

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Course Code	HU1101
Name of Course	COMMUNICATION SKILLS 1
Prerequisite	NA
Class Declaration	NO

1) 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	PA	ESE	PA	100
2	1	-	3	40	10	--	50	

(*):OE/POE (Oral Examination/Practical & Oral Examination mention whichever is applicable)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessments.

2) RATIONALE

This is been noticed that diploma pass outs lack in grammatically correct written and oral communication in English. It is also been noticed that communication is not a problem of students, communication in correct English is the basic problem of Diploma pass outs. Students will have to interact in this language so far as their career in industry is concerned. In order to enhance this ability in students English is introduced as a subject to groom their personality.

3) COMPETENCY

The aim of this course is to attend following industry competency through various teaching learning experiences:

- **To develop English Language Speaking Abilities, enrich fluency, and to make students get acquainted with basics of communication skills.**

4) COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Communicate effectively to overcome barriers

CO2: Apply Nonverbal codes for effective communication.

CO3: Apply LearningSkills.

CO4: Interpret information to present orally.

CO5: Use Language lab for improving listening and speaking abilities.

5) SUGGESTED PRACTICALS/ EXERCISES

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
1	Introduction to Communication Cycle	1	1
2	Analyze Communication Events.	1	1
3	Collect Different Pictures Depicting Body actions.	2	2
4	Utilize Signs, Symbols & color codes.	2	1
5	Loud Reading of Given Paragraph.	3	2
6	Utilize Techniques of Listening with the help of lingua phone	3	2
7	Topic Writing on Current Issues	4	1
8	Comprehending Information and extempore it	4	1
9	Practice Vocabulary I (Identify words from various Technical Jargons.)	5	2
10	Practice Vocabulary II(Homophones/abbreviations/Synonyms/antonyms)	5	2
11	*Complete the Micro-project as per the guidelines in point no 11 - compulsory .	1 to 5	2
Total			16

Assignment no 11 is compulsory. *Perform assignment no.5 or 6.

Sr.No.	Performance Indicators	Weightage in %
a.	Arrangement of available equipment / test rig or model	-

Sr.No.	Performance Indicators	Weightage in %
b.	Setting and operation	-
c.	Safety measures	-
d.	Observations and Recording	40
e.	Interpretation of result and Conclusion	-
f.	Answer to sample questions	30
g.	Submission of report in time	30
Total		100

6) THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit 1 Introduction and Principles of Communication	
1a. Interpret different communication skills 1b. Define elements of communication 1c. Describe process of communication 1d. Identify barriers for finding remedies 1e. Interpret principles of communication	1.1 Introduction to communication 1.2 Definition and elements of communication 1.3 Process of communication 1.4 Barriers to communication and remedies to overcome it. 1.5 Principles of communication
Unit 2 Nonverbal Skills	
1a. Differentiate graphic communication 1b. Use different nonverbal codes 1c. Interpret various graphic forms.	1.1 Graphic communication 1.2 Nonverbal codes [Kinesics, Proxemics, Chronemics, Haptics 1.3 Vocalics Dress and Appearance] 1.4 Reading graphic forms [Bar graph Pie chart]
Unit 3 Learning Skills	
1a. Recall listened information 1b. Apply oral skills 1c. Perceives various fonts & use it 1d. Compose sentences & paragraphs	1.1 Listening skills 1.2 Speaking skills 1.3 Reading skills 1.4 Writing Skills
Unit 4 Comprehension	

1a. Improve writing techniques 1b. Interpret information 1c. Summarize to extempore	1.1 Topic Writing (current issues) 1.2 Comprehend various information 1.3 Extempore some current Activities
Unit 5 Language Skills	
1a. Use phonetic signs and symbols for pronunciation 1b. Practice Pronunciation using lingua-phone 1c. Utilize listening skills 1d. Classify jargon wise vocabulary for improvement	1.1 Phonetics(Practice of pronunciation) 1.2 Listening skills 1.3 Use of lingua-phone (language lab) 1.4 Vocabulary building

7) SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			RLevel	U Level	A Level	Total Marks
I	Introduction and principles of communication	08	04	06	02	12
II	Nonverbal Communication	06	02	02	06	10
III	Comprehension	06	00	02	04	06
IV	Learning Skills	06	00	00	04	04
V	Language skills	06	-	02	06	08
Total		32	06	12	22	40

8) MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	PR. O. No.
1	Language Lab	5,6

9) SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in Ling phone laboratory. Journal consists of drawing, observations, required equipment's, date of performance with teacher signature.
- Collection of Paper cuttings from magazines, Newspapers, periodicals etc
- Encyclopedia

10) SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Correlate subtopics with power plant system and equipment.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11) SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of POs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Student must collect pictures depicting various body actions.**

2. Students should utilize signs, symbols, signals and color code to represent traffic signals.
3. Student should prepare a table of Jargon wise vocabulary of various technical domains.
4. Student should extempore on a given topic.
5. Student should collect abbreviations related to corporate world.

12) SUGGESTED LEARNING RESOURCES

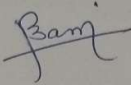
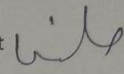
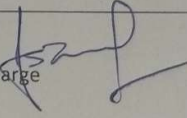
Sr. No.	Author	Title	Publication	ISBN
1	Joyeeta Bhattacharya	Communication skills	Macmillan Co.	--
2	Sarah Freeman	Written communication in English	Orient Longman Ltd.	ISBN-13 : 978-8125004264
3	Krishna Mohan and Meera Banerji	Developing Communication skills	Macmillan India Ltd.	0333929195 9780333929193

13) SOFTWARE/LEARNING WEBSITES

- A. www.talkenglish.com
- B. Edutech.com
- C. Swayam.com
- D. www.mooc.org

Course Code: _____

14. Prepared by :

Signature of Course Expert 	Signature of Head of Department 
Name of Course Expert MB Patil S. C.	Name of Head of Department Mr. Bhide Y. D.
Signature of Program Expert	Signature of CDC In charge  Mr. Zangpure
Name of Program Head	Name of CDC In charge

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Course Code	HU1102
Course Name	COMMUNICATION SKILLS 2
Prerequisite	NA
Class Declaration	NO

1. 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	PA	ESE	PA	100
2	1		3	40	10	-	50	

(*):OE/POE (Oral Examination/Practical & Oral Examination mention whichever is applicable)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessments.

2. RATIONALE

This has been noticed that diploma pass outs lack in grammatically correct written and oral communication in English. It is also been noticed that communication is not a problem of students, communication in correct English is the basic problem of Diploma pass outs. Students will have to interact in this language so far as their career in industry is concerned. In order to enhance this ability in students English is introduced as a subject to groom their personality.

3. COMPETENCY

The aim of this course is to attend following industry competency through various teaching learning experiences:

- **To build confidence in written correspondence required in technical fields.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Prepare various speeches for presentation

CO2: Write application for Business purposes.

CO3: Write various technical reports.

CO4: Write business letters.

5. SUGGESTED PRACTICALS/ EXERCISES

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
1	Practice to write various speeches like vote of thanks, guest introduction etc.	1	2
2	Write job application, resume, leave application	1	2
3	Draft a project report to start a new industry (Or to write down the market survey report)	2	2
4	Prepare industrial visit report after visit	3	1
5	Write a placing an order letter, complaint letter	3	2
6	Write a joining letter	4	1
7	Draft a notice, circular and memorandum	3	2
8	Write a fall in production report	3	1
9	Work progress report	3	1
10	Description of devices	4	2
	Total		16
11	*Complete the Micro-project as per the guidelines in point no 11 - compulsory .	1 to 5	2

Assignment no 11 is compulsory. * Perform assignment no.9 or 10.

Sr.No.	Performance Indicators	Weightage in %
a.	Arrangement of available equipment / test rig or model	-
b.	Setting and operation	-
c.	Safety measures	-
d.	Observations and Recording	50
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	20
g.	Submission of report in time	10
	Total	100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Pr O. No.
1	NA	

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit 1 Writing Speeches	
1a. Give in own words the introduction of guest. 1b. Express feelings in own words to welcome 1c. Express feelings in own words for Farewell Speech 1d . Give in own words	1.1 Introduction of guest 1.2 Welcome speech 1.3 Farewell speech 1.4 Vote of thanks
Unit 2 Writing Applications	
1a. Write official correspondence for Job 1b. Application with Resume 1c. Write application for leave. 1d. Write application for getting NOC from corporation. 1e. Students can write various applications	1.1 Job application with resume 1.2 Leave application 1.3 Miscellaneous applications
Unit 3 Writing Reports and Notices	
1a. Students can write Industrial visit report after visit. 1b. Students can write survey report. 1c. Students can write Fall in production report. 1d. Students can draft circular and other notices. 1e. Students can draft Memos.	1.1 Visit report 1.2 Survey report (feasibility report) 1.3 Fall in production report 1.4 Circular/notice 1.5 Memos
Unit 4 Drafting Business Letters	
1a. Students can write Enquiry Letter. 1b. Students can write Placing an order letter. 1c. Student can write Complaint Letter. 1d. Students can write Appointment Letter. 1e. Students can draft Joining Letter.	1.1 Enquiry letter 1.2 Placing an order letter 1.3 Complaint letter 1.4 Appointment letter 1.5 Joining letter

8. 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	Writing speeches	08	2	2	6	10
II	Writing applications	06	2	2	4	08
III	Writing Reports and Notices	10	2	2	6	10
IV	Business letters	08	2	4	6	12
Total		32	8	10	22	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in Lingua- phone- laboratory. Journal consists of drawing, observations, required equipment's, date of performance with teacher signature.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Correlate subtopics with power plant system and equipments.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and technical manuals

11. SUGGESTED MICRO-PROJECTS

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A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

1. Practice to write various speeches and give speech on any of it.
2. Draft personal Resume/ Biodata/CV
3. For drafting project report to start a new industry student should have a market survey and search other accepts to be and an entrepreneur
4. Prepare an industrial visit report after visiting an industry.
5. Describe various technical devices and prepare a PPT on any one of it.

12. SUGGESTED LEARNING RESOURCES

Sr.No.	Author	Title	Publication	ISBN
1	Joyeeta Bhattacharya	Communication skills	Macmillan Co.	--
2	Sarah Freeman	Written communication in English	Orient Longman Ltd.	ISBN- 13 : 978-8125004264
3	Krishna Mohan and Meera Banerji	Developing Communication skills	Macmillan India Ltd.	0333929195 9780333929193

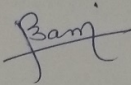
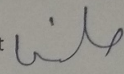
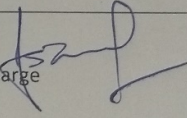
13. SOFTWARE/LEARNING WEBSITES

- A. www.talkenglish.com
- B. Edutech.com
- C. www.makeuseof.com
- D. www.mooc.org

14. Prepared by :

Course Code:

14. Prepared by :

Signature of Course Expert 	Signature of Head of Department 
Name of Course Expert MB Patil S. C.	Name of Head of Department MB Bhide Y. D.
Signature of Program Expert	Signature of CDC In charge  Mr. Zampure
Name of Program Head	Name of CDC In charge

Government Polytechnic, Pune

'180 OB' Scheme

Programme	Diploma in Information Technology
Programme Code	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Name of Course	Basics of Information Technology
Course Code	IT1101
Prerequisite course code and name	No
Class Declaration	No

1. 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	PA	
03	-	-	03	Marks	40	10	-	-	50
				Exam Duration	2Hrs	1Hr	-	-	

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE- End semester examination, PA- Progressive Assessment.

2. RATIONALE

IT is for fast communications, data processing and market intelligence. IT plays an integral role in every industry, helping companies improve business processes, achieve cost efficiencies, drive revenue growth and maintain a competitive advantage in the marketplace.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- Maintain software and hardware devices.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Explain basics of Algorithms and basic Data representations.
2. Explain working of Memory.
3. Describe working of input output devices.
4. State characteristics of various Computers.
5. Explain concepts of Internet and Multimedia.
6. State the need of IT act and E-commerce.

5. PRACTICALS/ EXERCISES

NA

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

NA

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. ALGORITHMS AND DATA REPRESENTATION (Weightage-08, Hrs-08)	
1a. Differentiate between algorithm and a program. 1b. Explain ASCII, EBCDIC and Unicode. 1c. Define: Bits, Bytes, Parity Bit. 1d. State the need for Binary System.	1.1 Introduction, Three Basic Operations, Procedures and Programs – Compiler, Translator, High Level Language, Machine Level Language, Low Level Language. 1.2 Representing Different Symbols, Relevance to the Computer, Minimizing Errors, Representing more symbols, Generic Formula. 1.3 ASCII and EBCDIC Code, Bits and Bytes, Parity Bit, writing a Character in the memory and on the disc, Unicode, Need for Binary.
UNIT 2. MAIN MEMORY AND SECONDARY MEMORY (Weightage-10, Hrs-08)	
2a. Differentiate between Load and Store operation. 2b. List and state characteristics of Primary and Secondary storage devices. 2c. Describe working of Hard Disk, Optical Disk, Pen Drive.	2.1 Introduction, Main memory, Load and Store Instructions, transferring a Data Item and a Record, Cache Memory, Memory Capacity, Memory Categories, what are memories made of? 2.2 Hard Disks and CDs - Memory Hierarchy, Hard Disks, Optical Disks, Pen Drives.
UNIT 3. THE I/O MEDIA (Weightage-04, Hrs-06)	
3a. List and state features of Input-Output Devices. 3b. Describe Types of Printers. 3c. State characteristic and use of RFID and Barcode Reader.	3.1 Introduction, The Keyboard, The Screen, LCD, Mouse. 3.2 Laser Printer, Barcode Reader and RFID.
UNIT 4. CLASSIFICATION, COMPONENTS AND APPLICATIONS OF COMPUTERS (Weightage-06, Hrs-08)	
4a. Draw diagram and describe classification /components of Digital Computer. 4b. Use & Configure Windows Desktop.	4.1 Introduction, Classification of Digital Computers, Anatomy of a Digital Computer, Components of a PC. 4.2 Characteristics of Computers, What can Computers do?, What Computers cannot do?, Application of Computers.
UNIT 5. THE INTERNET AND MULTIMEDIA (Weightage-06, Hrs-08)	
5a. List uses of Internet. 5b. State types of Internet Connections.	5.1 Introduction, History of the Internet, Uses of Internet, Equipment Required for Internet Connection, Types of Internet Connections. 5.2 Internet-Related Concepts, Web Browser, Searching the Web. 5.3 Digital Images, Digital Audio and Digital

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	Video.
UNIT 6. BUSINESS INFORMATION SYSTEMS AND E-COMMERCE (Weightage-06, Hrs-10)	
6a. Identify Use of Computers in Businesses. 6b. Describe types of Ecommerce. 6c. State the need of IT Act. 6d. Explain the clauses in IT Act.	6.1 Introduction, Types of Information Needed by Organizations, Why should we use Computers in Businesses? 6.2 E-commerce: Introduction, Business to Customer E-commerce, Business to Business E-commerce, Customer to Customer E-commerce, Advantages and Disadvantages of E-commerce, IT Act 2000.

8. SUGGESTED SPECIFICATION TABLE

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Algorithms and Data Representation	08	4	2	2	08
2	Main Memory and Secondary Memory	08	4	4	2	10
3	The I/O Media	06	2	1	1	04
4	Classification, Components and Applications of Computers	08	4	2	-	06
5	The Internet and Multimedia	08	3	2	1	06
6	Business Information Systems and E-Commerce	10	3	2	1	06
Total		48	20	13	07	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- They have to study a given topic and explain it in the class.
- Teacher and student interaction in the class by asking different questions.
- Assignments can be given to students.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.

- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. Teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Use proper equivalent analogy to explain different concepts.
- e. Use Flash/Animations to explain various components, operation.

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Demystifying Computers	Achyut Godbole	McGraw Hill
2	Introduction to Information Technology	V. Rajaraman	PHI
3	Computing Essentials	Timothy J. O. Leary	TMH
4	Comdex Computer Course Kit	Vikas Gupta	Dreamtech

13. SOFTWARE/LEARNING WEBSITES

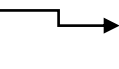
- a. <https://www.slimjet.com/en/lp/top-10-browsers.php>
- b. <https://www.ecommerceceo.com/types-of-ecommerce-business-models/>
- c. <https://www.investopedia.com/terms/b/btob.asp>
- d. <https://drudesk.com/blog/consumer-to-comsumer-c2c-ecommerce>
- e. <https://www.toppr.com/guides/business-laws-cs/cyber-laws/information-technology-act-2000/>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1 Basic and Discipline Specific knowledge	PO2 Problem Analysis	PO3 Design/Development of Solutions	PO4 Engineering Tools, Experimentations and Testing	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning
Explain basics of Algorithms and basic Data representations.	3	2	2	-	-	-	2
Explain working of Memory.	3	1	-	-	-	-	2
Describe working of input output devices.	2	1	-	-	-	-	-
State characteristics of various Computers	2	1	-	-	-	-	-
Explain concepts of Internet and Multimedia	2	1	-	-	1	-	-
State the need of IT act and E-commerce	1	2	-	-	2	-	-

Summary	2	1	2	-	2	-	2
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PSO - COMPETENCY- CO MAPPING

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Explain basics of Algorithms and basic Data representations.	-	2	2
Explain working of Memory.	2	2	2
Describe working of input output devices.	3	-	-
State characteristics of various Computers	-	-	1
Explain concepts of Internet and Multimedia	2	-	1
State the need of IT act and E-commerce	1	1	1
Summary	2	2	1

(Smt. P. N. Yewale)
 (Smt. S. R. Hande)
 Signature of Course Expert

(Mrs. M. U. Kokate)
 Signature of Head of the Department
 (Information Technology)

(Mrs. M. U. Kokate)
 Signature of Programme Head

(Mr. A. S. Zanpure)
 Signature of CDC In-charge

GOVERNMENT POLYTECHNIC, PUNE

'180 OB' – Scheme

Programme	Diploma in CE/EE/ET/ME/MT/CM/IT
Programme code	01/02/03/04/05/06/07/15/16/17/18/19/21/22/23/24/26
Name of Course	APPLIED MAHEMATICS I
Course Code	SC1101
Prerequisite	--
Class Declaration	NO

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Tutorials		Total Marks
L	T	P	C		ESE	PA	ESE	PA	
				Marks	80	20	00	25	125
03	02	00	05	Exam Duration	3 Hrs	1 Hr	00	--	—

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment

2. RATIONALE

The students of Diploma in Engineering and technology must acquire some essential Competencies in Mathematics

3. COMPETENCY

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

- Solve various engineering related problems using the principles of applied mathematics

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Apply the concepts of algebra to solve engineering related problems.
2. Utilize basic concepts of trigonometry to solve elementary engineering problems.
3. Solve basic engineering problems under given conditions of straight lines.
4. Solve the problems based on measurement of regular closed figures and regular solids.

5. SUGGESTED PRACTICALS/ EXERCISES

Experiment Sr. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
1	Solve simple problems of Logarithms based on definition and laws	1	2
2	*Solve problems on determinant to find area of triangle, and solution of simultaneous equation by Cramer's Rules.	1	4
3	*Resolve into partial fraction using linear non repeated, repeated, and irreducible factors	1	4
4	Solve problems on Compound, Allied, multiple and sub multiple angles.	2	4
5	Practice problems on factorization and de factorization.	2	2
6	Solve problems on inverse circular trigonometric ratios.	2	2
7	Practice problems on equation of straight lines using different forms.	3	4
8	Solve problems on perpendicular distance, distance between two parallel lines, and angle between two lines.	3	2
9	Solve problems on Area, such as rectangle, triangle, and circle.	4	2
10	Solve problems on surface and volume, sphere, cylinder and cone.	4	2
11	Solve simple problems of Logarithms based on definition and laws	4	2
12	Skill test		2
13	*Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course.	ALL	4
Total			32

***Experiment No. 13 compulsory, perform experiment 2 or 3.**

Sr. No.	Performance Indicators	Weightage in %
a.	Prepare experimental set up	-
b.	Handling of instruments during performing practical.	-
c.	Follow Safety measures	-
d.	Accuracy in calculation	20
e.	Answers to questions related with performed practices.	40
f.	Submit journal report on time	20
g.	Follow Housekeeping	10
h.	Attendance and punctuality	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will be used in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	LCD Projector	1-11
2	Interactive Classroom	1-11

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Units 1 : Algebra (Hours: 12 , Weightage: 24)	
1a. Solve the given simple problem based on laws of logarithm. 1b. Calculate the area of the given triangle by determinant method. 1c. Solve given system of linear 1d. Equations using by Cramer's rule. 1e. Obtain the proper and improper partial fraction for the given simple rational function	1.1 Logarithm: Concept and laws of logarithm 1.2 Determinant a. Value of determinant of order 3x3 b. Solutions of simultaneous equations in three unknowns by Cramer's rule. 1.3 Partial Fractions: Types of partial fraction based on nature of factors and related Problems.
Unit 2:Trigonometry (Hours: 18 , Weightage: 24)	
2a. Apply the concept of Compound angle, allied angle, and multiple angles to solve the given simple engineering problem(s) 2b. Apply the concept of Sub- multiple angle to solve the given simple engineering related problem 2c. Employ concept of factorization and de-factorization formulae to solve the given simple engineering problem(s). 2d. Investigate given simple problems utilizing inverse trigonometric ratios	2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), submultiples angle.(without proof) 2.2 Factorization and De factorization formulae (without proof). 2.3 Inverse Trigonometric Ratios and related problems 2.4 Principle values and relation between trigonometric and inverse trigonometric ratios.
Unit 3: Co ordinate geometry (Hours: 09 , Weightage: 16)	
3a. Calculate angle between given two straight lines. 3b. Formulate equation of straight lines related to given engineering problems. 3c. Identify perpendicular distance from the given point to the line.. 3d. Calculate perpendicular distance between the given two lines.	3.1 Straight line and slope of straight line a. Angle between two lines. b. Condition of parallel and perpendicular lines. 3.2 Various forms of straight lines. a. Slope point form, two point form. b. Two points intercept form. c. General form. 3.3 Perpendicular distance from a Point on the line. 3.4 Perpendicular distance between two parallel lines
Unit 4:Mensuration (Hours: 09 , Weightage: 16)	
4a. Calculate the area of given triangle and circle 4b. Determine the area of the given square, parallelogram, rhombus, trapezium. 4c. Compute surface area of given cuboids, sphere, cone and cylinder.	4.1 Area of regular closed figures, Area of triangle, square, parallelogram, rhombus, trapezium and circle. 4.2 Volume of cuboids, cone, cylinders and sphere.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
4d. Determine volume of given cuboids, sphere, cone and cylinder.	

8. 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	Algebra	12	6	12	6	24
II	Trigonometry	18	6	6	12	24
III	Co ordinate geometry	09	2	6	8	16
IV	Mensuration	09	2	6	8	16
Total		48	16	30	34	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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:

- Identify engineering problems based on real world problems and solve with the use of free tutorials available on internet.
- Use graphical software's: EXCEL, DPLLOT and GRAPH for related topics.
- Use Mathcad as Mathematical Tool and solve the problems on Calculus.
- Identify problems based on applications of differential equations and solve these problems

10. SUGGESTED 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:

- Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs.(Affective

Domain Outcomes) .Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission.. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Prepare charts using determinant to find area of regular shapes.
- Prepare models using trigonometry to solve engineering problems.
- Prepare models using regular closed figures and regular solids to solve engineering problems.
- Prepare models using Mensuration to solve engineering problems.

12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Higher Engineering Mathematics	Grewal B. S.	Khanna publication New Delhi , 2013 ISBN: 8174091955
2.	A text book of Engineering Mathematics	Dutta. D	New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3.	Advance Engineering Mathematics	Kreysizg, Ervin	Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2
4.	Advance Engineering Mathematics	Das H.K.	S Chand publication New Delhi 2008 ISBN: 9788121903455
5.	Engineering Mathematics Volume I (4 th edition)	Sastry S.S.	PHI Learning, New Delhi, 2009 ISBN: 978-81-203-3616-2

13. SOFTWARE/LEARNING WEBSITE

- www.scilab.org/ -SCI Lab
- www.mathworks.com/product/matlab/ -MATLAB
- Spreadsheet Applications
- www.dplot.com
- <https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig>

PREPARED BY:

1)Sign: Name: S. B. Yede 2)Sign: Name: 1.Shri V. B. Shinde 3)Sign: Name : Mrs. P. R. Nemade (Course Experts)	Sign: Name: (Head of Department)
Sign: Name: (Head of Program)	Sign: Name: Shri A. S. Zanpure (CDC)

GOVERNMENT POLYTECHNIC, PUNE

'180 OB' – Scheme

Programme	Diploma in CE/EE/ET/ME/MT/CM/IT
Programme code	01/02/03/04/05/06/07/15/16/17/18/19/21/22/23/24/26
Name of Course	APPLIED MAHEMATICS II
Course Code	SC1102
Prerequisite	SC1101 – Applied Mathematics I
Class Declaration	NO

1. TEACHING AND EXAMINATION SCHEM

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Tutorials		Total Marks
L	T	P	C		ESE	PA	ESE	PA	
				Marks	80	20	00	25	125
03	02	00	05	Exam Duration	3 Hrs	1 Hr	00	--	—

semester examination, PA- Progressive Assessment

2. RATIONALE

This subject intends to teach students basic facts, concepts, principles and procedure of Mathematics as a tool to analyze Engineering problems and as such it lays down foundation for the understanding of engineering science and core technology subjects

3. COMPETENCY

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

- **Solve various engineering related problems using the principles of applied mathematics**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Calculate the equation of tangent, maxima, minima, by differentiation.
2. Solve the given problems of integration using basic formulae.
3. Use basic concepts of statistics to solve engineering related problems.
4. Apply the concept of numerical methods to find the roots of equation.
5. Apply the concept of matrix to solve the engineering problems.

6. SUGGESTED PRACTICALS/ EXERCISES

Experiment Sr. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
1	Solve problems based on finding value of the function at different points	1	2
2	*Solve problems based on standard formulae of derivatives	1	2
3	*Solve problems to find derivatives of implicit function and parametric function.	1	2
4	Solve problems to find derivative of logarithmic and exponential functions	1	2
5	Solve problems based on finding equation of tangent and normal.	1	2
6	Solve problems based on finding maxima, minima of function	1	2
7	Solve problems based on finding radius of curvature at a given point.	1	2
8	Solve the problems based on standard formulae of integration.	2	2
9	Solve problems on finding range, coefficient of range and mean deviation.	3	2
10	*Solve problems on standard deviation.	3	2
11	*Solve problems on coefficient of variation and comparison of two sets. 2	3	2
12	Solve the algebraic equation using Bisection method, Regula falsi method and Newton –Raphson method	4	2
13	Solve the simultaneous equation using Gauss elimination method, Gauss Seidal and Jacobi's method	4	2
14	Solve elementary problems on Algebra of matrices.	5	2
15	Solve solution of Simultaneous Equation using inversion method.	5	4
16	*Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course.	ALL	4
Total			32

***Experiment No. 16 compulsory, perform experiment 2 or 3 and experiment 10 or 11.**

S.No.	Performance Indicators	Weightage in %
a.	Prepare experimental set up	-
b.	Handling of instruments during performing practical.	-
c.	Follow Safety measures	-
d.	Accuracy in calculation	20
e.	Answers to questions related with performed practices.	40
f.	Submit journal report on time	20
g.	Follow Housekeeping	10
h.	Attendance and punctuality	10
Total		100

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will be used in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	LCD Projector	1-15
2	Interactive Classroom	1-15

8. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit 1 : Differential Calculus (Hours: 24 , Weightage: 40)	
1a. Solve the given simple problems based on functions. 1b. Solve the given simple problems based on rules of differentiation. 1c. Obtain the derivatives of logarithmic, exponential functions. 1d. Apply the concept of differentiation to find given equation of tangent and normal. 1f. Apply the concept of differentiation to calculate maxima and minima and radius of curvature for given function.	1.1 Functions and Limits : a. Concept of function and simple b. Concept of limits without examples. 1.2 Derivatives: a. Rules of derivatives such as sum, Product, Quotient of functions. b. Derivative of composite functions to find derivative of given function (chain Rule), implicit and parametric functions. c. Derivatives of inverse, logarithmic and exponential functions. 1.3 Applications of derivative : a. Second order derivative without examples. b. Equation of tangent and normal c. Maxima and minima d. Radius of curvature
Unit 2: Integration (Hours: 06 , Weightage: 10)	
2a. Solve the given simple problem(s) based on rules of integration.	2.1 Simple Integration: Rules of integration and integration of standard functions
Unit 3: Statistics (Hours: 06 , Weightage: 10)	
3a. Obtain the range and coefficient of range of the given grouped and ungrouped data. 3b. Calculate mean and standard deviation of discrete and grouped data related to the given simple engineering problem. 3c. Determine the variance and coefficient of variance of given grouped and ungrouped data. 3d. Justify the consistency of given simple sets of data.	3.1 Range, coefficient of range of discrete and grouped data. 5.2 Mean deviation and standard from mean of grouped and ungrouped data, weighted means 3.3 Variance and coefficient of variance. 3.4 Comparison of two sets of observation.
Unit 4: Numerical Methods (Hours: 06 , Weightage: 10)	
4a. Apply the concept of approximate to find root of algebraic equation 4b. Apply the concept of iteration to solve the system of equations in three	4.1 Solution of algebraic equations : a. Bisection method, b. Regula falsi method and c. Newton –Raphson method.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
unknowns.	4.2 Solution of simultaneous equations containing three Unknowns : a. Gauss elimination method. b. Iterative methods- Gauss Seidal and Jacobi's method
Unit 5: Matrices (Hours: 06 , Weightage: 10)	
5a. Solve given system of linear equations using matrix inversion method	5.1 Matrices, algebra of matrices, transpose adjoint and inverse of matrices. 5.2 Solution of simultaneous equations by matrix inversion method.

8. 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	Differential Calculus	24	8	12	20	40
II	Integration	06	2	8	--	10
III	Statistics	06	2	--	8	10
IV	Numerical methods	06	2	4	4	10
V	Matrices	06	2	4	4	10
Total		48	16	28	36	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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:

- Identify engineering problems based on real world problems and solve with the use of free tutorials available on internet.
- Use graphical software's: EXCEL, DPLLOT and GRAPH for related topics.
- Use Mathcad as Mathematical Tool and solve the problems on Calculus.
- Identify problems based on applications of differential equations and solve these problems

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Prepare the model using the concept of tangent and normal bending of roads in case of sliding of a vehicle.
- Prepare the model using the concept of radius of curvature to bending of railway tracks.
- Prepare charts for grouped and ungrouped data.
- Write algorithm to find the approximate roots of algebraic equations.
- Write algorithm to find the approximate roots of transcendental equations.
- Write algorithm to solve system of linear equations.
- Prepare models using matrices to solve simple problems based on cryptography.

12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Higher Engineering Mathematics	Grewal B. S.	Khanna publication New Delhi , 2013 ISBN: 8174091955
2.	A text book of Engineering Mathematics	Dutta. D	New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3.	Advance Engineering Mathematics	Kreysizg, Ervin	Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2
4.	Advance Engineering Mathematics	Das H.K.	S Chand publication New Delhi 2008 ISBN: 9788121903455
5.	Engineering Mathematics Volume I (4 th edition)	Sastry S.S.	PHI Learning, New Delhi, 2009 ISBN: 978-81-203-3616-2

13 .SOFTWARE/LEARNING WEBSITES

- www.scilab.org/ -SCI Lab
- www.mathworks.com/product/matlab/ -MATLAB
- Spreadsheet Applications
- www.dplot.com
- <https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig>

PREPARED BY:

1)Sign: Name: S. B. Yede 2)Sign: Name: Shri. V.B.Shinde 3)Sign: Name : Mrs. P. R. Nemade (Course Experts)	Sign: Name: (Head of Department)
Sign: Name: (Head of Program)	Sign: Name: Shri A. S. Zanpure (CDC)

Government Polytechnic , Pune

'180 OB' – Scheme

Programme	Diploma in CE/EE/ET/ME/MT/CO/IT/DDGM
Programme Code	01/02/03/04/05/06/07/08/15/16/ 17/18/19/21/22/23/24/26
Name of the Course	Engineering Physics
Course Code	SC1104
Prerequisite	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
					Theory		Practical	
L	T	P	C		#ESE	PA	*ESE	PA
03	00	02	05	Marks	80	20	25	25
				Exam Duration	3 Hrs	1 Hrs	2 Hrs	--
								150

(*): POE (Practical & Oral Examination), (#): Online theory exam

Legends: L-lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

This course is designed in the way by which fundamental information will help the diploma engineers to apply the basic principles and concepts of physics to solve broad-based engineering problems. The study of basic principles and concepts of motion, light, electricity, and modern physics will help in understanding the technology courses where emphasis is on the applications of these in different technology applications.

3. COMPETENCY

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

- Apply principles of physics to solve broad-based engineering problems.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Estimate errors in measurement and Apply laws of motion in various applications.
2. Use basic principles of light in technical field.
3. Illustrate the basic principles of electrostatics in engineering field.
4. Apply basic principles of electricity to solve engineering problems.
5. Apply basic principles of magnetism to solve engineering problems.
6. Describe the principle and its application of modern physics in Engineering.

5. SUGGESTED PRACTICALS/ EXERCISES

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. required
1	1	Identify given instrument and i) Mention name and range of given instrument. ii) Calculate least count of given instrument. iii) List the uses of given instrument.	1	02
2	1	Use Vernier caliper to : i) Identify and calculate instrumental error. ii) Measure dimensions of different objects. iii) Estimate error in the measurement (if any).	1	04*
3	1	Use micrometer screw gauge to: i) Identify and calculate instrumental error. ii) Measures dimensions and determine volume of given object. iii) Estimate error in the measurement.	1	04*
4	1	Use simple pendulum to determine acceleration due to gravity.	1	02*
5	2	Determine refractive index of glass slab using total internal reflection.	2	02
6	2	Study the properties and working of laser using He-Ne laser beam.	2	02*
7	3	Determine permittivity of free space (Concept of electrostatics).	3	02
8	4	Construct circuit to verify Ohm's law and i) Determine resistance of given material of wire. ii) Calculate specific resistance of given material of wire.	1,4	02*
9	4	Use meter bridge to: i) Determine resistance of given material of wire. ii) Calculate specific resistance of given material of wire.	1,4	04*
10	4	Use potentiometer to :	1,4	04*

		i) Determine potential gradient of given cell (Principle of potentiometer). ii) Calibrate given voltmeter.		
11	4	Use potentiometer to : i) Compare emf of two cells	1,4	02
12	4	Use potentiometer to: i) Find internal resistance of a cell.	1,4	02
13	5	Use magnetic compass to draw magnetic lines of force of magnet of different shapes.	5	02
14	6	Use photoelectric cell to study effect of : i) Intensity of light on photoelectric current. ii) Applied potential on photoelectric current.	6	04*
15	All	Complete a Micro- project based on guidelines provided in Sr .no. 11	1 to 6	04*
		Total Hrs		32

Note: A suggestive list of PrOs is given in the above table. Minimum 10 practical need to be performed out of which practicals marked as * are compulsory. Any one practical out of Sr. No. 1,5,7,11,12 & 13 need to be performed.

S. No.	Performance Indicators	Weightage in %
a.	Arrangement of available equipment / test rig or model	10
b.	Setting and operation	10
c.	Safety measures	10
d.	Observations and Recording	20
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	20
g.	Submission of report in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Experiment No.
1	Vernier Calliper : Range: 0-15 cm, Resolution 0.01 cm.	1,2
2	Micrometer screw gauge: Range 0-25 mm, Resolution 0.01 mm.	1,2,8,9
3	Simple pendulum, Stop Watch.	4
4	Glass Slab 75x50x12mm.	5
5	He-Ne laser kit	6
6	Battery eliminator (0-12 V, 2 A)	7,8,9,10,11,12

7	Voltmeter(0-10 V), ammeter (0-5 A)	8
8	Meter Bridge (100 cm), Galvanometer (30-0-30) and jockey.	9
9	Potentiometer (400 cm).	10, 11, 12
10	Potentiometer, Daniell cell, Leclanche cell.	11,12
11	Bar Magnet, Magnetic Needle.	13
12	Photoelectric cell.	14

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit 1 General Physics (8 hrs,12 marks)	
1a. List fundamental and derived quantities with their unit. 1b. Explain various systems of unit and its need for the measurement. 1c. Estimate errors in measurement. 1d. Derive relation between linear velocity and angular velocity. 1e. Calculate angular velocity of the given body 1f. Distinguish between centripetal and centrifugal force. 1g. Derive equation of SHM.	1.1 Units and Measurement Introduction, Definition of unit, Fundamental and derived units, Different System of units, Errors in measurements. 1.2 Circular Motion: Definition, Uniform circular motion(UCM) Displacement, angular velocity, angular acceleration and units, relation between linear and angular velocity, relation between linear acceleration and angular acceleration, explanation of centripetal and centrifugal force, examples, applications of centripetal and centrifugal force, analytical treatment. 1.3 SHM: Concept of time period, Frequency, Amplitude, Wavelength, Relation between wave velocity frequency and wavelength. Definition of SHM, examples of SHM, SHM as a projection of UCM on the diameter, Equation of SHM starting from mean position, analytical treatment.
Unit 2 Optics and Laser (6 hrs,12 marks)	
2a. State laws of reflection and refraction. 2b. Describe phenomenon of total internal reflection. 2c. Calculate acceptance angle and numerical aperture for given optical fiber. 2d. Distinguish between optical fiber	2.1 Light: Introduction to reflection and refraction of light, Laws of reflection and refraction, Snell's law, Refractive index, Physical significance of refractive index, Critical angle, Total internal refraction of light, analytical treatment.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
communication system and ordinary system. 2e. Differentiate between properties of ordinary light and laser light. 2f. Explain spontaneous and stimulated emission. 2g. Describe working of He-Ne laser with energy level diagram. 2h. State applications of laser in different field.	2.2 Fiber optics: Propagation of light through optical fiber, Structure of optical fiber, Numerical aperture, Acceptance angle, Acceptance cone, Types of optical fibers, Applications of optical fiber, Comparison of optical fiber communication with electrical cable communication. 2.3 LASER: Definition, Properties of LASER, Spontaneous and Stimulated emission, Population inversion, Metastable state, Pumping, Life time, He-Ne laser-construction and working with energy level diagram, Engineering applications of laser.
Unit 3 Electrostatics (10 hrs,16 marks)	
3a. Calculate electrostatic force, electric field and electric potential difference of the given static charge. 3b. Describe properties of electric lines of force. 3c. Explain working of capacitor. 3d. Calculate the equivalent capacity and energy stored in the combination of the capacitors are 3e. Establish relation between parameters affecting capacitance of condenser.	3.1 Electric charge, Coulomb's law in Electrostatics, unit of charge, electric field, intensity of electric field, electric lines of forces (Properties), electric flux, flux density, analytical treatment. 3.2 Electric potential: Explanation, Definition, Potential due to a point charge, potential due to a charged sphere, potential of earth, absolute electric potential, analytical treatment. 3.3 Electric Capacitor :Capacitance Introduction, of conductor, unit, principle of condenser, parallel plate condenser, capacitances in series and parallel, analytical treatment.
Unit 4 Current Electricity (10 hrs,16 marks)	
4a. State Ohm's law 4b. Establish relation between resistance and length , cross section area of given material of wire 4c. Calculate the value of given resistance using the principle of Whetstone's bridge. 4d. Explain principle of potentiometer	4.1 Current, Resistance and its unit, Dependence of resistance- length, area of cross-section, temperature, Ohms law, specific resistance and its unit, Whetstone's network construction and principle, Meter bridge, Balancing condition of meter bridge, Measurement of unknown resistance using meter bridge, analytical

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
4e. Calculate the emf of given cell using potentiometer. 4f. Calculate energy consumption of different electric appliances.	treatment. 4.2 Potentiometer, Principle of potentiometer, Potential gradient, Construction of potentiometer, Applications of potentiometer, E.M.F., Comparison of E.M.F. using potentiometer. 4.3 Electric work- Electric power, Electric energy, Units and Calculations of electric bill.
Unit 5 Electromagnetism (8 hrs,14 marks)	
5a. State Ampere's right hand and Fleming's left hand rule. 5b. Explain Biot- Savart's Law (Laplace's Law), 5c. Calculate Magnetic induction for given conductor.	5.1 Magnetic effect of electric current, Ampere's rule, Coulombs inverse square law in magnetism, Intensity of magnetic field, Magnetic induction, Biot-Savart's Law (Laplace's Law), Fleming's left hand rule, Force experienced by current carrying straight conductor placed in magnetic field, analytical treatment.
Unit 6 Modern Physics (6 hrs,10 marks)	
6a. Explain production of X-rays. 6b. Describe properties and applications of X-ray in different field. 6c. Describe properties of photon 6d. Derive Einstein's photoelectric equation. 6e. Explain working of given photoelectric device.	6.1 X- ray: principle, production of X- rays using Coolidge tube, origin of X-rays, types of X-rays, properties of X-rays, engineering applications of X-rays, analytical treatment. 6.2 Photo electricity: photoelectric effect, Plank's quantum theory, concept of photon, properties of photon, threshold frequency, threshold wavelength, stopping potential, photoelectric work function, Einstein's photoelectric equation, photocell (circuit diagram and working), applications of photoelectric cell, analytical treatment.

