	8	5	5	4	14
2	Information security architecture and model	8	5	5	4	14
3	Cryptography	8	4	5	5	14
4	Network Security in Perspective	8	3	4	5	12
5	Cyber Crime & Security	8	3	4	5	12
6	Access, physical control and compliance standards	8	5	4	5	14
	Total	48	25	27	28	80

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

8. **LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS**

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	01	Identify the security provided with windows operating system(User authentication)	02
2	02	Trace the path and identify security policies of different websites.	04
3	03	Tracing of email origin using eMailTracePro utility	04
4	03	Install open source Latest version of Cryptool software and Encrypt and decrypt the message using Simple Transposition(Cryptool)	04
5	03	Encrypt and decrypt the message using Caesar Cipher With Variable Key(Cryptool)	02
6	04	Characterize and compare various Network Traffic Analysis tools.	04

7	04	Study and prepare a report on Network Attacks.	02
8	05	Study and prepare a report on IT act 2000 and IT act 2008.	04
9	05	Demonstrate the procedure of software piracy and Intellectual Property.	04
10	06	Use of different techniques for authentication like use of biometrics.	02
		Total	32

9. **SUGGESTED STUDENTS ACTIVITIES**

Following is the list of proposed student activities such as:
- Seminar (student would prepare seminar on security features adopted by some reputed companies/banks etc to protect their websites and data)
- Students would use power point presentations in above seminar and there would be group discussions on the strengths and weakness of the security features adopted by the concern company

10. **SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES**

1. Guide students in preparing actual procedure of data recovery.
2. Guide students in implementing it in c/c++ programming language.
3. Assign different types of Micro-projects.

11. **SUGGESTED LEARNING RESOURCE**

S.No.	Name of Book	Author	Publication
1.	Godbole Nina	Information System Security	John Wiley
2.	Mark Merkov& Jim Breithaupt	Information Security Principles and Practices	Pearson
3	V.K.Pachghare	Cryptography and Information Security	Prentice Hall India
4	Saurabh Sharma	Information Security and Cyber laws	Vikas Publishing House

12. **LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED** :

S. No.	Name of equipment	Brief specification
1.	VIM (Vulnerability Management)	
2.	PSI (Free PC Security)	Latest Version
3	CSI (Security Patching)	

13. **LEARNING WEBSITE & SOFTWARE**

- Download MD5 Application www.md5summer.org/download.html
- Download Wire shark Tools https://www.wireshark.org/tools/
- SecTools.Org: Top 125 Network Security Tools http://sectools.org/
- SHA-256 hash calculator http://www.xorbin.com/tools/sha256-hash-calculator
- Firewall Analyzer http://www.manageengine.com/products/firewall/?gclid= CO_Zh4DwtcICFYUrjgodx1cA9g&gclsrc=aw.ds

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

S.No	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Recognize importance of information security.	3	3	-	-	-	-	2	-	-
2	Select information security model.	3	3	-	-	-	-	-	-	-
3	Use encryption and decryption techniques.	1	3	-	-	-	-	1	3	-
4	Identify Security needs for network world.	-	1	1	2	-	-	2	2	-
5	Identify cyber laws for cyber-crime.	-	2	1	1	1	-	2	1	-
6	Apply accepted security policies; procedures are necessary to secure Operating Systems and applications.	-	3	-	-	-	-	2	-	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1.	D. S. Sonwane	Lecturer in Information Technology, Govt.Polytechnic, Aurangabad
2.	M. B. Dahiwal	Lecturer in Information Technology, Govt.Polytechnic, Aurangabad
3.	S. G. Chavan	Lecturer in Information Technology, Govt.Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE   **INDUSTRIAL ORGANIZATION AND MANAGEMENT**

COURSE CODE   **6G305**

PROGRAMME & SEMESTER

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

1. RATIONALE

Diploma graduate works at middle management level in the industries/engineering organizations. Therefore he has to be proficient in planning, organizing & coordinating various activities of industries/ organizations or when he is required to work in different types of projects. They are also expected to deal with workforce and management problems. In the present era of competition, optimum utilization of the resources with achieving higher productivity is essential for any industry to survive. Quality and cost controls are also other important factors which contribute to the day to day supervision issues. This course aims to deal effectively with such issues along with familiarization of acts and laws applied to industries.