8. 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
01	General Physics	8	2	4	6	12
02	Optics and Laser	6	2	4	6	12
03	Electrostatics	10	4	4	8	16
04	Current Electricity	10	4	4	8	16
05	Electromagnetism	8	2	4	8	14
06	Modern Physics	6	2	4	4	10
Total		48	16	24	40	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in Physics laboratory. Journal consists of drawing, observations, required equipment's, date of performance with teacher signature.

10. SUGGESTED 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:

- Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.9, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals.

11. SUGGESTED MICRO-PROJECTS

Only one Micro Project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She/He ought to submit it by the end of semester to

develop industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs. The Micro-Project could be industry application based, internet based, workshop based, laboratory based or field based. The assessment of micro-project is to be done under Practical (PA) Assessment. The Micro Project preferably assign to the group of (4-6) students or an individual taking into the considerations the capabilities and circumstances at the time .

A suggested list is given here. Similar micro-project could be added by the concerned faculty.

- a. **Systems and Units** : Prepare Chart on comparison of systems of units for different physical quantities..
- b. **Magnetism** : Prepare chart on magnetic lines of force of bar magnet.
- c. **Optics** :Prepare chart to study Total Internal Reflection/LASER.
- d. **X-Ray** :Prepare chart showing properties of X-rays/Photoelectric cell.
- e. Prepare Chart to Study **Ohm's Law**.

12. SUGGESTED LEARNING RESOURCES

S. No.	Title	Author	Publisher, Edition Year of publication and ISBN Number
1	Physics Textbook Part I- Class XI	J.V.Narlikar, A.W.Joshi, et al.	National Council of Education Research and Training, New Delhi,2010, ISBN:8174505083
2	Physics Textbook Part II- Class XI	J.V.Narlikar, A.W.Joshi, et al.	National Council of Education Research and Training, New Delhi,2015, ISBN:8174505660
3	Physics Textbook Part I- Class XII	J.V.Narlikar, A.W.Joshi, et al.	National Council of Education Research and Training, New Delhi,2013, ISBN:8174506314
4	Physics Textbook Part II- Class XII	J.V.Narlikar, A.W.Joshi, et al.	National Council of Education Research and Training, New Delhi,2013, ISBN:8174506713
5	Fundamentals of Physics	David Halliday, Robert Resnick and Jearl Walker	7 th Edition John Wily (2004)
6	Engineering Physics	R.K. Gaur and S. L. Gupta	Dhanpat Rai Publications ISBN 9788189928223 (1981)
7	Applied Physics	Prakash Manikpure	S. Chand Publishing ISBN 9788121919548
8	Applied Physics	Arthur Beiser	Schaum's Outline Series McGraw-HILL
9	Engineering Physics	Avadhanulu, Kshirsagar	S Chand ISBN 9788121908177

13. SOFTWARE/LEARNING WEBSITES

- 1) https://en.wikipedia.org/wiki/Engineering_physics
- 2) <https://www.laser.com.ve>
- 3) www.nanowerk.com
- 4) www.brainscape.com
- 5) <https://www.open2study.com/courses/basic-physics>
- 6) <http://nptel.ac.in/course.php?disciplineId=115>
- 7) <http://nptel.ac.in/course.php?disciplineId=104>
- 8) <http://hperphysics.phy-astr.gsu.edu/hbase/hph.html>
- 9) www.physicsclassroom.com
- 10) www.physics.org

Sign: Name: Smt. D. V. Saurkar Dr. R. B. Birajadar (Course Expert)	Sign: Name : Mrs.N.S.Kadam (Head of Department)
Sign: Name: (Program Head)	Sign: Name : Shri.A.S.Zanpure (CDC)

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in Computer Engineering Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/26
Name of Course	Programming in C
Course Code	CM2101
Prerequisite course code and name	NA
Class Declaration	NO

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	175
03	02	02	07	Marks	80	20	50	25	
				Exam Duration	3 Hrs	1 Hr	2 Hr		

(*):POE (Practical and Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

In this era of high speed computing, it is necessary to program computers with the help of structured dynamic languages like 'C' to study programming is useful in solving problems/tasks related to various domains. Now days almost every setup in software engineering domain chooses 'C' as a basic tool to develop software.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Develop command on programming language**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Write procedural program with 'C' language tokens.
2. Execute programs using branching and looping.
3. Write programs using arrays, strings.
4. Develop a C program using functions.
5. Implement programs using structures.
6. Execute programs using pointers.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1	1	Write/compile/execute simple 'C' program: Develop a program using Constants, Variables for different data types.	CO1	02
2	1	Write 'C' programs based on different operators and expressions. (ex. relational, logical, arithmetic etc.) Write programs based on bitwise and special operators.	CO1	02
3	1	Write simple program to take input from user at run time and display the output on the screen.	CO1	02
4	2	Programs using following control statements: If statement, Switch statements,?:operator, go to statements. Programs using following loop controls, while loop, do.. while loop, for loop.	CO2	04
5	3	Write programs based on arrays.	CO3	04
6	3	Write programs using strings operations such as comparison, concatenation, copying etc.	CO3	02
7	4	Write programs on Predefined Functions and User defined functions. Write programs based on recursion & nesting of functions.	CO4	04
8	5	Write programs based on structure definition and initialization. Write programs based on structure within structure.	CO5	04
9	6	Write programs based on pointers.	CO6	04
10	1 to 6	Micro-project (Refer point 11 for micro project list)	All COs	04
TOTAL				32

Sr.No.	Performance Indicators	Weightage in %
a.	Correctness of algorithm	40
b.	Debugging ability	20
c.	Quality of input and output displayed (messaging and formatting)	10
d.	Preparing assignments (write-ups, program and output).	20
e.	Submit assignment on time.	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1.	Computer system with Turbo C compiler to execute “C” programs	1 to 9

7. THEORY COMPONENTS

The following topics/sub topics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Section I	
UNIT I . C Overview, tokens and expressions (Weightage-12, Hrs-10)	
1a. State importance of ‘C’. Describe Basic structure of ‘C’ Programs. 1b. Demonstrate sample C program 1c. Describe Character set. 1d. Define keywords, identifiers, constants, variables, symbolic constants. 1e. List different data types. 1f. Describe different types of operators. 1g. Demonstrate input and output Operators. 1h. Initialize and evaluate expressions.	1.1 Introduction to ‘C’. 1.2 Importance of C. 1.3 Basic structure of ‘C’ programs, programming style, sample ‘C’ programs. execution of ‘C’ program. 1.4 Character set, C tokens, keywords & Identifiers, constants, variables. Data types, type conversion, declaration of variables, assigning values to variables. 1.5 Operators: Arithmetic operators and its precedence, relational, Logical, increment & decrement, conditional, bit-wise operator, special operator. 1.6 Expressions: Arithmetic expressions, evaluation of expressions.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT II. Decision Making and looping (Weightage-15, Hrs-10)	
2a. Understand Branching and looping statements. 2b. Demonstrate if statement, if-else, else-if ladder. 2c. Use of switch statement and ?: operator. 2d. Apply different types of loops.	2.1 Branching: decision making with if statement, if-else statement, else- if ladder. 2.2 Looping: switch statement, ?: operator, go-to statement, while loop, for loop, do-while loop, break and continue statement.
UNIT III. Arrays and Strings (Weightage-13, Hrs-08)	
3a. List different types of Arrays. 3b. Distinguish between one- dimensional, two-dimensional and multidimensional arrays, 3c. Demonstrate initialization of arrays 3d. Declaring and initializing String variables. 3e. Describe String functions.	3.1 Introduction to array: array, Initialization of arrays, 3.2 Types: one- dimensional arrays, two-dimensional arrays, multidimensional arrays. 3.3 Introduction to String: declaration & initialization of string, string variables, reading string, writing string. 3.4 Concatenation & comparison of two strings, string handling functions.
Section II	
UNIT IV. Functions (Weightage-15, Hrs-10)	
4a. Use the given Predefined function. 4b. Write User defined functions. 4c. Identify different categories of Functions. 4d. Understand nesting of functions. 4e. Implement Recursion. 4f. Demonstrate function with arrays.	4.1 Concept and need of functions 4.2 Predefined Functions: Library functions, Math function. 4.3 User defined function: Need, syntax, declaration, definition, return values and their types, calling a function. 4.4 Category of functions: No argument-No return value. 4.5 Nesting of functions, recursion and function with arrays.
UNIT V. Structures and Unions (Weightage-12, Hrs-04)	
5a. Define Structure. 5b. Use the structure for solving the given problem. 5c. Demonstrate arrays of structure. 5d. Execute arrays within structure. 5e. Identify use of structure in functions. 5f. Compare structure and Union.	5.1 Structure : definition, declaring and accessing, structure initialization, copying and comparing structure variables, operations on structure members, array of structures, array within the structure, structure within structures ,structure and functions, size of structures 5.2 Unions: Introduction to union, definition, syntax.
UNIT VI. Pointers (Weightage-13, Hrs-06)	
6a. Define pointer. 6b. Declaration of pointers. 6c. Initialization of pointers and pointer expressions. 6d. Demonstrate pointer as a function	6.1 Pointer: Introduction to pointer Concept. Accessing the address of a variable, declaration of Pointers, Initialization of Pointers, Accessing a variable through its pointer, chain of pointer, pointer expressions.

argument.	6.2 Pointer and Array : Array of pointers, Pointer to array, pointers as a function argument. 6.3 Returning pointer and passing addresses to Functions.
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8. 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
Section I						
I	C overview, tokens, expressions	10	04	02	06	12
II	Decision making and looping	10	04	03	08	15
III	Arrays, Strings	08	04	03	06	13
IV	Functions	10	04	03	08	15
V	Structures and Unions	04	04	04	04	12
VI	Pointers	06	04	04	05	13
Total		20	12	11	17	40
Total		48	24	19	37	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Drawing flowchart and writing algorithms for the given problem statements.
- Prepare practical files with write-ups, programs and its outputs

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
1	C overview, tokens, expressions	Class room teaching
2	Decision making and looping	Laboratory demonstration
3	Arrays, Strings	Class room teaching, laboratory demonstration
4	Functions	Class room teaching, laboratory work
5	Structures and Unions	Class room teaching, laboratory work
6	Pointers	Class room teaching, laboratory work

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:-

- Bank management system
- Snake game
- Customer billing system
- Library management system
- Quiz game
- Simple result system

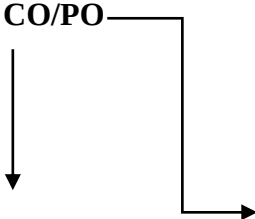
12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Programming in ANSI 'C'	E. Balaguruswamy	Mcgraw Hill
2	Let us 'C'	Yashwant Kanetkar	BPB Publication
3	C for Beginners	Madhusudhan Mothe	Shroff Publishers and Distributions. Pvt. Ltd.

13. SOFTWARE/LEARNING WEBSITES

1. <http://www.nptel.ac.in>
2. <https://www.tutorialspoint.com/cprogramming>
3. <https://onlinecourses.nptel.ac.in>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Write procedural program with 'C' language tokens.	3	2	2	3	-	-	3
Execute programs using branching and looping.	3	2	2	3	-	-	3
Write programs using arrays, strings.	3	2	2	3	-	-	3
Develop a C program using functions.	3	2	2	3	-	-	3
Implement programs using structures.	3	2	2	3	-	-	3
Execute programs using pointers.	3	2	2	3	-	-	3
Summary	3	2	2	2	-	-	3

PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO1	-	-	3
CO2	-	-	3
CO3	-	-	3
CO4	-	-	3
CO5	-	2	3
CO6	-	-	3
Summary	-	2	3

Sign: Name: 1. Mrs.G.B.Garud 2. Mrs. K.S.Gaikwad (CourseExperts)	Sign: Name: Mrs.M.U. Kokate (Head of Department) (Department of Information Technology)
Sign: Name: Mr. U.V. Kokate (Programme Head)	Sign: Name: Mr. A.S.Zanpure (CDC In-charge)

(Department of Computer Engineering)	
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Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in CE/EE/ET/ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/21/22/23/24/26
Name of Course	Fundamentals of ICT
Course Code	CM2102
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
01	00	02	03	Marks	-	-	25	25	50
				Exam Duration	-	-	2 Hr		

(*):POE (Practical and Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

In any typical business setup, in order to carry out routine tasks related to create business documents, perform data analysis and its graphical representations and making electronic slide show presentations, the student need to learn various softwares as office automation tools like word processing applications, spreadsheets and presentation tools. They also need to use these tools for making their project reports and presentations. The objective of Information and Communication Technology course is to develop the basic competency in students for using these office automation tools to accomplish the job.

3. COMPETENCY

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

- Use Computers for electronic documentation, data analysis, slide presentations and use of various internet services.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Connect Computer System and its peripherals.
2. Prepare document using word processing tool.
3. Create and design spreadsheets and data tables.
4. Prepare professional presentations.
5. Use various web services.

5. SUGGESTED PRACTICALS/ EXERCISES

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1	1	i) Identify various Input/output devices, connections and peripherals of computer system ii) Demonstration of Front Panel View ,Rear Panel View, I/O Serial and Parallel Ports iii) Demonstration of opening and closing of the Computer	1	1
2	1	i) Connections inside CPU and its demonstration ii) Setting up the Cabinet. iii) Identification and Demonstration of different slots on motherboard. Mounting and Un mounting of RAM, Graphics card and Network card	1	1
3	1	i) Connecting various I/O Devices such as Mouse, Keyboards, Monitors, Printers, Web Cameras, Speakers, Scanners and External Hard disks etc. ii) Demonstration of RJ45 connector and its use and Bluetooth as an external interface	1	2
4	1	Functions and working of Secondary Storage devices i) Study of various types of Secondary Storage devices. ii) BIOS Settings for Primary and secondary Memory. iii) Installation, Configuration and Setting of Hard Disks and working of CD-ROM/DVD-ROM/ DVD-Combo/ DVD-Writer (Internal and External).	1	1
5	1	Execution of basic commands in command window: Ex: dir, md, copy, cd, move, rmdir, rd etc.	1	1
6	1	Various operations on Window based operating system part I: i) Windows Operations: Minimizing, Maximizing, Resizing. ii) Managing files and folders: Create, copy, rename, delete, move file and folder, Creating shortcuts.	1	1
7	1	Various operations on Window based operating system part II: i) Creating and Removing/Deleting User Accounts. ii) Using Add /Remove Programs and Hardware Utility. iii) Adding Fonts and Viewing Computer Configuration iv) Desktop settings: Display properties, Time and Date setting, Screen Saver , Appearance	1	2

8	2	i) Create, edit and save document : apply formatting features on the text - line, paragraph ii) Use bullets, numbering, page formatting iii) Insert and edit images and shapes, sizing, cropping, color, background, group/ungroup	2	2
9	2	i) Insert and apply various table formatting features on it. ii) Use mail merge with options.	2	1
10	2	Apply page layout features i) Themes, page background, paragraph, page setup ii) Create multicolumn page iii) Use different options to print the documents	2	2
11	3	Create, open and edit worksheet i) Enter data and format it, adjust row height and column width ii) Insert and delete cells, rows and columns iii) Apply wrap text, orientation feature on cell.	3	2
12	3	i) Insert formulas, “IF” conditions, functions and named ranges in worksheet. ii) Apply data Sort Filter and Data Validation features.	3	3
13	3	Create charts to apply various chart options.	3	2
14	3	Apply Page setup and print options for worksheet to print the worksheet.	3	1
15	3	Perform following in GUI based database software using GUI like MS-Access i) Create Database ii) Create tables and assign primary key. iii) Modify the table structure-add column, change the data type of column, delete the column from table. iv) Insert, update and delete the record from table. v) Retrieve data from the table according to condition given.	3	2
16	4	i) Create slide presentation ii) Apply design themes to the given presentation iii) Add new slides and insert pictures/images, shapes, apply animation effects to the text and slides. iv) Add tables and charts in the slides. v) Run slide presentation in different modes and Print it.	4	2
17	5	Configure Internet connection	5	1
18	5	Use internet for different web services.	5	2
19	5	Configure browser settings and use browsers.	5	1
20	All	Micro-project (Refer point 11 for micro project list)	All COs	2
		Total		32

Sr.No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Major Equipment/ Instruments Required	PrO. No.
1	Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), Graphics cards, sound cards, internal hard disk drives, DVD drive, Network interface card, Mouse, Keyboard, Monitors, Printers, Web Cameras, Speakers, Scanners and External Hard disks etc.	1 to 7
2	Laser printer	1,14,16
3	Hard Disks, CD-ROM/DVD-ROM/ DVD-Combo/ DVD-Writer (Internal and External).	3,4
4	Hubs, Switches, Modems.	18,19
5	Any operating system.	5 to 20
6	Any Office Software.	8,9,10, 11, 12, 13, 15,16,17
7	Any browser.	18,19,20

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit -1 Introduction to Computer System (Hours- 04)	
1a.Explain the given block diagram of computer system. 1b. Classify the given types of software. 1c.Explain characteristics of the specified type of network. 1d.Describe Procedure to manage file/folders. 1e.Describe application of the specified type of network connecting device.	1.1 Basics of Computer System: Overview of Hardware and Software ,block diagram of Computer System, Input /Output unit, CPU, Control unit, Arithmetic logic unit(ALU), Memory Unit 1.2 Internal Components: Processor, Motherboards, random access memory(RAM), read-only memory(ROM), Video cards, Sound cards and internal hard disk drives 1.3 External Devices: Types of Input/ Output Devices, Types of monitors, Keyboards, Mouse, Printers: Dot Matrix, Inkjet and LaserJet, Plotter and scanner, external storage devices CD/DVD , Hard disk and pen drive 1.4 Basic Commands in command window:

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	Ex: dir, md, copy, cd, move, rmdir, rd etc. 1.5 Application Software: Word processing , Spreadsheet, database management systems, Control software, measuring software, photo editing software , video editing software, graphics manipulation software system software compilers, linkers, device drivers, operating systems and utilities 1.6 Network environments: Network interface cards, hubs, switches, routers and modems, concept of LAN, MAN, WAN, WLAN, Wi-Fi and Bluetooth 1.7 Working With Operating Systems: Create and manage file and folders, Copy a file, renaming and deleting files and folders, searching files and folders, application installation , creating shortcut of application on the desktop
Unit - 2 Word Processing (Hours- 03)	
2a. Write steps to create the given text document. 2b. Explain the specified feature for document editing. 2c. Explain the given page setup features of a document. 2d. Write the specified table formatting feature	2.1 Word Processing: Overview of Word processor, Basics of Font type, size, color, Effects like Bold, italic, underline, subscript and superscript, Case changing options, Previewing a document, Saving a document, Closing a document and exiting application. 2.2 Editing a Document: Navigate through a document, Scroll through text, Insert and delete text, Select text, Undo and redo commands, Use drag and drop to move text, Copy, cut and paste, Use the clipboard, Clear formatting, Format and align text, Formatting Paragraphs, Line and paragraph spacing, using FIND and REPLACE, Setting line spacing ,add bullet and numbers in lists, add borders and shading, document views, Page settings and margins, Spelling and Grammatical checks 2.3 Changing the Layout of a Document: Adjust page margins, Change page orientation, Create headers and footers, Set and change indentations, Insert and clear tabs 2.4 Inserting Elements to Word Documents: Insert and delete a page break, Insert page numbers, Insert the date and time, Insert special characters(symbols), Insert a picture from a file, Resize and reposition a picture 2.5 Working with Tables: Insert a table, Convert a table to text, Navigate and select text in a table, Resize table cells, Align text in a table, Format a table, Insert and delete columns and rows, Borders and shading, Repeat table headings on subsequent pages, Merge and split cells. 2.6 Working with Columned Layouts and Section Breaks: Add Columns, Section breaks, Creating columns, Newsletter style columns, Changing part of a document layout or formatting, Remove section break, Add columns to remainder of a document, Column widths, Adjust column spacing, Insert manual column breaks

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit -3 Spreadsheets and Database (Hours- 04)	
3a. Write steps to create the given spreadsheet. 3b. Explain the specified formatting feature of a worksheet. 3c. Write steps to insert formula and functions in the given worksheet. 3d. Write steps to create charts for the specified data set. 3e. Explain steps to perform advance operation on the given dataset	3.1 Working with Spreadsheets: Overview of workbook and worksheet, Create Worksheet Entering sample data, Save, Copy Worksheet, Delete Worksheet, and Open & Close Workbook. 3.2 Editing Worksheet: Insert and select data, adjust row height and column width, delete, move data, insert rows and columns, Copy and Paste, Find and Replace, Spell Check, Zoom In-Out, Special Symbols, Insert Comments, Add Text Box, Undo Changes,- Freeze Panes, hiding/un hiding rows and columns. 3.3 Formatting Cells and sheet: Setting Cell Type, Setting Fonts, Text options, Rotate Cells, Setting Colors, Text Alignments, Merge and Wrap, apply Borders and Shades, Sheet Options, Adjust Margins, Page Orientation, Header and Footer, Insert Page Breaks, Set Background. 3.4 Working with Formula: Creating Formulas, Copying Formulas, Common spreadsheet Functions such as sum, average, min, max, date, In, And, or, mathematical functions such as sqrt, power, applying conditions using IF. 3.5 Working with Charts: Introduction to charts, overview of different types of charts, Bar, Pie, Line charts, creating and editing charts. Using chart options: chart title, axis title, legend, data labels, Axes, grid lines, moving chart in a separate sheet. 3.6 Advanced Operations: Conditional Formatting, Data Filtering, Data Sorting, Using Ranges, Data Validation, Adding Graphics, Printing Worksheets, print area, margins, header, footer and other page setup options 3.7 Introduction to Database Management System: Meaning of Data, Database, DBMS, GUI based database software Creating tables and assign primary key, Modifying the table structure-add column, change the data type of column, and delete the column from table. And Insert, update and delete the record from table.
Unit – 4 Presentation Tool (Hours- 03)	
4a. Write the steps to create the specified slide presentation. 4b. Write the steps to insert multiple media in the given presentation. 4c. Write steps to apply table features in the	4.1 Creating a Presentation: Outline of an effective presentation, Identify the elements of the User Interface, Starting a New Presentation Files, Creating a Basic Presentation, Working with text boxes, Apply Character Formats, Format Paragraphs, View a Presentation, Saving work, creating new Slides, Changing a slide Layout, Applying a theme, Changing Colors, fonts and effects, apply custom Color and font theme, changing

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
given presentation 4d. Write steps to manage charts in the given presentation	the background, Arrange Slide sequence, 4.2 Inserting Media elements: Adding and Modifying Graphical Objects to a Presentation - Insert Images into a Presentation, insert audio clips, video/animation, Add Shapes, Add Visual Styles to Text in a Presentation, Edit Graphical Objects on a Slide, Format Graphical Objects on a Slide, Group Graphical Objects on a Slide, Apply an Animation Effect to a Graphical Object, Add Transitions, Add Speaker Notes, Print a Presentation. 4.3 Working with Tables: Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications. 4.4 Working with Charts: Insert Charts in a Slide, Modify a Chart, Import Charts from Other Office Applications
Unit - 5 Basics of Internet (Hours- 02)	
5a. Explain use of the given setting option in browsers. 5b.Explain features of the specified web service. 5c.Describe the given characteristic of cloud. 5d.Explain the specified option used for effective searching in search engine	5.1 World Wide Web: Introduction, Internet, Intranet, Cloud, Web Sites, Web Pages, URL, web servers, basic settings of web browsers-history, extension, default page, default search engine, creating and retrieving bookmarks, use search engines effectively for searching the content. 5.2 Web Services: e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking.

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Computer System	4	--	--	--	--
II	Word Processing	3	--	--	--	--
III	Spreadsheets and Database	4	--	--	--	--
IV	Presentation Tool	3	--	--	--	--
V	Basics of Internet	2	--	--	--	--
Total		16	--	--	--	--

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.

- b. Prepare a sample document with all word processing features.(Course teacher shall allot appropriate document type to each students)
- c. Prepare PowerPoint Presentation with all the presentation features.(Course teacher shall allot various topics to the groups of students)
- d. Prepare Database/spreadsheets in groups, related to various Fields/Organizations
- e. Undertake micro projects

10. SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Guide student(s) in undertaking micro-projects.
- e. Correlate subtopics with power plant system and equipments.
- f. Use proper equivalent analogy to explain different concepts.
- g. Use Flash/Animations to explain various components, operation and
- h. Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Word documents: Prepare Time Table, Application Notes, Reports(Subject teacher shall assign a document to be prepared by the each students)
- b. Slide Presentations: Prepare slides with all Presentation of reports(Subject teacher shall assign a presentation to be prepared by each student.
- c. Spreadsheets: Prepare pay bills, tax statement, student's assessment record using spreadsheets (Teacher shall assign a spreadsheets to be prepared by each student
- d. Web Browser/ Email : Create Email ID using any web browser and E-mail service and explore all the options available in Email e.g. drive, forms etc.

12. SUGGESTED LEARNING RESOURCES

S.N.	Title	Author	Publisher, Edition, Year of publication ,ISBN Number
1	Computer Fundamentals	Goel, Anita	Pearson Education, New Delhi, 2014 • ISBN-13: 978-8131733097
2	Computer Basics Absolute Beginner's Guide, Windows 10	Miller, Michael	QUE Publishing; 8th edition August 2015 • ISBN: 978-0789754516
3	Microsoft Office 2010 for Windows: Visual Quick Start	Schwartz, Steve	Pearson Education, New Delhi India, 2012 • ISBN:9788131766613
4	OpenOffice.org for Dummies	Leete, Gurdy, Finkelstein Ellen, Mary Leete	Wiley Publishing, New Delhi 2003 • ISBN : 978-0764542220
5	Microsoft Office 2010: On Demand	Johnson, Steve	Pearson Education, New Delhi India, 2010. • ISBN : 9788131770641

13. SOFTWARE/LEARNING WEBSITES

- <http://www.nptel.ac.in>
- <https://www.microsoft.com/en-in/learning/office-training.aspx>
- <http://www.tutorialsforopenoffice.org>
- <https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Connect Computer System and its peripherals.	2	-	-	2	1	-	2
Prepare document using word processing tool.	-	-	-	2	2	2	3
Create and design spreadsheets and data tables.	3	2	2	2	2	2	3
Prepare professional presentations.	-	-	-	2	2	2	3
Use various web services.	1	-	-	-	1	-	1
Summary	2	2	2	2	2	2	3

PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
Connect Computer System and its peripherals.	2	-	-
Prepare document using word processing tool.	-	-	1
Create and design spreadsheets and data tables.	-	3	1
Prepare professional presentations.	-	-	1
Use various web services.	2	-	1
Summary	2	3	1

Sign: Name: Smt. A. D. Kshirsagar Smt. K. S. Sathawane Smt. P.L. Sonwane (Course Expert /s)	Sign: Name: Shri. U. V. Kokate Dr. S. B. Nikam (Head of Department) (Department of Computer Engineering)
Sign: Name: Shri .U. V. Kokate Dr. S. B. Nikam (Programme Head) (Department of Computer Engineering)	Sign: Name: Shri A. S. Zanpure (CDC Incharge)

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in Computer Engineering Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of Course	Linux Basics
Course Code	CM2103
Prerequisite course code and name	NA
Class Declaration	NO

15. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
01	-	02	03	Marks	--	--	25	25	50
				Exam Duration	--	--	2 Hr		

(*):POE (Practical & Oral Examination)

Legends: *L- lecture-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.*

16. RATIONALE

Linux Operating System is Open source and freely distributed O.S. Apart from the fact that it's freely distributed, Linux's functionality, adaptability and robustness makes it highly suitable for server platform. The course aims at providing knowledge of shell and command line essentials.

17. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Practice Basic commands of Linux operating system.**

18. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Install and Configure Linux O.S.
2. Execute various commands of Linux Operating System.
3. Manage files and Directories in Linux OS
4. Compress and archive files in Linux OS.
5. Write and execute programs using shell scripting.

19. SUGGESTED PRACTICALS/ EXERCISES

Sr. No.	Unit No	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
9	1	i) Installing Linux: Hardware, Software, Requirements, Opening Disk space for Linux partitions ii) Virtual Consoles iii) Configuring GRUB / LILO Boot Loader.	CO1	4
10	2	i) Executing commands related to Login into user accounts, start up and shutdown commands, command line editing commands, man, who, who am i, info, pwd.	CO2	2
11	2	i) Executing Commands, I/O redirection and pipes. ii) Practicing File Name Arguments: *,?, [].	CO2	4
12	3	i) Executing various file Related commands –cat, more,ls, cd, cp, mv, rm, touch, mkdir, rmdir, find.	CO2	2
13	3	i) Practicing Absolute and Relative Pathnames. ii) Setting/Changing file and directory related permissions chmod. iii) Link command.	CO2	4
14	4	i) Executing commands related to archive and file compression	CO3	2
15	4	i) Executing various commands related to vi Editor. ii) Practicing editing with vi editor. iii) Practicing vi editing commands.	CO4	4
16	5	i) Executing various Shell commands: cat, tee, head and tail. ii) Creating shell variables	CO5	2
17	5	i) Configuring Login Shell with Special Shell Variables. ii) Practicing filter output: wc, spell and sort.	CO5	2
18	5	i) BASH Shell Programming (any 4 basic programs without looping)	CO5	4
19	All Unit	Micro-project (Refer point 11 for Micro Project list)	All CO's	2
Total				32

S.No.	Performance Indicators	Weightage in %
f.	Debugging ability.	20
g.	Quality of output achieved.	40
h.	Complete the practical in stipulated time.	10
i.	Answer to sample questions.	20
j.	Submission of assignment in time.	10
Total		100

20. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO Sr.No.
1	Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), internal hard disk drives, Mouse, Keyboard, open-source operating System. (RedHat, Ubuntu etc).	All

21. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit - I Introduction to Linux Operating System (Hrs-03)	
1a. Describe History of Linux. 1b. Identify different types of shells. 1c. Compare Linux file systems.	1.1 Operating System and Linux 1.2 History, Overview of Linux 1.3 Shell: Bourne, Korn, Cshell. 1.4 Linux releases, Linux File Systems(ext) and versions.
Unit -II The Shell (Hrs- 04)	
2a. Use History command. 2b. Use filename arguments. 2c. Execute file related commands. 2d. Execute commands using pipes and I/O redirection.	2.1 The Command Line. 2.2 Command Line Editing. 2.3 Command and Filename Completion. 2.4 History: History Events, History command, History Event Editing. 2.5 Configuring History: HISTFILE and HISTSAVE. 2.6 Filename Expansion: *, ?, []: Matching Multiple Characters, Matching Single Characters, Matching a Range of Characters, Matching Shell Symbols, Generating Patterns. 2.7 Standard Input/Output and Redirection: Redirecting the Standard Output: > and >>, The Standard Input. 2.8 Pipes: , Redirecting the Standard Error:2>, >>.
Unit-III Linux Files and Directories (Hrs-02)	
3a. Describe linux file structure 3b. Use absolute and relative pathnames. 3c. Execute file and Directory commands. 3d. Change file and directory permissions 3e. Use link command.	3.1 Linux Files, The File Structure- Home Directories, Pathnames, System Directories. 3.2 Listing, Displaying, and Printing Files(ls, cat, more, less, and lpr). 3.3 Displaying Files: cat, less, and more, Printing Files: lpr, lpq, and lprm. 3.4 Managing Directories (mkdir, rmdir, ls, cd, and pwd): Creating and Deleting Directories, Displaying Directory Contents, Moving Through Directories, Referencing the Parent Directory. 3.5 File and Directory Operations (find, cp, mv, rm, and ln): Searching Directories: find, Searching the Working Directory, Locating Directories, Copying Files, Moving Files, Copying and Moving Directories, Erasing Files and Directories: The rm Command. 3.6 Links: The ln Command, Symbolic Links, Hard Links. 3.7 File and Directory Permissions: chmod.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit - IV Archive, Editors and Utilities(Hrs- 03)	
4a. Compress and archive files. 4b. Create and modify files using vi editor. 4c. Use line editing command.	4.1 Archive Files and Devices: tar Displaying Archive Contents, Creating Archives, Extracting Archives, Updating Archives, Compressing Archives. 4.2 File Compression: gzip, bzip2, and zip: Compression with gzip, Compressing with bzip2, Using Zip. 4.3 The vi Editor: vi Command, Input, and Line Editing Modes. 4.4 Creating, Saving and Quitting a File in vi, Managing Editing Modes in vi. 4.5 vi Editing Commands: Common Operations.
Unit - V Filters, Regular Expressions and Shell programming(Hrs- 04)	
5a. Execute Linux filters. 5b. Execute commands using regular expressions. 5c. Execute shell script programs.	5.1 Filters and Regular Expressions: Using Redirection and Pipes with Filters: cat, tee, head and tail. 5.2 Types of Filter Output : wc, spell and sort. 5.3 Configuring Your Login Shell with Special Shell Variables. 5.4 Introduction to BASH Shell Programming, Variables and Scripts.

22. SUGGESTED SPECIFICATION TABLE

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
I	Introduction to Linux Operating System	3	-	-	-	-
II	The Shell	4	-	-	-	-
III	Linux Files and Directories	2	-	-	-	-
IV	Archive, Editors and Utilities	3	-	-	-	-
V	Filters, Regular Expressions and Shell programming	4	-	-	-	-
Total		16				

23. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical.
- Practice more commands and their options other than practical list.
- Undertake Micro projects in group of students.

24. SUGGESTED 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. Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- b. About 15-20% of the topics/sub-topics which is relatively simpler or descriptive in nature is to be given to the students for self-directed learning and assess the development of the COs through classroom presentations.
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for co-curricular activities.
- d. Use different Audio-Visual media for Concept understanding.
- e. Guide student(s) in undertaking micro-projects.
- f. Demonstrate students thoroughly before they start doing the practice.
- g. Observe continuously and monitor the performance of students in Lab.

25. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a) Write a shell program for the following:
 1. Take 1st name as input from user. (E.g.,John)
 2. Take 2nd name as input from user. (E.g.,Smith)
 3. Display both names individually.
 4. Display the message "Welcome John and Smith."
 5. Redirect this output to a file.
- b) Write a Shell script to calculate the gross salary of employee. (HRA = 20% of basic salary, DA = 50% of basic salary).
- c) Write a shell program for the following:
 1. Execute commands to add "Hello GPP" 5 times in a file in Vi editor.
 2. Execute commands to sort a file in alphabetical order with numbered list.
- d) Write a shell program to display the contents of two files in sorted format with numbers to each line.
- e) Write a program to find misspelled words from two files and write the output to new file.

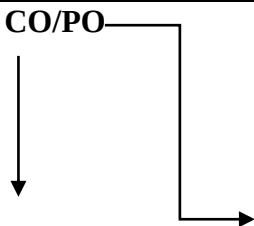
26. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author, Publisher, Edition and Year of publication	ISBN Number
1	Linux The Complete Reference	Richard Petersen, McGraw Hill, 6th edition (16 January 2008)	- ISBN-10 007149247X - ISBN-13 978-0071492478
2	Linux command line and shell scripting	Richard Blum, Wiley India	- ISBN-10 1119700914 - ISBN-13 978-1119700913
3	Linux Lab: Hands on Linux.	Prof. Dayanand Ambawade Dreamtech Press (14 September 2009)	- ISBN-10 935004000X - ISBN-13 978-9350040003

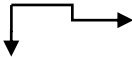
27. SOFTWARE/LEARNING WEBSITES

1. <https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners>
2. <https://www.tecmint.com/linux-commands-cheat-sheet/>
3. <https://www.guru99.com/must-know-linux-commands.html>
4. <https://www.shellscript.sh/>
5. https://www.tutorialspoint.com/unix/shell_scripting.htm
6. <https://spoken-tutorial.org/tutorial>

28. PO - COMPETENCY- CO MAPPING

CO/PO 	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Install and Configure Linux O.S.	3	2	2	3	1	-	3
Execute various commands of Linux Operating System.	3	-	1	3	1	-	3
Manage files and Directories in Linux OS.	3	-	1	3	1	-	3
Compress and archive files in Linux OS.	3	2	2	3	1	-	3
Write and execute programs using shell scripting.	3	2	2	3	1	-	3

29. PSO - CO MAPPING

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Install and Configure Linux O.S.	3	-	3
Execute various commands of Linux Operating System.	3	1	3
Manage files and Directories in Linux OS	3	1	3
Compress and archive files in Linux OS.	3	1	3
Write and execute programs using shell scripting.	3	1	3

Sign: Name: 1. Smt. H F Khan 2. Smt. H S Pawar 3. Smt. S. S. Ingavale (CourseExperts)	Sign: Name: Mr. M.U. Kokate (Head of the Department) (Information Technology)
Sign: Name: Mr. U.V. Kokate (Programme Head) (Department of Computer Engineering)	Sign: Name: Mr. A.S. Zanpure (CDC In-charge)

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in Computer Engineering, Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/15/16/17/18/19/21/22/23/24/ 26
Name of Course	Web Designing using HTML
Course Code	CM2104
Prerequisite course code and name	NA
Class Declaration	No

1. 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	PA	*ESE	PA	
1	-	2	3			25	50	75

(*): POE (Practical and Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

In the Era of Web Technology it is essential for every Diploma Engineering students to understand the various steps for designing a creative and dynamic Web site and finally create good effective and customized websites. This course covers Web designing using HTML, Web site publishing, Internet related technologies and systematic way of developing a website.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Develop static interactive web sites.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Use HTML tags for information representation on webpage.
2. Create webpage using images, colors and backgrounds.
3. Design HTML forms.
4. Format web pages using CSS.
5. Host static web sites.

5. SUGGESTED PRACTICALS/EXERCISES

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1	1	a) Create lists of at least 10 available browsers and search engines. Use internet for acquiring this information. b) Take a string example “Government Polytechnic, Pune” and display it in all <h1> to <h6> header tags. State the output.	CO1	2
2	1	a) Design a web page with two paragraphs each of 8-10 lines. Assign title to web page. Practice formatting tags for bold, italics, underline, center, break, space, horizontal lines, span tag, pre tag etc.	CO1	2
3	1	a) Write an HTML script that gives information about G.P. Pune and displays the names of various Departments as unordered list. b) Design and implement a webpage displaying list of grocery items as ordered list	CO1	2
4	1	a) Design a webpage for implementing – • Ordered list within unordered list. • Unordered list within ordered list. • Ordered list within ordered list (implement different list numbering style) • Unordered list within unordered list (Implement different bullet styles) b) Write an HTML script that displays definitions of minimum 10 terms related to a context. Use definition lists for the same.	CO1	2
5	2	a) Adding Hyperlinks and Images: Create a webpage containing two images and add a hyperlink to another webpage. Apply width and height property to one image. Align one image to center and the other one to left. Assign the second image as hyperlink to another webpage. b) Create a webpage containing an image and some paragraph. Apply following- • Create the map of image with sections of image linking to different webpage’s in the same HTML where it is to be applied. • Apply this map on the image.	CO2	2
6	2	a) Applying background properties - Create a webpage with paragraphs, headers and information of your choice. Apply and practice following effects on webpage: • Set the background color of the page to linen. • Set border to h1 tag. • Set background image to a page. • Set background image to any paragraph. • Repeat the image vertically only.	CO2	2

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
		- Repeat the image horizontally only. - Show the background image at top right position.		
7	2	a) Applying Border properties: Create a webpage with paragraphs, headers and information of your choice. Apply and practice following effects on webpage: - Set all top border properties of a paragraph in one declaration. - Set style of bottom border for a paragraph. - Set the width of left border. - Assign different colors to four borders. Use hexadecimal color assignment. - Set rounded border for some paragraph - Apply border to the page. - Set border width to the header.	CO2	2
8	3	a) Create a webpage that displays first year timetable. Make effective use of rowspan and colspan attributes. Make use of <th> tag too.	CO3	2
9	3	a) Use the webpage from earlier assignments with tables. Use borders, margins and padding properties on table/table rows/table cells. b) Use <div> tag to mark various divisions of webpages. Apply background, border, margin properties to different divisions	CO3	2
10	3	a) Create a webpage for creating any layout in frameset with at least two frames. b) Design the layout first and then write appropriate scripts for defining frameset and individual frames.	CO3	2
11	3	a) Create a webpage that provides a form for filling information. The webpage must contain following elements : - Textbox - Radio buttons - Checkboxes - Buttons (Submit/REST) - Text area - Textbox for passwords Design the form properly for some task: Example- Login creation/Registration etc. Provide appropriate Labels to all form elements to guide user into filling the form.	CO3	2
12	4	a) Apply background and border style on paragraph/page/header using inline and internal cascaded styles. b) Apply different styles to various selectors i.e. elements, names, ids, class, groups. Use any web page created earlier.	CO4	2

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
13	4	a) Applying CSS text properties: Create a web page with number of paragraphs and headers. Apply following text properties: - Set the text color of page to “RED” and text color of <h1> to “BLUE”. - Align <h1> to center. - Style text in <h1> to uppercase. - Style text in some <p> to capitalize. - Indent the first line of the paragraph to 20 px. - Set letter spacing for the paragraph - Set word-spacing in another paragraph - Set text direction from right to left - Create text-shadow effect on certain heading. - Set no wrap property for some paragraph. State the output.	CO4	2
14	4	a) Applying CSS font properties: Create a web page with number of paragraphs and headers. Apply following font properties: - Set the font of page to “COURIER” and the font of <h1> tag to “VERDANA”. - Set the font size of page to “20px” and the font size of a paragraph to “3em” - Show some <p> elements as Italic text. - Set some part of <p> element to small caps - Set font style through CSS to oblique. - Set font-weight of some part of paragraph to bold.	CO4	2
15	4	a) Applying CSS link properties: Create a web page with number of paragraphs and number of links. Apply different styles to hyperlinks: - Link changing colors when visited. - Link changing color on Mouse over - Link changing font-size on mouse over. - Link changing background color on mouse-over - Link changing font-family when visited. - Set color of some link to green. - Remove underline from the links. - Set the background color of link to TOMATO for visited and unvisited link	CO4	2
16	All	Micro-project (Refer point 11 for micro project list)	All COs	2
Total Hrs				32

S.No.	Performance Indicators	Weightage in %
a.	Debugging ability	20
b.	Quality of output achieved	40
c.	Complete the practical in stipulated time	10
d.	Answer to sample questions	20
e.	Submission of assignment in time	10
Total		100

6. MAJOR EQUIPMENTS/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Experiment Sr. No.
1	Computer with a text editor and browser	All
2	Computer system with Internet connection	16
3	Web server	16

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit - I. Introduction to Common HTML, Links and Addressing. (Hrs-04)	
1a. Define HTML.	1.1 Introduction to HTML
1b. State the Terminologies used in Web Design.	1.2 Terminologies used in Web Design: Web, Web site, Web page, Web server, Web Browser, Search Engine
1c. Describe Block Level Elements.	1.3 Components of HTML: Tags – closed tags and open tags, Attributes, Elements
1d. Define Components of HTML Tags.	1.4 Structure Tags: !DOCTYPE, HTML, HEAD, TITLE, BODY tags.
1e. Enlist Text Level Elements.	1.5 Block Level Elements: Headings, Paragraphs, Breaks, Divisions, Centered Text, Block Quotes, Preformatted text, Address.
1f. Create the different List.	1.6 Text Level Elements: Bold, Italic, Teletype, Underline, Strikethrough, Superscript, subscript.
1g. Write a program for Linking HTML Documents.	1.7 Horizontal Rules, Special characters, Adding comments, The Meta tag.
	1.8 Creating Lists: Ordered Lists, Unordered Lists, Definition Lists, Nested Lists.
	1.9 Linking HTML Documents URL: Types of URLs, Absolute URLs, Relative URLs, The Anchor Tag. Linking: To document in the same folder, to document in the different

	folder, to document on the web, to specific section within the Document, Inserting E-mail link.
Unit - II. Images, Colors and Background (Hrs-04)	
2a. Find Image Formats 2b. Describe HSPACE & VSPACE. 2c. Differentiate between Server-side image maps & Client-side image maps. 2d. Describe Text Color. 2e. Write a program for setting text color & background Color. 2f. Write a program for setting background images. 2g. Describe attribute of BODY tag	2.1 Image: - Image formats: gif, jpeg, png - The inline image: an IMG tag, alternate text, image alignment, buffer space – HSPACE, VSPACE, wrapping text, height and width of images, Image as a link. - Image maps: Server-side image maps, Client-side image map 2.2 Colors and Backgrounds: - The text color: color attribute of FONT tag, text attribute of BODY tag. - Background color: bgcolor attribute of BODY tag - Background Images: Background attribute of BODY tag. - Changing link colors: link, alink, vlink attributes of BODY tag.
Unit - III. Tables, Frames and Forms (Hrs-04)	
3a. State Basic Tables Tags. 3b. Describe how to add Captions. 3c. Define Frames. 3d. Enlist Advantages & Disadvantages of Frames. 3e. Write a program to Create Frame using Frame Tag. 3f. Define Forms. 3g. Write a program to Create basic form using different form fields. 3h. Describe Button tag.	3.1 Tables: - Creating basic tables: TABLE, TR, TH, TD tags. - Formatting tables: border, cellpadding, width, align, bgcolor attributes. Adding captions: CAPTION tag. - Formatting contents in the table cells: align, valign, bgcolor, height, width, nowrap attributes. Spanning rows and columns: rowspan and colspan attributes. 3.2 Frames: - Introduction to frames: What is frame? Advantages and disadvantages of using frames. - Creating frames: FRAMESET tag – rows, cols attributes, FRAME tag – name, frame border, margin height, margin width, src, resize, scrolling Attributes, Use of NOFRAMES tag, Frame targeting. 3.3 Forms: - Creating basic form: FORM tag, action and method attributes. - Form fields: Single line text field, password field, multiple line text area, radio buttons, and check boxes. Pull down menus: SELECT and OPTION tags. - Buttons: submit, reset and generalized

	buttons. Formatting technique: Using table to layout form.
Unit – IV. Style Sheets (Hrs-02)	
4a. Define CSS. 4b. Write a program for adding different Style to the Document. 4c. Describe Selectors. 4d. Describe Style Sheet Properties. 4e. Write a Program displaying Style Sheet Properties.	4.1 Adding style to the document: Linking to style sheets, embedding style sheets, using inline style. 4.2 Element Selectors: CLASS rules, ID rules. 4.3 Style sheet properties: font, text, box, color and background properties.
Unit - V. Website Hosting (Hrs-02)	
5a. Describe the procedure to configure a web server 5b. Differentiate hosting requirement on Internet and Intranet. 5c. Describe the procedure for hosting the given web site. 5d. Explain process of uploading given files on a web site.	5.1 Concept of Internet and Intranet 5.2 Publishing web site on Intranet 5.3 Installing and configuring web server 5.4 Uploading files on Intranet site, Access intranet base web page 5.5 Publishing web site on Internet. 5.6 Access Internet based web site.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
I	Introduction to common HTML, Links and addressing.	4	-	-	-	-
II	Image colors and background	4	-	-	-	-
III	Tables, frames and forms	4	-	-	-	-
IV	Style Sheets	2	-	-	-	-
V	Website Hosting	2	-	-	-	-

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practical.
- Browse and Observe features of different types of website.
- Undertake micro projects.

10. SUGGESTED 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:

- h. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- i. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations.
- j. With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- k. Use different Audio-Visual media for Concept understanding.
- l. Guide student(s) in undertaking micro-projects.
- m. Demonstrate students thoroughly before they start doing the practice.
- n. Observe continuously and monitor the performance of students in Lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Develop website for any School/Hospital/Hotel administration.
- b. Develop website for online Shopping (Flower, grocery, Cloth etc.)
- c. Develop website for ant showroom.
- d. Develop any other Relevant website of Student's / Faculty's Choice.

12. LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	The Complete Reference: HTML	Thomas A.Powell	Tata McGraw Hill, 5 th Edition
2	Mastering HTML 4.0	Deborah S. Ray , Eric J. Ray	BPB

13. SOFTWARE/LEARNING WEBSITES

1. <https://www.w3.org/TR/2018/SPSD-html401-20180327/struct/links.html>
2. <http://www.html.net/>
3. <http://webdesign.about.com>
4. <https://www.html.am/templates/simple-website-templates/>
5. <https://www.w3schools.com/html/>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO ↓	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Use HTML tags for information representation on webpage.	-	-	2	2	-	-	2
Create webpage using images, colors and backgrounds.	-	-	2	-	2	-	2
Design HTML forms.	1	-	2	2	2	-	2
Format web pages using CSS.	1	-	2	2	1	-	2
Host static web sites.	2	-	2	2	2	2	1

PSO - COMPETENCY- CO MAPPING

CO /PSO ↓	Hardware and Networking	Database Technologies	Software Development
Use HTML tags for information representation on webpage.	-	-	3
Create webpage using images, colors and backgrounds.	-	-	3
Design HTML forms.	-	-	3
Format web pages using CSS.	-	-	3
Host static web sites.	-	-	3

Sign: (Smt. S. P. Ambavane) (Smt. A. B. Bhusagare) Course Experts	Sign: Name: Smt. M.U. Kokate (Head of Department) (Department of Information Technology)
Sign: Name: Smt. M.U. Kokate (Programme Head) (Department of Information Technology)	Sign: (Mr.A.S. Zanpure) (CDC)

GOVERNMENT POLYTECHNIC, PUNE
‘180 OB’ – Scheme

Programme	Diploma in CM/IT
Programme code	06/07/26
Name of Course	ENGINEERING MAHEMATICS
Course Code	SC2102
Prerequisite	SC1102 – Applied Mathematics II
Class Declaration	NO

1. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Tutorials		Total Marks
L	T	P	C		ESE	PA	ESE	PA	
03	02	00	05	Marks	80	20	00	25	125
				Exam Duration	3 Hrs	1 Hr	00	--	—

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment

2. RATIONALE

The student shall learn various techniques in integration and differential equations and use these techniques to their related Engineering problems.

3. COMPETENCY

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

- **Solve various engineering related problems using the principles of Engineering Mathematics**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Solve the given problems of integration using suitable methods.
2. Apply the concept of integration to find mean and RMS value.
3. Solve the differential equation of first order and first degree using suitable methods.
4. Utilize basic concepts of probability distribution to solve elementary engineering problems.
5. Use statistical measures to solve engineering related problems

5. SUGGESTED PRACTICALS/ EXERCISES

S. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant COs	Approx. Hrs. required
1	1	Integration by substitution method	1	3
2	1	Integration on the type $1/ax^2+bx+c$, $1/\sqrt{ax^2+bx+c}$, $1/asinx+bcosx+c$, $1/asin^2x+bcos^2x+c$.	1	2
3	1	*Integration using By Part Rule and integration by partial fraction method.	1	2
4	1	*Integration by partial fraction method.	1	2
5	2	Examples on Definite integral and it's properties	2	2
6	2	Examples on Mean and R.M.S. value	2	2
7	3	Examples on order, degree and formation of differential equation.	3	2
8	3	Solution of first order first degree D.E. using various methods.	3	3
9	4	Solve problems based on Binomial Distribution related to engineering problems.	4	2
10	4	Solve problems based on Poisson Distribution related to engineering problems.	4	2
11	4	Solve problems based on Normal Distribution related to engineering problems.	4	2
12	5	Solve problems on moments.	5	2
13	5	Solve problems on skewness.	5	2
14	5	*Solve problems on Kurtosis.	5	2
15	5	*Solve problems on correlation.	5	2
16	ALL	Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course.	ALL	4
	Unit No.	Total		16

***Experiment No. 16 compulsory, perform experiment 3 or 4, experiment 14 or 15.**

S.No.	Performance Indicators	Weightage in %
a.	Prepare experimental set up	-
b.	Handling of instruments during performing practical.	-
c.	Follow Safety measures	-
d.	Accuracy in calculation	20
e.	Answers to questions related with performed practices.	40
f.	Submit journal report on time	20
g.	Follow Housekeeping	10
h.	Attendance and punctuality	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	LCD Projector	1-15
2	Interactive Classroom	1-15

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Units 1 : Integration (Hours: 09 , Weightage: 20)	
1a. Obtain the given simple integral(s) using substitution method. 1b. Integrate given simple functions using the integration by parts. 1c. Evaluate the given simple integral by partial fractions.	1.1 Methods of Integration: a. Integration by substitution. b. Integration by parts. c. Integration by partial fractions.
Unit 2: Definite integrals (Hours: 09 , Weightage: 16)	
2a. Solve given simple problems based on properties of definite integration. 2b. Utilize the concept of definite integration to find mean value of the function. 2c. Invoke the concept of definite integration to find root mean square value of function.	2.1 Definite Integration: a. Simple examples b. Properties of definite integral (without proof) and simple examples. 2.2 Applications of integration : a. Mean value. b. Root Mean Square Value.
Unit 3: Differential Equations (Hours: 12 , Weightage: 20)	
3a. Find the order and degree of given differential equations 3b. Form simple differential equation for given simple engineering problems. 3d. Solve given differential equations using the method of Variable separable form. 3e. Solve the given differential equations using linear differential equations.	3.1 Concept of differential equation. 3.2 Order, degree and formation of Differential equations 3.3 Solution of differential equation a. Variable separable form. b. Linear differential equation. 3.4 Application of differential equations and related engineering problem(s).
Unit 4: Probability Distribution (Hours: 09 , Weightage: 12)	
4a. Make use of probability distribution to identify discrete and continuous probability distribution 4b. Solve given problems based on repeated trials using Binomial distribution 4c. Solve given problems when number of trials are large and probability is very small. 4d. Utilize the concept of normal distribution to solve related engineering problems.	4.1 Probability distribution Probability a. Discrete Probability distribution. b. Continuous Probability distribution. 4. 2 Binomial distribution. 4. 3 Poisson's distribution. 4. 4 Normal distribution.
Unit 5: Statistical Measures (Hours: 09 , Weightage: 12)	
5a. Calculate Moments about the mean of the given frequency distribution. 5b. Calculate the coefficient of Skewness of given distribution. 5c. Calculate the coefficient of Kurtosis of given distribution. 5d. Calculate the coefficient of correlation of given simple data.	5.1 Moments of given frequency distribution. 5.2 Skewness and coefficient of skewness of the given frequency distribution. 5.3 Kurtosis, coefficient of Kurtosis and type of Kurtosis. 5.4 Karl Pearson's coefficient of Correlation of simple data.

8. 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	Integration	09	04	08	08	20
II	Definite integration	09	--	08	08	16
III	Differential equation	12	04	08	08	20
IV	Probability Distribution	09	04	04	04	12
V	Statistical Measures	09	04	04	04	12
Total		48	16	32	32	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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:

- Identify engineering problems based on real world problems and solve with the use of free tutorials available on internet.
- Use graphical software's: EXCEL, DPLLOT and GRAPH for related topics.
- Use MathCAD as Mathematical Tool and solve the problems on Calculus.
- Identify problems based on applications of differential equations and solve these problems.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- Use Flash/Animations to explain various components, operation.
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one Micro Project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She/He ought to submit it by the end of semester to develop industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs. The Micro-Project could be industry application based, internet based, workshop based, laboratory based or field based. The assessment of micro-project is to be done under Practical (PA) Assessment. The Micro Project preferably assign to the group of (4-6) students or an individual taking into the considerations the capabilities and circumstances at the time

A suggested list is given here. Similar micro-project could be added by the concerned faculty.

- a. Prepare charts displaying the area of irregular shapes using the concept of integration.
- b. Prepare charts displaying the volume of irregular shapes using the concept of integration.
- c. Prepare models using the concept of differential equations for radio carbon decay.
- d. Prepare models using the concept of differential equations for population growth.
- e. Prepare models using the concept of differential equations for thermal cooling.
- f. Prepare models using the concept of Probability Distribution to solve engineering problems.
- g. Prepare models using the concept of Statistical measures to solve engineering problems.

12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Higher Engineering Mathematics	Grewal B. S.	Khanna publication New Delhi , 2013 ISBN: 8174091955
2.	A text book of Engineering Mathematics	Dutta. D	New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3.	Advance Engineering Mathematics	Kreysizg, Ervin	Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2
4.	Advance Engineering Mathematics	Das H.K.	S Chand publication New Delhi 2008 ISBN: 9788121903455

13. SOFTWARE/LEARNING WEBSITES

- a. www.scilab.org/ -SCI Lab
- b. www.mathworks.com/product/matlab/ -MATLAB
- c. *Spreadsheet Applications*
- d. www.dplot.com
- e. <https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig>

PREPARED BY:

1)Sign: Name: S. B. Yede 2)Sign: Name: Shri. V. B. Shinde 3)Sign: Name : Mrs. P. R. Nemade (Course Experts)	Sign: Name: (Head of Department)
Sign: Name: (Head of Program)	Sign: Name: Shri A. S. Zanpure (CDC)

Government Polytechnic, Pune

1800B-Scheme

Program Name	:	Diploma Programme in Information Technology
Program Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Computer Hardware & Maintenance
Course Code	:	IT2101
Prerequisite course code and name		NA
Class Declaration	:	NO

1. TEACHING AND EXAMINATION SCHEME

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

(*):POE Practical & Oral Examination.

Legends- L-Lecture, T-Tutorial/teacher guided theory practice, P-Practical, ESE-End Semester Examination, and PA- Progressive Assessment.

2. RATIONALE

Maintenance and troubleshooting of computer system and its peripheral is an important skill to upkeep the computer systems and peripherals. Diploma pass out must be able to use and maintain these systems peripherals authentically. They must also possess basic skills of assembling desktop computers, interfacing with peripheral devices, installing new devices and carry out preventive and breakdown maintenance and troubleshooting. This course is designed to develop these vital skills in them through lab based activities to solve problems associated with computer hardware.

3. COMPETENCY

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

- **Maintain computer hardware and peripherals.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following *industry oriented* Cos associated with the above mentioned competency:

1. Identify different types of computer systems.
2. Troubleshoot common motherboard problems.
3. Select processors required for relevant systems.
4. Partition/format hard disk drives.
5. Troubleshoot peripherals and networks.
6. Test power supplies.

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

Sr. No.	Unit No	Name of Experiment/Assignment	Relevant CO	Approximate Hours Required.
1.	I	a. Identify desktop and server by its type and verify its specifications. b. Identify type of laptop and verify its Specification.	CO1	02
2.	II	a. Identify hardware components on motherboard. b. Troubleshoot common problems of motherboard.	CO2	02
3.	III	Configure BIOS settings.	CO3	02
4.	IV	Partition and manage hard disk: format hard drives with different file systems.	CO4	02
5.	IV	Install operating system-Windows family(such as window 7/window 10 windows server 12)	CO4	02
6.	IV	Install operating system-Unix family(such as linux/ubuntu/centos)	CO4	02
7.	IV	Troubleshoot hard disk problems.	CO4	02
8.	V	a. Install local printer(software configuration settings on printers and troubleshooting) b. Share printers in network(software configuration settings on printer and troubleshooting)	CO5	02
9.	V	Set keyboard, mouse, monitor, speaker, microphone and LCD projector.	CO5	02
10.	VI	Install SMPS, measure voltage levels in main connector of SMPS connecting various subsystems.	CO6	02
11.	VI	Assemble and disassemble desktop system	CO6	02
12.	VI	Troubleshoot computer system by diagnosing the problems.	CO6	02
13.	VI	Use diagnostic software for fault finding and viruses.	CO6	02
14.	VI	Undertake preventive maintenance of PC using vaccum cleaner and simple to use tools .	CO6	02
15.	All	Complete a micro project based on guidelines provided in Sr. No. 11	ALL	04
Total				32

S.No.	Performance Indicators	Weightage in %
a.	Arrangement of available equipment / test rig or model	02
b.	Setting and operation	03
c.	Safety measures	05
d.	Observations and Recording	05
e.	Interpretation of result and Conclusion	10
f.	Answer to sample questions	70

S.No.	Performance Indicators	Weightage in %
g.	Submission of report in time	05
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1.	Computer system with all necessary components like: motherboard, random access memory(RAM), read only memory(ROM), graphic cards, sound cards, internal hard disk drives, DVD drive, network interface card.	All
2.	LCD/DLP Projector.	Student activity
3.	Mouse: Mechanical, Optical, Opto-mechanical.	8
4.	Laptop.	All
5.	Bluetooth based wireless mouse and keyboard or any other device.	8
6.	Dot matrix printer,/laser printer/ inkjet printer.	7
7.	Computer maintenance kit.	All
8.	Operating system.	5,6,7,8,11,12
9.	Power supply.	All
10.	Diagnostic software	12
11.	Vacuum cleaner/Blower.	13

7. THEORY COMPONENTS

The following topics/subtopics are to be taught and assessed in order to develop UCs for achieving the COs to attain the indentified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. Features of computer hardware (Weightage-10 , Hrs- 06)	
1a. Explain characteristics of the given type of computer system. 1b. Describe features of the given desktop system. 1c. Describe features of given tablet system. 1d. Describe features of the given server system.	1.1 Computers: desktop computers, tablet, laptop, main-frame, supercomputer. 1.2 Features description: hardware components of desktop systems, laptops and tablets. 1.3 Types of servers, server feature descriptions and its applications.
UNIT 2. Motherboard (Weightage-12 , Hrs- 06)	
2a. Identify the given component of motherboard. 2b. Describe features of the given motherboard.	2.1 Mother board: components, layout, connections. 2.2 Motherboards: types and features. 2.3 Enhancing features of mother board: adding and or replacing components.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
2c. Differentiate hardware based and software based problems of mother board. 2d. Describe the procedure to identify the given type of motherboard problems.	2.4 Troubleshooting problems of motherboard.
UNIT 3. Processor and BIOS (Weightage-18 , Hrs-12)	
3a. Describe architecture of given type of multi-core processors. 3b. Explain the purpose of the given type of co-processor. 3c. Explain the level and purpose of cache memory. 3d. Write the procedure to configure given BIOS setting.	3.1 Processor: common features, types of processor, basic structure of CPU, different levels of cache, system bus, clock speed, packaging. 3.2 Multi core processor: description, two core processor architecture and multi core processor architecture. 3.3 Co-processors: graphics, maths. 3.4 BIOS: basic input output system services, Bios interaction, data and time, boot device priority, boot setting configuration, password security.
UNIT 4 Hard disk (Weightage-16 , Hrs- 12)	
4a. Describe features of the given type of hard disk interface. 4b. Describe features of the given type of disk structure. 4c. Explain characteristics of the given disk performance parameter. 4d. Write the procedure to partition the given HDD. 4e. Describe the given type of file system.	4.1 Hard disk drive. 4.2 Hard disk interfaces: EIDE, serial ATA, SCSI, USB and IEEE 1394(fire wire), RAID, solids state drive(laptop). 4.3 Disk structure: Heads, tracks, sectors, cylinders, clusters, landing zone, MBR, zone bit recording. 4.4 Disk performance parameters characteristics: seeks an latency, data transfer rate. 4.5 File system: FAT16, FAT32, NTFS, unix file system, EXT2/EXT3, RAID.
UNIT 5. I/O and modem (Weightage-12 , Hrs- 06)	
5a. Describe features of the given I/O device. 5b. Write steps to troubleshoot the given peripheral device. 5c. Explain use of the given I/O cable. 5d. Explain features of given type of interface. 5e. Describe the procedure to troubleshoot the given network problem.	5.1 Troubleshoot I/O devices: keyboard, switches, mouse, scanners, webcam, monitors, printers, speakers and mike, LCD projector. 5.2 I/O cables: specification of I/O cables, type of I/O cables, types of I/O ports, internal and external modem, block diagram and specification. 5.3 Network interface: definition of network interface, types of network interface, troubleshooting and network connectivity, antivirus.
UNIT 6. Power supply (Weightage-12 , Hrs- 06)	
6a. Describe features and working of the given SMPS. 6b. Describe features and working the given UPS. 6c. Differentiate the salient features of the specified type of UPS.	6.1 Purpose and features of SMPS, working of SMPS. 6.2 Fault finding in power supply. 6.3 Uninterrupted power supply: characteristics of UPS, types of UPS. Online and offline. 6.4 Preventive maintenance of power supply.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
6d. Describe the steps to troubleshoot the given type of SMPS.	

8. 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	Features of Computer Hardware	06	4	4	2	10
II	Motherboard	06	4	4	4	12
III	Processor and BIOS	12	6	6	6	18
IV	Hard disk	12	6	6	4	16
V	I/O and modem	06	6	4	2	12
VI	Power supply	06	6	4	2	12
Total		48				80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare specification chart for different types/family of processors
- Prepare journal for practical.
- Prepare power point presentation related to Computer Hardware components like motherboard, hard disk, CD, DVD etc.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
1	Features of Computer Hardware	Class room teaching
2	Motherboard	Laboratory demonstration
3	Processor and BIOS	Class room teaching, laboratory demonstration
4	Hard disk	Class room teaching, laboratory work
5	I/O and modem	Class room teaching, laboratory work
6	Power supply	Class room teaching, laboratory work

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs.(Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission.. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- SMPS: List down components available in SMPS. Measure the different output voltage from SMPS.
- Computer Motherboard: Prepare brief report by identifying different electronics components in a given motherboard. List active and passive components.
- Microprocessor: Prepare a report on different types of microprocessor.
- Peripherals Specification: Prepare a report on technological differences and installation procedure of printers and scanners.
- Network Layout: Prepare a report on different types of networks by doing survey of Computer lab.

12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	The complete PC upgrade and maintenance guide	Mark Minasi	Sybex; 16 edition (July 27, 2005)
2	The Computer Hardware, installation, interfacing, troubleshooting and maintenance	James.K.L.	Prentice Hall India Learning Private Limited (2013) ISBN-10: 8120347986 ISBN-13: 978-8120347984
3	Comdex: Hardware and Networking Course Kit	Gupta, Vikas	Dreamtech Press, New Delhi ISBN:987-93-5119-265-7
4	Computer Architecture and Maintenance Vol I	Kadam, Sachin	Shroff Publication, Mumbai ISBN:987-9350230244

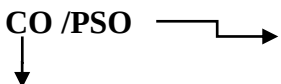
13. SOFTWARE/LEARNING WEBSITES

- <https://www.howstuffworks.com/>
- https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm
- <https://www.youtube.com/watch?v=4sz4VHCj2Ho>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO/PO	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
CO1	2	-	1	-	-	-	-
CO2	3	1	1	1	-	-	1
CO3	3	1	2	2	-	-	2
CO4	3	3	3	3	1	1	3
CO5	3	2	3	3	1	3	3
CO6	1	-	-	1	1	-	1
Summary	-	-	2	2	-	-	2

PSO - COMPETENCY- CO MAPPING

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
CO1	3	-	-
CO2	3	-	-
CO3	3	-	-
CO4	3	-	-
CO5	3	-	-
CO6	3	-	-
Summary	3	-	-

Sign: Name: Smt.K.S.Gaikwad Smt.N.P.Sarwade (Course Expert /s)	Sign: Name: Smt.M.U.Kokate Head of the Department (Information Technology)
Sign: Name: Smt.M.U.Kokate (Program Head) (Information& Technology Dept.)	Sign: Name: Shri A.S.Zanpure (CDC)

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM CM/IT
Programme code	01/02/03/04/05/06/07/08/21/22/23/24/26
Name of Course	Electrical Engineering
Course Code	EE2107
Prerequisite course code and name	--

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
03	00	02	05	Marks	80	20	25	25	150
				Exam Duration	3Hrs	1Hrs	2 Hrs		

(*):OE/POE (Oral Examination/Practical & Oral Examination mention whichever is applicable)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

The basic concepts of electrical engineering in this course will be very useful for understanding the utilization of electrical circuits, equipment, and machines. Hence, it is necessary to be able to grasp the basic electric and magnetic circuits, AC fundamentals, polyphase circuits, different types of AC and DC motors, their principles, working characteristics and application. It is also useful for trouble shooting of basic electrical wiring and knows the electrical safety; this course will be very useful for understanding of higher level courses.

3. COMPETENCY

The aim of this course is to help the student to attain the following competency through various teaching learning experience

- Use electrical equipment in computer.
- Do trouble shooting and rectification of basic electrical wiring.
- Understand the electrical safety.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so the student are able to demonstrates the following COs associated with the above mentioned competency.

- a. CO1- Appreciate the basic principles of electric and magnetic circuits
- b. CO2- Use single phase and three phase AC supply.
- c. CO3- Utilization of transformer and AC , DC and special purpose motors for specific applications
- d. CO4- Use electrical protective switchgear for electrical wiring and system as per requirement
- e. CO5- Recognize the electrical safety

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Pro1:- Verify the basic laws of electric and magnetic circuits.

Pro2:- Analyze the single and three phase circuits.

Pro3:- Understand the operation of transformer, DC and AC motors

Pro3:- Perform the simple electrical wiring and testing by lamps or multimeters

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required
1	1	To verify properties of series and parallel connection of resistances	CO1	2
2	1	Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law	CO1	2
3	1	Verification of Faradays laws of Electromagnetic Induction.	CO1	2
4	1	To perform statically and dynamically induced EMF	CO1	2
5	2	To determine frequency, time period, peak value, rms value, peak factor and form factor of a sinusoidal A. C. waveform on C. R. O.	CO2	2
6	2	Find the phase difference between voltage and current on C. R. O. for resistive, inductive and capacitive circuits.	CO2	2
7	2	To verify the relation between line & phase values of current and voltage in a balanced star & delta connected circuit	CO2	2
8	2	Measurement of power by two wattmeter method	CO2	2
9	3	To determine voltage & current ratio of single-phase transformer and determine efficiency and voltage regulation of single phase transformer	CO3	2

10	3	Reversal the direction of following motors 1 Three phase Induction motor 2. Single phase induction motor	CO3	4
11	4	Reversal the direction of any one of the following motor 1. D.C. motor 2. Stepper Motor 3. Servo motor 4. BLDC motor	CO3	2
12	5	To connect and perform two lamps control by two switches with MCB.	CO4	2
13	5	To prepare switch board of one lamp and one socket control by using two switches.	CO4	2
14	5	Test circuit using series lamp and multimeter	CO4	2
15	5	Prepare chart of procedure for rescuing a person who has received an electrical shock.	CO5	2
Total Hrs				32

S.No.	Performance Indicators	Weightage in %
1	Arrangement of available equipment / test rig or model	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will user in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr.No.	Major Equipment/ Instruments Required	PrO. No.
1	Voltage /Current/Power measuring meter AC & DC	Pro1, Pro2, Pro3
2	Single phase transformer	Pro3
3	DC Motor	Pro3
4	Three phase induction motor	Pro3
5	Single phase motor	Pro3
6	Tachometer	Pro3
7	Passive electrical elements ,Rheostat, Capacitor and inductor	Pro1 to Pro4
8	Three phase lamp load	Pro2

7. THEORY COMPONENTS

The following topics/subtopic should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. Electrical Circuit and Electromagnetism (Marks-12, Hrs-07)	
1a. Define Ohms Law and Kirchhoff's Laws 1b. Analyze series and parallel circuits 1c. Define Power and Energy. 1d. Define laws and rules of electromagnetism. 1e. Explain Statically and dynamically induced EMF.. 1f. Explain concepts of self-inductance, mutual inductance and coefficient of coupling. 1g. Explain Energy stored in magnetic fields.	1.1 Ohms Law and Kirchhoff's laws 1.2 Analysis of series, parallel and series –parallel circuits excited by independent voltage sources. Power and Energy. 1.3 Faradays Laws, Lenz's Law, Fleming's Rules. Statically and dynamically induced EMF. Concepts of self-inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic fields
Unit 2 Single Phase and Three phase A.C. Circuits (Marks-22, Hrs-13)	
2a. Describe the method of generation of single phase voltage by an elementary alternator, define basic terms of sinusoidal waveform 2b. Represent the given AC quantities by phasors, waveform and mathematical equations. 2c. With the help of waveforms and phasor diagrams, show the phase relationship between voltage and current in R, L, C, RL, RC, and RLC ac circuit. 2d. Calculate the parameters of the given circuit, and also calculate current, power factor and power of the given AC circuit 2e Explain the concept of symmetrical system and phase sequence of the given AC supply.	2.1 Generation of sinusoidal voltage. Definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities. 2.2 Analysis with phasor diagrams of R, L, C, RL, RC and RLC circuits. Real power, reactive power, apparent power and power factor, series, parallel and series -parallel circuits. Series and parallel resonance. 2.3 Necessity and Advantages of three phase systems. 2.4 Generation of three phase power, definition of Phase sequence. 2.5 Relationship between line and phase values of balanced star and delta connections. Power in balanced three phase circuits. 2.6 Measurement of power by two wattmeter method

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
2f Calculate the current and power of the given three phase star / delta connection.	
UNIT 3 Induction motor and Transformer (Marks- 16 , Hrs- 10)	
.3a. Explain the construction & working principal of induction motor 3b. Select relevant induction motor for given application with justification. 3c. Describe the construction and working of transformer. 3d. Derive emf equation and explain losses, efficiency and voltage regulation.	3.1 Concept of rotating magnetic field; Principle of operation, types and constructional features of induction motor.; Slip and its significance. 3.2 Necessity of a starter, star-delta starter: 3.3 Applications of squirrel cage and slip ring motors. 3.4 Single Phase Induction Motors- Working principle, construction and applications of following Motors. I) Split phase a)Resistance b)Capacitance II) Capacitor start capacitor run III) Shaded pole. Reversal of rotation of above motors. 3.5 Principle of operation and construction of single phase transformers (Core and shell types). 3.6 EMF equation, losses, efficiency and voltage regulation
UNIT 4 Special Purpose Electrical Motors (Marks-16 , Hrs-10)	
4a. Explain the construction and working principle of DC motor and its applications. 4b. Explain the construction and working principle of stepper motor, servo motor and BLDC motor and its applications	4.1 DC Motor: DC motor working principle; Back EMF and its significance, torque equation; Types of D.C. motors, characteristics and applications; Necessity of a starter for DC motor. 4.2. Stepper Motor: Working principal and construction of stepper motor and application. 4.3 Servo motor: Servo motor working principal, construction and application. 4.5 BLDC Motor: Brush less D. C. Motor construction, working principal and application
UNIT 5 Electrical wiring ,Protective Devices and Electrical safety (Marks-14, Hrs-08)	
5a. Select the relevant protective device and suitable switchgear for the given application with justification. 5b Describe the features of the given type of protective device. 5c State the I.E. rule related to be applied for the safety with justification.	5.1 Introduction to domestic wiring, service mains, meter board and distribution board; 5.2 Introduction to circuit protective devices: Concept of overload, O.C., S.C., leakage current, H.R.C. Fuses, MCB, use of ELCB. Necessity of Earthing 5.3. One lamp control by one switch. Two lamp control by two switches. Electrical wiring diagram of 5 PC labs. 5.4 I.E. rules for safety of person & equipment followed when working with electrical installation. Electrical shocks and

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
5d. Explain how to take the precautions against shocks and understand the procedure for rescuing a person, who has received an electrical shock.	precautions against shocks. Procedure for rescuing a person who has received an electrical shock.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Practical Marks			
			R Level	U Level	A Level	Total Marks
I	Electrical Circuit and Electromagnetism	07	02	06	04	12
II	Single Phase and Three phase A.C. Circuits	13	06	10	06	22
III	Induction motor and Transformer	10	04	06	06	16
IV	Special Purpose Electrical Motors	10	04	06	06	16
V	Electrical wiring ,Protective Devices and Electrical safety	08	04	06	04	14
VI						
VII						
Total		48	20	34	26	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journals based on practical performed in laboratory.
- Market survey regarding commonly used electrical equipment which are not covered in the curriculum.
- Prepare charts of different electrical wiring diagram
- Search information about Ratings and specifications of AC, DC and special purpose electrical motors.
- Prepare power point presentation or animation for showing working of DC or AC or special purpose electrical motors.
- Prepare posters to illustrate the use of procedure for rescuing a person who has received an electrical shock.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.

- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through practically implementation.
- c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Guide student(s) in undertaking micro-projects.
- e. Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

S.N.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Electrical Technology – Vol-I	B. L. Theraja, A. K. Theraja , S. Chand & Company Pvt. Ltd. New Delhi	ISBN: 978-81-219-2440-5
2	Electrical Technology- Vol- II	B. L. Theraja, A. K. Theraja , Revised by S. G. Tarnekar , S. Chand & Company Pvt. Ltd., New Delhi	ISBN: 978-81-219-2437-5
3	A Textbook of Electrical Machines	K. R. Siddhapura, D. B. Raval, Vikas Publishing House Pvt. Ltd.	ISBN: 978-93259-7562-0

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. www.electrical-technologies.com
3. www.youtube.com/electrical

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	-	1	-	1
CO2	3	1	1	-	1	-	2
CO3	3	1	-	-	-	-	-
CO4	-	2	1	-	1	-	2
CO5	-	1	-	-	3	-	2

	PSO1	PSO2
--	------	------

CO1	1	-
CO2	3	-
CO3	2	-
CO4	2	-
CO5	2	-

Sign: Name: Dr. Vijaykumar Kishanrao Jadhav (Course Expert /s)	Sign: Name: (Head of Department)
Sign: Name: (Program Head)	Sign: Name: Shri A.S.Zanpure (CDC)

GOVERNMENT POLYTECHNIC, PUNE

'1800B' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/ 07 /08/16/17/21/22/23/24/26
Name of Course	Fundamental of Electronics
Course Code	ET2107
Prerequisite course code and name	--
Class Declaration	NO

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
03	--	02	05	Marks	80	20	25	25	150
				Exam Duration	3 Hrs	1 Hr	2 Hr	--	

(*):OE (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

In today's world most of the consumer appliances are based on electronic circuits and devices. The foundation for working of computer or any of its peripherals are based on electronics. This course has been designed to develop skills to understand and test simple electronic components and circuits. After studying this course students will develop an insight to identify, build and troubleshoot simple electronic circuits.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Maintain electronic circuits comprising of discrete electronic components.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

CO1. Plot the characteristics of semiconductor devices.

CO2. Interpret working of oscillators.

CO3. Use OP-AMP IC in circuits.

CO4. Operate CRO and Function generator.

CO5. Select appropriate transducers for relevant applications

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Plot V-I characteristics of P-N junction diode.	CO1	02
2.		Plot V-I characteristics of the given Zener diode.	CO1	02
3.		Test performance of diode as Half wave and Full wave rectifier with and without filter.	CO1	04
4.		Plot the input and output characteristics of NPN transistor in CE configuration.	CO1	04
5.	2	Plot the characteristics of n-channel JFET.	CO1	02
6.	3	Calculate frequency of oscillations for Crystal Oscillator.	CO2	02
7.		Observe input-output waveforms of Inverting Amplifier.	CO3	02
8.		Observe input-output waveforms of Non Inverting Amplifier.	CO3	02
9.		Observe input/output waveforms of Integrator.	CO3	02
10.		Observe input/output waveforms of Differentiator	CO3	02
11.	4	Study of front panel of C.R.O.	CO4	02
12.		Study of front panel of Function generator.	CO4	02
13.		Measure amplitude, Time period of sine, triangular and square wave with the help of CRO.	CO4	02
14.	5	Test performance of inductive transducer LVDT.	CO5	02
15	All	Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course.	All	04
		Total Hrs		36

S.No.	Performance Indicators	Weightage in %
a.	Arrangement of available equipment / test rig or model	20
b.	Setting and operation	20
c.	Safety measures	10
d.	Observations and Recording	10
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	10
g.	Submission of report in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr.No.	Major Equipment/ Instruments Required	PrO. No.
1	Variable DC Power supply 0-30V with display for voltage and current	3,4
2	Digital Multimeter	7,8
3	CRO	1,2,3,4,5,6,7,8,9,10,11,12,13
4	Function Generator	12,13
5	Different types of cables and connectors	All

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. SEMICONDUCTOR DEVICES (Weightage-22 , Hrs- 14)	
1a. Plot V-I characteristics of PN Diode 1b. Define and Measure parameters of diode 1c. Implement Zener diode as voltage regulator. 1d. Compare salient features of the given type of rectifiers. 1e. Explain with sketches the working principle of the given transistor configuration.	1.1 Rectifying diode: Review of P - type and N - type semiconductor, PN junction, Barrier voltage, depletion region, Junction Capacitance, Forward biased & reversed biased junction. Diode symbol , forward & reversed Characteristics of PN junction diode Specifications : Forward voltage drop , Reverse saturation current, maximum forward current , power dissipation ,Package view of diodes of different power ratings (to be shown during practical hours)

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
1f. Analyze and differentiate between CE, CB, CC configurations 1g. Derive relation between alpha and beta.	1.2 Zener diode : Construction ,Symbol ,characteristics (forward & reversed) Avalanche &Zener breakdown Specifications : Zener voltage , power dissipation , break over current, dynamic resistance & maximum reverse current (to be shown during practical hours) 1.3 Rectifier : Half wave, Full wave and Bridge Rectifier, working principle, circuit diagram, performance parameters PIV, ripple factor, efficiency Need for filters: circuit diagram and working of ‘L’, ‘C’ and ‘π’ filter. 1.4 Working principle and block diagram of regulated power supply. 1.5 Symbol, construction and working principle of LED 1.6 Transistor : construction, symbol, operating principle, characteristics, applications, rating and specifications, configurations, comparison between CB, CE, CC. Transistor as a switch and amplifier. Transistor parameters – alpha, Beta , input and output resistance and relation between alpha and beta
UNIT 2 FIELD EFFECT TRANSISTORS(Weightage- 14 , Hrs- 08)	
2a. Explain with sketches the working principle of the given transistor configuration. 2b. Determine the FET parameters from the given FET characteristics curve. 2c. Describe the specified JFET parameter. 2d. Describe the specified MOSFET parameter.	2.1 FET-Types: JFET and MOSFET 2.2 Classification of JFET 2.3 Symbol, construction and working principle of N-channel and P channel JFET, Drain and transfer characteristics of JFET 2.4 JFET parameters: DC and AC drain resistance, Transconductance, amplification factor 2.5 Symbol, construction and working principle of MOSFET.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 3 OSCILLATORS & LINEAR ICS (Weightage- 16 , Hrs- 10)	
3a. State Barkhausen criteria for oscillator. 3b. Classify oscillators. 3c. Describe how oscillations are produced in LC tank circuit. 3d. Explain with circuit diagram working of LC oscillators. 3e. Draw circuit and explain working of Crystal oscillator. 3f. Draw symbol and pin diagram of IC 741. 3g. Define various parameters related to OP-AMP. 3h. Derive expression for various mathematical operation of OP-AMP.	3.1 Block diagram, Barkhausen Criteria for sustained oscillations, classification of oscillator. Oscillations in LC tank circuit, Working of - Hartley, Colpitts, Clapp Oscillators Crystal oscillator : Diagram, Working principle 3.2 OP AMP. IC 741, symbol, pin diagram, ideal and typical characteristics, Applications such as Inverting , Non Inverting amplifier, Difference amplifier, adder , subtractor , Integrator, differentiator.
UNIT 4 INSTRUMENTATION (Weightage- 12 , Hrs- 06)	
4a. Draw and explain blocks of CRT, CRO and Function generator. 4b. State applications & specifications of CRO and Function generator.	4.1 CRO: Cathode Ray Tube, Oscilloscope Block diagram, operation, oscilloscope specifications, Applications. 4.2 Function generator: Block diagram, operation, specifications, applications
UNIT 5 SENSORS & TRANSDUCERS (Weightage- 16 , Hrs- 10)	
5a. Differentiate between sensor and transducer. 5b. Define and classify transducers. 5c. State selection criteria of transducer. 5d. Differentiate between Active- Passive, Primary- Secondary, and Analog- Digital transducers. 5e. Interpret working principle and application of Resistive, Capacitive, Inductive, Transducers (LVDT), photodiode, phototransistor, Piezoelectric Transducers, proximity sensor transducers.	5.1 Definition, classification: Active, Passive, Primary, Secondary, Analog, Digital 5.2 Selection criteria for transducer 5.3 Construction, Operation, One example of -Resistive, Capacitive, Inductive, Transducers (LVDT), photodiode and phototransistor , Piezoelectric Transducers 5.4 Thermocouple, proximity sensor and its applications

8. 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	Semiconductor Devices	14	08	08	06	22
II	Field Effect Transistors	08	04	06	04	14
III	Oscillators & Linear ICs	10	04	08	04	16
IV	Instrumentation	06	04	04	04	12
V	Sensors & Transducers	10	04	06	06	16
Total		48	24	32	24	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journals based on practical performed in laboratory.
- Study of datasheet of electronic components.
- Prepare charts of symbols of Electronic components.
- Search information about Ratings and specifications of Regulator, diodes, transistors, CRO, function generator.
- Collect information of passive transducers and prepare charts of the same.
- Prepare posters to illustrate the use of photoelectric sensors in remote controls.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Correlate subtopics with power plant system and equipments.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one Micro Project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She/He ought to submit it by the end of semester to develop industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs. The Micro-Project could be industry application based, internet based, workshop based, laboratory based or field based. The assessment of micro-project is to be done under Practical (PA) Assessment. The Micro Project preferably assign to the group of (4-6) students or an individual taking into the considerations the capabilities and circumstances at the time .