2. COMPETENCY

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

"Plan, organize and Coordinate various activities/ processes in industry/projects by ensuring optimal use of resources"

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE@ (PR/OR)	PA (TW)	
03	-	02	05	80	20	-	25	125
Duration of the Examination (Hrs)			02 (Online Exam)		01	-	-	

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

4. **COURSE OUTCOMES**

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

1. Identify the different sector and industry of given company name.
2. Plan, organize and Coordinate various activities in industry or a project.
3. Ensure proper management of human resources.
4. Identify the need of finance and its optimal use in an organization.
5. Manage materials &stores.
6. Apply PERT/CPM method for project scheduling of given project
7. Apply marketing strategies to promote the sales & services.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics (Containing POs and PSOs assignment in each Sub-topic)
Unit 1 Business overview	1a Classify businesses. 1b Outline the impact of Globalization and IPR on business. 1c Identify& need of e-commerce.	1.1 Type of sectors. Service, Manufacturing, Trade. 1.2 Globalization and IPR- Introduction, Advantage and Disadvantage w.r.t India. 1.3 e - Commerce: Merits and Demerits.
Unit 2 Evolution of Scientific Management.	2a Outline the historical perspective of management. 2b Identify the functions of management. 2c Develop organization structure. 2d Select appropriate form of ownership.	2.1 Evolution of management thoughts. 2.2 Definition of management, Levels of management. 2.3 Scientific management by F W Taylor. 2.4 Administration Vs. Management 2.5 Henry Fayol's 14 Principles of management. 2.6 Functions of management - Planning, Organizing, Staffing, Directing & controlling 2.7 Types of organization- Line, Line & Staff, Functional & Project. 2.8 Centralization and Decentralization. 2.9 Forms of Ownership- Proprietorship, Partnership, Joint Stock Company, Co-operative society & Government Sector.
Unit 3 Personnel Management & Legislative Act.	3a Identify & develop human resource 3b Apply strategies of motivation. 3c Practice safety procedure 3d Identify the features of industrial	3.1 Definition, Objectives and Function of Personnel management 3.2 Recruitment & Selection Procedure 3.3 Training & its type: Induction, Skill Enhancement & Motivational Training. 3.4 Leadership & its styles.

	acts.	3.5 Motivation-Definition, its type & Maslow Theory
		3.6 Safety management: Causes of Accident and Safety procedure
		3.7 Salient Features of (Introduction, Objective, Scope, Important definition & Related provision)
		     1 Indian Factory act 1948.
		     2 Industrial dispute acts 1947.
		     3 Workmen compensation act 1923.
		     4 The employees state insurance Act 1948.
		     5 Contract Labour Act.

Unit 4 Financial Management	4a Identify sources of finance 4b Prepare budget. 4c Acquaint with prevailing taxation policy.	4.1 Objectives & Functions of financial management. 4.2 Capital, Types of Capitals-Fixed & Working Capital 4.3 Direct Cost & Indirect Cost 4.4 Sources of raising Capital- Internal & External sources. 4.6 Introduction of budget & budgetary control. 4.7 Production Budget (including Variance Report) 4.8 Labour Budget 4.9 Introduction to Profit & Loss Account (only concepts) 4.10 Introduction of Income Tax & GST (Good & Service Tax)
Unit 5 Materials Management	5a. Plan Inventory for processes. 5b. Calculate EOQ. 5c. Practice purchase procedure.	5.1 Objective and function of material management. 5.2 Inventory – Concept, its Classification & Objective. 5.3 Economic Order Quantity (EOQ) - Concept & Graphical Representation. 5.4 ABC Analysis- Definition & Step of ABC Analysis. 5.5 Purchase Procedure 5.6 Overview of ERP, JIT, 5's, Kaizen& six sigma (Introduction, Objective & Benefit).
Unit 6 Project Management	6a Use CPM/PERT for project scheduling for execution. 6b Track the project with the help of project management techniques.	6.1 Introduction of Project Management, project Network Analysis 6.2 Concept and introduction of CPM/PERT. 6.3 Solving simple network using CPM/ PERT 6.4 Concept of Breakeven analysis.

		6.5 Progress tracking charts-bar charts, Gantt charts and histogram.
Unit 7 Marketing Management	7a. Apply marketing strategies.	7.1 Objective & Function of marketing management 7.2 Sellers and Buyers markets, Marketing, Sales, Selling vs. Marketing, Sales promotion, Marketing Mix, Pricing Policies. 7.3 Marketing Strategies: Segmentation, Targeting & Positioning. 7.4 Marketing Information System.