A suggested list is given here. Similar micro-project could be added by the concerned faculty.

- Rectifier: Build a half wave rectifier for 5V, 500mA output current on general purpose PCB.
- Rectifier: Build a full wave rectifier with filter capacitor for 5V, 500mA output current on general purpose PCB.
- BJT: Build a circuit to switch ON and OFF the LED by using BJT as a switching component.
- Oscillator: Build a LC tank circuit to generate 650Hz frequency.
- Build adder circuit using OP-AMP 741 and implement it on PCB.
- Build subtractor circuit using OP-AMP 741 and implement it on breadboard.
- Build a circuit on breadboard to turn the relay ON and OFF by using Photodiode.
- Prepare Display boards consisting of electronic components: Prepare display boards / models/ charts / posters to visualize the appearance of electronics active and passive components.
- Use of sensors for driving relays / output devices: Build /test circuit on breadboard / General purpose PCB. Verify output of designed circuit by applying different inputs.

12. SUGGESTED LEARNING RESOURCES

S.N.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Basic Electronics.	Albert Malvino, 8 th Edition, Tata McGraw Hill, 2015	ISBN10:1259200116 ISBN13:9781259200113
2	Basic Electronics.	J.S.Katre. Edition 2017, Techmax Publishers	ISBN-10: 9350779641 ISBN-13: 978-9350779644
3	Basic Electronics.	B.L.Theraja, S Chand Publishing, 2007	ISBN 10: 8121925568 ISBN 13: 9788121925563
4	Linear Integrated Circuits	Ramakant Gaikwad, 4 TH EDITION, PHI Publication,	ISBN 10: 8120320581 ISBN 13: 9788120320581
5	Modern Digital Electronics	R P Jain, McGraw Hill Education Pvt. Ltd, 4 th Edition, 2012	ISBN 10: 0070669112 ISBN 13: 9780070669116
6	Instrumentation	A K Sawheny, Nineteenth edition, 2017, Dhanpat Rai publication	ISBN : 8177001006

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. <http://www.electronics-tutorials>
3. <https://en.wikipedia.org/wiki/P%E2%80%93junction>
4. <https://learn.sparkfun.com/tutorials/transistors>
5. <http://www.pitt.edu/~qi4/Academic/ME2082/Transistor%20Basics.pdf>
6. http://faculty.cord.edu/luther/physics225/Handouts/transistors_handout.pdf
7. <http://www.technologystudent.com/elec1>
8. www.slideshare.net/manash234/classification-of-transducers
9. <http://www.electrical4u.com/linear-variable-differential-transformer/>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	2	2	-	-	2
CO2	3	-	2	2	-	-	2
CO3	3	3	2	2	-	-	2
CO4	1	-	-	3	-	-	2
CO5	3	2	2	2	1	-	3

	PSO1	PSO2	PSO3
CO1	3	--	1
CO2	3	--	1
CO3	3	--	1
CO4	3	--	1
CO5	3	--	1

1)Sign: Name: Shri. N. D. Toradmal 2)Sign: Name: Smt.V.S.Sabnis (Course Experts)	Sign: Name: Shri.R.N.Shikari (Head of Department)
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Sign:	Sign:
Name: Smt.M.U.Kokate	Name: Shri A.S.Zanpure
(Program Head)	(CDC)
(Information& Technology Dept.)	

Government Polytechnic, Pune

'180OB' – Scheme

Programme Name	:	Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Name of Course	:	Multimedia And Animation
Course Code	:	IT3101
Prerequisite course code and name	:	NA
Class Declaration	:	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)				Total Credits (L+T+P)	Examination Scheme				
L	T	P	C		Theory		Practical		Total Marks
					ESE	PA	*ESE	PA	
2	-	2	4		Marks	40	10	25	25
					Exam Duration	2 Hrs	1 Hr	2 Hrs	
									100

(*): POE (Practical & Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Multimedia techniques and animation make connections between verbal and visual representations of content. Multimedia applications use text, graphics, animation, images and audio. These applications can be used in entertainment, business and education which can enhance communication and learning.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Design and Develop applications using all multimedia components.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Describe the Multimedia components and color models.
2. Create images using Graphics processing tools.
3. Design web pages with multimedia components.
4. Develop 2D and 3D animation objects.
5. Use action script and authoring tools.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	a. Convert given image into different image formats and observe the changes in image quality and file size. b. Create different types of still images using various graphical processing tools and RGB/CMY/HSB color models.	CO1	02
2.	2	a. Design banner using graphics processing tool. b. Image Editing and Merge multiple photographs using any 2D image processing software.	CO2	02
3.	2	Apply drop shadow and reflection effects to Text. Apply broken mirror effect to Image.	CO2	02
4.	2	a. Modify existing image by adding rainy season effect on any 2D image processing software. b. Design wallpaper showing water drop effect in image.	CO2	02
5.	3	Develop a webpage which show animation with sound effect / embed video using any professional HTML editor.	CO3	04
6.	4	Develop a 2D animation using shape twinning and motion twinning.	CO4	02
7.	4	a. Develop different types of symbols (button symbol, graphic, movie clip symbol and similar types of icons). b. Create 2D animation for bouncing and rolling ball down.	CO4	02
8.	4	Create 2D animation using motion guide layer and masking.	CO4	02
9.	4	Design simple 3D animation using basic shapes.	CO4	02
10.	5	Create animation using action script.(eg. Rotating ball)	CO5	04
11.	5	Create a variable for different Data Types using Action Script.	CO5	04
12.	All Units	Create Micro Project using all multimedia components. (Refer Point No.11 for Microproject Sample List)	All Units	04
		Total Hours		32
Following is the list of extra practical that can be given to Fast learner student.				
1.	2	Apply flaming ball effect to text/image.	CO2	
2.	2	Design poster by using different text effect(ketchup, rope, fire, fruit).	CO2	

3.	4	Apply lighting effect to 3D object.	CO4	
4.	5	Create Animation for Start/Stop Button using Script.	CO5	
5.	4	Create animation by applying sound effect.	CO4	
6.	3	Create Website using various multimedia components.	CO3	
7.	4	Create animation of 2D and 3D objects using various features.	CO4	

S.No.	Performance Indicators	Weightage in %
a.	Debugging ability.	20
b.	Quality of output achieved.	40
c.	Complete the practical in stipulated time.	10
d.	Answer to sample questions.	20
e.	Submission of assignment in time.	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Hardware: Personal computer Pentium IV, 2 GHz minimum (i3-i5 preferable), RAM minimum 2 GB.	For all experiments
2	Graphics and animation development tools (Like Gif animation tool, Pencil, Synfig studios, Stykz, Blender, Scilab, Macromedia Flash, Corel Draw or any other tool)	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1 . Introduction to Multimedia (Weightage-08 , Hrs- 06)	

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
1a. Describe characteristics of the given color model supported in graphics. 1b. Describe the working of CRT display. 1c. Describe the multimedia system architecture. 1d. Explain concept of virtual reality with example.	1.1 Definitions -Where to use Multimedia, Multimedia in Business, Multimedia in Schools, Multimedia in Home, Multimedia in Public Places. 1.2 Basic Tools- I/P, O/P devices, Painting & Drawing Tools, OCR Software, Digital v/s Analog, Multimedia System Architecture, Framework for Multimedia System, CRT display System, Display Terminology, Flat Panel Display. 1.3 Color models- RGB, CMY, HSB, HUE, saturation and brightness. 1.4 Fundamentals of virtual reality.
UNIT 2 . Image editing and compression (Weightage-10 , Hrs- 08)	
2a. Describe various image file formats. 2b. Describe image editing operations on an image. 2c. Compare Lossy and Lossless image compression techniques. 2d. Apply given effects on images.	2.1 Image types: Raster Format, Bitmap (BMP), Graphics Interchange Format(GIF), Joint Photographic Experts Group (JPEG), Tagged Image File Format (TIFF), Portable Network Graphics (PNG) and their differences. 2.2 Basic operations on image: crop, resize. 2.3 Image compression techniques lossy and lossless. 2.4 Effects and its types: Fonts and its types, text effects(Ketchup, rope, Fire). Image effect broken mirror effect, flaming ball effects, water drop effect in image. 2.5 2D and 3D images
UNIT 3 . Webpage development using multimedia (Weightage-06 , Hrs- 06)	
3a. Write steps to develop a webpage comprising of graphical media. 3b. Describe features of given audio file format. 3c. Compare different types of audio.	3.1 Design Web Pages using Hypertext and hypermedia. 3.2 Different audio file formats. 3.3 Uncompressed audio format, lossless compressed audio format, Lossy compressed audio format, mp3,wav,mpg-4, wma, pcm, MIDI Vs Digital audio.
UNIT 4 . Video and Animation (Weightage-08 , Hrs- 06)	
4a. Explain digital video and standards. 4b. Describe features of given video file format. 4c. Write the steps to create and modify the given types of 2D and 3D objects.	4.1 Digital Video. 4.2 How video works, Broadcast video standards. 4.3 Video file formats: MPEG, MPEG1, MPEG2, MPEG4, AVI. 4.4 Video Streaming: Introduction to Streaming, Difference between streaming and downloading, how streaming works, buffering, factors affecting streaming. 4.5 Study of story board. 4.6 Create and modify 2D elements. 2D Vs 3D

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	4.7 The Power of motion, Principles of Animation, Making Animation that Work(Rolling Ball and Bouncing Ball), Creating an Animated Scene. 4.8 Animation in 3D: Basic key frame animation, graph editor, cyclic animation, path animation.
UNIT 5 . Action Script and Authoring tools (Weightage-08 , Hrs- 06)	
5a. Use action script to create animation. 5b. Describe different types of Authoring tools.	5.1 Programming Concepts with respect to Action Script – Variables, Data types, conditionals, loops, arrays, Functions 5.2 Custom objects - Properties, Methods and Events – Display List, Timeline Control 5.3 Multimedia Authoring tools : Features. 5.4 Types of Authoring Tools: Card- and Page-Based Authoring tools, Icon-and Object Based Authoring tools, Time Based Authoring tools

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
1	Introduction to multimedia	6	2	6	-	08
2	Image editing and compression.	8	2	6	2	10
3	Webpage development using multimedia	6	2	2	2	06
4	Video and Animation	6	2	2	4	08
5	Action Script and Authoring tools	6	2	4	2	08
	Total	32	10	20	10	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practical.
- Prepare animation clips for social awareness.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).

- c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Guide student(s) in undertaking micro-projects.
- e. Use proper equivalent analogy to explain different concepts.
- f. Use Flash/Animations to explain various components, operation and
- g. Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

- a. Create 2D animation clip for advertising and any product.
- b. Create 2D animation clip for any cartoon story of 5 minutes.
- c. Create a banner for advertising any product and use it in the web page.
- d. Develop a webpage comprising all multimedia components (Text, Graphics, Audio and Video). Use all control attributes in audio and video control.
- e. Create 3D objects and use them in animation.

Note: Teacher can give more such statements.

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Multimedia: Making it work,9e	Vaughan Tay	McGraw Hill Education, New Delhi 2015, ISBN:9780071832885
2	Principles of Multimedia 2e	Parekh Ranjan	McGraw Hill Education, New Delhi.2015, ISBN-13: 978-1-2-90650-0
3	Action Script 3.0 Bible	Roger Brounstein	Wiley Publishing, Inc ISBN: 978-0-470-52523-4
4	Essential Action Script 3.0	Colin Moock	O'Reilly Media, Inc. ISBN: 0596526946
5	Multimedia Systems and Design	Andleigh, Prabhat K. Thakrar, Kiran	PHI Learning, New Delhi 2013 ISBN: 81-203-2177-4
6	Fundamentals of Multimedia	Li, Ze-Nian	PHI Learning, New Delhi 2013 ISBN:13-978-8120328174

13. SOFTWARE/LEARNING WEBSITES

1. <https://helpx.adobe.com/in/animate/how-to/create-2d-animation.html> (As on 12/12/2019)
2. <https://www.tutorialspoint.com/multimedia/> (As on 12/12/2019)
3. https://www.adobe.com/devnet/actionscript/articles/actionscript3_overview.html (As on 12/12/2019)
4. http://edutechwiki.unige.ch/en/AS3_Tutorials_Beginner (As on 12/12/2019)
5. <https://www.cloudflare.com/learning/performance/what-is-streaming/> (As on 20/06/2020)

14. PO - COMPETENCY- CO MAPPING

CO/PO ↓	PO1 Basic and Discipline Specific knowledge	PO2 Problem Analysis	PO3 Design/Development of Solutions	PO4 Engineering Tools, Experimentations and Testing	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning
Describe the Multimedia components and color models.	3	-	2	-	-	2	2
Create images using Graphical processing tools.	2	2	1	3	1	1	3
Design web pages with multimedia components.	2	1	2	2	2	2	2
Develop 2D and 3D animation objects.	3	2	2	3	2	2	3
Use action script and authoring tools.	3	1	2	2	1	2	3

PSO - COMPETENCY- CO MAPPING

CO /PSO ↓	Hardware and Networking	Database Technologies	Software Development
Describe the Multimedia components and color models.	-	-	2
Create images using Graphical processing tools.	-	-	3
Design web pages with multimedia components.	1	-	3
Develop 2D and 3D animation objects.	-	-	2
Use action script and authoring tools.	-	-	2

Sign: Name: 1. Smt. H.F.Khan 2. Smt. K.S.Gaikwad (Course Experts)	Sign: Name: Mrs .M.U.Kokate Head of the Department (Information Technology)
Sign: Name: Smt. M.U. Kokate (Programme Head)	Sign: Name: Mr.A.S. Zanpure (CDC)

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in Information Technology
Programme Code	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Name of Course	Digital Techniques and Microprocessor
Course Code	IT3102
Prerequisite course code and name	NA
Class Declaration	No

1. 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	PA	
04	-	02	06	Marks	80	20	25	25	150
				Exam Duration	3Hrs	1Hr	2Hrs	2Hrs	

(*):POE Practical & Oral Examination

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE- End semester examination, PA- Progressive Assessment.

2. RATIONALE

It is essential to know fundamentals of digital electronics to understand the concept of microprocessor and its application. Microprocessor is challenging, to meet challenges of growing advanced microprocessor technology. The student should be conversant with microprocessor programming.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- Maintain electronic circuits comprising of discrete electronic components.

4. COURSE OUTCOMES (Cos)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented Cos associated with the above mentioned competency: -

1. Perform arithmetic operations with various number systems.
2. Differentiate various logic gates and apply the logic on Boolean algebra.
3. Test combinational logic circuits of Multiplexer and De-Multiplexer.
4. Construct K-MAP using logic functions and vice versa.
5. Describe Microprocessor architecture.
6. Write and execute 8085 programs.

5. PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the Cos) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1	1	Know your Digital Lab 1.IC Tester 2.Multimeter 3.Bread Board 4.Trainer Kit	CO1	2
2		Study of Basic Gates Ics (7400, 7404, 7408, 7486, 7432) and verification of Truth tables by monitoring the output of Ics on Bread Board.		2
3		To derive AND, OR, NOT gates using universal gates by forming circuits on Bread Board.		2
4		Verify De-Morgan's Theorem by forming the circuit on Bread Board.		2
5	2	To verify of Multiplexer & De-multiplexer.	CO2	2
6	3	Minimization and realization of function using K-maps and its implementation by constructing the circuit on bread board.	CO3	2
7	4	Write simple programs and execute it on 8085 kit or on TASM.	CO4	2
8	5	Addition of 8 bit numbers with carry and without carry.	CO5	2
9		Subtraction of 8 bit number with carry and without carry.		2
10		Multiplication of two numbers.		2
11		Transfer the block of data from one place to another.		2
12		Find the smallest and greatest number of series.		2
13		Arrange the given numbers in ascending and descending order.		2
14		Transfer the block of data in reverse order from one place to another place.		2
15	6	Factorial of 8 bit number using subroutine.	CO6	2
16	All	Micro project covering 2 or more Cos from curriculum (Refer point number 11 for sample Micro projects)	All	2
		Total		32

Sr. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	IC Tester, Multimeter, Bread Board, Trainer Kit	1
2	ICs(7400, 7404, 7408, 7486, 7432), Bread Board, Wires, LED, Adapter	2,3,4,5,6
3	8085 kit/ TASM software, Online Simulation Tool	7,8,9,10,11,12,13, 14,15,16

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. NUMBER SYSTEM, CODES & LOGIC GATES AND BOOLEAN ALGEBRA (Weightage-12, Hrs-12)	
1a. Convert codes from one number system to another. 1b. Perform arithmetic operations with number system. 1c. Differentiate various logic gates and apply the logic on Boolean algebra. 1d. Explain theorems for Boolean algebra. 1e. Create simplified logic circuits.	1.1 Decimal, Binary, Octal, Hex. 1.2 Binary addition, subtraction. 1.3 One's complement, Two's Complement, Signed Numbers, Codes, Error code. 1.4 Working principals and Truth of AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR Gates, Universal Gates. 1.5 Boolean Algebra: Basic Boolean Operations, Basic Laws of Boolean Algebra, Duality Theorem, De-Morgan's Theorems.
UNIT 2. COMBINATIONAL LOGIC DESIGN USING MSI CIRCUIT (Weightage-15, Hrs-10)	
2a. Design Multiplexer and De-Multiplexer. 2b. Implement combinational logic design with MUX. 2c. Implement combinational logic design with DEMUX.	2.1 Multiplexer and their use in combinational, logic design. 2.2 De-multiplexer/decoders and their use in combinational logic design. 2.3 De-multiplexer- 4 to 16-line DEMUX. Demux design using sop method. 1:4, 1:8, 1:16 DEMUX.
UNIT 3. STANDARD REPRESENTATION FOR LOGIC FUNCTION & SEQUENTIAL LOGIC DESIGN (Weightage-15, Hrs-10)	
3a. Construct K-MAP using logic functions and vice versa. 3b. Simplify equations in the minterms / maxterms.	3.1 KARNAUGH map representation, Simplification of logic function using K-MAP. 3.2 Minimization of logical function specified in minterms / maxterms or truth table. 3.3 Minimization of logic function not specified in minterms / maxterms. Don't care condition.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 4. MICROPROCESSOR, MICROPROCESSOR ARCHITECTURE & MICROCOMPUTER SYSTEMS (Weightage-14, Hrs-12)	
4a. Describe Microprocessor architecture. 4b. Understand 8085 registers and instruction format. 4c. Draw timing diagram read/write memory cycle.	4.1 Microprocessor architecture & its Operations. 4.2 Memory & I/O Devices. 4.3 8085 MPU, Example of 8085 based microcomputers. 4.4 Classification of instruction, Instruction format. 4.5 How to write & execute 8085 programs. 4.6 8085 instruction set & Instruction timing.
UNIT 5. 8085 PROGRAMMING (Weightage-13, Hrs-10)	
5a. Write and execute 8085 programs for addition, subtraction. 5b. Write programs implementing branching.	5.1 Basic instruction of 8085. 5.2 All instructions of 8085 like Data transfer, Arithmetic Operations, Branch, Debugging Programs, etc.
UNIT 6. ADDITIONAL INSTRUCTIONS, STACK, SUBROUTINES, INTERRUPT (Weightage-11, Hrs-10)	
6a. Perform 16-bit arithmetic and logic operations. 6b. Recognize 8085 interrupts. 6c. Write programs using looping, subroutine.	6.1 Looping, indexing, counting. 6.2 16-bit arithmetic logic operations, rotate, compare. 6.3 Stack, Subroutine & 8085 interrupts.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Number System, Codes & Logic Gates and Boolean Algebra	12	03	03	06	12
2	Combinational logic design using MSI circuit	10	04	04	07	15
3	Standard representation for logic function & Sequential Logic Design	10	04	04	07	15
4	Microprocessor, Microprocessor Architecture & Microcomputer Systems	12	04	04	06	14
5	8085 Programming	10	02	03	08	13
6	Additional Instructions, Stack, Subroutines, Interrupt	10	03	04	04	11
Total		64	20	22	38	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.
- Prepare a simple circuit using appropriate ICs.
- Undertake micro projects.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Correlate subtopics with real time world.
- Use proper equivalent analogy to explain different concepts.
- Teacher should ask the students to go through instruction and Technical manuals.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs.(Affective Domain Outcomes) .Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission.. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Design a digital system whose output is defined as logically low, if the 4-bit input binary number is a multiple of 3. Otherwise the output will be logically high.
- Write an assembly language program using 8085 to find square of given number from memory location 2100H and store the result in the memory location 3000H.
- A bank vault has 3 locks with a key for each lock. Key A is owned by the bank manager. Key B is owned by the senior bank teller. Key C is owned by the trainee bank teller. In order to open the vault door at least two people must insert their keys into the assigned locks at the same time. The trainee bank

teller) can only open the vault when the bank manager is present in the opening.

- i) Determine the truth table for such a digital locking system
- ii) Design, using Karnaugh Map techniques, a minimum AND-OR gate network to realize this locking system.

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Modern Digital Electronics	R. P. Jain	McGraw Hill
2	8085 Microprocessor Assembly language Programming & Applications	Awate S.P.	McGraw Hill
3	Microprocessor Architecture, Programming & Applications with the 8085	Ramesh Gaonkar	Penram International Publishing (India) (Third Edition)
4	Microprocessor programming (8085)	B.Ram	
5	Microprocessor systems 8086/88 family	Liu –Gibson	Prentice Hall of India
6	Microprocessor & Interfacing	Douglass Hall	Tata -McGraw Hill

13. SOFTWARE/LEARNING WEBSITES

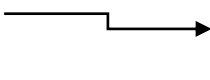
- b. <http://www.nj7p.org/Manuals/PDFs/Intel/9800301D.pdf>
- c. <https://www.slideshare.net/anupamkumarpanidit/list-of-8085-programs>
- d. <https://iemcse.files.wordpress.com/2017/07/lab-manual.pdf>
- e. <https://www.pantechsolutions.net/8085-trainer-kit-user-and-technical-reference-manual>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Perform arithmetic operations with various number systems.	3	2	3	3	1	-	3
Differentiate various logic gates and apply the logic on Boolean algebra.	3	3	2	2	1	1	3
Test combinational logic circuits of Multiplexer and De-Multiplexer..	3	1	2	2	-	2	3

Construct K-MAP using logic functions and vice versa.	3	-	1	-	-	-	3
Describe Microprocessor architecture.	3	1	1	1	1	-	3
Write and execute 8085 programs.	3	1	3	2	1	1	3

15. **PSO -CO MAPPING**

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Perform arithmetic operations with various number systems.	2	2	3
Differentiate various logic gates and apply the logic on Boolean algebra.	3	-	3
Test combinational logic circuits of Multiplexer and De-Multiplexer.	-	-	3
Construct K-MAP using logic functions and vice versa.	3	-	3
Describe Microprocessor architecture.	-	-	3
Write and execute 8085 programs.	2	-	3

Name: 1. Smt. P N Yewale 2. Smt. S R Hande (Course Experts)	Sign:	Name: Mrs. M.U.Kokate (Head of Department) Information Technology	Sign:
Name: Mrs. M.U.Kokate Program Head Information Technology	Sign:	Name: Shri A.S.Zanpure (CDC)	Sign:

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in Information Technology
Programme code	01/02/03/04/05/06/ 07 /08/15/16/17/18/19/21/22/23/24/26
Name of Course	Data Communication and Networks
Course Code	IT3103
Prerequisite course code and name	NA
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				Total Marks
					Theory		Practical		
L	T	P	C		ESE	PA	\$ESE	PA	150
3	-	2	5	Marks	80	20	25	25	
				Exam Duration	3 Hrs	1 Hr	2 Hr		

(\$):OE (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Most of the instruments are now a day's computer-based or connected with network. Data communication is the transmission of digital data through a network or to a device external to the sending device. It is the basis of modern Computer networks, which is growing with rapid technological progress. Computer communication through networking becomes essential part of our life. The Information technology diploma pass outs are required to handle the data communication related problems. By considering importance of concepts and techniques related to data communication and networking enable students to have an insight in to technology involved to make the network communication possible.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Manage information flow across different communication networks.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Setup a small network using various transmission media.
2. Describe various Analog and Digital signal transmission.
3. Identify various Multiplexing and Switching techniques in digital communication.
4. Describe error detection and correction techniques.
5. Describe various internetworking devices and TCP/IP protocol suit.
6. Describe various IEEE wireless standards

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Demonstrate various transmission media.	CO1	02
2.	1	Observe components of network in your network laboratory and state their specifications like transmission media and network control devices	CO1	02
3.	1,2	Demonstrate RS232 standard	CO2	02
4.	2	Prepare and Test Straight & Cross UTP Cable.	CO2	04
5.	3	Designing layout of a Network for small organization Deciding upon type of network, Floor designing/ building designing Deciding upon number/ length of components	CO3	02
6.	5	Install and Configure Network Interface Card and identify its MAC address	CO5	02
7.	5	Share File/Folder and Printer in network and access the resource from other node.	CO5	02
8.	6	Setup FTP client-server and transfer the file using FTP.	CO6	02
9.	4	Configure and use Telnet Client-server.	CO4	02
10.	4	Run the following TCP/IP commands with options and record their output: Arp, rarp, ipconfig, ping, tracert.	CO4	02
11.	5	Use Wireshark Packet Sniffer Software and capture TCP, IP, UDP, ARP, ICMP, Telnet, FTP packets.	CO5	02
12.	5	Create two subnets and implement it with calculated subnet masking.	CO5	02
13.	All	Microproject covering 2 or more COs from curriculum. (Refer Point no.11 for sample microproject list)	ALL	02
Total Hrs				32

Sr.No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1.	Modular Crimping Tool	4
2.	Wireshark Free Tool	11
3.	CAT-6 Cable	4
4.	Desktop System	1-12

7. THEORY COMPONENTS

The following topics/sub topics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION-I	
UNIT 1. INTRODUCTION TO DATA COMMUNICATION AND NETWORKING (Weightage-10 , Hrs- 06)	
1a. Describe data communication process and its components 1b. Enlist various categories of networks. 1c. Describe different modes of data transmission 1d. Describe various Network Models	1.1 Data communication process and its components: Transmitter, Receiver, Medium, Message, Protocol. 1.2 Data Representation: Text, Image, Numbers, Video. 1.3 Networks: Distributed Processing, Network Criteria, Physical Structures, Categories of Networks. 1.4 Network Models: LAN, MAN, WAN. 1.5 Communication Media: Guided Transmission Media, Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable. 1.6 Unguided Transmission Media: Radio Waves, Microwaves, Infrared, Satellite. 1.7 Line-of-Sight Transmission, Point to Point, Broadcast. 1.8 Modes of Communication: Simplex, Half duplex, Full Duplex. 1.9 Protocols, Standards, Standard organizations.
UNIT 2. Signal Transmission & Conversion (Weightage-16 , Hrs- 10)	
2a. Explain Various Transmission Impairment 2b. Describe various coding schemes 2c. State various network performance criteria 2d. Compare ASK, FSK, PSK. 2e. Define analog and digital signals	2.1 Analog and Digital Data: Analog Signal and Digital Signal, Periodic and non periodic signals. 2.2 Analog Signals: Sine Wave, Phase, Wavelength, Time and Frequency domain, Composite Signals, Bandwidth. 2.3 Digital Signals: Bit Rate, Bit Length, Digital Signal as a composite analog signal. 2.4 Transmission Impairment: Attenuation, Distortion, Noise. 2.5 Performance: Bandwidth, Throughput, Latency, Bandwidth-Delay product. 2.6 Analog-To-Digital Conversion: Pulse Code Modulation. 2.7 Transmission Modes: Parallel transmission, Serial transmission. 2.8 Digital-to-Analog Conversion: Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying.

UNIT 3. Multiplexing & Switching (Weightage-14,Hrs- 08)	
3a. Describe types of Multiplexing	3.1 Multiplexing: Introduction.
3b. Describe Spread Spectrum Technique	3.2 Categories of Multiplexing: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing.
3c. Compare various Switching techniques.	3.3 Spread Spectrum: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS). 3.4 Switching: Circuit-switched networks, Datagram networks, Virtual-circuit networks.
SECTION II	
UNIT 4 Error Detection, Correction and OSI Model (Weightage-14,Hrs-08)	
4a. Identify the major functions of OSI Reference Model.	4.1 Types of Errors, Forward Error Correction Versus Retransmission.
4b. Describe Error detection and correction methods with example.	4.2 Error Detection: Repetition codes, Parity bits, Checksums, CRC.
4c. Describe the process of fixed and variable type of Framing.	4.3 Error Correction: Automatic repeat request (ARQ), Error-correcting code.
4d. Identify characteristics of flow control technique.	4.4 Framing: Fixed-Size Framing, Variable-Size Framing. 4.5 Flow and error control techniques: stop and wait, sliding window, Go-back-n ARQ, Selective Reject ARQ.
	4.6 THE OSI MODEL: Layered Architecture, Layers in OSI Model.
UNIT 5. Networking Protocol and Internetworking Basics (Weightage-16, Hrs- 10)	
5a. Describe TCP/IP protocol suite.	5.1 TCP/IP PROTOCOL SUITE, IPv4, IPv6.
5b. Describe IPV4 and IPV6 packet format.	5.2 Addressing: physical addresses, logical addresses, port addresses, and specific Addresses.
5c. List and explain classes of IP address.	5.3 IPv4 Addresses: Addresses, Notations, Classless, Classful, NAT.
5d. Identify problems in internetworking.	5.4 IPv6 Addresses: Structure, Address Space.
5e. Describe given network ing devices.	5.5 Internetworking, Problems in Internetworking, Dealing with Incompatibility, Virtual Network, internetworking Devices, Repeaters, Bridges, Routers, Gateways.
5f. Explain ways of accessing Internet.	5.6 Ways of Accessing the Internet: Introduction, Dial Up access for an Individual User, Leased Lines, DSL and Cable Modems.

UNIT 6 Wireless Communication (Weightage-10, Hrs-06)	
6a. Illustrate the given IEEE standard of communication.	6.1 IEEE Standards.
6b. Identify the Characteristics of given layer in IEEE 802.11 Architecture	6.2 Wireless LANs: 802.11 Architecture, MAC Sublayer, Addressing Mechanism.
6c. Identify the Characteristics of given layer in Bluetooth architecture	6.3 Bluetooth Architecture, Bluetooth Layers, Radio Layer, Baseband Layer, the Logical Link Control and Adaptation Layer Protocol (L2CAP).
6d. Compare Functional/Operating parameters and Different Generations of Mobile Telephone System	6.4 The Mobile Telephone System, First-Generation: Analog Voice, Second-Generation: Digital Voice, Third-Generation: Digital Voice and Data. 6.5 4G & VoLTE: Introduction to 4G and VoLTE, Features of 4G and VoLTE.

8. 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
SECTION I						
I	Introduction to Data Communication and Networking	06	04	04	02	10
II	Signal Transmission & Conversion	10	04	08	04	16
III	Multiplexing & Switching	08	04	08	02	14
	Total	24	12	20	08	40
SECTION-II						
IV	Error Detection, Correction and OSI Model	08	04	06	04	14
V	Networking Protocol and Internetworking Basics	10	04	08	04	16
VI	Wireless Communication	06	04	06	-	10
	Total	24	12	20	08	40
Total		48	24	40	16	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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:

- Prepare Comparison table for Multiplexing techniques.
- Prepare charts for Guided and Unguided Transmission media.
- Draw OSI Reference model on chart.
- Prepare a journal for multiple accesses using CSMA/CD.
- Library /Internet survey on Wired and Wireless devices.

- f. Prepare power point presentation or animation for error detection and correction methods.

10. SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. '**L**' in *item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
- c. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
- d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- e. Use Flash/Animations to explain various concepts in networking

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

- a. Design and Setup a network using star /ring/bus topologies.
- b. Case studies on topics given by respective faculty teaching the course.
- c. Install and Configure Network Interface Card, connect 2 or 3 machines in network using workgroup. Then share files among these computers.
- d. Configure telnet and execute all commands with option and in different operating modes.
- e. Prepare animation clip of atleast 10 minutes on Transmission Media/Signal Transmission/Multiplexing/Switching/Error detection and Correction/Packet flow in TCP/IP protocol suite. (And many other Topics given by respective faculty teaching the course.
- f. Prepare charts, comparison tables or models on the topics given by respective faculty teaching the course.

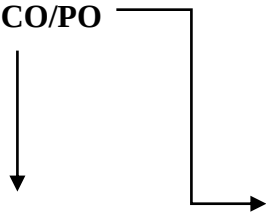
12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Data communications and networking.	Forouzan Behrouz A.	Tata McGraw Hill, New Delhi, 2006 ISBN : 9780-07-296775-3
2	Computer Networks	Andrew s. Tanenbaum	PRENTICE HALL ISBN-13: 978-0-13-212695-3
3	Data and Computer Communications	Stallings William	Pearson Prentice Hall Pearson Education, Inc., NJ 07458 ISBN: 0-13-243310-9
4	Data Communication and Networks	Godbole Achyut	Tata McGraw Hill, New Delhi, 2006 ISBN : 0070472971
5	Data Communication and Computer Networks	Gupta Prakash C.	Prentice Hall of India, Pvt Ltd. New Delhi, 2006 ISBN: 81-203-2846-9

13. SOFTWARE/LEARNING WEBSITES

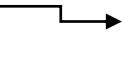
- www.nptelvideos.in/2012/11/data-communication.html
- http://www.tutorial-reports.com/wireless/wlanwifi/wifi_architecture.php
- <http://standards.ieee.org/about/get/802/802.11.html>
- www.tutorialspoint.com/data_communication_computer_network/
- <http://iit.qau.edu.pk/books/Data%20Communications%20and%20Networking%20By%20Behrouz%20A.Forouzan.pdf>
- <http://www.studytonight.com/computer-networks/overview-of-computer-networks>
- <https://abmpk.files.wordpress.com/2013/04/data-and-computer-comm-8e-william-stallings.pdf>
- <https://gradeup.co/flow-and-error-control-techniques-i-28750a29-ba8d-11e5-b537-dcac2f2dd7d1>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO/PO 	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Setup a small network using various transmission media.	3	3	-	1	1	2	3
Describe various Analog and digital signal transmission.	3	-	1	-	1	-	3
Identify various Multiplexing and Switching techniques in digital communication.	3	-	1	-	-	-	3
Describe error detection and correction techniques.	3	2	2	-	1	-	3
Describe various	3	3	3	2	1	-	3

internetworking devices and TCP/IP protocol suit.							
Describe various IEEE wireless standards.	3	-	1	-	1	1	3

PSO -CO MAPPING

CO / PSO 	Hardware and Networking	Database Technologies	Software Development
Setup a small network using various transmission media.	3	-	-
Describe various Analog and digital signal transmission.	3	-	-
Identify various Multiplexing and Switching techniques in digital communication.	3	-	-
Describe error detection and correction techniques.	3	-	1
Describe various internetworking devices and TCP/IP protocol suit.	3	-	3
Describe various IEEE wireless standards.	3	-	1

Name: 1. Smt. N.P.Sarwade 2. Smt. H.F.Khan (Course Experts)	Name: Mrs. M.U.Kokate Head of the Department Information Technology
Name: Mrs. M.U.Kokate Program Head Information Technology	Name: Shri A.S.Zanpure (CDC In-Charge)

Government Polytechnic, Pune

(An Autonomous Institute of Govt. of Maharashtra)

Scheme: 180 OB

Program Name	:	Diploma in Information Technology
Program Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Database Management System
Course Code	:	IT3104
Prerequisite course code and name	:	NA
Class Declaration	:	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	* ESE	PA	150
3	1	2	6	80	20	25	25	

* -POE-Practical and oral examination

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

2. RATIONALE

In software industry the relational database management system is being used predominantly to manage the data stored in database. The major objective of this course is to provide a strong formal foundation in Database Concepts, Technology and practice to the students to create and manage database using SQL. After learning this subject, the students will be able to understand the database normalization techniques, and can use any RDBMS package as a backend for developing database applications.