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Business Overview	03	02	04	00	06
II	Evolution of Scientific Management	09	04	10	00	14
III	Personnel Management & Legislative Act	11	04	10	04	18
IV	Financial Management.	07	04	06	02	12
V	Materials Management	06	04	04	02	10
VI	Project Management	07	02	06	04	12
VII	Marketing Management	05	02	04	02	08
	Total	**48**	**22**	**44**	**14**	**80**

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

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

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

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

1. Identify the different sector and industry of given company name.
2. Plan, organize and Coordinate various activities in industry or a project.
3. Ensure proper management of human resources.
4. Identify the need of finance and its optimal use in an organization.
5. Manage materials &Stores.
6. Apply PERT/CPM method for project scheduling of given project
7. Apply marketing strategies to promote the sales &services.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Approx. Hrs. required
		Part A- Common to all Programme	
1.	I	To collect data / information and prepare report about business/organization and identify the nature of business and prepare organization structure.	04
2.	III	Identify and propose Safety requirements/ mechanism for an industry.	04
3	V	Prepare a report of inventory by visiting stores of an industry/organization.	02
4	VI	Prepare network diagram using CPM& PERT (3-4 networks each) for identified Projects	04

5.	IV/VII	Undertake Survey/Data Collection, Presentation and Data interpretation for following. (Any One)
		  a. Sales Promotion.
		  b. Channel of Distribution
		  c. Capital Generation & Management
			04

		Part B- Programme Specific Practical for CO/IT/ET/EE/ME/AE (Five Numbers)	
6	III	Prepare a report on Human Resource (HR) policies used in Multinational companies	02
7	IV	Give presentation (PPT) on various Financial budgets of any company	02

8	IV/V/VII	Data collection on i) GST ii) Six sigma iii) Market segmentation	02
9	VII	Discuss Global marketing strategies by making small presentation (PPT).	04
10	All Units	Micro Project (visit to an industry, observe & prepare a report on various management techniques adopted by the company)	04
Total			**32Hrs**
		Part B- Programme Specific Practical for Civil Engineering (Five Numbers)	
6	III	Prepare a small report on Human Resource (HR) policies used in any Multinational companies/infrastructure development company/manufacturing of civil engineering materials.	02
7	VI	Prepare a bar chart of construction activities of bunglow / residential building.	02
8	V	Study and collection 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 etc.	02
9	II/III/V	Group Discussions and report writing on (Any one form following or likewise) 1) Modern Techniques of material Management 2) Causes of Accident and safety management. 3) Production and Labour budget	04
10	All Units	Micro Project (visit to an PWD/WRD/Large private construction organization/infrastructure development company to observe & prepare a report on construction management techniques/working adopted by the organization)	04
Total			**32Hrs**

8.   SUGGESTED STUDENTS ACTIVITIES

Sr No	Activities
1	Prepare a group of five students and write qualities of a good leader.
2	Prepare a group of 10 students and conduct a group activity like housekeeping of a class room.

3	Draw a network for given set of activities and identify the critical path
4	Calculate the total time required to accomplish a task when t_e, t_p and t_m is given.
5	Visit to nearest ESIC office and collect information about services provided by ESIC office to the working employees.

9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

Sr No.	Unit no.	Unit name	Strategy
1	1	Business Overview	Live explanation, videos.
2	2	Evolution of Scientific Management	Live explanation, , case study
3	3	Personnel Management & Legislative Act	Live explanation, movie, case study
4	4	Financial Management.	Case study, survey, industrial visits
5	5	Materials Management	Net survey, Case study, industrial visits
6	6	Project Management	Net survey, Case study, industrial visits
7	7	Marketing Management	Net survey, Case study, industrial visits

10. SUGGESTED LEARNING RESOURCE

Sr No.	Title of Book	Author	Publication
1.	Industrial Organization and Management	O.P.Khanna,	DhanpatRai and Sons
2.	Industrial Organization and Management	Banga and Sharma,	Khanna Publications
3.	Modern Business Organization & Management	S.A.Sherlekar& V.A. Sherlekar,	Himalaya Publications

11. LEARNING WEBSITE & SOFTWARE
1. https://mitpress.mit.edu
2. http://iveybusinessjournal.com/publication/a-new-role-for-management
3. https://en.wikipedia.org/wiki/Project_management
4. http://www.pmi.org.in/

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

SR No	Course Outcome	POs										PSOs	
		1	2	3	4	5	6	7	8	9	10	01	02
1	Identify the different secto and industry of given company name.	-	-	-	-	3	-	-	1	-	-	3	-
2	Plan, organize and Coordinat various activities in industry o a project	3	3	2	-	3	-	-	1	-	-	3	-
3	Ensure proper management o human resources.	2	3	-	2	3	-	-	1	-	-	2	2
4	Identify the need of finance and its optimal use in an organization	3	3	-	2	-	-	-	-	-	1	3	3
5	Manage materials & Stores	2	3	-	3	-	-	-	-	-	-	3	-
6	Apply PERT/CPM method for project scheduling of given project	1	3	-	3	-	-	-	-	-	2	3	2
7	Apply marketing strategies to promote the sales &services.	-	3	-	3	-	-	2	2	-	2	3	-

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	A. B. Deshpande	Lecturer in Mechanical Engineering, Govt. Polytechnic, Aurangabad
2	K.S. Borde	Lecturer in Civil Engineering, Govt. Polytechnic, Aurangabad
3.	P.B. Lahoti	Lecturer in Computer Engineering, Govt. Polytechnic, Aurang:

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **INTERNET OF THINGS**

COURSE CODE   **6N504**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	VI

1. RATIONALE

Over the past few years, IoT has become one of the most important technologies of the 21st century. IoT applications use machine learning algorithms to analyze massive amounts of connected sensor data in the cloud. Today it is possible to build different IoT solutions such as shopping system, infrastructure management in both urban and rural areas

2. COMPETENCY

Identify genesis and impact of IoT applications, architectures in real world. Identify Arduino Function Libraries to implement given interface.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	150
3	0	2	05	80	20	#25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR

– Oral Examination, TW - Term Work, # External, @ Internal

4.   **COURSE OUTCOMES**
     At the end of studying this course students will be able to: -

     1. Identify IoT Framework, IoT Architecture and Sources of IoT.
     2. Understand M2M Systems Layers and Web Connectivity.
     3. Describe IP Addressing in the IoT.
     4. Examine Data Acquiring and Storage in context to IoT.
     5. Identify and Understand IoT Cloud-based Services.
     6. Describe Sensor Technology, RFIDs and WSNs in context to IoT.

5.   **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I **Internet of Things: An Overview**	1a. Identify characteristics of IoT in given Application 1.b Explain IoT Conceptual Framework and Architectural View 1.c Describe the Sources of IoT	1.1 Internet of Things 1.2 IoT Conceptual Framework 1.3 IoT Architectural View 1.4 Technology Behind IoT 1.5 Sources of IoT 1.6 M2M Communications 1.7 Examples of IoT
Unit - II **Design Principles for Connected Devices & Web Connectivity**	2a. Identify IoT/M2M Systems Layers 2b. Understand Web Connectivity and Web Communications Protocols 2.c Describe Message Communication Protocols for Connected Devices	2.1 Introduction to IoT/M2M 2.2 IoT/M2M Systems Layers and Design Standardization 2.3 Communication Technologies 2.4 Data Enrichment, Data Consolidation and Device Management at Gateway 2.5 Ease of Designing and Affordability 2.6 Introduction to Web Connectivity 2.7 Web Communication Protocols for Connected Devices 2.8 Message Communication Protocols for Connected Devices
Unit – III **Internet Connectivity Principles**	3a. Describe Internet Based Communications 3b. Understand IP Addressing in the IoT	3.1 Introduction to Internet Connectivity 3.2 Internet Connectivity 3.3 Internet-Based Communications 3.4 IP Addressing in the IoT 3.5 Media Access Control
Unit - IV **Data Acquiring,**	4a. Describe Data Acquisition and Storage in IoT	4.1 Introduction to Application Layers 4.2 Data Acquiring and Storage

Organizing, Processing and Analytics	4b. Explain Business process Integration and Enterprise System	4.3 Organizing the Data 4.4 Transactions, Business Processes, Integration and Enterprise System 4.5 Analytics 4.6 Knowledge Acquiring, Managing and Storing Processes
Unit - V **Data Collection, Storage and Computing Using a Cloud Platform**	5a. Identify Cloud Computing Paradigm for Data Collection 5b. Use Xively, Nimbitis like platforms for IoT Cloud based services	5.1 Introduction to Data collection and storage 5.2 Cloud Computing Paradigm for Data collection, storage and computing 5.3 Everything as a Service and Cloud Service Models 5.4 IoT Cloud-based Services using the Xively, Nimbits and Other Platforms
Unit - VI **Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks**	6a. Describe Sensor Technology for IoT Devices 6b. Explain Radio Frequency Identification Technology for IoT 6c. Describe Wireless Sensor Networks Technology for ioT	6.1 Introduction 6.2 Sensor Technology 6.3 Participatory Sensing, Industrial IoT and Automotive IoT 6.4 Actuator 6.5 Sensor Data Communication Protocols 6.6 Radio Frequency Identification Technology 6.7 Wireless Sensor Networks Technology