3. COMPETENCY

- Apply Database Management concepts using SQL

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant Technical skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Describe the Database Management System with its advantages and applications.
2. Design the database structure with normalisation concept and Draw ER diagram.
3. Create the database Tables with constraints and perform various operations on database.
4. Create and Manage views, Sequences and Indexes.
5. Write PL/SQL code using cursor, control structure ,procedures and functions
6. Describe the concept of NoSQL, Big Data and Hadoop

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Scheme: 180 OB

5. PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1.	1	Create database ,table structure, insert records and filter the records based on criteria in any GUI based database (Ex.MS-Access)	CO1	01
2.	1	Write MS Access Code to Apply Given Validation on Table and Set Error Messages, Set Default Value for Column, Set and Remove Database Password.	CO1	02
3.	1	Design ER Diagram and Normalize Database	CO2	02
4.	3	Write and Execute DCL Commands for Creating Users, Granting Privileges to Users and Revoking Privileges From Users.	CO3	01
5.	3	Execute SQL Queries with data constraints using DDL Commands.	CO3	02
6.	3	Manage and Display the database Records using DML and DQL commands(Ex. Insert, Update, Delete and select command)	CO3	02
7.	3	Write and Execute SQL Queries Using Arithmetic, Relational, Logical, Set, Between and Like Operators.	CO3	01
8.	3	Write and Execute SQL Queries Using String, Arithmetic, Date and Time and Aggregate Functions.	CO3	01
9.	3	Write and Execute Queries Using the Select Command with where, Having, Group by and Order by Clauses.	CO3	02
10.	3	Write and Execute Queries Using Inner, Outer and Cross Join.	CO3	02
11.	4	Create Views and perform Insertion ,Modification and deletion of table data through Views	CO4	02
12	4	Create, Alter and Drop the Simple and Composite Index Also Check and Write time required for execution of queries before and after Index.	CO4	01

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Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
13.	4	Create, Alter and Drop the Sequence Also Insert sequence values in tables.	CO4	01
14.	5	Write and Execute basic PL/SQL Programs Using General data and Table data.	CO5	02
15.	5	Write and Execute PL/SQL Programs Using Different Control Structures like if then Else, for, While and Nested Loop	CO5	02
16.	5	Write and Execute PL/SQL Programs Based on Implicit and Explicit Cursors	CO5	01
17.	5	Write and Execute PL/SQL Programs Using Exception Handling both Predefined and User-defined exceptions.	CO5	01
18.	5	Write and Execute PL/SQL Code to Creating Procedures and Functions.	CO5	02
19.	5	Write and Execute PL/SQL Code to Create Triggers on Given Database	CO5	02
20.	All	Micro project:-Micro project will be carried out stepwise in every practical assignment. Completion of all assignments treated as one Micro project. For sample topics refer point no. 11	All COs	02
Total				32

Sr.No.	Performance Indicators	Weightage in %
a.	Coding of SQL queries and PL/SQL programming	60
b.	Database Integrity.	10
c.	Quality of result displayed by SQL queries and PL/SQL Programming	10
d.	Answer to sample Questions	10
e.	Submit Report in time.	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

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Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Computer System.	All
2	Microsoft Word and Microsoft Access or any open office suite	1,20
3	Any Database Software.	3-20

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)		Topics and Sub-topics	
Unit 1. Introduction to Database system (Weightage-10, Hrs- 04)			
1a. Define the database Management system. 1b. Identify the advantages of database approach over the file-based data storage system 1c. Describe the architecture of DBMS and Data Models	1.1	Basic Database concepts: Data, database, Database system, DBMS, and Drawbacks of file system, Advantages of DBMS, Applications of DBMS, data abstraction, Data independence, Schema, The Dr. E.F. Codd's Rules for RDBMS.	
	1.2	Architecture: Overall Architecture of DBMS.	
	1.3	Data Models: Three classical Data Models-Hierarchical, Networking, Relational Data Models.	
Unit 2. Relational Model(Weightage-10 , Hrs- 07)			
2a Create Normalized Database structure On given data. 2b. Draw the ER Diagrams on given Database. 2c. Define various RDBMS terminologies.	2.1	Database Design: Relational database Design, Normalization based on functional dependencies, Normal forms: 1NF, 2NF, 3NF.	
	2.2	Conceptual Design: Entity Relationship Model, Strong Entity set, Weak Entity set, Attribute, Types of Attributes, E-R Diagrams.	
	2.3	Relational Database Design: Concept of Relational Database Design, Different types of RDBMS Software.	
	2.4	RDBMS Terminology: Relation, Domain, Tuple, Cardinality, Degree.	
Unit 3. Interactive SQL(Weightage-20 , Hrs- 14)			
3a. Create Tables by applying constraints. 3b. Perform various operations on given data using DDL, DML and DCL Commands. 3c. Write and execute Database Queries on given	3.1	Introduction to SQL: Data types in SQL, Purpose of DDL, DML, DCL	
	3.2	DDL Commands: Create, Alter, Drop, Truncate, Desc, Rename.	
	3.3	Data Constraints: Use of Data Constraints, Types of Data Constraints- Primary key constraint, Foreign key constraint, Unique key constraint, Not Null Constraint, Check constraint, Default Value Concept	

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Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics	
data by using different operators ,functions and clauses 3d.Retrieve data from single or multiple tables	3.4	DML commands: Insert, Delete, and update
	3.5	DQL Command: Select
	3.6	SQL Operators: Arithmetic Operators, Logical Operators, Set Operators, Range Searching Operators-Between , Pattern matching operators-Like, The Oracle Dual table
	3.7	In built Functions: Aggregate functions, Date and time Functions, String functions. Conversion functions, Special Date formats using To Char () function.
	3.8	Clauses & Join: Different types of clauses in SQL, Joins, Types of Joins, Nested queries.
Unit 4. Advanced database Features(Weightage-10 , Hrs- 04)		
4a.Create and Manage views 4b.Create and Manage Sequences 4b. Create Indexes using SQL query to solve given Problem.	4.1	Views: Concept of View, Types of Views: Read Only View and Updatable Views, Creating Views, Updating Views, Dropping Views
	4.2	Sequences: Creating Sequences, Altering Sequences, Dropping Sequences.
	4.3	Indexes: Index Types, Creating of an Index: Simple Unique, and Composite Index, Dropping Indexes.
Unit 5. PL/SQL Programming(Weightage-20 , Hrs- 14)		
5a.Describe the advantages of PL/SQL 5b.Write basic PL/SQL Programs. 5b.Write PL/SQL program using Control structure. 5c. Write the PL/SQL Code to create cursor for retrieving multiple records for the given Problem. 5d. program for handling Exceptions. 5e. Create stored Procedures , Functions and Triggers	5.1	PL/SQL Programming: Introduction of PL/SQL, Advantages of PL/SQL, PL/SQL execution environment, PL/SQL data Types, Variables, Constants.
	5.2	Control Structure: Conditional Control, Iterative Control, Sequential Control.
	5.3	Exception handling: Predefined Exception, User defined Exception.
	5.4	Cursors: Implicit and Explicit Cursors, Declaring, Opening and Closing a Cursor, Fetching a Record from Cursor, Cursor for loops, Parameterized Cursors.
	5.5	Procedures: Advantages, Creating, Executing and Deleting a Stored Procedure.
	5.6	Functions: Advantages, Creating, Executing and Deleting a Function.
	5.4	Database Triggers: Use of Database Triggers, Types of Triggers, Syntax for Creating Trigger, Deleting Trigger.
Unit 6. Advanced Database Technologies(Weightage-10 , Hrs- 05)		
6a. Use NoSQL database to solve given queries. 6b.Differentiate SQL and NoSQL database.	6.1	Advanced Database Techniques: NoSQL database concept, Types of NoSQL databases, NoSQL data modelling, Benefits of NoSQL, Comparison between SQL and NoSQL database system.

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Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics	
6c. Use MongoDB to solve given queries. 6d. Implement basic operations on MongoDB shell. 6e. Define Data Warehousing and Data Mining. 6f. Define Big Data. 6g. Explain Hadoop Architecture.	6.2	Introduction to Hadoop Framework
	6.2	NoSQL using MongoDB: Introduction to MongoDB Shell, Running the MongoDB Shell, Basic operations with MongoDB Shell.
	6.3	Introduction to Data Warehousing and Data Mining.
	6.4	Introduction to Big data

8. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Database system	04	6	4	-	10
II	Relational Model	07	4	4	2	10
III	Interactive SQL	14	4	4	12	20
IV	Advanced database Features	04	2	4	4	10
V	PL/SQL Programming	14	4	4	12	20
VI	Advanced Database Technologies	05	2	4	4	10
Total		48	22	24	34	80

9. STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.
- Undertake micro projects

10. 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).

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- c. Guide student(s) in undertaking micro-projects.
- d. Use proper equivalent analogy to explain different concepts.
- e. Use Flash/Animations to explain various components, operation and
- f. Teacher should ask the students to go through instruction and Technical manuals.

11. MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty

- a. For Hospital Management: Patient data base/Doctor database/Billing (any one database)
- b. College Admission: Student personal Information System/Merit list database(any one data base)
- c. Medical Purchase: Database of medicine inventory records.
- d. Library Management: book issue /book stock database.
- e. Any other micro-projects suggested by subject faculty on similar line.

12. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Introduction to Database	ISRD Group	McGraw Hill Education,2005,New Delhi,ISBN-13:9780070591196
2	SQL,PL/SQL ,The Programming Language of ORACLE	Bayross, Ivan	BPB Publications, New Delhi 3 rd Edition ,ISBN-13:978-9332901384
3	Database System Concepts	Korth, Henery Abraham,Silberschatz Sudarshan ,S	McGraw Hill Education,2005,New Delhi,ISBN-13:978-9332901384
4	Complete Reference :Mysql	Vaswani Vikram	McGraw Hill Education,2005,New Delhi,ISBN-13:9780070586840

13. SOFTWARE/LEARNING WEBSITES

- a. <http://www.nptel.ac.in>
- b. <http://www.tutorialspoint.com>/NoSQL-Databases
- c. [wielyIndia.com](http://www.wielyIndia.com)
- d. <http://docs.mongodb.org/manual/>

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14.PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO/PO	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Describe the Database Management System with its advantages and applications	3	1	2	2	-	1	3
Design the Relational database structure with normalisation concept and Draw the ER diagrams	3	3	3	1	1	1	3
Create the database Tables with constraints and perform various operations on database.	3	2	2	3	2	1	1
Create and Manage views, Sequences and Indexes.	3	3	2	3	-	-	2
Write PL/SQL code using cursor, control structure, procedures and function	3	3	3	3	-	2	3
Describe the concept of NoSQL, Big Data and Hadoop	2	1	2	-	-	-	-

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15.PSO - COMPETENCY- CO MAPPING

CO /PSO	Hardware and Networking	Database Technologies	Software Development
Describe the Database Management System with its advantages and applications	-	3	1
Design the Relational database structure with normalisation concept and Draw the ER diagrams	-	3	3
Create the database Tables with constraints and perform various operations on database.	-	3	3
Create and Manage views, Sequences and Indexes.	-	3	2
Write PL/SQL code using cursor, control structure ,procedures and function	-	3	2
Describe the concept of NoSQL, Big Data and Hadoop	-	3	1

Sign: Name: 1. Smt.A.D.Kshirsagar 2. Smt.P L Sonwane (Course Experts)	Sign: Name: Smt M.U.Kokate Head of the Department (Information Technology)
Sign: Name: Smt M.U.Kokate Programme Head (Computer Engineering)	Sign: Name: Mr.A.S. Zanpure (CDC In-Charge)

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'1800B' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of Course	Operating System
Course Code	CM3101
Prerequisite course code and name	NA
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
04	00	02	06	Marks	80	20	25	25	150
				Exam Duration	3 Hrs	1 Hr	2 Hr		

(*):OE (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Operating Systems are system programs, which are very essential components of Computer system. Two primary aims of operating systems are to manage resources (e.g. CPU time, memory) and to control users and software. Operating system design goals are often contradictory and vary depending of user, software, and hardware criteria. This course describes the fundamental concepts behind operating systems, and examines the ways that design goals can be achieved and practice the concept of Operating System design.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Manage operations of Operating System.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Differentiate between types of operating systems.
2. Describe services of operating system.
3. Describe process management and execute related commands.
4. Describe various processor scheduling algorithms and deadlock handling techniques.

5. Explain different approaches to memory management.
6. Describe and manage structure and organization of the file system.

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Out comes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1	1	Advanced Linux Installation: Network and Dual Boot	CO1	02
2	2	Linux Disk Management using fdisk utility to create, delete and change the partitions on the disk.	CO2	02
3		Setting/Changing file and directory related permissions chmod and umask command.	CO2,CO6	02
4		Displaying File Information: inodes, inodes and directories, cp and i nodes,mv and inodes,rm and inodes,ls-l	CO2,CO6	04
5		Working with Linux-supported File Systems:Mounting and Unmounting to be tested with externaldrives	CO2	02
6	3	Linux Process Management : Jobs: Background, Kills and Interruptions and setting process priority Get Process status, Find Processes by Pattern or User, Display the Most Active Processes, Kill processes ,kill all processes(Executing commands For process management-ps, fg, bg, kill,killall, nice ,at, jobs)	CO3	04
7	3	System states :init Shutting down and changing Run levels, Managing Users and Groups: Adding and Removing users with add user,user mod and user del commands	CO3	02
8		Adding and Removing groups with groupadd, groupmod and Groupdel commands, Super user-The root User Desktop, System Time and Date	CO3	02
9	4	Scheduling jobs with crontab :crond daemon, crontab options, The format of cron tab file ,Environment variable settings, crontab command lines	CO4	02
10	5	Linux: Memory Management Practicing top, vm stat and free command	CO5	02
11	ALL	Micro-project (Refer point 11 for micro project list) Executing various Shell commands Creating shell variables , Writing shell scripts using decision making and various control structures., Executing various shell utilities, Using file test and string test conditions in scripts., Making use of Positional Parameters. Configuring your own login shell. Using Functions in Shell scripts.	ALL	06
		Total		32

Sr.No.	Performance Indicators	Weightage in %
a.	Installation/configuration of OS	40
b.	Correctness of Executing various commands	30
c.	Writing and executing programs to get desired output	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will user in uniformity in conduct of practical's, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
a	Computer Systems (Any Computer System with basic configuration)	ALL
b	Linux or alike OS such as Ubuntu,CentOS,RedHat etc.	ALL

7. THEORY COMPONENTS

The following topics/subtopicsshould betaught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION I	
UNIT 1: INTRODUCTION (Weightage-10 , Hrs- 10)	
1a. Explain the functioning of 1b. given component of OS. 1c. Explain characteristics of the given type of operating system. Identify type of operating system suitable for the given type of application. 1d. Execute command on command line for the given task.	1.1 Operating System: Concepts, Components of OS, And Operations of OS: Process Management, Memory Management, Storage Management, Protection and Security. 1.2 Views of OS: User View, System View 1.3 Operating System Operations: Dual Mode, Timer 1.4 Special-Purpose Systems: Real-Time Embedded Systems, Multimedia Systems,Batch OS,Time Shared OS,Distributed System,Mobile OS(Android,iOS) 1.5 Open-Source Operating System: Linux, BSD Unix
UNIT 2. OS SERVICES AND COMPONENTS (Weightage-14 , Hrs- 14)	
1e. Start, stop and restart the given service in Linux. 1f. Explain use of given system call of specified OS.	2.1 Different Services of Operating System. 2.2 System Calls-Concept, types of operating system calls

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
1g. Explain process that follows in managing the given resource. 1h. Explain use of the given operating system tool.	2.3 OS component-Process Management, Main memory Management, file Management, I/O system management, secondary storage management 2.4 Use of operating system tools, user management, security policy.
UNIT 3. PROCESS MANAGEMENT (Weightage-16 , Hrs- 08)	
3a. Explain functions carried out in the given process state. 3b. Describe the function of the given component of process stack in PCB. 3c. Explain the characteristics of the given multithreading model. 3d. Describe method of executing the given process command with example.	3.1 Process-Process states, Process Control Block (PCB). 3.2 Process Scheduling- Scheduling Queues Schedulers, Context switch. 3.3 Operations on Process:Creation, Termination 3.4 Inter-Process Communication (IPC): Introduction, shared memory system and message passing system. 3.5 Multithreading Models 3.6 Thread Libraries, Threading Issues
Section-II	
UNIT 4 CPU SCHEDULING AND DEADLICK (Weightage-16 , Hrs- 12)	
4a. Justify the need and objective of given job scheduling criteria with relevant example. 4b. Explain with example the procedure of allocating CPU to the given process using the specified OS. 4c. Calculate turnaround time and average waiting time of the given scheduling algorithm. 4d. Explain functioning of the given necessary condition leading to deadlock.	4.1 Scheduling types-Scheduling objective, CPU and I/O burst cycles, Pre-emptive, Non-Per-emptive. 4.2 Types of scheduling algorithms-First come first served (FCFS), shortest job first (SJF), Shortest Remaining Time (SRTN), Round Ribon(RR) Priority scheduling, multilevel queue scheduling. 4.3 Critical section problem. 4.4 Deadlock- system, Models,Necessary condition leading to Deadlocks, Deadlock Handling-Preventions, avoidance and Recovery.
UNIT 5. MEMORY MANAGEMENT (Weightage-14 , Hrs- 10)	
5a. Describe the working of specified memory management function. 5b. Explain characteristic of the given memory management techniques. 5c. Write algorithm for the given	5.1 Basic Memory Management-Partitioning, Fixed and variable, 5.2 Free space management techniques-Bitmap, Linked List. 5.3 Introduction to page tables 5.4 Segmentation, Fragmentation, Page Fault 5.5 Virtual memory-Introduction to paging, Demand Paging 5.6 Page replacement Algorithm-FIFO, LRU, Optimal.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
page replacement technique. 5d. Calculate page fault for the given page reference string.	
UNIT 6 : FILE MANAGEMENT (Weightage-10 , Hrs- 10)	
6a. Explain the structure of the given file system with example. 6b. Describe mechanism of the given file access method. 6c. Explain procedure to create and access method.	6.1 File-concept, Attributes, Operations, types and File System Structure. 6.2 Access Methods-Sequential, Direct, Swapping, File Allocation Methods-Contiguous, Linked, Indexed. 6.3 Directory Structure-Single level, two level, tree-structured directory, Disk organization and Disk Structure-Physical structure, Logical structure, Raid structure of Disk, RAID level 0 to 6. 6.4 File System Implementation: Partitions and Mounting, Virtual File Systems

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Unit Title	Teachin g Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
Section - I						
I	Introduction	10	04	04	02	10
II	OS Services and components	14	02	06	06	14
III	Process Management	08	02	04	10	16
Total		32	08	14	18	40
Section - II						
IV	CPU Scheduling and Deadlock	12	02	04	10	16
V	Memory Management	10	04	04	04	14
VI	File Management	10	04	04	02	10
Total		32	10	12	16	40
Grand Total		64	18	26	34	80

9. STUDENT ACTIVITIES

Other than the classroom and laboratory 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:

- Prepare Journal for practical's
- Undertake micro projects

10. 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:

- Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.

- b. **'L' in item No. 4** does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
- c. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
- d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- e. Guide student(s) in undertaking micro-projects.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** under taken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro projects, the number of students in the group should not exceed three.

Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Study and present three Microsoft Device Drivers
- b. Study and present HDFS configuration
- c. Write a shell script that schedules a process and run the shell scrip at specific time.
- d. Write a shell script that tests the connectivity of group of computers.
- e. Write a shell script that counts number of files and number of directories in a directory.

12. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Operating System Concepts	Silberschatz Galvin, Gagne, John Wisley& Sons	Wiley and Sons, Ninth Edition, Galvin . 2015, ISBN: 978-5 1-265-5427-0 2 ISBN-13: 978-0470128725
2	Operating Systems	Achyut S. Godbole, Tata McGraw-Hill	Tata McGraw Hill Education, 2015, ISBN: 97800705911343
3	System Programming & Operating System	D. M. Dhamdhere,TMH	McGrawHill Education;ISBN:9780074635797

Sr. No.	Title of Book	Author	Publication
4	Operating System Concept & Design	Milan Milenkovic, TMH	McGraw Hill Education ISBN-10: 0074632728 ISBN-13: 978-0074632727

13. SOFTWARE/LEARNING WEBSITES

- www.cs.wisc.edu/~ bart/537 lecture notes-University of Wisconsin Madison.
- www.cs.kent.edu/osf 03/notes/index.html- ViliniusGediminas Technical University
- <http://www.howstuffworks.com/operating-system 1.htm>
- www.en.wikipedia.org/wiki/Operating system ay a

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO ↓	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Differentiate between types of operating systems.	3	-	-	-	-	-	3
Describe services of operating system.	3	2	2	3	2	2	3
Describe process management and execute related commands.	3	2	2	3	3	-	3
Describe various processor scheduling algorithms and deadlock handling techniques.	3	2	2	1	3	-	3
Explain different approaches to memory management.	3	2	2	3	3	-	3
Describe and manage structure and organization of the file system.	3	2	2	3	2	1	3

PSO - COMPETENCY- CO MAPPING

CO /PSO ↓	Hardware and Networking	Database Technologies	Software Development
Differentiate between types of operating systems.	3	3	3
Describe services of operating system.	1	2	2
Describe process management and execute related commands.	2	2	3
Describe various processor scheduling algorithms and deadlock handling techniques.	1	2	2
Explain different approaches to memory management.	2	1	3
Describe and manage structure and organization of the file system.	3	3	3

Sign: Name: (Smt. N.P. Sarwade) (Smt.A.B.Bhusagare) (Smt. A. M. Galshetwar) (Smt.N.R.Wagh) (Smt. S.A.Ade) (Smt. S. J. Siraskar) (CourseExpert/s)	Sign: Name:Smt.M U Kokate (Head of Department Information technology)
Sign: Name: Shri. U.V.Kokate (Program Head) (Computer Engineering Dept.)	Sign: Name: Shri.A.S.Zanpure (CDC)

Government Polytechnic, Pune

'180OB' – Scheme

Programme Name	:	Diploma in Computer Engineering Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Data Structures
Course Code	:	CM3103
Prerequisite course code and name	:	CM2101- Programming in 'C'
Class Declaration	:	YES

1. 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	PA	*ESE	PA	150
3	1	2	6	Marks	80	20	25	25	
				Exam Duration	3 Hrs	1 Hr	2 Hrs		

(*) : POE (Practical & Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Data structures is an important aspect of Computer engineering and Information technology. Data structures is mathematical and logical model of storing and organizing data in particular way in computer. After studying this course student will be able to understand and identify different types of data structures, use algorithms with appropriate data structures to solve real life problems.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Implement relevant algorithms using Data Structures.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Describe Data structures, Complexity and Array operations.
2. Use algorithms for searching and sorting techniques with arrays.
3. Implement programs for Stack, Queue and Recursion using Arrays.
4. Write programs to perform operations on Linked List.
5. Write algorithms to implement Tree data structure.
6. Describe Graph and its traversing methods.

Sr. No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Implement Programs based on: Structures & Dynamic Memory allocation	CO1	02
2.	1	Implement Program to perform insertion and deletion operations on One Dimensional Array.	CO1	02
3.	1	Implement Program for matrix operations using Multidimensional Arrays. (Eg. Matrix Addition, Subtraction and Multiplication)	CO1	02
4.	2	Implement programs for following search technique. i. Linear search ii. Binary Search	CO2	02
5.	2	Write Programs to implement sorting algorithms. (Bubble sort, Selection sort, Insertion sort, Merge sort and Radix sort, Shell sort)	CO2	04
6.	3	Write Program to perform Push and Pop operations on Stack using array.	CO3	02
7.	3	Write Program to perform Insert and Delete operations on Linear Queue using array.	CO3	02
8.	3	Write Program to implement Tower of Hanoi.	CO3	02
9.	4	Write Programs to traverse single link list.	CO4	02
10.	4	Write Programs to search in sorted and unsorted linked list.	CO4	02
11.	4	Write Programs to perform following operations on Single link list. i. To insert a node at beginning and at given location. ii. To delete a node.	CO4	04
12.	5	Write Program to create Binary Search Tree and perform Inorder, Preorder and Postorder traversal.	CO5	02
13.	6	Write Program to traverse graph in DFS and BFS.	CO6	02
14.	All	Microproject covering 2 or more COs from curriculum. (Refer Point no.11 for sample microproject list)	ALL	02
		Total Hours		32
Following is the list of extra practical that can be given to Fast learner student.				
1.	2	Write Program to traverse Doubly link list.	CO2	
2.	2	Write Program to perform Insert and Delete operations on Doubly link list.	CO2	
3.	2	Write Program to perform Insert and Delete operations on Linear Queue using link list.	CO2	
4.	3	Write Program to perform Insert and Delete operations		

		on Circular Queue using array.	CO3	
5.	3	Write Program to perform Insert and Delete operations on Circular Queue using link list.	CO3	
6.	4	Write Programs to perform Search, Insert and Delete operations on BST.	CO4	
7.	5	Write Program to implement Heap Sort algorithm.	CO5	

Sr. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Hardware: Personal computer Pentium IV, 2 GHz minimum (i3-i5 preferable), RAM minimum 2 GB.	For all experiments
2	C/C++ Compiler.	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION I	
UNIT 1 . Introduction to data structures and Arrays (Weightage-12 , Hrs- 06)	
1a. Define data structure terminologies. 1b. Enlist various data structure Operations. 1c. Differentiate between various complexities. 1d. Use dynamic memory allocation in programs. 1e. Write algorithms to perform operations on	1.1 Introduction, Basic Terminology, Elementary data structure, Organization, Classification of data structure. 1.2 Operations on data structures: Traversing, Inserting, deleting, Searching, sorting, and Merging. 1.3 Complexity: Time Complexity, Space Complexity, Big 'O' Notation. 1.4 Dynamic memory Allocation. 1.5 Arrays: Introduction, Representation of linear arrays in memory. 1.6 Traversing linear Arrays, Inserting and

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
array.	Deleting. 1.7 Multidimensional Arrays.
UNIT 2 . Searching and Sorting Techniques (Weightage-14 , Hrs- 08)	
2a. Write algorithm and programs for various searching and sorting techniques 2b. Apply Hashing techniques to store and retrieve element from given data set. 2c. Use sorting methods to sort dataset.	2.1 Searching: Basic search techniques, Linear Search, Binary search. 2.2 Hashing: Hash functions, Collision Resolution, Linear probing, Chaining. 2.3 Sorting: General background. 2.4 Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Merge sort, Radix sort, Shell sort.
UNIT 3 . Stacks, Queues & Recursion (Weightage-14 , Hrs- 10)	
3a. Implement Stack and Queue data structure to carry out various data structure operation. 3b. Use stack and queues to solve various problem (like prefix to postfix conversion, evaluation of expression, Tower of Hanoi etc). 3c. Differentiate between stack and queue.	3.1 Stacks: Concept, representing stacks in 'C', Applications of stacks. 3.2 Polish Notations (Prefix, postfix, Infix), Quick sort. 3.3 Recursion: Recursive definitions and processes, Recursion in 'C', writing recursive programs factorial, Fibonacci. 3.4 Tower of Hanoi, Implementation of recursive, procedures by means of stack. 3.5 Queues: The queue and its sequential representation, concept of queues, priority queues.
SECTION II	
UNIT 4 . Linked Lists (Weightage-14 , Hrs- 08)	
4a. Implement linked list data structure to carry out various data structure operations. 4b. Use Linked list to implement other data structures.	4.1 Introduction Singly link list Representation of link list in memory. 4.2 Creating, Traversing, Searching in Sorted and Unsorted Linked List. 4.3 Memory allocation, garbage Collection. 4.4 Inserting into linked list, Deleting from a linked list. 4.5 Header links list, Two-way list, Implementation of link list.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 5 . Trees (Weightage-14 , Hrs- 10)	
5a. Draw binary tree for given data set. 5b. Write algorithm for binary tree traversal. 5c. Write algorithms to perform given operation on Binary Search Tree. 5d. Create Heap tree for given dataset.	5.1 Tree Terminologies: Degree of node, level of node, leaf node, Depth/Height of tree, In-degree and Out-degree, path, Ancestor and Descendant node. 5.2 Tree Types: General Trees, Binary trees, Binary Search Trees 5.3 Binary Tree Traversal methods: Inorder, Preorder, Postorder traversal using stack. 5.4 Binary search tree (BST), searching and inserting BST, deleting from BST. 5.5 Heap: Inserting into a Heap, Deleting the root of Heap, Heap sort.
UNIT 6 . Graphs (Weightage-12 , Hrs- 06)	
6a. Define terminologies related to Graph. 6b. Represent graph using adjacency list and adjacency matrix 6c. Solve problems to find out shortest path using Warshall's algorithm. 6d. Write algorithm to traverse the given graph.	6.1 Introduction o Graph Terminologies: Graph, Node(Vertices), Arcs(Edges), Directed Graph, Undirected Graph, In-degree and Out-degree, Adjacent, Successor, Predecessor, relation, path, sink. 6.2 Linear Representation of Graph: Adjacency List, Adjacency Matrix of directed graph. 6.3 Warshall's Algorithm; Shortest Paths. Linked representation of graph, traversing a graph (BFS,DFS). 6.4 Applications of Graph.

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN						
Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
SECTION I						
1	Introduction to data structures and Arrays	06	4	6	2	12
2	Searching and Sorting Techniques	08	2	4	8	14
3	Stacks, Queues & Recursion	10	2	4	8	14
Total		24	08	14	18	40
SECTION II						
4	Linked Lists	08	2	4	8	14
5	Trees	10	2	4	8	14
6	Graphs	06	2	4	6	12
Total		24	06	12	22	40
	Total	48	14	26	40	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Prepare journal of practicals.

10. SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Guide student(s) in undertaking micro-projects.
- e. Use proper equivalent analogy to explain different concepts.
- f. Use Flash/Animations to explain various components, operation and
- g. Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Develop program in C/C++ to evaluate an arithmetic expression using stack with linked list representation.
- b. Develop a program in C/C++ to create a Queue of given persons. Shift the original position of person to a new position based on its changed priority or remove a person from the queue using linked list representation.
- c. Develop a program in C/C++ that create tree to store given data set using linked list representation. Locate and display a specific data from data set.
- d. Develop a program in C/C++ for performing following banking operations: Deposit, Withdraw and Balance Enquiry. Select appropriate data structures for the same.

Many more.....

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Data Structures Schaum Outline Series	Lipschultz	McGraw Hill Education, New Delhi.2013, ISBN-13: 978-0070701984
2	Data Structures Using 'C'	ISRD Group	McGraw Hill Education, New Delhi.2013,ISBN-13:978-12590006401
3	Data Structures	Dr. Rajendra Kawale	Devraj Publications

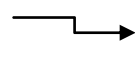
13. SOFTWARE/LEARNING WEBSITES

1. <https://www.w3schools.in/data-structures-tutorial>
2. <https://www.geeksforgeeks.org/data-structures/>
3. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Describe Data structures, Complexity and Array operations.	2	2	3	-	1	-	3
Use algorithms for searching and sorting techniques with arrays.	2	2	3	-	-	1	2
Implement programs for Stack, Queue and Recursion using Arrays.	2	3	3	-	1	1	2
Write programs to perform operations on Linked List.	2	3	3	-	1	1	2
Write algorithms to implement Tree data structure.	2	3	3	-	1	1	2
Describe Graph and its traversing methods	2	3	3	-	1	1	2

PSO - COMPETENCY- CO MAPPING

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Describe Data structures, Complexity and Array operations.	-	1	2
Use algorithms for searching and sorting techniques with arrays.	-	2	3
Implement programs for Stack, Queue and Recursion using Arrays.	-	2	3
Write programs to perform operations on Linked List.	-	2	3
Write algorithms to implement Tree data structure.	-	2	3
Describe Graph and its traversing methods	-	2	3

Sign: Name: 1. Smt.H.F.Khan 2. Shri. S.B.Nikam (Course Experts)	Sign: Name: Smt M.U.Kokate Head of the Department (Information Technology)
Sign: Name: Shri. U.V. Kokate Programme Head (Computer Engineering)	Sign: Name: Mr.A.S. Zanpure (CDC In-Charge)

Government Polytechnic, Pune
'180 OB' – Scheme

Programme	Diploma in Computer Engineering / Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of Course	Object Oriented Programming : C++
Course Code	CM3104
Prerequisite course code and name	NA
Class Declaration	Yes

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theor y		Practical		Total Mark s
L	T	P	C		ESE	PA	*ESE	PA	150
03	01	02	06	Marks	80	20	25	25	
				Exam Duratio n	3 Hrs	1 Hr	2 Hr		

(*): POE (Practical and Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-Endsemester examination, PA- Progressive Assessment.

2. RATIONALE

This subject intends to teach the students the basic concepts of object-oriented programming (OOP) using C++ programming language. Object-Oriented Programming offers a new and powerful way to cope with the programming complexities wherein programs are prone to error and software errors can get expensive. Its goal is clearer, more reliable, more easily maintained programs. This subject will act as backbone for all other subjects that are based on Object Oriented concept.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Build logical and cognitive thinking for solving real time problems.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Differentiate between procedural and object oriented programming methodology.
2. Define classes and create objects in C++.
3. Develop C++ code using function overloading.
4. Write programs for operator overloading and type conversion in C++.
5. Write programs using inheritance in C++.
6. Write programs for exceptions and file handling.

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours required
1	1	Write a simple C++ program to print "HELLO" on the output screen	CO1	01
2	2	Write a program to perform simple mathematical operations and all the control structures in C++.	CO2	02
3	2	Write a program to implement class and object concept and use various access specifiers.	CO2	02
4	3	Write a program to implement functions using call by reference and return by value concept.	CO3	01
5	3	Write a program to implement following concepts: a) Inline functions b) Friend functions c) Static function d) Object as a function argument and returning object e) Nesting of functions	CO3	04

6	3	Write a program to perform following string operations using pre-defined string functions and without using pre-defined string functions :- a) String concatenation b) String Comparison c) Find position of an character in a given string d) String reversing	CO3	02
7	4	Write a program to implement operator overloading and operator overriding (polymorphism).	CO4	02
8	4	Write a program to implement type conversion concept.	CO4	02
9	5	Write a program to implement following types of inheritances using various access specifiers :- a) Single inheritance b) Multilevel inheritance c) Multiple inheritance d) Hierarchical inheritance e) Hybrid inheritance	CO5	02
10	5	Write a program to implement pointers concepts	CO5	04
11	5	Write a program to implement following concepts: a) Virtual functions b) Pure virtual function	CO5	02
12	6	Write a program to perform various operations using File concepts	CO6	02
13	6	Write programs to handle pre-defined and user-defined exceptions.	CO6	02
14	1 to 6	Micro-project (Refer point 11 for micro project list)	All COs	04
TOTAL :				32

		%
a.	Drawing the flowchart for the given problem statement	20
b.	Writing an algorithm for the given problem statement	20
c.	Writing the code	10
d.	Observations and error handling	10
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	10
g.	Submission of report in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Major Equipment/ Instruments Required	PrO. No.
1	Basic configuration systems with editor supporting C++ language program execution.	ALL

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs)
(in cognitive domain)

Topics and Sub-topics

SECTION - I

UNIT-I. Introduction To Object Oriented Programming

(Weightage-12, Hrs- 06)

1a. Define procedural and object oriented programming language. 1b. Differentiate between procedural and object oriented programming language.
1c. Explain the features of object oriented language.
1d. Write a simple program to learn source file, compilation and linking of various files together.

1.1 Procedural programming: What is procedural programming? Features of procedural programming. Drawbacks of procedural programming.
1.2 Object Oriented Programming: Definition on Object Oriented Programming, Object Oriented Programming paradigm, basic concepts of Object Oriented Programming, benefits of Object Oriented Programming, Object Oriented languages, and applications of Object Oriented Programming.
1.3 Beginning with C++: What is C++, C++ program structure, object, class, example of object and class, creating the source file, compiling and linking.

UNIT-II Basics Of Object Oriented Programming (Weightage- 14 , Hrs- 10)

- 2a. Understand various basic concepts of C++ language.
- 2b. Define class and object.
- 2c. Understand memory allocation concepts.
- 2d. Differentiate between constructors and destructor.

- 2.1 Tokens, Expressions and Control Structures
Tokens, keywords, identifiers, constants and symbolic constants, data types and its classifications, type casting.
- 2.2 Variables: introduction, declaration, dynamic initialization, reference.
- 2.3 Operators : introduction, scope resolution operator, type cast operator, memory management operators, operator precedence,
- 2.4 Expressions: introduction, types, special assignment expressions.
- 2.5 Access Specifiers: introduction, why there is need of access specifiers, types of access specifiers.
- 2.6 Control structures : introduction, types of control structures like sequence structure, selection structure, loop structure, example of all the types of structures like if-else, while, do- while, for, switch with its syntax and usage.
- 2.7 Classes and Objects
Classes: Introduction, use of classes in OOP, syntax to declare class, local classes.
Objects: introduction, memory allocation for objects, static data members, array of objects, objects as function arguments, returning objects.
- 2.8 Constructors and Destructors
Constructors : introduction, syntax, concept of memory allocation using constructors, types of constructors, constructors with default arguments, dynamic initialization of objects, dynamic constructors
Destructors: introduction, syntax, concept of memory de-allocation using destructors, example.

UNIT-III Functions In C++ (Weightage- 14 , Hrs- 08)

3a. Define function and implement function prototypes. 3b. Understand various types of functions. 3c. Implement string functions and perform various operations on the same.

3.1 Introduction : The main function, function prototype, call by reference, return by reference, inline functions, default arguments, const arguments
3.2 More on function: Function overloading, friend functions, virtual functions, pure virtual functions, inline functions, making outside function inline, nesting of member functions, private member functions, static member functions, object as a function argument, returning an object.
3.3 String functions: Introduction, library string functions, creating string objects, manipulating string objects, string characteristics, accessing characters in strings, user defined functions to implement library string functions.

SECTION - II

UNIT-IV Operator Overloading, Polymorphism And Type Conversion

(Weightage- 14 , Hrs- 06)

4a. Explain the concept of operator overloading.
4b. Understand and implement object oriented programming language key feature like polymorphism.
4c. Implement type conversion for various data types.

4.1 Operator Overloading : Introduction, defining operator overloading, overloading unary operators, overloading binary operators, overloading binary operators using friends, manipulation of strings using operators, rules of overloading operators.
4.2 Polymorphism: Introduction, why polymorphism is useful, syntax and example.
4.3 Type Conversion: Introduction, basic to class type, class to basic type, one class to another type, data conversion example.

UNIT-V Inheritance And Pointers (Weightage- 14 , Hrs- 08)

5a. Define inheritance. 5b. Explain the need of inheritance.
5c. Implement various types of inheritances.
5d. Describe pointers in C++

5.1 Introduction : Definition of inheritance, defining derived classes, concept of base class and sub class, types of inheritance, making private member inheritable, single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance,
5.2 More on inheritance: virtual base class, virtual functions, abstract classes, constructors in derived classes, member classes using nesting of classes.
5.3 Pointers : Introduction, definition, syntax to declare pointer, pointers to objects, this pointer, pointers to derived classes, example on pointers

UNIT-VI Files And Exception Handling (Weightage- 12 , Hrs- 10)

- 6a. Define files in C++.
- 6b. Implement various operations that can be performed on files.
- 6c. Execute a program to handle exceptions in the programs.

- 6.1 Files: Introduction, classes for file stream operations, opening and closing a file, detecting end of file, more about open(), file modes, file pointers and their manipulations, sequential input and output operations, updating a file, random access of file, error handling during file operations, command line arguments.
- 6.2 Exception Handling: Introduction, basics of exception handling, types of exceptions, structure to handle an exception, exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions.

8. 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
SECTION - I						
I	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING	06	4	6	2	12
II	BASICS OF OBJECT ORIENTED PROGRAMMING	10	4	6	4	14
III	FUNCTIONS IN C++	08	4	6	4	14
Total		24	12	18	10	40
SECTION - II						
IV	OPERATOR OVERLOADING,POLYMORPHISM AND TYPE CONVERSION	06	4	6	4	14
V	INHERITANCE AND POINTERS	08	4	6	4	14
VI	FILES AND EXCEPTION HANDLING	10	2	6	4	12
Total		24	10	18	12	40
Total		48	22	36	22	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their

(student's) portfolio which will be useful for their placement interviews:

- a. Prepare journals based on practical performed in laboratory.
- b. Search information about more object oriented programming concepts.

10. SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Use different Audio-Video media for concept understanding.
- e. Guide students in undertaking micro-projects.
- f. Demonstrate students thoroughly before they start doing the practice.
- g. Observe continuously and monitor the performance of students in lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- (a) Railway reservation system
- (b) Payroll management system
- (c) Supermarket billing system
- (d) Telephone directory system

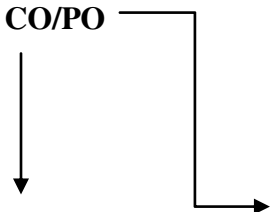
12. SUGGESTED LEARNING RESOURCES

S.N .	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Object Oriented Programming with C++	E Balagurusamy, Tata McGrawHill	ISBN 10: 0070473390 ISBN 13: 9780070473393
2	Beginning C++ - The complete Language	Ivor Horton , Shroff Publishers	ISBN 978-1-4302-4882-8
3	Object Oriented Programming in C++	Robert Lafore, BPB	ISBN-10: 8176351865; ISBN-13: 978-8176351867
4	Teach Yourself C++	Herbert Schildt, Tata McGraw Hill	ISBN 10: 007070368X ISBN 13: 9780070703681.
5	The C++ Programming Language	Bjarne Stoustrup, Addison-Wesley 2000	ISBN 978-0321992789

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. <https://www.quora.com>
3. <https://www.softwaretestinghelp.com>
4. <https://www.geeksforgeeks.org>

14. PO - COMPETENCY- CO MAPPING

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Differentiate between procedural and object oriented programming methodology.	3	2	1	2	-	2	3
Define classes and create objects in C++.	3	2	3	3	2	2	3
Develop C++ code using function overloading.	3	2	3	3	-	-	3
Write programs for operator overloading and type conversion in C++.	3	2	3	3	-	2	3
Write programs using inheritance in C++.	3	2	3	3	-	2	3
Write programs for exceptions and file handling.	3	2	3	3	-	2	3

	CO /PSO	Hardware and Networking	Database Technologies	Software Development
↓	→			
Differentiate between procedural and object oriented programming methodology.		-	1	2
Define classes and create objects in C++.		-	2	3
Develop C++ code using function overloading.		-	-	3
Write programs for operator overloading and type conversion in C++.		-	-	3
Write programs using inheritance in C++.		-	2	3
Write programs for exceptions and file handling.		-	2	3

Sign:	Sign:
Name: Mrs. G. B. Garud Mrs. S. P. Panchakshari (Course Experts)	Name: Mr. U. V. Kokate (Head of Department) (Department of Computer Engineering)
Sign:	Sign:
Name: Mr. U. V. Kokate (Head of Department) (Department of Computer Engineering)	Name: Mr. A. S. Zangpure(CDC In-charge)

Government Polytechnic, Pune

‘180 OB’ – Scheme

Programme	Diploma in Computer Engineering / Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/26
Name of Course	Java Programming-I
Course Code	CM3102
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
03	00	02	05	Marks	80	20	25	25	150
				Exam Duration	3 Hrs	1 Hr	2 Hr		

(*): POE (Practical&Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Java is platform independent, open-source object oriented programming language enriched with free and open source libraries. In current industrial scenario java has board industry support and is prerequisite with many allied technologies like advanced java, java server pages, and Android Application Development. Thus current industrial trends necessitate acquiring Java knowledge for Computer engineering and Information technology graduates this course develops necessary skills in students to apply object oriented programming techniques in java so that students will be able to develop complete applications using core java.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Build applications using Java.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented Cos associated with the above mentioned competency:

1. Develop programs using Object Oriented methodology in Java.
2. Develop programs to apply all access modifiers,array and string.
3. Develop program using multithreading.
4. Implement Exception Handling.
5. Develop program using graphics & applet.
6. Develop programs for handling I/O and file streams.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr.No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours required
1	1	Setup a Java Programming development environment by using: a. Command prompt. (Class path and path setup b. Any IDE (Eclipse, J creator etc.) Test the JDE setup by implementing a small program.	1	2
2	1	Develop programs to demonstrate use of different control statements and 'for' , 'while' and 'do-while' looping Statements	1	2
3	1	Develop programs for implementation of implicit and explicit type casting in JAVA.	1	2
4	2	Develop programs for implementation a) Constructor b) multiple Constructors	2	2
5	2	a) Develop a program to accept input using command line argument. b)Develop programs for implementation of Arrays in JAVA	2	2
6	2	Develop programs for implementation of different function of String and StringBuffer Class.	2	2
7	2	Develop programs for implementation of a) Vector b) HashMap c) Wrapper	2	2
8	2	Develop a program for implementation of a) method overriding. b) method overloading.	2	2
9	3	Develop programs for implementation of a) Single inheritance b) multiple inheritance	3	2

		c) multilevel inheritance by applying various access controls to its data members and methods.		
10	3	Develop programs for creating classes in a package, accessing a package, importing a class from other package.	3	2
11	4	Develop a program for implementation of Multithreading Operation.	3	2
12	4	Develop programs for implementation of a) exception handling b) user defined exception handling.	4	2
13	5	Develop minimum two basic Applets. Display output with applet viewer and browser. Develop a program on basic applet Develop program using control loops in applets.	5	2
14	5	Develop a Program to draw following shapes , Graphics and Applets a) Cone b) Cylinders c) Cube d) Square inside a circle e) Circle inside a Square	5	2
15	6	Develop programs for implementation of a) I/O classes b) file stream classes	6	2
16	All	Micro-project (Refer point 11 for micro project list)	1 to 6	2
TOTAL HOURS :				32

Sr.No.	Performance Indicators	Weightage in %
a.	Correctness of algorithm	40
b.	Debugging ability	20
c.	Quality of input and output displayed (messaging and formatting)	10
d.	Preparing assignments (write-ups, program and output).	20
e.	Submit assignment on time.	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. no.	Equipment Name with Board Specification	Pro Sr. no.
1.	Computer with JDK 1.8 or above	All
2.	Any IDE for JAVA Programming such as Eclipse ,Jcreator or any other	All

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit- I Basics of JAVA (Weightage-09, Hrs- 06)	
1a. State Features of Java. 1b. Write Programs to create classes and object for given problem. 1c. Enlist different data types & Operators in Java. 1d. Construct the expressions using implicit and explicit type conversions to solve the given problems. 1e. Develop the programs using relevant control structure to solve the given problems.	1.1 Java Features. 1.2 Defining a class, Fields declaration, Methods declaration, Creating object, Accessing class members. 1.3 Java tokens and data types, constants and symbolic Constant, variables, Dynamic initialization, Data types, array and string, Scope of Variable, typecasting and standard default value. 1.4 Operators and Expressions, Type conversions in expressions, Mathematical functions- min(), max(), sqrt(), pow(), exp(), round(), abs(). 1.5 Decision making and looping: If statement, if else statement, nested if else statement, if else if ladder, the switch statement, nested switch statement, The ?: operator, the while statement, the 'for' statement, break, continue and return statement, nested loops ,labeled loops, for-each version of the for loop.
UNIT- II Derived Syntactical Constructs in JAVA (Weightage-13, Hrs-08)	
2a. Use constructors for the given programming problem. 2b. State different visibility controls. 2c. Write the programs by implementing array to solve the given problems. 2d. Develop programs using vectors, wrapper and HashMap classes for the given problem.	2.1 Constructors and methods type of constructors, nesting of methods, argument passing the 'this' keyword, command line arguments, garbage collection, finalize() method, the object class. 2.2 Visibility Control Public, Private Protected, Default, friendly protected access. 2.3 Arrays and Strings: Types of arrays, creating an array, strings, string classes and string buffer, vector, wrapper classes, HashMap. Enumerated types.
UNIT-III Inheritance , Interface and Package (Weightage-19, Hrs-10)	
3a. Describe Inheritance. 3b. Enlist different types of Inheritance. 3c. Differentiate between overloading and overriding for given example. 3d. Develop program using the specified interface. 3e. Create user defined package for the given problems. 3f. Add class and interface to the given package.	3.1 Inheritance: concept of inheritance, Types of Inheritance. 3.2 Single Inheritance, multilevel Inheritance, Hierarchical Inheritance, method and constructors overloading and overriding. Dynamic method dispatch, final variables final methods, use of super, abstract methods and classes, static members. 3.3 Interfaces: Define Interface, implementing interface, accessing interface variables. 3.4 Package: Define package, types of package, naming and creating packages, accessing packages, import package, static imports, adding class and interfaces to a package.