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Internet of Things: An Overview	06	2	4	4	10
2	Design Principles for Connected Devices & Web Connectivity	10	4	6	4	14
3	Internet Connectivity Principles	06	4	4	4	12
4	Data Acquiring, Organizing, Processing and Analytics	10	6	4	6	16
5	Data Collection, Storage and Computing Using a Cloud Platform	06	4	4	4	12
6	Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks	10	4	6	6	16
	Total	48	24	28	28	80

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

7. SUGGESTED EXERCISES/PRACTICALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Identify and study Components of Arduino Board.	2
2	1	Search and prepare a report on new trends used in information and communication technology	4
3	2	Identify applications with different IoT models.	4
4	3	Download any one open source OS used for IOT. Describe its functioning.	2
5	3	Identify different protocols used in IoT.	4
6	4	Explore working of IoT framework for given application.	2
7	4	Identify security issues in IoT.	4
8	5	Prepare a report on IoT application to automate for Shopping Mall.	2
9	5	Prepare a report on IoT application to automate for hospital's critical care unit.	4
10	6	Prepare a report on IoT application for smart city.	4
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:
1. Describe gateway-as-a-service deployment in IoT toolkit.
2. Explain application framework and embedded software agents for IoT toolkit.
3. Explain working of Raspberry Pi.
4. Create any circuitry project using Arduino.
5. How do you connect and display your Raspberry Pi on a Monitor Or TV?
6. Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory

9. Mini project
i. Connect Raspberry Pi with your existing system components.
ii. Select the use of the different pin present on given Arduino Boards.
iii. Select different Arduino Function Libraries to implement given interface.

10. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

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

11. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Internet of Things: Architecture and Design Principles	Raj Kamal	McGraw Hill
2.	Internet of Things: A Hands-on Approach	Arshdeep Bahga and Vijay Madisetti	Universities Press
3	Internet of Things	Dr. Jeeva Jose	Khanna Publishing House

12. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :
1. Desktop Computer i5 processor or higher,4gb RAM
2. Raspberry pi/Arduino Latest version

13. LEARNING WEBSITE & SOFTWARE

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.org/
4. Contiki (Open source IoT operating system)
5. Arduino (open source IoT project)

6. IoT Toolkit (smart object API gateway service reference implementation)
7. Zetta (Based on Node.js, Zetta can create IoT servers that link to various
devices and sensors)

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Internet of Things: An Overview	3	--	--	--	--	--	3	3	
2	Design Principles for Connected Devices & Web Connectivity	3	--	--	--	--	--	3	3	
3	Internet Connectivity Principles	3	--	--	--	--	--	3	3	
4	Data Acquiring, Organizing, Processing and Analytics	3	2	2	2	2	2	3	3	
5	Data Collection, Storage and Computing Using a Cloud Platform	3	2	2	2	2	2	3	3	
6	Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks	3	2	2	2	2	--	3	3	

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	S. M. Rudsamudra	Lecturer in Information Technology, Govt. Polytechnic, Chhatrapati Sambhajinagar
2	S. G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Chhatrapati Sambhajinagar
3	V. B. Kundalikar	Lecturer in Information Technology, Govt. Polytechnic, Chhatrapati Sambhajinagar

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **INTRODUCTION TO DEEP LEARNING**
COURSE CODE   **6N505**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	VI

1. RATIONALE

Deep Learning is one of the most exciting and promising segments of Artificial Intelligence and machine learning technologies. This course will help the students to understand and build neural networks using the deep learning framework PyTorch.

2. COMPETENCY

The students will be familiar with the significant technological trends driving the rise of deep learning, build, train, and apply fully connected deep neural networks, identify key parameters in a neural network's architecture and apply deep learning to their own applications.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				
				Theory		Practical		Total
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	
3	-	2	05	80	20	#25	25	150
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR

– Oral Examination, TW - Term Work, # External, @ Internal

4. **COURSE OUTCOMES**

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

   1. Differentiate between machine learning, deep learning and artificial intelligence.
   2. Understand the concepts of PyTorch its main functions, operations and the execution pipeline.
   3. Build a simple neural network using the PyTorch.
   4. Implement gradient descent and backpropagation Algorithm.
   5. Build a simple Convolutional Neural Network (CNN) in PyTorch.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I **Introduction to Deep Learning**	1a. Describe the use of Deep Learning in given application domain. 1b. Differentiate Machine Learning and Artificial Intelligence on the basis of given points. 1c. Identify advantages of using deep leaning in give application. 1d. Compare conventional Learning methods with deep learning methods.	1.1 Deep Learning 1.2 Differentiate Machine Learning and Artificial Intelligence 1.3 Working Deep Learning Architecture- Feed Forward Neural Network, Recurrent Neural Network, Convolutional Neural Network, Auto encoders etc. 1.4 Limitations of Deep Learning 1.5 Deep Learning Applications 1.6 Advantages and disadvantages of Deep Learning
Unit - II **Introduction to PyTorch**	2a. Identify essential elements of PyTorch 2b. Create tensors from given Python lists. 2c. Compare PyTorch and TensorFlow on the basis of given points. 2d. Illustrate the PyTorch Deep Learning Model Life-Cycle.	2.1 PyTorch: An open source machine learning framework 2.2 Major features of PyTorch, TensorFlow vs. PyTorch 2.3 Tensors, Datasets and DataLoaders 2.4 Transforms, Build Model, Automatic Differentiation, Optimization Loop, Save, Load and Use Model 2.5 PyTorch Deep Learning Model Life-Cycle: Prepare the Data, Define the Model, Train the Model, Evaluate the Model, And Make Predictions.
Unit - III **Artificial Neural**	3a. Compare Biological Neural Network Artificial Neural Network on the	3.1 ANN Introduction 3.2 Perceptron-Basic Components, working, Types ,Training Rule

Networks	given points.	3.3 Gradient Descent Rule.
	3b. Demonstrate the Perceptron Learning Algorithm on the basis of given data, using a given learning rate and given initial weight values.	3.4 Gradient, Types of Gradient Descent
		3.5 Activation Functions: Sigmoid, ReLU, Hyperbolic tangent, Softmax, etc.
	3c. Calculate the output of the network for the given input pattern & given activation function.	
Unit - IV **Gradient Descent and Backpropagation**	4a. Difference between Epoch, Batch, and Iteration in Deep Learning	4.1 Gradient Descent
		4.2 Stochastic Gradient Descent
	4b. Illustrate when training a Neural Network by Backpropagation	4.3 Momentum, RMSProp, Adam, etc.
		4.4 Back propagation
	4c. Identify ways to deal with the vanishing gradient problem in a deep neural network.	4.5 Some problems in ANN - vanishing & exploding gradients.
		4.6 Optimization and Regularization: Bias-Variance trade-off, Cross Validation,
	4d. Illustrate the steps for using a gradient descent algorithm.	4.7 Regularization - L1, Dropout, data augmentation, early stopping, batch Normalization.
Unit - V **Introduction to Convolutional Neural Networks**	5a. Illustrate how CNN used in given real-life applications.	5.1 Introduction to CNNs,
		5.2 Padding, strided convolution, convolution over volume, pooling.
	5a. Justify why do we use a different Layer in a CNN	5.3 Case studies: LeNet, AlexNet, VGG-Net, ResNet, GoogleNet, MobileNet, etc.
	5b. Describe the characteristics of given type of Pooling.	5.4 Introduction to RNNs

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introduction to Deep Learning	10	8	4	4	16
2	Introduction to PyTorch	10	4	4	8	16
3	Artificial Neural Networks	12	4	6	8	18
4	Gradient Descent and Backpropagation	10	4	8	6	18
5	Introduction to Convolutional Neural Networks	06	4	4	4	12
	Total	48	24	24	30	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	1	Setup a Python Environment for Deep Learning and Install Deep Learning Libraries.	4
2	2	Install PyTorch popular deep learning framework and work with 1. Datasets & DataLoaders 2. Datasets	4
3	2	Implement a simple linear regression model using PyTorch.	4
4	3	Implementation of Perceptron Algorithm for AND Logic Gate with 2-bit Binary Input	4
5	3	Implement Perceptron Learning in Python using Iris flower dataset.	4
6	4	Implement Linear Regression model in PyTorch.	4
7	4	Implement Gradient Descent in PyTorch	4
8	5	Implement CIFAR 10- CNN using PyTorch.	4
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

Following is the list of proposed student activities like:
     i. Implement Recurrent Neural Network with Pytorch.
     ii. Describe the steps in implementation of a full Recurrent Neural Network.
     iii. Identify the need a Recurrent Neural Network.

9. **Mini project**: Build a Model by using hypothetical data consisting of crop yields of Mangoes and Oranges given the average Temperature, annual Rainfall and Humidity of a particular place.