UNIT-IV Exception handling and Multithreading (Weightage- 13 , Hrs- 08)	
4a. Define Exception, Errors & its types. 4b. Develop program for handling the given exception. 4c. Develop a program for throwing our own Exceptions. 4d. Explain the function of the specified phase in thread life cycle using the given example.	4.1 Errors and Exception: Types of errors, exceptions, syntax of exception handling code, build-in exceptions, chained exceptions, creating own exception (throw clause). 4.2 Multithreaded Programming Creating a Thread: By extending thread class and by implementing Runnable interface, lifecycle of thread, Thread Methods: wait(), sleep(), notify(), resume(), suspend(), stop(). Synchronization, inter-thread communication, deadlock.
UNIT-V JAVA applets and Graphics Programming (Weightage-18, Hrs-08)	
5a. Describe the given phase of applet life cycle using a typical example. 5b. Develop programs using applet implementation for the given problem. 5c. Develop a Program for passing Parameters to Applets 5d. Develop program for implementing different font methods.	5.1 Introduction to applets: Applet, Applet life cycle (skeleton), Applet tag, Adding Applet to HTML file, passing parameter to applet, embedding <applet> tags in java code, adding controls to applets. 5.2 Graphics Programming: Graphics classes, lines, rectangles, ellipse, circle, arcs, polygons, color and fonts, font class, variable defined by font class, font methods.
UNIT-VI Managing I/O Files in JAVA (Weightage- 08 , Hrs- 08)	
6a. Use I/O stream classes in a program to solve the given problem. 6b. Write Program for reading and writing character stream to and from the given files. 6c. Write Programs for reading and writing bytes to and from given files. 6d. Write program to demonstrate use of primitive data types with the specified stream.	6.1 Introduction and concept of streams. 6.2 Stream classes. 6.3 Byte Stream classes: Input stream classes, Output stream classes. 6.4 Character stream classes, using streams. 6.5 Using file class: I/O Expressions, Creation of files, Reading/Writing characters, Reading/Writing bytes, Handling primitive Data types.

8. 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	Basics of JAVA	06	2	2	5	9
II	Derived Syntactical Constructs in JAVA	08	2	2	9	13
III	Inheritance , Interface and Package	10	4	5	10	19
IV	Exception handling and Multithreading	08	4	3	6	13
V	JAVA applets and Graphics Programming	08	5	4	9	18
VI	Managing I/O Files in JAVA	08	3	1	4	8
Total		48	20	17	43	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Prepare journal based on practical performed in laboratory.
- b. Follow Coding Standards.
- c. Give seminar on relevant topic.
- d. Undertake micro-projects.
- e. Develop variety of program to improve logical skills.
- f. Develop Application oriented real world programs.

10. SUGGESTED 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:

Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations.

With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.

Use different Audio-Visual media for Concept understanding.

Guide student(s) in undertaking micro-projects.

Demonstrate students thoroughly before they start doing the practice.

Observe continuously and monitor the performance of students in Lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Develop Alumni Management System.
- b. Develop Payroll System.
- c. Develop Text Editor.
- d. Develop LAN chat and file sharing System.
- e. Design Tic Toc game using Applet and graphics.

12. SUGGESTED LEARNING RESOURCES

Sr.No.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Programming with Java	E. Balagurusamy, Tata McGraw Hill, 6 th Edition, 2019	- ISBN-10 9353162343 - ISBN-13978-9353162344
2	The Complete Reference Java2	Herbert Schildt, Tata McGraw Hill, 5 th Edition, 2017	- ISBN-10 0070495432 - ISBN-13978-0070495432
3	The Complete IDIOT's Guide To JAVA 2	Michael Morrison, PHI, 2 edition	ISBN-13 978-0789721310

13. SOFTWARE/LEARNING WEBSITES

1. <http://www.nptel.ac.in>
2. <https://www.tutorialspoint.com/javaprogramming>
3. <https://onlinecourses.nptel.ac.in>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Develop programs using Object Oriented methodology in Java.	3	1	2	3	-	-	3
Develop programs to apply all access modifiers, array and string.	3	2	3	3	1	2	3
Develop program using multithreading	3	2	3	3	1	2	3
Implement Exception Handling.	3	2	3	3	1	2	3
Develop program using graphics & applet.	3	2	3	3	1	2	3
Develop programs for handling I/O and file streams.	3	2	3	3	1	2	3

15. PSO - COMPETENCY- CO MAPPING

CO /PSO	Hardware and Networking	Database Technologies	Software Development
Develop programs using Object Oriented methodology in Java.	-	-	3
Develop programs to apply all access modifiers, array and string.	-	-	3
Develop program using multithreading	-	-	3
Implement Exception Handling.	-	-	3
Develop program using graphics & applet.	-	-	3
Develop programs for handling I/O and file streams.	-	1	3

Sign: Name: Smt.K S Gaikwad Smt. H.S.Pawar Smt.S.P.Panchakshari Smt. S.S.Ingavale (Course Experts)	Sign: Name: Mrs.M.U. Kokate (Head of Department) (Department of Information Technology)
Sign: Name: Mr. U. V. Kokate (Program Head) (Department of Computer Engineering)	Sign: Name: Mr. A. S. Zanpure (CDC In-charge)

Government Polytechnic, Pune

'1800B' – Scheme

Programme	Diploma in _____
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Digital Marketing
Course Code	AU4105
Prerequisite course code and name	NA
Class declaration	No

1. TEACHING AND EXAMINATION SCHEME

1. TEACHING AND EXAMINATION SCHEME									
Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	50
00	00	02	02	Marks	00	00	25	25	
				Exam Duration	--	--	--	--	

(*):OE (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End Semester Examination, PA- Progressive Assessment.

Note: ESE for the course will be based on oral examinations

2. RATIONALE

Digital marketing is advertising or promotions of products and services using digital platforms. Digital Marketing is rapidly evolving technology. And social media is ever growing marketing platform for users. The course will help students to improve skills to market their product or service in the digital media. The course will enable students to explore and create something new who wants to be a good entrepreneur or good professional in design and development.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- Enhance business using various digital media channels

4. COURSE OUTCOMES (COs)

The practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Identify advertisement sections of web pages in a website.
2. Install Google analytics on a website.
3. Use Google analytics for reading analytics data.
4. Generate reports for sample web-site
5. Use e-mail marketing tool

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e., sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No	Unit No	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1	NA	Study and prepare a report of a sample web-site with strategic flow for e-commerce/publication etc. (with the use of: HTML, CSS, and JavaScript etc.)	CO1, CO2	2
2		Set up and create account on Google Analytics and install it on a web-site. Study of Google Analytics GUI/IDE for: • Inbound and outbound marketing • Content marketing • Website Content optimization	CO2	2
3		Study of Search Engine Optimization (SEO) using Digital marketing platform.	CO2	2
4		(A)Create the tracking id for web-site and track links (B) Analyze website traffic and leads using DM platform/tool	CO2	2
5		Read Analytics data. Read audience acquisition and behavior statistics	CO3	2
6		Generate different types of reports through Google Analytics	CO4	2
7		Study of any email marketing tool (Freeware)	CO5	2
8		Micro-project (Refer point 11 for micro project list)	All COs	2
		Total Hrs		16

S.No.	Performance Indicators	Weightage in %
a.	Study of web pages and web site	20
b.	Installing and setting up the tool for web site	10
c.	Observations and Recording	25
d.	Interpretation of reports, result and Conclusion	25
e.	Answer to sample questions	10
f.	Submission of term work journal in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major tools with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr.No.	Major tools Required	PrO.No.
1	Web browser	All
2	Any Web Server (e.g. Glassfish, Tomcat)	
3	Google Analytics	

7. **THEORY COMPONENTS**
(Not Applicable)

8. **SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**
(Not Applicable)

9. **SUGGESTED STUDENT ACTIVITIES**

Other than the laboratory 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: Students should conduct following activities in group and prepare reports of each activity.

- a. Prepare journals based on practical performed in laboratory.
- b. Study of different types of web-sites (ecommerce/ publication/ social media) and advertisements on these web-sites.

10. **SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through presentations.
- c. Self-learning through Online tutorials to analyze business data
- d. Use of freeware marketing tools to check for the effectiveness for particular type of websites

11. **SUGGESTED MICRO-PROJECTS**

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed than three**.

Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Develop and deploy a sample web-site (using CSS, JavaScript, and similar techniques) for given sample commercial requirements. And identify advertising sections among these pages.
- b. Create blog post for educational videos for demonstrating content marketing
- c. Create an account on Google analytics and analyze traffic to the sample website
- d. Create code for tracking ID for sample web site and generate reports through Google analytics

12. SUGGESTED LEARNING RESOURCES

Sr No	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Fundamental of digital Marketing	Punneet Singh Bhatia, Pearson India, 2 nd Edition (2019)	9789353434141
2	The Art of SEO	Eric Enge, Stephan Spencer, Jessie Stricchiola, O'Reilly: 3 Edition (August 2015)	1491948965 978- 1491948965

13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. <https://youtu.be/mXcQ7rVn3ro>
3. <https://youtu.be/gQe7gGGuzeQ>
4. https://www.tutorialspoint.com/digital_marketing/

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	1	3	2	-	1	-
CO2	-	2	1	2	-	-	1
CO3	1	2	3	3	-	1	1
CO4	-	1	2	3	-	1	1
CO5	-	3	3	3	1	1	1

PSO- COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO1	1	-	2
CO2	-	-	3
CO3	-	-	3
CO4	-	1	3
CO5	-	-	3

Sign: Name: 1) Smt. M.G. Yawalkar 2) Smt.A.S. Paikar 3) Smt. K.S.Gaikwad 4) Smt. P.K.Zade (Course Expert /s)	Sign: Name: Mr. U.V. Kokate (Head of Department) (Department of Computer Engineering)
Sign: Name: Mr. U.V. Kokate (Programme Head) (Department of Computer Engineering)	Sign: Name: Shri A.S.Zanpure (CDC In-charge)

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in _____
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Introduction to E-Commerce
Course Code	MA4105
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme			
					Theory Marks		Practical Marks	
L	T	P	C		ESE	PA	*ESE	PA
02	-	-	02	Marks	40	10	-	-
				Exam Duration	2Hrs	1 Hr	-	-

(*): OE/POE (Oral Examination/Practical & Oral Examination mention whichever is applicable)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

This course is aimed at providing the students with modules on the use of the Internet and e-commerce. It also includes all aspects of deploying e-business and e-commerce within an organization. It also provides theories and concepts and questions the validity of these models in the light of the differences between the Internet and other media.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- Understand real time problem solving and relevant soft skills.

4. COURSE OUTCOMES (COs)

The theory, real time problem solving and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Define E-commerce and various business models.
2. Describe fundamental sales process.
3. Recognise the variants of the process of B2C and B2B.
4. Identify ethical aspects of ICT.

5. SUGGESTED PRACTICALS/ EXERCISES

NA

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

NA

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit- I Introduction to E-Commerce (Weightage-06, Hrs- 04)	
1a. Define E-commerce. 1b. Differentiate between various business models. 1c. Explain technical challenges. 1d. Explain economic challenges.	1.1 Basics and definitions – E-Commerce. 1.2 Business models related to E-Commerce. 1.3 Technical and economic challenges.
Unit-II Frameworks and Architectures (Weightage-10, Hrs- 08)	
2a. Explain fundamental sales process. 2b. List out Technological elements.	2.1 Actors and Stakeholders. 2.2 Fundamental sales process. 2.3 Technological elements.
Unit-III B2C Business (Weightage-10, Hrs- 08)	
3a. Explain the variants of the process of B2C. 3b. Differentiate between various challenges. 3c. Understand CRM.	3.1 The process model and its variants. 3.2 The pricing challenges. 3.3 The fulfilment challenges. 3.4 The payment challenges. 3.5 B2C-business and CRM. 3.6 B2C software systems.
Unit-IV B2B Business (Weightage-08, Hrs- 06)	
4a. Explain the variants of the process of B2B. 4b. Identify B2B software systems.	4.1 The process model and its variants. 4.2 B2B software systems.
Unit-V Impact of E-Commerce (Weightage-06, Hrs- 06)	
5a. Identify ethical aspects of ICT. 5b. List out different impacts of E-Commerce.	5.1 Ethics, morale and technology. 5.2 Ethical aspects of ICT. 5.3 Overall impacts of E-Commerce. 5.4 Specific impacts of E-Commerce.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction To E-Commerce	04	02	02	02	06
II	Frameworks and Architectures	08	02	04	04	10
III	B2C Business	08	02	04	04	10
IV	B2B Business	06	02	02	02	08
V	Impact of E-Commerce	06	02	04	02	06
Total		32	10	16	14	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews: -

Student can study and prepare report on any application in which e-commerce they used.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
1	Introduction To E-Commerce	Class room teaching
2	Frameworks and Architectures	Class room teaching
3	B2C Business	Class room teaching
4	B2B Business	Class room teaching
5	Impact of E-Commerce	Class room teaching

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author, Publisher, Edition and Year of publication	ISBN Number
1	Introduction to E-Commerce: Combining Business and Information Technology	Prof. Dr. Martin Kutz, 1 st Edition	ISBN 9788740315202

13. SOFTWARE/LEARNING WEBSITES

NA

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	-	-	1	3	2
CO2	1	1	-	1	1	3	2
CO3	1	-	-	1	1	3	3
CO4	1	1	-	1	1	3	3

	PSO1	PSO2	PSO3
CO1	-	2	2
CO2	-	2	2
CO3	-	2	2
CO4	-	2	2

Sign:

Sign:

Name: 1. Smt. H. S. Pawar 2. Smt. N. R. Wagh 3. Smt. P. N. Yewale 4. Smt. S. S. Ingavale 5. Smt. S. J. Siraskar 6. Smt. S. R. Hande (Course Experts)	Name: Mr. U.V. Kokate (Head of Department) (Department of Computer Engineering)
Sign: Name: Mr. U.V. Kokate (Programme Head) (Computer Engineering)	Sign: Name: Mr. A.S. Zanpure (CDC In-charge)

Government Polytechnic, Pune

'180OB' – Scheme

Program Name	:	Diploma Program in Computer Engineering (Other Branches)
Program Code	:	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Course Title	:	Information Management
Course Code	:	MA4106
Class Declaration	:	No

1. 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	PA	ESE	PA	
2	-	-	2	40	10	-	-	50

(#): Online Exam

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

2. RATIONALE

Organizations of all sizes generate and work on information .Collection and management of Information becomes an important aspect in each and every field. This course is aimed at providing the students with the basics of Information Management.

3. COMPETENCY

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

- Use information management system in industries.

4. COURSE OUTCOMES (COs)

The theory, real time problem solving and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Recognize information system in any organization.
2. Enlist types of Information Systems.
3. Identify the competitive environment of business.
4. Identifying challenges in Information management.
5. State Social and Ethical issues with Information Management.

5. PRACTICALS/ EXERCISES (Not Applicable)

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED (Not Applicable)

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit-I Organizations and Information Systems (Weightage-08, Hrs-06)	
1a. List different types of modern organizations. 1b. Explain IT interaction model. 1c. Identify challenges for the manager.	1.1 Modern Organization- IT enabled, Net-worked, Dispersed, Knowledge Information Systems in Organizations. 1.2 Managing Information Systems in Organization. 1.3 Challenges for the manager. 1.4 The Role of Internet 1.5 Managing the Internet era
Unit-II Concepts of Management Information Systems (Weightage-08, Hrs-06)	
2a. Enlist types of Information Technology. 2b. Enlist types of Information Systems. 2c. Differentiate between various decisions. 2d. Explain communication in organizations.	2.1 Data and Information, Information as a re-source. 2.2 Information in organizational functions. 2.3 Types of Information Technology, Types of Information Systems. 2.4 Decision making with MIS. 2.5 Communication in organization.
Unit-III Information Systems and Management Strategy (Weightage-10, Hrs-08)	
3a. Identify the competitive environment of business. 3b. Find out the properties of Information Goods. 3c. Explain value chain.	3.1 The competitive environment of business. 3.2 Using IT for competing. 3.3 Information Goods. 3.4 Information Systems and Competitive strategy.
Unit-IV Managing Information Systems (Weightage-08, Hrs-06)	
4a. Understand the challenges of managing the IT function. 4b. Identify vendor. 4c. Explain the role of CIO.	4.1 Challenges of managing the IT function. 4.2 Vendor Management. 4.3 The Role of CIO.
Unit-V Ethical and Social Issues (Weightage-06, Hrs-06)	
5a. Explain Ethical issues. 5b. Explain Social issues.	5.1 Ethical issues- Privacy, Workplace Monitoring, Power over Users. 5.2 Social issues- Workplace behaviour and Health, De-skilling and Alienation, Tele-commuting, E-Waste.

8. 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	Organizations and Information Systems	6	4	2	2	08
II	Concepts of Management Information Systems	6	4	2	2	08
III	Information Systems and Management Strategy	8	4	4	2	10
IV	Managing Information Systems	6	2	4	2	08
V	Ethical and Social Issues	6	2	2	2	06
Total		32	16	14	10	40

9. STUDENT ACTIVITIES

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: Students should conduct following activities in group and prepare reports of about 5 pages for the activity mentioned, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews :-

Student can study and prepare report on information management as done in any small setup like cyber café, canteen, medical or grocery shops etc.

10. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
1	Organizations and Information Systems	Class room teaching
2	Concepts of Management Information Systems	Class room teaching
3	Information Systems and Management Strategy	Class room teaching
4	Managing Information Systems	Class room teaching
5	Ethical and Social Issues	Class room teaching
6	Organizations and Information Systems	Class room teaching

11. SUGGESTED LIST OF MICROPROJECTS:- Not Applicable

12. LEARNING RESOURCES

Sr.No.	Title of Book	Author, Publisher, Edition and Year of publication
1	Indian Economy	Rahul Rai

13. SOFTWARE/LEARNING WEBSITES

1. https://en.wikipedia.org/wiki/Information_system

14. PO - COMPETENCY- CO MAPPING

CO/PO	Basic and Discipline Specific Problem Analysis	Design/Development of Solutions	Engineering Tools, Experiments and Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning	
Recognize information system in any organization.	-	-	-	2	2	3
Enlist types of Information Systems	-	-	-	1	2	3
Identify the competitive environment of business.	-	-	-	2	2	3
Identifying challenges in Information management	-	-	-	1	3	3
State Social and Ethical issues with Information Management.	-	-	-	3	2	3
Summary	-	-	-	2	3	3

PSO - COMPETENCY- CO MAPPING

	Hardware and Networking	Database Technologies	Software Development
CO1	1	1	1
CO2	-	2	2
CO3	-	1	2
CO4	-	1	1
CO5	1	1	2
Summary	1	1	2

Sign : 1. Smt. P. N. Yewale 2. Smt.G.B.Garud 3. Smt. A.S.Paike 4. Smt.P.K.Zade 5. Smt.S.R.Hande (Course Expert)	Sign : Mrs.M. U. Kokate (Head of the Department) (Department of Information Technology)
Sign : Mr.U.V. Kokate (Program Head) (Department of Computer Engineering)	Sign: Mr. A.S. Zanpure (CDC In-charge)

Government Polytechnic, Pune
'180 OB' – Scheme

Programme	Diploma in Information Technology /Diploma in Computer Engineering
Programme code	01/02/03/04/05/ 06/07 /08/21/22/23/24/26/15/16/17/18/19/ 26
Name of Course	INDUSTRY INPLANT TRAINING
Course Code	CM4101
Prerequisite course code and name	Concerned Level 1 & Level 2 courses Term grant
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	100
-	-	06	06	Marks	-	-	50	50	
				Internship Duration	6 weeks duration				

Note: Both ESE and PA part of assessment will be carried out by institute faculty and industry training mentor as explained in Table 1 and Table 2, Table 3.

2. RATIONALE :

Employability competencies can be enhanced by exposing students to the actual real time working environment in industry . The industrial skills like, soft skills, life skills and hands-on will be inculcated among the students. Inplant training is the only way students learn application of acquired knowledge to fulfill market demand and develop skills and competencies required to become employable.

3. COMPETENCY:

Following competencies are expected to be developed through INDUSTRY INPLANT TRAINING :

- Soft Skills : Communication, Presentation, Technical Report Writing.
- Life Skills : Time management, Safety, Innovation, Entrepreneurship, Team building etc..
- Hands-on Practices: Implementation of production process and development of software and Quality Assurance aspects.

4. COURSE OUTCOMES:

Industry Inplant training is intended to acquire the competencies as mentioned above to supplement those attained through several courses up to fourth semester of the program:

CO1: Communicate effectively (verbal as well as written) to execute the work.

CO2: Prepare the report of the executed work at the industry.

CO3: Exercise time management and safety in the work environment.

CO4: Work in teams for successful completion of projects assuring quality.

5. GENERAL GUIDELINES FOR INDUSTRIAL TRAINING

- a) **Period of Industrial Training:** Between 4th and 5th semester (Summer Vacation).
 - b) **Duration of the training:** Six weeks
 - c) The Industries/Organizations can be Government/Public limited/or Private family enterprises.
- **Training Area:** Students should be placed in large and medium scale Industry / Organization. However, despite the best efforts by the institute, if large and medium scale Industry / Organization are not available to all students then, students can also be placed in small scale Industry / Organization.

For **Civil engineering** it can be public works department, irrigation department, public health engineering, municipal corporations, town and country planning, highway and roads authorities, railways, large and medium scale civil contractors, rural engineering departments, environment corporations, large and medium scale private construction companies, mining companies etc.

For **Mechanical Engineering** it can be manufacturing, fabrication, foundry or processing industry which may include compressors, boilers, engines, heat exchangers, air conditioning and refrigeration plants, conveyors, automation etc are either manufactured or used. Power plants, Railways, process plants, ordinance factories, textile factories, automobile manufacturers or major automobile workshops

For **Electrical Engineering** it can be electricity transmission and distribution companies, power generating stations, sub stations, railways, industries manufacturing electrical products which may include industry where large motors/transformers etc. are used, process plants, electrical contractors.

For **Electronic Engineering** it can be telecommunication companies, post and telegraph department, manufacturer of telecommunication product, manufacturers of control equipments, manufacturer of CNC machines, any manufacturing industry where electronic controls are used either in production process or in its products, computer hardware manufacturers, signal divisions of railways, etc.

For **Computer and IT Engineering** it can be any software developers, cyber security companies, web page developers, networking companies, data base management companies, telecommunication companies or IT division of any other industries/finance/retail companies or organizations where software are used and maintained for various applications.

For **Metallurgical Engineering** it can be manufacturing industry such as fabrication, foundry, processing industry, forging, galvanizing, Iron making and steel making industries.

For **Dress Designing and Garment Manufacturing** it can be Textile industries, Weaving and

Knitting industries, Garments industries, Design and Styling fashion garments , Retail malls.

6. ROLE OF PARENT DEPARTMENT & THE INSTITUTE:

A. Formation of Placement cell for IIP at institute level: (one time activity)

It will be consisting of Training & Placement Officer (TPO), CDC Incharge , and one Faculty from each program .

Activities to be carried by Institute IIP Cell:

- A.1 Collecting information about Industry / Organisation available for training along With the capacity.
- A.2 Communication with Industry / Organisation available for training along with capacity and its confirmation.
- A.3 Issue letter to the Industry / Organisation for the training along with details of students and mentors.

B. Formation of IIP Cell At program level: (one time activity)

It will be consisting of A faculty from Institute IIP cell , One faculty per division.

for examiners coordination ,orientation +mentors ,letters initialization,

Activities to be carried by Program level IIP Cell:

- B.1 Student and mentor allocation as per the slots available for in-plant Training.
- B.2 Obtaining consent letter from parents / guardian.(Undertaking on Rs100 stamp, Insurance)
- B.3 Orientation and selection of Students in before start of Industry inplant training through counseling.
- B.4 Mentors to carry out progressive assessment of the students during the in-plant training.
- B.5 End of training assessment by mentor along with Industry / Organization expert as external

● Scheduling for Implant Training placements –

Sr. no	activity	Period	Responsibility
1	Industries to be identified	6 th -8 th week of 4 th Semester.	Departmental inplant training coordinator
2	Communication and coordination with industry	8 th -10 th week of 4 th Semester	Departmental inplant training coordinator

3	Allocation of faculty / Mentor	8 th -10 th week of 4 th Semester	Departmental inplant training coordinator
4	Acquire undertaking from students and parents .	10 th – 12 th week of 4 th Semester	Allocated faculty / Mentor
5	Finalise and prepare letter of placements	12 th – 16 th week of 4 th Semester	Allocated faculty / Mentor
6	Organise orientation and guidance and counseling Session for respective students	12 th – 16 th week of 4 th Semester	Allocated faculty / Mentor
7	Progressive assessment of the students during the in-plant training	Each week of training	Allocated faculty / Mentor
8	End of training assessment by mentor along with Industry / Organization expert	Before 5 th semester ESE	Allocated faculty / Mentor

- Faculty will be visiting the industry **at least once** during training phase after third week for assessment in coordination with industry personnel and for taking feedback. Weekly assessment can be done through online mode .

7. **FORMAT FOR TRAINING REPORT**

Following is the suggestive format for the training report, actual format may differ slightly depending upon the nature of Industry / Organisation. The training report may contain the following

- Title page
- Certificate
- Abstract
- Acknowledgement
- Content Page

Chapter 1. Organizational structure of Industry / Organisation and General Lay Out

Chapter 2. Introduction of Industry / Organisation (Type of products and services, history, turn over and number of employees etc.)

Chapter 3. Types of major equipment/instruments/machines/hardware and software used in industry with their specification, approximate cost and specific use and their routine maintenance.

Chapter 4. Manufacturing Processes/Models along with planning , handling and control methods.

Chapter 5. Testing of Hardware/Software/raw materials, components and finished products along with quality assurance procedures.

- Chapter 6. Safety procedures followed and safety gear used (includes Preventive maintenance schedule and breakdown maintenance procedures).
- Chapter 7. Particulars of Practical Experiences in Industry / Organisation if any in Production/ Assembly/ Testing/Maintenance.
- Chapter 8. Detailed report of the Task . (if any done during the training)
- Chapter 9. Special/challenging experiences encountered during training if any (may include students liking & disliking of work places)
- Chapter 10. Conclusion
- Chapter 11. References /Bibliography

8. SUGGESTED LEARNING & EVALUATION STRATEGIES/GUIDELINES

- Students should visit the website of the industry where they are undergoing training to collect information about products, processes, capacity, number of employees, turnover etc.
- They should also refer the handbooks of the major machinery, softwares and operation, testing, quality control and testing manuals used in the industry.
- Students may also visit websites related to other industries wherein similar products are being manufactured as their learning resource.
- Both the industry supervisor and the faculty supervisor are responsible to assess the students' performance and soft-skills.
- To assess the students, the scoring rubric, scoring schemes and rating scales are developed. The components to be assessed are :
 - Industrial training Report,
 - Logbook(Diary),
 - Industrial training Oral Presentation,
 - Student Performance Evaluation by Organization Supervisor, and
 - Student Performance Evaluation by Faculty Supervisor
- Industrial Training report writing require students to produce a substantial report to explain about the organization's background, the overall training that have been performed and the specific projects that they have conducted along with specific conclusions /solutions.
- The students must apply the skills of communicating using written language, outlining, organizing, and planning a report, as well as using reference materials and sources and follow the above format.
- The student plays important role in deciding what should be included in the log book and learn to understand and evaluate her own progress.
- In exceptional case, on line training can also be considered as an option, provided, the contents and the assessment schemes are approved from the concerned authorities.
- Student performance evaluation focuses on a student's work performance and the personality. The scoring rubric forms are used that relates assessment item to the learning outcome. The work performance is the ability to complete the given tasks within the specified time frame independently using their knowledge and skills with good quality of

work. The soft skills include the socialization, communication, initiative and motivation, discipline, cooperation and teamwork

9. TENTATIVE WEEK-WISE SCHEDULE OF INDUSTRIAL TRAINING

Industrial training is a common course to all programs; therefore the industry / Organisation selection will depend upon the nature of programme and its related industry. The training activity may vary according to nature and size of Industry / Organisation. The following table details suggestive schedule for industrial training for all programs.

Table 1: Guidelines for generalized week schedule and PA Marks distribution

S. No.	Week No.	Details of activities to be completed during Industrial training	Marks distribution/ week for PA
1	Week No. 1	Induction to industry and its departments or study of assigned job.	04
2	Week No. 2	Study of layout and specifications of major machines, equipment and raw materials / components / software and models used.	04
3	Week No. 3	Execute/study Task. (Execution may start from first week as per job assigned and nature of industry)	04
4	Week No. 4	Study of QA/QC/Testing procedures.	04
5	Week No. 5	safety and maintenance procedure in an industry/organization .	04
		Total	20
6b	Week No. 6	Report Writing (PA marks to be given by faculty based on report writing)	10
PA marks to be given by industry supervisor based on student involvement and quality of job performed or job assigned.			20
Total PA marks for training			50

Table 2: Suggested Rubric for PA Assessment of Internships/Implant Training**Note: Allot the marks in the appropriate cell given based on Presentations Done**

Week No	Task to be assessed	Outcome Achievement – Poor	Outcome Achievement – Moderate	Outcome Achievement – High		Total week wise Marks
		Poor (Marks 1)	Average (Marks 2)	Good (Marks 3)	Excellent (Marks 4)	
Week 1 : Industry Induction	Induction to industry and its departments or study of assigned job.	Minimal knowledge of departments, processes, products & work culture of the company	Moderate knowledge of departments, processes, products & work culture of the company	Good knowledge of all departments, processes, products & work culture of the company	Extensive knowledge of all departments, processes, products & work culture of the company	
					1	
Week 2 : Study of Existing Systems	Study of layout and specifications of major machines, equipment and raw materials / components / software and models used.	Minimal Explanation of existing systems & Objectives of the proposed work are not identified	Moderate Explanation of existing systems & Objectives of the proposed work are not well defined	Good Explanation of existing systems & Some objectives of the proposed work are well defined	Detailed Explanation of existing systems & All objectives of the proposed work are well defined	

Week No. 3: Execution of task	Execute/study Task. (Execution may start from first week as per job assigned and nature of industry)	Minimal efforts and participation and poor understanding	Moderate efforts and participation and preliminary understanding	Good efforts and participation and fair understanding	Extensive efforts and participation and well understanding	
Week 4 : Testing Procedures	Study of QA/QC/Testing procedures.	Applications are not appropriate	Applications are appropriate but not well delivered	Applications are appropriate and well delivered Student cannot apply his/her knowledge on top of assessing what he/she knows	Applications are appropriate and well delivered Student can apply his/her knowledge on top of assessing what he/she knows.	
Week 5 : Study Safety & Maintenance Procedure	Study safety and maintenance procedure in an industry/organization .	Not very appropriate	Appropriate but not well delivered	Appropriate and well delivered Student cannot apply his/her knowledge on top of assessing what he/she knows	Appropriate and well delivered Student can apply his/her knowledge on top of assessing what he/she knows.	

Week No	Task to be assessed	Outcome Achievement – Poor	Outcome Achievement – Moderate	Outcome Achievement – High	Week No	Task to be assessed
		Poor (Marks 5)	Average (Marks 6)	Good (Marks 8)	Excellent (Marks 10)	
Week 6 : Report Writing	Description of concepts and technical details Conclusions and Discussion	Results are not presented properly Project work is not summarized and concluded Future extensions in the project are not specified	Results are presented in good manner Project work is not well summarized and concluded Future extensions in the project are not properly specified	Results are presented in good manner Project work is well summarized and concluded Future extensions in the project are not properly specified	Results are presented in very appropriate manner Project work is well summarized and concluded Future extensions in the project are well specified.	
Total Marks Out of 60						
Marks mapped to 50						

Table 2.1 -PA of Industrial training

Academic year : 20 -20

Name of the industry:

Sr. No.	Enrolment Number	Name of student	Marks from above Rubrics(Mapped to 4 marks for each week)						PA Marks by Industry Supervisor	PA based on Report by mentor faculty (Week 6)	Total
			Week 1	Week 2	Week 3	Week 4	Week 5	Total out of 20 (A)	Out of 20 (B)	Out of 10 (C)	Out of 50 (A)+(B)+(C)

Marks for PA are to be awarded out of 4 for each week considering the level of completeness of activity observed, from the daily diary maintained and feedback from industry supervisor.

Signature of mentor

Name of mentor:

Table 3 Assessment Scheme ESE

	Contents(30 marks)					Presentation(20 marks)					Total Out of (50)
Enroll ment No.	Title of Industrial project	Topic Selection (5)	Presen tation skill (10)	Overall understand ing capability (5)	Knowle dge (Q & A) (10)	Speech Clarity (5)	Body Language (3)	Neat Dressi ng (2)	Slides (05)	Report Writin g(5)	Total Out of (50)

Suggested structure for industry Inplant training

Mrs. M. U. Kokate,
Head of Department of Information Technology,
G.P.Pune

Shri A.S.Zanpure
CDC Incharge

Dr.V.K.Jadhav,
Lecturer, Electrical Engineering.,GPP.

Smt.P.M.Zilpe
Lecturer, E&TC Engineering.,G. P. Pune

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Professional Practice-II
Course Code	CM4105
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				Total Marks
					Theory		Practical		
L	T	P	C		ESE	PA	ESE	PA	
00	00	02	02	Marks	-	-	-	50	50
				Exam Duration	-	-	-		

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests. While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts. The purpose of introducing professional practices is to inculcate soft skills through active learning. Micro-Project, MOOCs courses, Industrial visits, expert lectures and related presentations and/ group discussions on technical topics are planned so that there will be increased active participation of students in learning process and hence impart life-long learning ability.

3. COMPETENCY

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

1. Learn independently and develop lifelong learning ability.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant Professional skills associated with First and second semesters courses are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Apply acquired knowledge
2. Learn independently and develop life long learning ability.
3. Perform SWOT analysis.
4. Learning through observations and Interactions.
5. Understand and prepare Reports.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Learning Outcome	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1	a. Application and integration of knowledge from minimum three course outcomes of two courses for development of a project. b. Write reports and state outcomes achieved. c. Work in group d. Present/Demonstrate project	Micro-Project – a) Microproject allocation and development (06-08 hrs.) Faculty must allocate one real life simple problem statement(least complexity) for Microproject which is combination of application of minimum two courses learnt/being learnt during Third and Fourth semesters to a group of 3-4 students. The problem statement must involve simple logic building which can be designed and implemented within 06-08 hours. b) Report Writing : Not more than 7-8 pages (to be prepared simultaneously with development) a. Problem Definition b. Platform and/Hardware Specifications c. Flow charts/diagram related to micro-project d. Source Code/Related Procedure for Micro-Project e. Outcome (Technical/Personal) achieved f. Books/References/Websites. c) Microproject Presentations/Demonstrations (04 hrs.) (Preferably by arranging Project exhibition/ classroom presentations as is applicable)	CO1	12
2	a. Learn from alternate sources. b. Enhance self learning ability	MOOCs(Massive open online courses): Undertake SWAYAM/NPTEL/Spoken Tutorial/Any other Online Courses learning courses and certificate courses Each individual student can select any relevant online course under the guidance of course teacher as per interest areas.	CO2	10

3	a. Interpersonal skill and personal skill development. b. Develop conflict resolution ability.	SWOT Analysis : Self SWOT analysis Study Habits (Group discussions) Sharing of self-experiences in a group on Note taking, Methods of Learning, Memory Enhancement, self - Study Techniques, Techniques for effective Reading and Writing. Stress Management (Role play by group) Stresses in groups, how to control emotions, Strategies to overcome stress, understanding importance of good health to avoid stress. Out of above three SWOT analysis is compulsory for all students . Half groups can get involved in group discussions on study habits and each group leader will present abstract to all. Half groups will present role play on stress management. Groups can be considered for different activities based on their likings.	CO3	06
4	a. Learning through observations. b. Understanding professional environment. c. Report writing.	Industrial Visit Industrial visits must be arranged for fulfilling the requirement of programme/course outcomes of undertaken courses of first and second semester and report of the same should be submitted by the individual student, to form a part of the term work.	CO4	02
5	a. Understanding industry practices or evolving concepts. b. Report writing.	Expert Lecture Lectures by Professional / Industrial Expert to be organized to bridge the gap of learnt/undertaken courses during first and second semester. Probably the Professional / Industrial Expert can be organized in the following areas - 1. Project presentation tips. 2. Spoken English. 3. Personality development. 4. How to develop positive thinking. 6. Any topic related to social awareness 7. Hygiene Awareness 7. Any other topics.	CO5	02
		Total		32

Sr.No.	Performance Indicators	Weightage in Marks
a.	Micro-Project –	20
b.	MOOCs	10
c.	Group Activity	05
d.	Industry Visit	07
e.	Guest Lecture	08
	Total	50

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

7. THEORY COMPONENTS: NA**8. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**

Unit No.	Unit Title	Teaching/PR Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Micro-Project	12	--	--	--	--
II	MOOCs:SWAYAM-NPTEL and Spoken Tutorial Courses	10	--	--	--	--
III	Group Activity	06	--	--	--	--
IV	Industrial Visit	02	--	--	--	--
V	Expert Lecture	02	--	--	--	--
Total		32	--	--	--	--

9. STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare group activity Report
- Prepare Industrial Visit Report
- Prepare Guest lecture Report
- Undertake micro projects
- Undertake MOOC certifications.

10. SUGGESTED 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:

1. Microproject:

- Teachers must brief the students about outcome expected through Microproject, form groups, and allocate micro projects to group of 3-4 within first two weeks.
- Micro-Projects must be on a problem statement with the aim to achieve not more than three outcomes by combining outcomes from two courses. Assessment will be as per Rubrics (A) done progressively.
- Students must utilize the allocated slots as per the course for development of Microproject. Faculty must take care that the problem statement to be developed and presented are fair enough for stipulated time duration (12hrs.)
- Teachers may organize departmental/interdepartmental project exhibition or presentations as per convenience to enhance demonstration/presentation skills.

NOTE: All first year and Second year faculty members prepare combined document

regarding detail problem statement of Microproject. Other than this Individual Teaching Faculty may add other problem statements.

2. MOOCs :

Teachers are advised to guide students into undertaking the MOOCs courses offered through various platforms. Students may take up different courses under the guideline of faculty. Faculty may take help of SWOC analysis for deciding the relevance of course allocation. Following are the guidelines, students may follow:-

- May take technical courses for enhanced knowledge in interested areas.
- Students requiring courses on language ability may take-up those courses
- Students interested in Management/Entrepreneurship may opt for relevant courses.
- Students requiring mathematical skills may opt for mathematics courses with relevant topics.
- Faculty must motivate students to acquire certifications. If not faculty may take orals, ensure that proper outcome is being acquired and assign marks in proportion.
- Students must use the timetable slots allotted for course and may utilize extra hours if interested.
- Assess students performance with the help of RUBRICs (B).

3. Guest Lecture/Industry Visit :

- Faculty must undertake Expert Lectures and Industry visit planned at start of semester by Department to fulfill gaps/knowledge and relevant skill enhancements.
- Students must submit Report as per given format (FORMAT-Visit and FORMAT-Guest Lecture)
- Assessment will be done as per RUBRICs(C/D) as applicable

4. Group activity :RUBRICs

- Faculty must assign different group activity to different groups based on their abilities and preferences. Students must complete activity, prepare report and cite acquired affective domain outcome.(Format – Group activity)
- Faculty will guide students regarding the same.

11. SUGGESTED MICRO-PROJECTS

NA

12. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Personality Development and soft skills	Barun K. Mitra Oxford University	Press
2	Entrepreneurship	Rajeev Roy Oxford University	Press
3	First Semester learnt & Second semester learning courses reference Books	--	--

4	Journals and magazines IEEE Journals, IT Technologies	--	--
5	Local newspapers and events	--	--

13. SOFTWARE/LEARNING WEBSITES

1. <http://www.nptel.ac.in>
2. <http://www.seminarforyou.com>

14. PO - COMPETENCY- CO MAPPING

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Devel opment of Solutions	Engineering Tools, Experimenta tions and Testing	Engineering Practices for Society ,Sustainabilit	Project Management	Life Long Learning
CO1	3	3	3	3	1	3	3
CO2	2	1	-	2	1	-	3
CO3	-	-	-	-	-	1	2
CO4	3	-	-	-	2	-	2
CO5	3	-	-	-	-	-	3
Summary	3	2	3	2	2	2	3

PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	1	1	1
CO3	2	2	2
CO4	2	2	2
CO5	1	1	1
Summary	2	2	2

(Smt. U.V.Kokate) (Smt. M.U.Kokate) (Smt.A.D.Kshirsagar) (Smt.A.M.Galshetwar) (Smt.Pranita Zilpe) Signature of Course Experts	(Mr.U.V.Kokate) Signature of Head of the Department (Computer Engineering)
(Mr. U. V. Kokate) Signature of Programme Head	(Mr.A.S. Zanpure) Signature of CDC In-charge

Micro-Project Guidelines

1. Micro-project selection should be based on Third Semester learnt and Fourth Semester learning courses.
2. Group of 3-4 students can work on micro-project under the guidance of Course teacher. Students can finalise micro-project topics through number of discussions with course teacher .
3. Abstract must not be greater than 100 words. Report must not be more than 7-10 pages.
4. Micro-project topics across all students must not be repeated.
5. Due care must be taken to write reports with grammatically correct statements and in neat and clean handwriting. Statement must not contain shortcuts and spelling mistakes.
6. Evaluation of Micro-project should be based on Topic Selection, Problem Definition, Requirement gathering, Development, Presentation , Report writing and Response to the Questions.
7. Micro-project Report must include
 1. Cover Page
 2. Index
 3. Abstract
 4. Chapters
 5. References/Bibliography
8. The page size of the Micro-project report should be A4 .
9. **Page Numbering (Centered having format Page No__of __)**
10. **Paper Size: A- 4 size paper**

1. **Margins :**

Top: 1" (1 inch=2.54cm)

Bottom: 1.15" (2.86cm)

Left: 1.5"

Right: 0.6"

2. **Line Spacing:** 1.5 line

3. **Title of Chapter**

Font: Times New Roman (Bold face)

Size: 14 point

Alignment: Centre

11. **Text**

Font: Times New Roman

Size: 12 point

Alignment: Justified (Full Text)

12. **Figures and Tables:**

- Font:** Times New Roman (**Bold**)
- Size:** 12 point
- Alignment:** Centered
- Figure Caption** must be below the figure and centered
- Table caption** must be above the table and centered

Assignment 1: Rubrics for Micro-project Evaluation

Topic Selection Relevant to course outcome (2)	Problem Definition (2)	Course Outcome Achievement in terms of Output (5)	Involve ment in project develop ment(2)	Presentati on (5)	Report Writing(4)	Total (20)

Assignment 2: Rubrics for MOOCs Evaluation

Completion of Topics/	Weekly Assignment	Final	Total(20)
tutorial (05)	submission (10)/ Progressive assessment through internal orals	Certificate(05) Or final Internal orals	

Assignment 3: Rubrics for Group Activity

Involvement (5)	Performance(5)	Total (10)

Assignment- 4 :Rubrics for Industrial Visit Evaluation

Note : Students who have attended Industrial Visit will only be eligible for marks assignment, else they will be marked as absent. Marks will be awarded from Reports submitted by present students only.

Discipline and Behavior (3)	Knowledge (Q & A) (5)	Report Writing(2)	Total (10)

Assignmnet-5 :Rubrics for Professional / Industrial Expert Lecture Evaluation

Note : Students who have attended Lecture will only be eligiblefor marks assignment, else they will be marked as absent. Marks will be awarded from Reports submitted by present students only.

Representati on of concepts (4)	Representation of best/Motivational Part(4)	Representation of Outcome achieved/Relevance to the course(2)	Total (Out of 10)

Report Formats

1) Seminar/Micro-Project Report format

i) Cover page

Government Polytechnic, Pune-16

(An Autonomous Institute of Government of Maharashtra)



**A
Seminar Report
On**

“SEMINAR TITLE”

SUBMITTED BY:

<Name of the student>

Under the Guidance of

<Guide Name>

DEPARTMENT OF INFORMATION TECHNOLOGY

Industry Visit Report format **Government Polytechnic, Pune**

Department of Information Technology

Industry Visit Report

Name of Industry Visited:_____Date & Time of Visit:_____

Name of Student:_____Enrollment No.:_____

Term Name:_____Std:_____Email-d:_____

1 Equipment Observed/Demonstrated

.

2 Specific Standard/processes observed in technical practices/management processes

.

3 Comments on Industry dressing/uniform

.

4 Industry Culture

.

5 Sections/Divisions/offices visited along with description

.

6 Any observation of facilities ex. Canteen/Recreational facilities etc.

.

7. Can you relate the experience gathered with any course of your curriculum State:

Course Name:

Course Code:

Details :

Specific Outcomes:

8.SAFETY MEASURES

.

Expert Lecture Report
Government Polytechnic, Pune
Department of Information Technology

Title of Session: _____

Name of Student: _____

Speaker: _____ Enrollment No.: _____ Organized By: _____ Date & Time: _____

Venue : _____ Term: _____

1. Highlights of Technologies/Concepts introduced in session.

2. Association of Topics/Title/Concepts with courses learnt(Mention Course Name).

3. State the best/Motivational Part:

Signature of Student

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in Computer Engineering, Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/15/16/17/18/19/21/22/23/24/ 26
Name of Course	Web development using JavaScript
Course Code	CM4106
Prerequisite course code and name	NA
Class Declaration	No

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)				Total Credits (L+T+P)	Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
01	01	02	04	Marks	-	-	25	50	75
				Exam Duration	-	-	-		

(*): POE (Practical & Oral Examination)

Legends: L- Lecture, T-Tutorial/teacher guided theory practice, P-Practical, ESE-End Semester Examination, PA- Progressive Assessment.

2. RATIONALE

Web pages will always be in the form of HTML. Client-side scripting including faster response times, a more interactive application, and less overhead on the web server. As web applications become larger and more complex, combined with the increasing popularity of mobile applications that run on smart phones and other mobile devices, the need for client-side scripting, JavaScript will continue to grow.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Build Webpages using JavaScript.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant technical skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Write JavaScript using basic syntactical constructs
2. Create forms and Control browser window features through Scripts
3. Write and Execute JavaScript for handling cookies and regular expressions for validations
4. Create Webpages with Rollovers, Status Bar, Banners and Slideshow.
5. Create web page application using Angular JS

5. SUGGESTED PRACTICALS/ EXERCISES

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1.	1	Programs based on decision making statement*	CO1	02
2.		Programs based on looping statement*	CO1	02
3.	2	Programs based on arrays*	CO1	02
4.		Programs based on functions*	CO1, CO2	02
5.		Programs based on strings	CO1, CO2	02
6.	3	Program using Form Objects and form elements	CO1, CO2	02
7.		Program using Form Events*	CO1, CO2	02
8.		Program using Intrinsic Java Functions	CO1, CO2	02
9.		Programs for Using and Personalizing cookies*	CO4	02
10.		Programs for placing the Window on the screen.	CO4	02
11.		Programs for accessing child Window. *	CO4	02
12.	4	Programs for implementing Rollovers*	CO4	02
13.	5	Writing basic application demonstrating Angular JS expressions and directives (Any 2) *	CO5	02
14.	5	Writing Simple application using Angular JS and Forms (Any 2)	CO5	02
15.	All	Micro-project* (Refer point 11 for micro project list)	All	04
Total Hrs				32

(*) Indicates compulsory practicals

Sr. No.	Performance Indicators	Weightage in %
a	Coding	70
b	Designing	10
c	Answer to sample Questions	10
d	Submit Report in time.	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr. No.
1.	Any browser	All
2.	Any word processing IDE	All

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT I - An Inside Look at JavaScript Programming (Hrs- 02)	
1a. Create a JavaScript page using various control and looping structure	1.1 Getting Down to JavaScript 1.2 Values and Variables 1.3 Operators and Expressions 1.4 if Statement 1.5 switch...case Statement 1.6 Loop Statement
UNIT II - Arrays, Functions and String (Hrs- 04)	
2a. Write a JavaScript using array and Function. 2b. Implement various string functions.	2.1 Array: Declaring, Defining, Looping the Array, Adding Array Element, Sorting Array Elements, making a New Array from an Existing Array, Combining Array Elements into a String, Changing Elements of the Array. 2.2 Function: Defining, The Scope of Variables and Arguments, calling a Function, Function Calling Another Function, Returning Values from a Function. 2.3 String: Joining Strings, Dividing Text, Converting Numbers and Strings, Changing the Case of the Strings, Strings and Unicode
UNIT III - Forms and Event Handling, Cookies and Browser Windows (Hrs- 04)	
3a. Develop JavaScript to handle event 3b. Write JavaScript to handle forms using intrinsic function 3c. Manage cookies using JavaScript	3.1 Building Block of a Form, Responding to Form Events, Form Objects and Elements, Changing Attribute Values Dynamically, Changing Option List Dynamically, Evaluating Check Box Selections, Manipulating Elements Before the Form, Disabling Elements, Read-Only Elements, Using Intrinsic JavaScript Functions, Changing Labels Dynamically 3.2 Cookie Basics, Creating, Reading, Setting the Expiration Date, Deleting Personalizing and Experience Using a Cookie. 3.3 Giving the New Window Focus, placing a Window into Position on the Screen, Changing the Contents of a Window, Closing the Window, scrolling a Web Page, Opening Multiple Windows at Once, Creating a Web Page in a New Window
UNIT IV - Regular Expressions, JavaScript and Frames, Rollovers, Status Bar, Banners, Slideshow, Protecting Your Webpage (Hrs- 04)	
4a. Validate form using regular expressions. 4b. Implement banners slideshow and rollovers to make website come alive	4.1 Regular Expression: The Language of a Regular Expression, Replace Text, Return the Matched Characters, Using a Regular Expression, Invisible Borders 4.2 Calling a Child Windows JavaScript Function, Changing the Content of a Child Window, Changing the Focus of a Child Window, writing to a Child Window from a JavaScript, Accessing Elements of Another Child Window 4.3 Setting the Stage, creating a Rollover, Text Rollovers, Multiple Actions for a Rollover, More Efficient Rollovers, Making Magic Using the Status Bar, Banner Advertisements,

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	Creating a Slideshow
UNIT V - Introduction to Angular JS (Hrs- 02)	
5a. Develop a sample web page using Angular JS	5.1 Introduction of Angular JS, Core features of Angular JS Angular JS as MVC Architecture. 5.2 Angular JS components: directives, expressions, controls, functions, filters 5.3 Creating and executing basic application using Angular JS Angular JS with tables, Forms

8. 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	An Inside Look at JavaScript Programming	02	--	--	--	--
II	Arrays, Functions and String	04	--	--	--	--
III	Forms and Event Handling, Cookies and Browser Windows	04	--	--	--	--
IV	Regular Expressions, JavaScript and Frames, Rollovers, Status Bar, Banners, Slideshow, Protecting Your Webpage	04	--	--	--	--
V	Introduction to Angular	02	--	--	--	--
Total		16	--	--	--	--

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in laboratory.
- Follow Coding Standards.
- Undertake micro-projects.
- Develop variety of program to improve logical skills.
- Develop Application oriented real-world programs.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.

2. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
3. With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
4. Guide student(s) in undertaking micro-projects.
5. Correlate subtopics with power plant system and equipment.
6. Use proper equivalent analogy to explain different concepts.
7. Use Flash/Animations to explain various components, operation and
8. Teacher should ask the students to go through instruction and technical manuals

11. SUGGESTIVE MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

a. Password pattern matching

Design a Webpage that accepts UserName and Password. Provide appropriate validation to Username . Use regular expression only, to validate the password with following pattern : -

- i. password must have at least 8 characters
- ii. at least an upper case letter,
- iii. an lowercase letter,
- iv. a number
- v. and probably a symbol .

If invalid display accordingly.

b. Control Window Locations

Create a basic page in html that includes a single image.

When the image is clicked, it should open 5 new windows in the following locations on the screen:

- one in the top left corner of the screen
- one in the top right corner
- one in the lower left corner
- one in the lower right corner
- one in the center of the screen

The URLs displayed for each window can be of your choosing.

c. Multiple Rollovers -

- i. Create a basic page in html that displays 3 unique images.
 - ii. Create a separate rollover for each of these images, i.e. onMouseOver display a new, unique image, onMouseOut return it to the original image.
 - iii. Add a fourth image to your page.
 - iv. The fourth image when mouse over will not change. Instead, it will change the other three images on the page (these images do not have to be unique).
 - v. Then, onMouseOut of the fourth image, return the other 3 images to their original images.
- a) Preload all necessary images.
 - b) Disable hyperlinks on the images, if using the <a> tag to complete this.

12. SUGGESTED LEARNING RESOURCES

S.N.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	JavaScript Demystified	Jim Keogh, Tata McGraw Hill, First Edition - June 2005	ISBN: 0072254548
2	JavaScript in 24 hours	Michael Moncur, Sams Publishing; 7th edition - February 2019	ISBN-10: 0672338092 ISBN-13: 978-0672338090
3	AngularJS: Up and Running - Enhanced Productivity with Structured Web Apps	Shyam Seshadri, Brad Green, Shroff/O'Reilly; First edition - October 2014	ISBN-10: 9789351108016 ISBN-13: 978-9351108016

13. SOFTWARE/LEARNING WEBSITES

1. <http://www.nptel.ac.in>
2. <https://www.tutorialspoint.com/>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	1	1	-	1
CO2	3	2	3	3	1	2	1
CO3	3	2	3	3	1	2	2
CO4	3	2	3	3	1	2	1
CO5	3	2	3	3	1	2	2
Summary	3	2	3	3	1	2	1

	PSO1	PSO2	PSO3
CO1	1	-	3
CO2	-	-	2
CO3	-	-	2
CO4	-	1	2
CO5	1	-	3
CO6	1	1	2
Summary	1	1	2

Sign: Name: 1. Mrs. M.U Kokate 2. Smt. M. G. Yawalkar 3.. Smt. A. S. Paiké (Course Expert /s)	Sign: Name: Mr. U.V. Kokate (Head of Department) (Department of Computer Engineering)
Sign: Name: Mr.U.V.Kokate (Programme Head) (Department of Computer Engineering)	Sign: Name: Mr. A.S.Zanpure (CDC In-charge)

Government Polytechnic, Pune

'180OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of the Course	Seminar
Course Code	CM4103
Prerequisite course code and name	90 credits & L1 passed
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

F. TEACHING AND EXAMINATION SCHEME									
Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	
--	04	--	04	Marks	--	--	25	25	50

(*): OE (Internal Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End Semester Examination, PA- Progressive Assessment.

2. RATIONALE

This course tends to mould students towards integrating the knowledge acquired throughout and applying it to understand and interpret evolving technologies in order to strengthen the confidence over acquired Engineering skills and thus fulfill the objective of Diploma Programme. Seminar mainly serves the purpose of developing learning-to-learn skills with an aim to develop the following attributes in the students:

3. COMPETENCY

The course should be taught and implemented with the aim to develop the required course outcomes (COs) so that students will acquire following competency needed by the industry:

- **Interpret innovative/new technologies independently.**

4. COURSE OUTCOMES (COs)

After undergoing this course, the student will demonstrate the following Course Outcomes

1. Analyze and study new technologies/tools.
2. Apply technical knowledge.
3. Compile and Write a Seminar Report
4. Work independently, prepare and deliver presentations.

5. GUIDELINES FOR UNDERTAKING A SEMINAR :

1. Department must organize a Seminar Orientation session for all the registered students.
2. The process of conducting a Seminar includes allocating a topic to individual student who should perform the required search, decide on the topic objectives, design and prepare an appropriate method of presentation, and present the topic to their fellow students and teachers with all of the necessary explanation and discussion. Faculty assigned to student should be providing necessary guidance.
3. Students would individually prepare the Seminar report with the following sub-titles:
 - a. Acknowledgement
 - b. Abstract
 - c. Index
 - d. List of Figures
 - e. Introduction
 - f. Information/Chapters related to Seminar topic
 - g. Advantages and Disadvantages
 - h. Conclusion
 - i. References
4. Seminar topic shall be approved by the respective guide.
5. The student will begin to maintain a dated Seminar Diary for the whole semester. This diary should be assessed by respective guide timely. Format of diary is as given in **table I**

Suggested Seminar Activities to be performed:-

- Collection of **at least three Seminar topics** on recent technologies and presentation of their abstract to faculty guide.
- Finalization of Seminar topic.
- Submission of final abstract on selected topic.
- Weekly interaction of students in group with seminar guide.
- Weekly assessment of seminar and work is labeled as Progressive Assessment.
- Group of Students should prepare and submit Report writing and presentation slides of Seminar in consultation with Seminar guide.
- Presentation of Seminar in well defined manner within specified time.
- Submission of Seminar report with the permission of faculty and Head of the Department..

6. ASSESSMENT OF SEMINAR WORK

- Like other courses, assessment of Seminar work also has two components, first is progressive assessment, while another is end of the term assessment that is Term Work.
- The faculty will undertake the progressive assessment to develop the COs in the students. They can give oral informal feedback about their performance and

their interpersonal behavior while guiding them on their seminar work every week.

- There will also be regular progressive assessment by the teacher.

A. Progressive Assessment (PA) Guidelines and criteria :

The assessment of the students in the fifth semester Progressive Assessment (PA) for 25 marks is to be done based on following criteria.

Sr. No.	Criteria	Marks
1	Topic Selection	5
2	Regularity in Seminar work as mentioned in Diary	5
3	Overall understanding capability	5
4	Progress in work and efforts displayed (Interactions with Q & A)	10

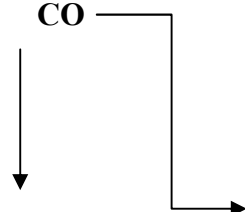
B. End Semester Assessment(ESE) criteria/Term Work assessment criteria :

The assessment of the students in the fifth semester end-semester-examination (ESE) for 25 marks is to be done as per RUBRICS of Annexure V. This assessment shall be done by the faculty.

7. **THEORY COMPONENTS**
NA
8. **SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**
NA
9. **SUGGESTED STUDENT ACTIVITIES**
NA
10. **SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)**
As per the guidelines mentioned in Annexure-I or any other guidelines given by faculty.
11. **SUGGESTED MICRO-PROJECTS**
NA
12. **SUGGESTED LEARNING RESOURCES**
As per the guidelines mentioned in Annexure-I or any other guidelines given by faculty.
13. **SOFTWARE/LEARNING WEBSITES**
NA

14. PO - COMPETENCY- CO MAPPING

- Mapping Course Outcomes With Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Analyze and study new technologies.	3	2	-	-	-	1	3
Apply technical knowledge.	3	2	-	-	-	1	3
Compile and Write a Seminar Report	1	-	-	-	-	1	3
Work independently and deliver presentations.	1	-	-	-	-	1	3
Summary	2	2	-	-	-	1	3

- Mapping Course Outcomes With Program Specific Outcomes:**

CO /PSO	Hardware and Networking	Database Technologies	Software Development
Analyze and study new technologies.	2	2	2
Apply technical knowledge.	2	2	2
Compile and Write a Seminar Report	1	2	2
Work independently and deliver presentations.	3	3	2
Summary	2	2	2

Annexure-I

Seminar Report Guideline

1. All students should submit their seminar report to their respective guide on or before _____.
2. Seminar report must include
 1. Cover Page
 2. Certificate
 3. Acknowledgement
 4. Index
 5. Abstract
 6. Chapters (as per discussion with guide)
 7. References/Bibliography
3. The page size of the seminar report should be in A4 size.
4. The seminar report should be **Spiral bonded**.
5. Two copies of the report (hard copy only). One for self and one to be submitted to department.
6. **Page Numbering (Centered having format Page No__ of __)**
7. **Paper Size:** A- 4 size paper
 1. **Margins :**
 - Top:** 1" (1 inch=2.54cm)
 - Bottom:** 1.15" (2.86cm)
 - Left:** 1.5"
 - Right:** 0.6"
 2. **Line Spacing:** 1.5 line
 3. **Title of Chapter**
 - Font:** Times New Roman (Bold face)
 - Size:** 14 point
 - Alignment:** Centre
8. **Text**
 - Font:** Times New Roman
 - Size:** 12 point
 - Alignment:** Justified (Full Text)
9. **Figures and Tables:**
 - a. **Font:** Times New Roman (**Bold**)
 - b. **Size:** 12 point
 - c. **Alignment:** Centered
 - d. **Figure Caption must be below the figure and centered**
 - e. **Table caption must be above the table and centered**

Annexure-II

Government Polytechnic, Pune-16
(An Autonomous Institute of Government of Maharashtra)



A
Seminar Report
On

"SEMINAR TITLE"

SUBMITTED BY:

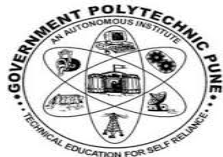
<Name of the student>

Under the Guidance of

<Guide Name>

DEPARTMENT OF INFORMATION TECHNOLOGY
(Academic Year: 2019-20)

Government Polytechnic, Pune-16
(An Autonomous Institute of Government of Maharashtra)
Department Information Technology



CERTIFICATE

This is to certify that Ms/Mr. _____ with Enrollment No. _____, of
Third Year Diploma in Information Technology has successfully completed the seminar
titled “ _____ ” as part of his/her diploma curriculum in academic year 2019-20.

Seminar Guide
(Shri/Smt. Name of Guide)

H.O.D
(Mrs. M. U. Kokate)

Principal
(Dr. V. S. Bandal)

ACKNOWLEDGEMENT

Acknowledgement should be prepared by the students in their wordings expressing their gratitude towards department.

Government Polytechnic Pune

Department of Information Technology

General Guideline

for

Seminar-CM4103

Annexure-III

Department of Information Technology GENERAL SEMINAR GUIDELINES (Odd 2019)

Purpose of carrying out Seminars is to develop self learning capability of students wherein they will be able to apply the knowledge gathered to a new technology, understand it and deliver the presentations accordingly. All students must follow the guidelines given below :

- Seminar Presentation should be on Technical Topic only. The topic (technology) chosen may be related to perspective project.
- Seminar topic contents cannot be the contents of their Diploma course.
- Evaluation of Seminar should be based on Topic Selection, Technical Contents, Content Understanding, Content Delivery and Response to the Questions.
- Seminar topics across all students must not be repeated.
- Seminar Topics of last year should not be repeated.
- Each student has to collect 3-4 topics, present their abstract to guide, discuss with guides and finalise topics through number of discussions. Abstract must also contain key terms in topics.
- Each abstract should not exceed 200 words.
- Abstract must be written with grammatically correct statements. Shortcuts must not be used for any words and should not contain spelling mistakes with neat and clean handwriting.
- Each student must prepare and attach the seminar diary to their Seminar Reports containing:
 - Table I .
 - Abstract of 3-4 topics with keywords.
- Every student must report to respective guide as per timetable, perform necessary work and submit as per plan, get necessary attestations on activities done in seminar diary on due dates and time as per Time Table.

Annexure-IV

SEMINAR DIARY

Name of the Student: _____ **Name of Guide (Faculty) :** _____

Enrollment Number: _____ **Semester:** _____ **Batch Number:** _____

Date	Discussion Topics/Activity Details	Work Allotted Till Next Session/ Corrections Suggested/Faculty Remarks	Dated Signature of Faculty

Dated Signature of Faculty

Dated Signature of HOD

Annexure-V

Rubrics

SeminarTerm work(50)										
				Presentation(20)						
Topic Selection(5)	Regularity in Seminar Work(5)	Overall understanding capability(5)	Knowledge (Q & A) (10)	Speech Clarity (5)	Body Language(3)	Neat Dressing(2)	Slides (10)	Report Writing(5)	Total Out of (50)	Marks mapped to (25)

Sign: Name: 1. A.B.Bhusagare (Course Expert/s)	Sign: Name: Mrs.M.U Kokate (Program Head and Course Expert) (Information Technology)
Sign: Name: Mr.U.V.Kokate (Program Head) (Computer Dept.)	Sign: Name: Mr. A.S.Zanpure (CDC In-charge)

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Scheme: 180 OB

Programme Name	:	Diploma in Computer Engineering Diploma in Information Technology Diploma in Electronics and Telecommunication
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Professional Practices-I
Course Code	:	CM4104
Prerequisite course code and name	:	NA
Class Declaration	:	No

1. TEACHING AND EXAMINATION SCHEME

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

Legends: *L*-Lecture; *T* – Tutorial, *P* - Practical; *C* –Credit, *ESE* - End Semester Examination; *PA* - Progressive Assessment; # –No theory exam, \$ –online examination, * – oral examination

2. RATIONALE

Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests. While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts. The purpose of introducing professional practices is to inculcate soft skills through active learning. Micro-Project, MOOCs courses, Industrial visits, expert lectures and related presentations and/ group discussions on technical topics are planned so that there will be increased ,active participation of students in learning process and hence impart life-long learning ability.

3. COMPETENCY

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

1. Learn independently and develop lifelong learning ability.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant Professional skills associated with First and second semesters courses are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Apply acquired knowledge
2. Learn independently and develop life long learning ability.
3. Work in group.
4. Learning through observations and Interactions.
5. Understand and prepare Reports.

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5. PRACTICALS / EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Learning Outcome	Practical Exercises	Marks	Approx. Hrs.
1	a. Application and integration of knowledge from minimum three course outcomes for development of a project. b. Write reports and state outcomes achieved. c. Work in group d. Present/Demonstrate project	Micro-Project – a) Microprojects allocation and development (06-08 hrs.) Faculty must allocate one real life simple problem statement(least complexity) for Microproject which is combination of application of minimum two courses learnt/being learnt during First and Second semesters to a group of 3-4 students. The problem statement must involve simple logic building which can be designed and implemented within 06-08 hours. b) Report Writing : Not more than 7-8 pages (to be prepared simultaneously with development) a. Problem Definition b. Platform and/Hardware Specifications c. Flow charts/diagram related to micro-project d. Source Code/Related Procedure for Micro-Project e. Outcome (Technical/Personal) achieved f. Books/References/Websites. c) Microproject Presentations/Demonstrations (04 hrs.) (Preferrably by arranging Project exhibition/ classroom presentations as is applicable)	20M	12
2	a. Learn from alternate sources. b. Enhance self learning ability	MOOCs (Massive open online courses): Undertake SWAYAM/NPTEL/Spoken Tutorial/Any other Online Courses learning courses and certificate courses Each individual student can select any relevant online course under the guidance of course teacher as per interest areas.	10M	10
3	a. Interpersonal skill and personal skill development. b. Develop conflict resolution ability.	Group Activity: 1. Group Activity: Case studies to be discussed in a group and presentation of the same by group and summarization by group leader.	5M	06

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		2. Role play by individual/group leader. 3. Sharing of self-experiences in a group. Out of above three any one activity can be conducted for group of students. Different groups can be considered for different activities based on their likings.		
4	a. Learning through observations. b. Understanding professional environment. c. Report writing.	Industrial Visit Industrial visits must be arranged for fulfilling the requirement of programme/ course outcomes of undertaken courses of first and second semester and report of the same should be submitted by the individual student, to form a part of the term work.	07M	02
5	a. Understanding industry practices or evolving concepts. b. Report writing.	Expert Lecture Lectures by Professional / Industrial Expert to be organized to bridge the gap of learnt/ undertaken courses during first and second semester. Probably the Professional / Industrial Expert can be organized in the following areas - 1. Project presentation tips. 2. Spoken English. 3. Personality development. 4. How to develop positive thinking. 6. Any topic related to social awareness 7. Hygiene Awareness 7. Any other topics.	08M	02
		Total	50	32

Sr.No.	Performance Indicators	Weightage in Marks
a.	Micro-Project –	20
b.	MOOCs	10
c.	Group Activity	05
d.	Industry Visit	07
e.	Guest Lecture	08
	Total	50

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

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7. THEORY COMPONENTS: NA

8. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching/PR Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Micro-Project	12	--	--	--	--
II	MOOCs: SWAYAM-NPTEL and Spoken Tutorial Courses	10	--	--	--	--
III	Group Activity	06	--	--	--	--
IV	Industrial Visit	02	--	--	--	--
V	Expert Lecture	02	--	--	--	--
Total		32	--	--	--	--

9. STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare group activity Report
- Prepare Industrial Visit Report
- Prepare Guest lecture Report
- Undertake micro projects
- Undertake MOOC certifications.

10. SPECIAL IMPLEMENTATION/INSTRUCTIONAL STRATEGIES(If any)

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

- Micro project:
 - Teachers must brief the students about outcome expected through Microproject, form groups, and allocate micro projects to group of 3-4 within first two weeks.
 - Micro-Projects must be on a problem statement with the aim to achieve not more than three outcomes by combining outcomes from two courses. Assessment will be as per Rubrics (A) done progressively.
 - Students must utilize the allocated slots as per the course for development of Microproject. Faculty must take care that the problem statement to be developed and presented are fair enough for stipulated time duration (12hrs.)
 - Teachers may organize departmental/interdepartmental project exhibition or presentations as per convenience to enhance demonstration/presentation skills.

NOTE: All first year and Second year faculty members prepare combined document regarding detail problem statement of Micro project. Other than this Individual Teaching Faculty may add other problem statements.

- MOOCs : Teachers are advised to guide students into undertaking the MOOCs courses offered through various platforms. Students may take up different courses under the guideline of faculty. Faculty may take help of SWOC analysis for deciding the relevance of course allocation. Following are the guidelines , students may follow:-
 - May take technical courses for enhanced knowledge in interested areas.

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- Students requiring courses on language ability may take-up those courses
 - Students interested in Management/Entrepreneurship may opt for relevant courses.
 - Students requiring mathematical skills may opt for mathematics courses with relevant topics.
 - Faculty must motivate students to acquire certifications. If not faculty may take orals, ensure that proper outcome is being acquired and assign marks in proportion.
 - Students must use the timetable slots allotted for course and may utilize extra hours if interested.
 - Assess students performance with the help of RUBRICs (B).
- c. Guest Lecture/Industry Visit :
- Faculty must undertake Expert Lectures and Industry visit planned at start of semester by Department to fulfill gaps/knowledge and relevant skill enhancements.
 - Students must submit Report as per given format (FORMAT-Visit and FORMAT-Guest Lecture)
 - Assessment will be done as per RUBRICs(C/D) as applicable
- d. Group activity :RUBRICs
- Faculty must assign different group activity to different groups based on their abilities and preferences. Students must complete activity , prepare report and cite acquired affective domain outcome.(Format – Group activity)
 - Faculty will guide students regarding the same.

11. SUGGESTED MICRO-PROJECTS- Refer Point 5

12. LEARNING RESOURCES

13.

Sr. No.	Title of Book	Author	Publication
1	Personality Development and soft skills	Barun K. Mitra Oxford University	Press
2	Entrepreneurship	Rajeev Roy Oxford University	Press
3	First Semester learnt & Second semester learning courses reference Books	--	--
4	Journals and magazines IEEE Journals, IT Technologies	--	--
5	Local newspapers and events	--	--

13. SOFTWARE/LEARNING WEBSITES

- a. <http://www.nptel.ac.in>
- b. <http://www.seminarforyou.com>

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14. PO - COMPETENCY- CO MAPPING

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experiments and Testing	Engineering Practices for Society, Sustainability	Project Management	Life Long Learning
CO1	3	3	3	3	1	3	3
CO2	2	1	-	2	1	-	3
CO3	-	-	-	-	-	1	2
CO4	3	-	-	-	2	-	2
CO5	3	-	-	-	-	-	3
Summary	3	2	3	2	1	2	3

PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	1	1	1
CO3	2	2	2
CO4	2	2	2
CO5	1	1	1
Summary	2	2	2

(Smt. M.U.Kokate) (Smt.A.D.Kshirsagar) (Smt.A.B.Bhusagare) (Smt.Pranita Zilpe) (Smt.B.K.Vyas) Signature of Course Experts	(Mr.U.V.Kokate) Signature of Head of the Department (Computer Engineering)
(Mr. U. V. Kokate) Signature of Programme Head	(Mr. A.S. Zanjure) Signature of CDC In-charge

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Micro-Project Guidelines

- a. Micro-project selection should be based on First Semester learnt and Second Semester learning courses.
- b. Group of 3-4 students can work on micro-project under the guidance of Course teacher. Students can finalise micro-project topics through number of discussions with course teacher .
- c. Abstract must not be greater than 100 words. Report must not be more than 7-10 pages.
- d. Micro-project topics across all students must not be repeated.
- e. Due care must be taken to write reports with grammatically correct statements and in neat and clean handwriting. Statement must not contain shortcuts and spelling mistakes.
- f. Evaluation of Micro-project should be based on Topic Selection, Problem Definition, Requirement gathering, Development, Presentation , Report writing and Response to the Questions.
- g. Micro-project Report must include
 - i. Cover Page
 - ii. Index
 - iii. Abstract
 - iv. Chapters
 - v. References/Bibliography
- h. The page size of the Micro-project report should be A4 .
- i. **Page Numbering (Centered having format Page No _____ of __)**
- j. **Paper Size:** A- 4 size paper
 - i. **Margins :**
Top: 1" (1 inch=2.54cm)
Bottom: 1.15" (2.86cm)
Left: 1.5"
Right: 0.6"
 - ii. **Line Spacing:** 1.5 line
 - iii. **Title of Chapter**
Font: Times New Roman (Bold face)
Size: 14 point
Alignment: Centre
- k. **Text**
Font: Times New Roman
Size: 12 point
Alignment: Justified (Full Text)
- l. **Figures and Tables:**
 - a. **Font:** Times New Roman (**Bold**)
 - b. **Size:** 12 point
 - c. **Alignment:** Centered
 - d. **Figure Caption must be below the figure and centered**
 - e. **Table caption must be above the table and centered**

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Assignment 1: Rubrics for Micro-project Evaluation

Topic Selection Relevant to course outcome (2)	Problem Definition (2)	Course Outcome Achievement in terms of Output (5)	Involve ment in project develop ment(2)	Presentati on (5)	Report Writing(4)	Total (20)

Assignment 2: Rubrics for MOOCs Evaluation

Completion of Topics/ tutorial (05)	Weekly Assignment submission (10)/ Progressive assessment through internal orals	Final Certificate(05) Or final Internal orals	Total(20)

Assignment 3: Rubrics for Group Activity

Involvement (5)	Performance(5)	Total (10)

Assignment- 4 : Rubrics for Industrial Visit Evaluation

Note : Students who have attended Industrial Visit will only be eligible for marks assignment, else they will be marked as absent. Marks will be awarded from Reports submitted by present students only.

Discipline and Behavior (3)	Knowledge (Q & A) (5)	Report Writing(2)	Total (10)

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Scheme: 180 OB

Assignmnet-5 :Rubrics for Professional / Industrial Expert Lecture Evaluation

Note : Students who have attended Lecture will only be eligible for marks assignment, else they will be marked as absent. Marks will be awarded from Reports submitted by present students only.

Representati on of concepts (4)	Representation of best/Motivational Part(4)	Representation of Outcome achieved/Relevance to the course(2)	Total (Out of 10)

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Report Formats

1) Seminar/Micro-Project Report format

i) Cover page

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**A
Seminar Report
On**

“SEMINAR TITLE”

SUBMITTED BY:

<Name of the student>

Under the Guidance of

<Guide Name>

Government Polytechnic, Pune

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Scheme: 180 OB

DEPARTMENT OF COMPUTER ENGINEERING

Industry Visit Report format

Government Polytechnic, Pune

Department of Computer Engineering

Industry Visit Report

Name of Industry Visited: _____ Date & Time of Visit: _____

Name of Student: _____ Enrollment No.: _____

Term Name: _____ Std: _____ Email-d: _____

1. Equipment Observed/Demonstrated

2. Specific Standard/processes observed in technical practices/management processes

3. Comments on Industry dressing/uniform

4. Industry Culture

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5. Sections/Divisions/offices visited along with description
6. Any observation of facilities ex. Canteen/Recreational facilities etc.
7. Can you relate the experience gathered with any course of your curriculum State: Course Name: Course Code: Details : Specific Outcomes:
8. SAFTY MEASURESS

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Scheme: 180 OB

Expert Lecture Report
Government Polytechnic, Pune
Department of Computer Engineering

Title of Session: _____ Speaker: _____
Name of Student: _____ Enrollment No.: _____
Organized By: _____ Date & Time: _____
Venue : _____ Term: _____

1. Highlights of Technologies/Concepts introduced in session.

2. Association of Topics/Title/Concepts with courses learnt(Mentione Cours Name).

3. High light the best/Motivational Part:

Signature of Student:

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of the Course	Project
Course Code	CM4102
Prerequisite Course Code and Name	90 credits & L1 passed
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				Total Marks
					Theory		Practical		
L	T	P	C		ESE	PA	*ESE	PA	100
--	04	--	04	Marks	--	--	50	50	

(*):POE (External Practical & Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End Semester Examination, PA- Progressive Assessment.

2. RATIONALE

This course tends to mould students towards integrating the knowledge acquired throughout and applying it to the real life projects, in order to gain the confidence of acquiring Engineering skills and thus fulfil the objective of Diploma Programme. Projects mainly serve the purpose of developing learning-to-learn skills.

3. COMPETENCY

The course should be taught and implemented with the aim to develop the required course outcomes (COs) so that students will acquire following competency needed by the industry:

- **The discipline of planning, organizing, and managing resources to bring about the successful completion of a specific project.**

4. COURSE OUTCOMES (COs)

After undergoing this course, the student will demonstrate the following Course Outcomes :

1. Analyze and define the real life problem from Project development point of view.
2. Apply appropriate design methodology to the Projects.
3. Make use of designing tools.
4. Conduct feasibility study and cost estimation
5. Create test and debug working model.
6. Compile and Write a Project Report
7. Communicate effectively and confidently as a member /and leader of team.

5. GUIDELINES FOR UNDERTAKING A PROJECT :

- I. During the guidance and supervision of the project work, faculty should ensure that students acquire following **learning outcomes**(depending upon the nature of the project work some of these learning outcomes may not be applicable):
- Identify the problems in the area related to their programme based on the competencies acquired since inception into the programme.
 - Identify the information suggesting the cause of the problem and possible solutions.
 - Assess the feasibility of different solutions and the financial implications:
 - Collect relevant data from different sources (books/internet/market/suppliers/experts etc. through surveys/interviews).
 - Prepare required drawings and detailed plan for execution of the work.
 - Prepare seminar presentations to present findings/features of the project.
- II. In case of Industry sponsored/guided project, implementation stages may vary as per industry requirements but same format of project report, diary, demonstration and RUBRICs will be required to be fulfilled.