10. **SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES**
    These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.
    - a. Improved Lecture methods
    - b. Q & A technique.
    - c. Demonstration
    - d. Seminars
    - e. Activity based learning

11. **SUGGESTED LEARNING RESOURCE**

S.No.	Name of Book	Author	Publication
1.	Deep Learning	Rajiv Chopra	Khanna Publishing House
2.	Programming PyTorch for Deep Learning	Ian	O'Reilly Media
3	Deep Learning: A Practitioner's Approach 1st Edition	Josh Patterson, Adam Gibson	Kindle Edition

12. **LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED** :

Hardware: Desktop Computer P-IV processor or higher
Software: Windows 10 or higher, Python,
1. PyTorch-open source machine learning framework
2. Anaconda -The World's Most Popular Data Science Platform
3. Colaboratory

13. **LEARNING WEBSITE & SOFTWARE**

- https://www.simplilearn.com/tutorials/deep-learning-tutorial/what-is-deep-learning accessed on 10/03/2022
- https://pytorch.org/ accessed on 10/03/2022
- https://www.tutorialspoint.com/python_deep_learning/index.htm accessed on 10/03/2022

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Differentiate between machine learning, deep learning and artificial intelligence.	3	-	-	3	-	-	-	-	3
2	Understand the concepts of PyTorch its main functions, operations and the execution pipeline.	3	-	-	3	-	-	-	-	3
3	Build a simple neural network using the PyTorch.	3	-	-	3	-	-	-	-	3
4	Implement gradient descent and backpropagation Algorithm.	3	3	3	3	-	-	-	-	3
5	Build a simple Convolutional Neural Network (CNN) in PyTorch.	3	3	3	3	-	-	-	-	3

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	G. U. Jadhav	Lecturer in Computer Engineering, Govt. Polytechnic, Aurangabad
2	S.G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Aurangabad

(Member Secretary PBOS)   (Chairman PBOS)

COURSE TITLE-   **DATA SCIENCE**

COURSE CODE   **6N506**

PROGRAMME & SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
AN	VI

1. RATIONALE

Data analytics deals with advanced analytic techniques against very large, diverse data sets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabytes.

2. COMPETENCY

After learning this course students will be able to understand Big data concepts, Data Science and Data Mining Tools.

3. TEACHING AND EXAMNATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE (OR)	PA (TW)	150
3	-	2	05	80	20	@25	25	
Duration of the Examination (Hrs)				3	1	--	--	

Legends : L-Lecture**; T-**Tutorial/Teacher Guided Theory Practice **; P-** Practical**; C-** Credits**;**

ESE- End Semester Examination**; PT – Progressive Test, PA-** Progressive Assessment, OR

– Oral Examination, TW - Term Work, # External, @ Internal

4. **COURSE OUTCOMES**

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

   1. Use the fundamental concepts of data science.
   2. Analyze and design data analytics Framework.
   3. Apply the techniques and Tools of data analytics on data.
   4. Use data mining tools for various applications.
   5. Identify ethics surrounding privacy, data sharing and algorithmic decision-making.

5. **DETAILED COURSE CONTENTS**

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit - I **Introduction to Data Analytics**	1a.	1.1 Definition and example of data analytics, Responsibilities of a Data Analyst, Qualities and Skills to be a Data Analyst, Applications of Data Analytics, Data Analytics vs. Data Analysis 1.2 Data Analysis Process: Data Requirement Specifications, Data Collection, Data Processing, Data Analysis, Infer and Interpret Results. 1.3 Data Analysis Methods: Qualitative Analysis, Quantitative Analysis, Text analysis, Statistical analysis, Diagnostic analysis, Predictive analysis.
Unit - II **Working with Data**	2a.	2.1 Types of Data, Different Types of File Formats, Sources of Data like Sensors/Signals/GPS 2.2 Data Literacy, Data acquisition, Data examination, Data transformation, Data exploration.
Unit - III **Data Analysis Techniques and Tools**	3a.	3.1 Techniques based on Mathematics and Statistics, Techniques based on Artificial Intelligence and Machine Learning, Techniques based on Visualization and Graphs 3.2 Introduction to Data Analysis Tools: Excel, Tableau, Power BI, Fine Report, R & Python, SAS

Unit - IV
Basics of Data Mining
	4a.	4.1 Basic concept of data mining, Gathering and selecting data, data cleansing and preparation, outputs of data mining, Evaluating data mining results
		4.2 Data Mining Techniques-
		  • Supervised Learning:- decision tree, Regression, Artificial Neural Network
		  • Non-supervised learning:- Cluster analysis , Association rules.
		4.3 4.3 Tools and Platforms for Data Mining:-
		  • Simple or sophisticated
		  • Stand-alone or Embedded
		  • Open source or Commercial
		  • User interface
		  • Data formats

Unit - V **Ethics and Recent Trends**	5a.	5.1 Data Science Ethics – Doing good data science, Owners of the data, Valuing different aspects of privacy 5.2 The Five Cs :-Consent, Clarity, Consistency and Trust, Control and transparency, Consequences, Implementation of 5C's, Diversity, Inclusion, Future Trends

6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
1	Introduction to Data Analytics	10	8	4	4	16
2	Working with Data	10	4	4	8	16
3	Data Analysis Techniques and Tools	08	4	6	8	18
4	Basics of Data Mining	12	4	8	6	18
5	Ethics and Recent Trends	08	4	4	4	12
	Total	48	24	24	30	80

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

7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1		Apply pivot table of Excel to perform data analysis	2
2		Perform data import/export(CSV,XLS,TXT) operations using data frames by R/Python	4
3		Perform numerical operations(MAX, MIN, AVG, SUM, SQRT, ROUND) using R/Python	4
4		Install Tableau, Understand User Interface, Dimensions, Measures, Pages, Filters, Marks and Show Me, Dataset Connections and Create a visualization	2
5		Perform statistical operations(Mean, Median, Mode and standard deviation)	4
6		Implement basic data frame analysis using Python	2
7		Install data mining tool WEKA. Study the GUI explorer on WEKA.	4
8		Implement data cleaning technique (data preprocessing – Finding and replacing Missing value in sample dataset)	2
9		Perform the Histogram Analysis of given dataset using Data Analysis Toolbox of Excel	4
10		Perform Simple Linear Regression using Data Analysis Toolbox of Excel or with Python and Interpret the regression table	4
		Total	32

8. SUGGESTED STUDENTS ACTIVITIES

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

a. Installing Python and R on windows system
b. Creating different Dataframes in python using pandas
c. Data Analysis Tools like Excel, Tableau, Power BI, R & Python, Hive, Pig, Spark

9. Mini project: Create any Dataframe with at least 10 columns and perform various operations on that Dataframe like Filtering, GroupBy, Aggregation, Joining etc.

10. SUGGESTED SPECIFIC INSTRUCTIONAL STRATERGIES

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

a. Improved Lecture methods-
b. Q & A technique.
c. Designing Dataframe and reading CSV files in Python.
d. Guiding students for designing Machine learning algorithms in python.
e. Observe students and monitor the performance of students.
f. Activity based learning.
g. Assign mini projects.

11. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	Data Analytics: The Complete Beginner's Guide	The Black Book, Byron Francis	Create Space Independent Publishing Platform, 2016
2.	Data Analytics	Dr. Anil Maheshwari	
3	Mining of Massive Datasets	Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman	Cambridge University Press, 2nd edition, 2014

12. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

Hardware: Desktop Computer P-IV processor or higher
Software: Windows 10 or higher, Python, R, MS-Excel, Apache Hadoop, Spark, Pig, Hive, WEKA

13. LEARNING WEBSITE & SOFTWARE

- https://nptel.ac.in/courses/110/106/110106072/
- https://www.coursera.org/specializations/statistics
- https://swayam.gov.in/nd1_noc20_ma53/preview

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

SNo	Course Outcome	POs							PSOs	
		1	2	3	4	5	6	7	01	02
1	Use the fundamental concepts of data science.	3	--	--	--	--	--	--	--	--
2	Analyze and design data analytics Framework.	3	--	--	--	--	--	--	3	--
3	Use data mining tools for various applications.	3	--	3	3	--	3	3	3	3
4	Use data mining tools for various applications.	3	--	3	3	--	3	3	--	3
5	Identify ethics surrounding privacy, data sharing and algorithmic decision-making.	3	--	3	3	--	3	3	--	--

Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
1	N. V. Patil	Lecturer in Computer Engineering, Govt. Polytechnic, Chhatrapati Sambhajinagar
2	D. S. Sonwane	Lecturer in Information Technology, Govt. Polytechnic, Chhatrapati Sambhajinagar
3	S. G. Chavan	Lecturer in Information Technology, Govt. Polytechnic, Chhatrapati Sambhajinagar

(Member Secretary PBOS)   (Chairman PBOS)