Sr. No.	General Guidelines
1.	Project can be Hardware or Software or Combination of Both. It must involve logic building and application of various technologies learnt during Diploma Completion
2.	Project has to be done in a group of 3-4 students under the guidance of allotted faculty
3.	Faculty may Form a team of students as per industry roles- Requirement Gathering, Developers, testers, Business Analysts, Project managers. Assign this team a project. Each group is to be assigned a guide faculty. Project titles are to be decided in co-ordination with Faculty.
4.	Students are required to prepare working model of the Project and simultaneously prepare a report. In general project can be - - Prototype (design, make, test and evaluate). - Application development using hardware/software.
5.	Students Must Submit One Hard copy and one Soft copy each of Project Report and soft-copy of the project code or the working model.
6.	Generically these titles are to be covered in Project Report: - Problem Definition - Platform and/Hardware Specifications - Feasibility Study: Cost Estimation, Time Estimation - Various Design UML charts/diagrams as applicable like Use Case Diagram, Activity Charts, Class Hierarchy, DFD, CFD, ER-Diagrams, Dependency charts or any other - Important project Code - Testing details - Limitations - Future Scope/Extendibility - Books/References/Websites (Other titles may be added and used as applicable, based on the nature of project)

7.	Student should maintain a project diary and note down all the progress steps and details in the diary. Faculty should check the diary each week and accordingly interact with students based on the progress shown and keep proper notings. Impart proper guidance. This will assist in proper evaluation of students. Format of cover page of diary is as Annexure IV. Project diary may contain not more than 5-10 pages.
----	---

Course Implementation Stages:

1. **Orientation Session:** Portfolio Incharge faculty has to coordinate conduction of Project orientation session during last week of fifth semester.
2. **Problem Search and problem statement finalization:** Students have to undergo survey activity under the guidance of faculty . This activity maybe started during earlier semester in parallel with Seminar activity and **completed during first week of semester start.**
3. **Requirement Gathering :** One week to be utilized for gathering detailed project requirements including human resource, technical requirements/resources (software and hardware platforms), feasibility study and cost requirements. Presented to the faculty.
4. **Planning:** Next week must be utilized towards prepare a detailed project proposal and plan which must be executed or implemented within the time allocated. **Planning includes resources required, work allocation, time estimations and cost estimations.** Decide the development model to be implemented.
5. Outcome to be published under **project proposal** . May only be submitted in softcopy.
6. **Project Development, Testing& Report preparations:** Project development to proceed under faculty guidance as per planned.
7. **Project Demonstration:** Phase wise demonstration to faculty is done. The project would have to go through minimum two demonstrations :
 - a. Preliminary demonstration (Given to faculty guide)
 - b. Final Demonstration: During ESE final demonstration of working model is to be presented.

Note:

- i. Student must be maintaining a project diary simultaneously as well as preparing a project report, periodically monitored and assessed by the teacher as per provided RUBRICS.
- ii. Some stages maybe done recursively.

6. ASSESSMENT OF PROJECT WORK

A. Progressive Assessment (PA) Guidelines and criteria

The assessment of the students in the fifth semester Progressive Assessment (PA) for 50 marks is to be done based on following criteria.

Sr. No.	Criteria	Marks
1	Topic Selection & Problem definition	10
2	Requirement Gathering	10
3	Stage wise progress as per discussion	10
4	Involvement in project development	10
5	Report Writing	10

B. End Semester Exam Assessment (ESE) criteria/Term Work assessment criteria

The assessment of the students in the fifth semester End-Semester-Examination (ESE) for 50 marks is to be done based on following criteria. This assessment shall be done by the Faculty.

Sr. No.	Criteria	Marks
1	Knowledge	20
2	Development	20
3	Innovation	5
4	Presentation	5

7. THEORY COMPONENTS

NA

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

NA

9. SUGGESTED STUDENT ACTIVITIES

NA

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

As per the guidelines mentioned in Annexure-I or any other guidelines given by faculty.

11. SUGGESTED MICRO-PROJECTS

NA

12. SUGGESTED LEARNING RESOURCES

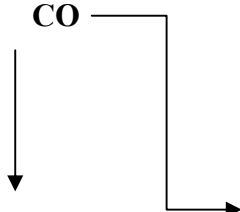
As per the guidelines mentioned in Annexure-I or any other guidelines given by faculty.

13. SOFTWARE/LEARNING WEBSITES

NA

14.PO - COMPETENCY- CO MAPPING

- **Mapping Course Outcomes With Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Analyze and define the real life problem from Project development point of view.	3	3	3	-	2	3	3
Apply appropriate design methodology to the Projects.	3	3	3	3	2	3	3
Make use of designing tools.	3	3	3	3	2	3	3
Conduct feasibility study and cost estimation.	3	3	3	2	2	3	3
Create, test and debug working model.	3	3	3	3	2	3	3
Compile and Write a Software Project Report.	2	-	3	1	2	3	3
Communicate effectively and confidently as a member and leader of team.	-	-	-	-	-	3	3
Summary	3	2	3	2	2	3	3

- **Mapping Course Outcomes with Program Specific Outcomes:**

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Analyze and define the real life problem from Project development point of view.	3	3	3
Apply appropriate design methodology to the Projects.	3	3	3
Make use of designing tools.	3	3	3
Conduct feasibility study and cost estimation.	3	3	3
Create , test and debug working model.	3	3	3
Compile and Write a Software Project Report.	3	3	3
Communicate effectively and confidently as a member and leader of team.	3	3	3
Summary	3	3	3

Annexure-II

Major Project Report

After completion of the project work, every student will submit a project report which should contain the following:

1. Cover Page (as per annexure 1)
2. Title page (as per annexure 2)
3. Certificate by the Guide (as per annexure3)
4. Acknowledgment (The candidate may thank all those who helped in the execution of the project.)
5. Abstract (It should be in one page and include the purpose of the study; the methodology used.)
6. Table of Contents(as per general guidelines):Detailed description of the project (This should be split in various chapters/sections with each chapter/section describing a project activity in totality). This portion of report should contain all relevant diagrams, tables, flow charts,which are properly labelled.
7. Conclusion
8. References (The listing of references should be typed 2 spaces below the heading “REFERENCES” in alphabetical order in single spacing left – justified. It should be numbered consecutively (in square [] brackets, throughout the text and should be collected together in the reference list at the end of the report. The references should be numbered in the order they are used in the text. The name of the author/authors should be immediately followed by the year and other details). Typical examples of the references are given below:

Report Specifications:

1. Project Report’s Cover Type: Hard-bound
2. Color of Project Report Cover: Black only with golden alphabets (as per annexure 1)
3. Number of Copies: 5 (Individual copies(each per student) + Departmental Copy(one))
4. Paper Size (orientation): A4 (portrait)
5. Margins: 1” top / bottom / right and 1.5” left
6. Font Type: Times New Roman
7. Font Size: 16 bold for chapter names, 14 bold for headings and 12 for normal text
8. Line Spacing: 1.5 throughout
9. Page Numbering: Bottom center of page in the format – Page 1 of N

NOTE: Project report must contain only a relevant and short mention – technology or platform or OS or tools used . It must be more focussed on project work carried out and its implementation details without including any source code.

Details of Softcopy to be submitted:

CD of the project work is required to be pasted on the back cover of the project report in clear packet, which should include the following folders and contents:

1. **Presentation** (should include a PPT about project in not more than 15 slides)
2. **Documentation** (should include a word file of the project report)
3. **SourceCode** (full source code of the project with libraries used)
4. **Program** (final copy of the project executable)
5. **Support** (any third party tools used or runtime environment setups that are required to run the project)
6. **Help** (user manual on how to run the project)

NOTE: CD must be checked for any harmful viruses before submission. Source Code and Program folders can be combined into single folder **Project** if it's a web project etc.

Annexure-III

Government Polytechnic, Pune

(An Autonomous Institute of Government of Maharashtra)



CERTIFICATE

This is to certify that

1)Name Of Student	Enrollment Number
2)Name Of Student	Enrollment Number
3)Name Of Student	Enrollment Number
4)Name Of Student	Enrollment Number

Has completed the necessary project work and prepared the bonafide on

“Project Title”

In a satisfactory manner as a partial fulfillment of requirement of the

**THIRD YEAR DIPLOMA IN
INFORMATION TECHNOLOGY
FOR THE ACADEMIC YEAR
2017-2018**

(H.O.D)

(Principal)

(Internal Guide)

(External Examiner)

Table of Contents

Title Page	i
Certificate of the Guide	ii
Acknowledgement	iii
Index	iv
Abstract	v
List of Figures	vi
List of Tables (optional)	vii

	INDEX	
Sr.No.	Chapter	Page No.
1.	INTRODUCTION*	1
2.	PROBLEM DEFINATION	5
3.	REQUIREMENT SPECIFICATION	
4	FEASIBILITY STUDY	
5	FLOWCHARTS / DFDS / ERDS/UML DIAGRAMS	
6.	SCREENSHOTS	
7.	ADVANTAGES & DISADVANTAGES	
8.	CONCLUSIONS	
9.	REFERENCES	

***Students can add/remove/edit chapter names as per the discussion with their guide**

Annexure-IV

PROJECT DIARY

Name of the Student: _____ **Name of Guide (Faculty) :** _____

Enrollment Number: _____ **Semester:** _____ **Project batch Number:** _____

Date	Discussion Topics/Activity Details	Work Allotted Till Next Session/Corrections Suggested/Faculty Remarks	Dated Signature of Faculty

Dated Signature of Faculty

Dated Signature of HOD

Annexure-V

Rubrics

Progressive Assessment					Project Presentation			
Topic Selection & Problem definition (10)	Requirement Gathering (10)	Stage wise progress as per discussion (10)	Involvement in project development (10)	Report Writing (10)	Knowledge (20)	Development (20)	Innovation (5)	Presentation (5)

Sign: Name: A.B.Bhusagare (Course Expert/s)	Sign: Name: Mrs.M.U Kokate (Program Head and Course Expert) (Information Technology)
Sign: Name: Mr.U.V.Kokate (Program Head) (Computer Dept.)	Sign: Name: Mr. A.S.Zanpure (CDC In-charge)

Government Polytechnic, Pune

'180OB' – Scheme

Programme Name	:	Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Network Management and Administration
Course Code	:	IT4106
Prerequisite course code and name	:	NA
Class Declaration	:	NO

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
					Theory Marks		Practical Marks	
L	T	P	C		ESE	PA	*ESE	PA
2	-	2	4	Marks	40	10	25	25
				Exam Duration	2 Hrs	1 Hr	2 Hrs	
								100

(*):OE/ (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Managing Network and System is the essential part in networking and computing technologies. This course is aimed at providing students hands on Experience over Linux Operating System: Red Hat Linux Server, Configuring Server for Network Environment. It would expose students to system and network administration

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Manage System and Network using Linux server operating system.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Install and Manage softwares on Linux server operating system.
2. Create users and groups and configure their properties.
3. Configure file system and core system services.
4. Configure TCP/IP network and its properties.
5. Configure DNS and FTP server.
6. Configure DHCP server and Electronic mail.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Install and Configure Linux operating system.	CO1	02
2.	1	Install and Uninstall any software using RPM.	CO1	02
3.	1	Compile and Install GNU software.	CO1	02
4.	2	Create User Account through command-line and GUI.	CO2	02
5.	2	Create Group Account through command-line and GUI.	CO2	02
6.	3	i. Mount and Unmount Local Disks. ii. Create Partition and Logical Volume.	CO3	02
7.	3	Configure the crontab file.	CO3	02
8.	4	Configure TCP/IP properties. Configure serial hardware using utilities.	CO4	04
9.	5	Install and Configure DNS server.	CO5	02
10.	5	Install and Configure FTP server.	CO5	04
11.	6	Install and Configure DHCP server.	CO6	04
12.	6	Configure E-Mail using sendmail utility.	CO6	02
13.		Microproject covering 2 or more COs from the curriculum. (Refer Point 11 for Sample Microproject List)	ALL	02
Total Hours				32

Sr. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Hardware: Personal computer Pentium IV, 2 GHz minimum (i3-i5 preferable), RAM minimum 2 GB.	For all experiments
2	Red Hat Linux Server Operating System	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. Managing Softwares (Weightage-06 , Hrs- 04)	
1a. Install and configure Linux server operating system. 1b. Install softwares using RPM. 1c. Unpacking Packages. 1d. Configure Packages. 1e. Test softwares.	1.1 Installing Linux in a Server Configuration: Hardware and Environmental Considerations, Server Design ,Uptime ,Dual-Bootting Issues , Methods of Installation. 1.2 Managing Software: The RPM Package Manager, Managing Software Using RPM, Querying for Information the RPM Way, Installing with RPM, Uninstalling Software with RPM. 1.3 Compile and Install GNU Software: Getting and Unpacking the Package , Looking for Documentation, Configuring the Package, Compiling the Package ,Installing the Package, Testing the Software, Cleanup.
UNIT 2. Managing Users and Groups (Weightage-06 , Hrs- 06)	
2a. Create Users and Groups. 2b. Configure properties of users and groups. 2c. Use Pluggable Authentication Modules.	2.1 Managing Users: Introduction to User account, User account Information, The /etc/passwd File, The /etc/shadow File, The /etc/group File. 2.2 User Management Tools, Command-Line User Management, GUI User Managers, Users and Access Permissions, Understanding SetUID and SetGID. 2.3 Programs ,Pluggable Authentication Modules (PAM), Working of PAM, PAM's Files and their Locations, Configuring PAM , Debugging PAM.
UNIT 3. File System and Core System Services (Weightage-08 , Hrs- 06)	
3a. Configure File System. 3b. Mount and Unmount local disks. 3c. Manage Volume of disks. 3d. Manage Core system services. 3e. Edit crontab File.	3.1 File Systems: Structure of File System, i-Nodes, Superblocks, ext3 and ReiserFS, Managing File Systems, Mounting and Unmounting Local Disks, Using fsck, Adding a New Disk, Overview of Partitions, Traditional Disk and Partition Naming Conventions Volume Management, Creating Partitions and Logical Volumes, Creating File Systems. 3.2 Core System Services: The init Daemon, upstart, The /etc/inittab File, xinetd and inetd, the /etc/xinetd.conf File, The Logging Daemon, Invoking rsyslogd, Configuring the Logging Daemon, Log Message Classifications, Format of /etc/rsyslog.conf. 3.3 The cron Program- The crontab File, Editing the crontab File
UNIT 4. TCP/IP Networking (Weightage-06 , Hrs- 06)	

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
4a. Write issues related to TCP/IP networking. 4b. Write steps for configuration of network properties. 4c. Write steps for configuration of serial hardware. 4d. Describe use of configuration utilities.	4.1 Introduction to Networking: TCP/IP Networks, Linux Networking 4.2 Issues of TCP/IP Networking: Networking Interfaces, IP Addresses, The Internet Control Message Protocol 4.3 Configuring the Serial Hardware Communications Software for Modem Links, Accessing Serial Devices ,Using the Configuration Utilities, Serial Devices and the login:Prompt 4.4 Configuring TCP/IP Networking: Understanding the /proc File system
UNIT 5. DNS and FTP (Weightage-08 , Hrs- 06)	
5a. Describe working of DNS. 5b. Write steps for configuration of DNS Server. 5c. Describe use of DNS Toolbox. 5d. Write steps for Installation of FTP Server. 5e. Write procedure to transfer file using FTP Server. 5f. Write steps for Setting up FTP with virtual users.	5.1 DNS: The Hosts File ,Working of DNS, Domain and Host Naming Conventions, Subdomains, The in-addr.arpa Domain ,Types of Servers, Installing a DNS Server, The BIND Configuration File, Configuring a DNS Server, Defining a Primary Zone in the named.conf File, Defining a Secondary Zone in the named.conf File, Defining a Caching Zone in the named.conf File, DNS Records Types, SOA: Start of Authority, NS: Name Server, A: Address Record , PTR: Pointer Record , MX: Mail Exchanger, CNAME: Canonical Name , RP and TXT: The Documentation Entries, Setting Up BIND Database Files, Breaking Out the Individual Steps, 5.2 The DNS Toolbox: host ,dig , nslookup , whois, nsupdate , The rndc Tool Configuring DNS Clients, The Resolver ,Configuring the Client . 5.3 FTP: The Mechanics of FTP, Client/Server , Obtaining and Installing vsftpd ,Configuring vsftpd ,Starting and Testing the FTP Server, Customizing the FTP Server ,Setting Up an Anonymous-Only FTP Server , Setting Up an FTP Server with Virtual Users
UNIT 6. DHCP and Electronic Mail (Weightage-06 , Hrs- 04)	
6a. Write steps for configuration of DHCP Server and client. 6b. Write issues related to E-Mail administration. 6c. Use sendmail utility. 6d. Configure sendmail files.	6.1 DHCP: The Mechanics of DHCP, The DHCP Server, Installing DHCP Software via RPM, Installing DHCP Software via APT in Ubuntu, Configuring the DHCP Server, The DHCP Client Daemon Configuring the DHCP Client 6.2 Administration Issues with Electronic Mail: Introduction to Electronic Mail Message, Email Delivery, Email Addresses, Working of Mail Routing, Mail Routing on the Internet 6.3 sendmail : Installing the sendmail Distribution, sendmail Configuration Files, sendmail.cf Configuration Language, Creating a sendmail Configuration, sendmail Databases, Testing the Configuration, Running sendmail.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
1	Managing Softwares	04	02	-	04	06
2	Managing Users and Groups	06	-	02	04	06
3	File System and Core System Services	06	-	04	04	08
4	TCP/IP Networking	06	-	02	04	06
5	DNS and FTP	06	-	04	04	08
6	DHCP and Electronic Mail	04	-	02	04	06
	Total	32	02	14	24	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs.(Affective Domain Outcomes) .Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission.. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Configure a system as per the given requirement:
 - i. Create a user
 - ii. Configure the FTP server on Linux server operating system.
 - iii. Transfer file from server to user.
- b. Configuring the Serial Hardware Communications Software for Modem Links, access devices through it.
- c. Configure Primary and Secondary DNS server.
- d. Configure DHCP server and DHCP client assign IP addresses to machines through it.
- e. Configure a File System, Mount and Unmount the Local Disks, add new disk, create partitions and logical volumes.

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Linux Administration A Beginners Guide	Wale Soyinka	McGraw Hill Education, Osborne DOI: 10.1036/0071545883
2	Linux Network Administrator's Guide	Tonny Bautts, Terry Dawson & Gregor N. Purdy	O'Reilly ISBN -10:0-596-00548-2 ISBN-13:978-0-596-00548-1
3	Pro Linux System Administration	James Turnbull, Peter Lieverdink, Dennis Matotek	Apress ISBN-13 (pbk): 978-1-4302-1912-5 ISBN-13 (electronic): 978-1-4302-1913-2

13. SOFTWARE/LEARNING WEBSITES

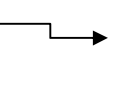
1. https://www.tutorialspoint.com/linux_admin/index.htm
2. <https://www.geeksforgeeks.org/beginners-guide-to-linux-system-administration/?ref=leftbar-rightbar>
3. <http://www.tldp.org/LDP/nag2/index.html>
4. <https://www.tecmint.com/linux-networking-commands/>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO/PO	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Install and manage softwares on Linux server operating system.	3	1	-	1	1	1	3
Create users and groups	3	2	2	2	2	2	2

and configure their properties.							
Configure file system and core system services.	3	2	2	2	2	2	3
Configure TCP/IP network and its properties.	3	3	3	2	2	2	3
Configure DNS and FTP server.	3	3	3	3	3	2	3
Configure DHCP server and Electronic mail.	3	3	3	3	3	2	3
Summary	3	3	3	3	3	2	3

PSO - COMPETENCY- CO MAPPING

CO / PSO 	Hardware and Networking	Database Technologies	Software Development
Install and manage softwares on Linux server operating system.	3	-	1
Create users and groups and configure their properties.	3	-	-
Configure file system and core system services.	3	-	-
Configure TCP/IP network and its properties.	3	-	2
Configure DNS and FTP server.	3	-	-
Configure DHCP server and Electronic mail.	3	-	2
Summary	3	-	2

Sign: Name: Smt. H.F.Khan (Course Expert)	Sign: Name: Smt. M.U.Kokate Head of the Department (Information Technology)
Sign: Name: Smt. M.U. Kokate (Programme Head)	Sign: Name: Mr. A.S. Zanpure (CDC)

Government Polytechnic, Pune

'180OB' – Scheme

Programme Name	:	Diploma Programme in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Software Engineering
Course Code	:	IT4101
Prerequisite course code and name	:	NO
Class Declaration	:	NO

1. 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	PA	125
3	-	2	5	Marks	80	20	--	25	
				Exam Duration	3 Hrs	1 Hr	3 Hrs		

Practical-ESE-Internal Oral examination

Legends: L-lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End Semester Examination, PA- Progressive Assessment.

2. RATIONALE

Software engineering is the foundation for professional processes to be followed involving principles, techniques, and practices for software development. The course provides a framework for software professionals for building quality assured software products. It enables students to blend the domain specific knowledge with programming skills to create quality software products.

3. COMPETENCY

It describes Software Engineers who participate in development and modifications to software-intensive systems.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Select and use specific SDLC model for software development /assigned project/ case study
2. Prepare Software Requirement Specifications.
3. Use Software modeling to create data designs with effective use of UML tools.
4. Estimate size and cost of Software Project.
5. Apply Project Management and Quality Assurance principles in Software development.
6. Test software by developing various test cases for Software Project.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Application and use of studied process models such as Agile, RAD, Waterfall Model	CO1	02
2.	1	Write problems statements to define the project title with bounded scope of the project.	CO1	02
3.	2	To Develop Software Requirement Specification (SRS) using Use-Case Scenario.	CO2	02
4.	3	To perform data design using design concepts eg. DFD decision tables, E-R (entity relationship) diagram.	CO3	04
5.	3	Develop class diagram, Sequence diagram, Activity Diagram, State Transition Diagram for assigned project (eg. Library Management)	CO3	06
6.	4	i. Estimate cost of project using COCOMO (constructive cost model)/COCOMO II Approach for the assigned project.	CO4	04
7.	4	Identify risk involve in the project and prepare RMMM (RMMM-Risk Management, Mitigation and monitoring) plan.	CO4	02
8.	5	Design Project Plan and SQA Plan	CO5	02
9.	5	Use CPM (Critical Path Method)/PERT (Programme evaluation and review technique) for scheduling the assigned project.	CO5	02
10.	5	Use timeline charts/Gantt charts to track progress of assigned projects	CO5	02
11.	6	Write test cases to validate requirements of assigned project from SRS documents.	CO6	02
12	All	Micro-project (Refer point 11 for Micro Project list)	All COs	02
		Total Hours		32

Sr.No.	Performance Indicators	Weightage in %
a.	Problem Selection and its feasibility study	20
b.	Logical thinking to decompose problem into modules	30
c.	Ability to estimates size and cost of software	30
d.	Presentation and Technical documentation skills	10
e.	Submission of reports within time	10
	Total	100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Hardware: Personal Computer (i3-i5 preferable), RAM minimum 2 GB.	For all experiments
2	Operating System : Windows 7/Windows 8/Windows10/Linux or any other.	
3	Software tools: Any UML tool.	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

<i>Unit Outcomes (UOs)</i> (in cognitive domain)	<i>Topics and Sub-topics</i>
Section I	
Unit– I Software Development Process(Weightage-14 , Hrs- 08)	
1a.Suggest the attributes that match with standards for the given software application 1b.Recommended the relevant software solution for the given problem with justification 1c. Select the relevant software [processes model for the given problem statement with justification 1d.Suggest the relevant activities in Agile Development process in the given situation with justification.	1.1 Software, its Characteristics and Types of software. 1.2 Framework of Umbrella Activities 1.3 The Process: Software Engineering: A Layered Technology -Process, Methods, and Tools. 1.4 A Generic View of Software Engineering, The Software Process 1.5 Software Process Model: Waterfall Model 1.6 Incremental Process model : RAD Model 1.7 Evolutionary Process Models : Prototyping model, Spiral model 1.8 Agile Process Model: Extreme Programming, Adaptive Software Development (ASD), Scrum, dynamic System development method (DSDM), CRYSTAL. 1.9 Selection Criteria for software process model.
Unit-II Software Requirement Engineering(Weightage-12 , Hrs- 06)	
2.a. Apply the principles of Software engineering for the given situation problem 2.b. Choose the relevant requirement engineering steps in the given problem. 2.c. represent the requirement	2.1 Software Engineering practices and importance, core principles. 2.2 Communication Practices, Planning Practices, Modelling practices construction practices, software deployment (statement and meaning of each principle for each practice). 2.3 Requirement Engineering: requirement Gathering

<i>Unit Outcomes (UOs)</i> (in cognitive domain)	<i>Topics and Sub-topics</i>
engineering model in the given problem 2.d. prepare SRS for the given problem	and Analysis, types of requirements(functional, products, organizational, external requirements),Eliciting Requirements, Building requirements negotiation, Validation. 2.4 Software Requirement Specification: Need of SRS, format, and its characteristics.
Unit– III Software Modelling and Design (Weightage-14 , Hrs-10)	
3.a. Identify the elements of analysis model for the given software requirements. 3.b. Apply the specified design feature for software requirements mode 3.c. represent the specified problem in the given design notation 3.d. explain the given characteristics of software testing 3.e. Prepare test cases for the given module	3.1 Translating Requirement model into design model into design model: Data Modelling. 3.2 Analysis Modelling: Elements of Analysis model. 3.3 Design modeling: Fundamental Design Concepts (Abstraction, information hiding, structure, modularity, Concurrency, verification, Aesthetics). 3.4 Design notations: data flow Diagram (DFD), Structured Flowcharts, decision tables. 3.5 UML Modelling :Use-Case ,Class Diagrams, Sequence Diagrams
Section II	
Unit –IV Software Project Estimation (Weightage-16 , Hrs-10)	
4a. Estimate the size of the software product using the given method. 4b. Estimate the cost of the software product using the given method. 4c. Evaluate the size of the given software using CoCoMo model. 4d. Apply the RMMM strategy in identified risks for the given software development problem.	4.1 The management spectrum-4p's 4.2 The Process: Software Scope, 4.3 Problem Decomposition, 4.4 Metrics for size Estimation: line of Code (LoC), Function Points (FP). 4.5 Project Cost Estimation Approaches: Overview of Heuristic, Analytical and Empirical Estimation. 4.6 COCOMO (Constructive Cost Model), COCOMO II. 4.7 Risk Analysis and Management: Risk identification, Risk projection, Risk assessment, Risk management and monitoring, Risk Refinement and Mitigation, RMMM Plan.
Unit –V Project Scheduling & Quality Assurance (Weightage-14 , Hrs- 08)	
5a. Use the given scheduling technique for the identified project. 5b. Draw the activity network for the given task. 5c. Prepare the timeline chart/Gantt chart to track progress of the	5.1 Project scheduling: Basic Principles Work breakdown structure, activity network and critical path method 'scheduling techniques (CPM, PERT). 5.2 Project tracking: Timeline charts, Earned value Analysis, Gantt charts 5.3 Quality Assurance: Quality concepts, Software quality assurance, Phases of SQA: Planning, activities, audit, reviews.

<i>Unit Outcomes (UOs)</i> (in cognitive domain)	<i>Topics and Sub-topics</i>
given project. 5d. Describe the given software Quality Assurance (SQA) activity. 5e. Describe feature of the given software quality evaluation standard.	5.4 Defect amplification and removal: Formal technical reviews, the review meeting, Review reporting and record keeping. 5.5 Quality Evaluation standards: Six Sigma, ISO for software, CMMI: Levels, Process areas.
UNIT 6. Software Testing Techniques and Maintenance (Weightage-10 , Hrs- 06)	
6a. Test software by developing various test cases for software project. 6b. Describe software maintenance process. 6c. Apply Unit, Integration, system testing for software project. 6d. Compare Reverse and Re-Engineering.	6.1 Testing- Meaning and purpose, testing methods- Black-box and White-box, Level of testing-Unit testing. 6.2 Test Documentation-Test case template, test plan, introduction to defect report, test, summary report. 6.3 Software Maintenance: A definition of software maintenance, Maintenance Characteristics, Maintainability, and Maintenance tasks, Maintenance side effects, Software Configuration Management. 6.4 Reverse Engineering and Re-Engineering.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
SECTION-I						
1	Software development Process	08	04	04	06	14
2	Software requirement engineering	06	04	04	04	12
3	Software modelling and design	10	04	04	06	14
	Total	24	12	12	16	40
SECTION-II						
4	SoftwareProject Estimation	10	06	06	04	16
5	Project scheduling & QualityAssurance	08	04	06	04	14
6	Software Testing Techniques and Maintenance	06	04	02	04	10
	Total	24	14	18	12	40
	Total	48	26	26	28	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Prepare journal based on practical performed in laboratory.
- b. Give seminar on relevant topic
- c. Undertake micro-projects.

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

- a. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations.
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Use different Audio-Visual media for Concept understanding.
- e. Guide student(s) in undertaking micro-projects.
- f. Demonstrate students thoroughly before they start doing the practice.
- g. Observe continuously and monitor the performance of students in Lab.

10. SUGGESTED 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:

- h. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- i. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations.
- j. With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- k. Use different Audio-Visual media for Concept understanding.
- l. Guide student(s) in undertaking micro-projects.
- m. Demonstrate students thoroughly before they start doing the practice.
- n. Observe continuously and monitor the performance of students in Lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of **PrOs, UOs and ADOs**. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

- Automated college timetable generator
- Mobile Banking
- Bus Pass with webcam Scan
- Android Blood Bank

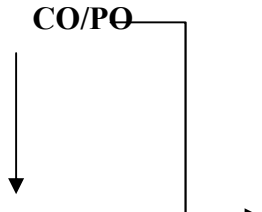
12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Software Engineering: A practitioners approach	Pressman, Roger S.	McGraw Hill Higher Education, New Delhi,(Seventh Edition) ISBN 978-0-07-337597-7
2	Software Engineering Concepts	Fairly, Richard	McGraw Hill Higher Education, New Delhi,(2001) ISBN 13: 9780074631218
3	Software Testing: Principles and Practices	Jain, Deepak	Oxford University Press, New Delhi ISBN 9780195694840

13. SOFTWARE/LEARNING WEBSITES

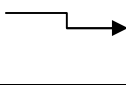
1. https://www.tutorialspoint.com/software_engineering/index.htm
2. <https://www.geeksforgeeks.org/cost-estimation-models-in-software-engineering/>
3. <https://www.toptal.com/agile/software-costs-estimation-in-agile-project-management>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation	Engineering Practices for Society, Sustainability and	Project Management	Life Long Learning
Select and use specific SDLC model for software development /assigned project/ case study	2	2	2	-	1	3	3
Prepare software requirement specifications.	3	3	3	3	2	3	3

Use software modelling to create data designs with effective use of UML tools.	3	3	3	3	2	3	3
Estimate size and cost of software project.	2	3	3	2	2	3	3
Apply project management and quality assurance principles in software development.	2	2	2	-	-	1	2
Test software by developing various test cases for software project.	3	3	3	3	2	2	2
Summary	3	3	3	3	2	3	3

PSO - COMPETENCY- CO MAPPING

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Select and use specific SDLC model for software development /assigned project/ case study	--	2	3
Prepare software requirement specifications.	2	1	3
Use software modelling to create data designs with effective use of UML tools.	--	3	3
Estimate size and cost of software project.	1	2	3
Apply project management and quality assurance principles in software development.	1	2	3
Test software by developing various test cases for software project.	--	3	3
Summary	1	3	3

1.(Smt.K.S.Gaikwad)
2.(Smt.A.B.Bhusagare)

Signature of Course Expert

(Smt. M.U. Kokate)

Signature of Programme Head

(Mr.M.U.Kokate)

Signature of Head of the Department
(Computer Engineering)

(Mr.A.S. Zanpure)

Signature of CDC In-charge

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Program Name	:	Diploma in Information Technology
Program Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Software Testing
Course Code	:	IT4102
Class Declaration	:	NO
Pre-requisite Course Code	:	NA

1. 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	PA	*ESE	PA	100
2	-	2	4	40	10	25	25	

(*)-Practical and Oral examination

Legends: *L*-Lecture; *T* – Tutorial, *P* - Practical; *C* –Credit, *ESE* - End Semester Examination; *PA* - Progressive Assessment; # –No theory exam

2. RATIONAL

In today's software environment writing bug free code is challenging task, which make software testing important to get the quality software. Testing techniques include the process of executing a program or application with the intent of finding software bugs by applying types, levels and methods of software testing on applications with effective test planning approach. Testing techniques also include the process of plan an effective test approach, build report for your finding, and to tell when your software is ready for release.

3. COMPETENCY

- Design Test cases and apply various software testing methods.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Describe objectives of software testing and design test cases.
2. Apply different types and levels of testing.
3. Prepare test plan for given application.
4. Identify bugs to create defect report of given application.
5. Test software for performance measures using automated testing tools.

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5. PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1.	1	Write test cases on any device.(Ex. Monitor, Keyboard, Mouse, Booting Failure)	CO1	02
2.	1	Identify system specification & design test cases for given application (Ex. purchase order management, Inventory management).	CO1	04
3.	1	Design test cases for simple calculator application. (BB Testing)	CO1	02
4.	2	Design test cases for railway reservation form.	CO2	02
5.	2	Design test cases for e-commerce (Flipkart, Amazon) - login form.	CO2	02
6.	2	Design test cases for web pages testing any web sites.	CO2	02
7.	2	Write program and design test cases for the following Control and decision making statement. 1) For...loop 2) Switch...case 3) Do...while 4) If...else.	CO2	04
8.	3	Prepare test plan for an identified mobile application.	CO3	02
9.	3	Design test plan and test cases for Notepad (MS Window based) Application.	CO3	02
10.	3	Write test cases for an Entry screen with at least 10 parameters.	CO3	02
11.	4	Prepare defect report after executing test cases for any application (Ex. Library management system, Withdraw of amount from ATM machine, Any login form).	CO4	02
12.	5	Design and run test cases for word pad (MS window based).Using an automated tool.	CO5	02
13.	5	Micro project covering 2 or more COs from curriculum. (Refer Point no.11 for sample Micro project list)	CO5	04
Total				32

Sr. No.	Performance Indicators	Weightage in %
a.	Preparation of system specification, designing test plan and test cases using any spreadsheet package.	40
b.	Preparation of defect report.	20
c.	Execution of test cases using automation tool.	20
d.	Answer to sample questions.	10
e.	Submit report in time	10
Total		100

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Sr. No.	Performance Indicators	Weightage in %

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Computer System (Any computer system with basic configuration)	All
2	Any Spreadsheet Package for maintaining Test cases record.Ex:MS Excel	All
3	Any freeware Automation Testing Tool .Ex: Selenium , IBM Rational Functional Tester	13
4	Any freeware Bug Tracking Tools: Example -, Bugzilla , Mantis Bug Tracker	All

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics	
Unit 1. Basics of software testing and testing method (Weightage-08, Hrs- 06)		
1a. State the objective of Testing. 1b. Identify errors and bugs in the given program. 1c. Prepare test case for the given application. 1d. Describe the Entry and Exit Criteria for the given test application. 1e. Validate the given application using V model in relation with quality assurance. 1f. Describe features of the given testing method.	1.1	Software Testing, Objectives of Testing.
	1.2	Failure, Error, fault, Defect, Bug Terminology.
	1.3	Test case, when to start and stop testing of software (Entry and Exit criteria).
	1.4	Verification and Validation (V Model) Quality Assurance, Quality Control.
	1.5	Methods of testing: Static and dynamic testing
	1.6	The box approach: White Box Testing: Inspections, Walkthroughs, Technical Reviews, Functional Testing, Code Coverage Testing, Code Complexity Testing. Black Box Testing: Requirement Based Testing, Boundary value Analysis, Equivalence Partitioning,
	1.7	Black Box Testing: Requirement Based Testing, Boundary value Analysis, Equivalence Partitioning
Unit 2. Types and Levels of Testing (Weightage-10, Hrs- 08)		

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2a. Apply specified testing level for the given web based application. 2b. Apply Acceptance testing for given web based application. 2c. Apply the given performance testing for the specified. 2d. Generate test cases for the given application and GUI Testing.	2.1	Levels of testing Unit Testing: Driver, Stub
	2.2	Integration Testing: Top- Down Integration, Bottom-Up Integration Bi-Directional Integration.
	2.3	Testing on Web Application: Performance Testing: Loud Testing, Stress Testing, Security Testing. Client-Server Testing.
	2.4	Acceptance Testing: Alpha Testing and Beta Testing, Special Tests: Regression Testing, GUI Testing.
Unit 3. Test Management (Weightage-06, Hrs- 06)		
3a. Prepare test plan for given application 3b. Identify the resource requirement of the given application. 3c. Prepare test cases for the given application. 3d. Prepare test report of executed test cases for given application	3.1	Test Planning: Preparing a Test Plan, Deciding Test Approach, Setting Up Criteria for Testing, Identifying Responsibilities, Staffing, Resource Requirements, Test Deliverables, Testing Tasks
	3.2	Test Management: Test Infrastructure Management, Test People Management
	3.3	Test Process: Base Lining a Test Plan, Test case Specification.
	3.4	Test Reporting: Executing Test Cases, Preparing Test Summary Report.
Unit 4. Defect Management (Weightage-06, Hrs- 04)		
4a. Create and Manage views 4b. Create and Manage Sequences 4b. Create Indexes using SQL query to solve given Problem.	4.1	Defect Classification, Defect Management Process.
	4.2	Defect Life Cycle, Defect Template.
	4.3	Estimate Expected Impact of a Defect, Techniques for Finding Defects, Reporting a Defect.
Unit 5. Testing Tools and Measurements (Weightage-10, Hrs- 06)		

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5a. Improve testing efficiency using automated tool for given application 5b. Identify different testing tools to test the given application. 5c. Describe Metrics and Measurement for the given application 5d. Explain Object oriented metrics used in the given testing application.	5.1	Manual Testing and Need for Automated Testing Tools
	5.2	Advantages and Disadvantages of Using Tools
	5.3	List of Automated Testing Tools
	5.4	Selecting a Testing Tool
	5.5	When to Use Automated Test Tools, Testing Using Automated Tools.
	5.6	Metrics and Measurement: Types of Metrics, Product Metrics and Process Metrics, Object Oriented metrics in testing.

8. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

9.

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basics of software testing and testing method	06	04	02	02	08
II	Types and levels of testing	08	02	02	06	10
III	Test management	06	-	02	04	06
IV	Defect management	04	-	02	04	06
V	Testing tools and measurements	06	02	02	06	10
Total		32	08	10	22	40

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in laboratory.

11. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
---------	-------	------------------------

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1	Basics of Software Testing and Testing Methods	Class room teaching
2	Types and Levels of Testing	Laboratory demonstration
3	Test Management	Class room teaching, laboratory demonstration
4	Defect Management	Class room teaching, laboratory work
5	Testing Tools and Measurements	Class room teaching, laboratory work

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

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- Guide student(s) in undertaking micro-projects.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Design and run test cases for MS word application using automation tool.
- Write test cases on any real time website for example
 - Online shopping website,
 - Food order website
- Write test cases on any real time application for example
 - Car Booking application
 - Gaming application

10. LEARNING RESOURCES

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S. No.	Title of Book	Author	Publication
1	Software Testing: Principals and Practices	Srinivasan Desikan Gopalaswamy Ramesh	PEARSON Publisher: Pearson India 2005, ISBN: 9788177581218,
2	Software Testing: Principals, Techniques and Tools	Limaye M. G.	Tata McGraw Hill Education, New Delhi., 2007 ISBN 13:9780070139909
3	Software Testing: Principles and Practices	Chauhan Naresh	Oxford University Press Noida-
4	Software Testing	Singh Yogesh	Cambridge University Press, Bangluru. ISBN 978-1-107-65278-1

12. SOFTWARE/LEARNING WEBSITES

1. <http://www.selenium.com>
2. https://en.wikipedia.org/wiki/Test_automation
3. https://en.wikipedia.org/wiki/Software_testing#Testing_tools
4. <http://www.softwaretestingsoftware.com>
5. www.toolsqa.com

13.PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Apply various software testing methods.	2	3	2	2	2	1	2
Prepare test cases for different types and levels of testing.	3	3	2	2	1	2	2
Prepare test plan for given application.	2	2	2	1	1	3	3
Identify bugs to create defect report of given application.	2	2	2	2	2	2	2
Test software for performance measures using automated testing tools.	1	2	2	3	-	-	-
Summary	2	2	2	2	2	2	2

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14.PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
Apply various software testing methods.	-	2	3
Prepare test cases for different types and levels of testing.	1	2	3
Prepare test plan for given application.	1	2	2
Identify bugs to create defect report of given application.	1	2	2
Test software for performance measures using automated testing tools.	1	2	1
Summary	1	2	3

(Smt.A.D.Kshirsagar &
Smt.K.S.Gaikwad)
Signature of Course Expert

(Smt. M.U. Kokate)
Signature of Programme Head

(Mr. A.S. Zanpure)
Signature of CDC In-charge

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'180 OB' – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	Java Programming-II
Course Code	IT4103
Prerequisite course code and name	CM3102- Java Programming-I

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				Total Marks
					Theory		Practical		
L	T	P	C		ESE	PA	*ESE	PA	
03	00	02	05	Marks	80	20	25	25	150
				Exam Duration	3 Hrs	1 Hr	2 Hr		

(*): POE (Practical&Oral Examination)

Legends: L- lecture-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

This course introduces students to intermediate and advanced features of the Java programming language. Student will know how to implement graphical user interfaces using Java components. In the Era of Web technology it is essential for every diploma Engineer to have knowledge of Internet programming. This course covers advanced features of JAVA.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Develop standalone Applications using advanced concepts of Java.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Develop GUI applications using Abstract Windowing Toolkit (AWT) and event handling.
2. Create GUI applications using Swing.

3. Develop client/server applications using TCP/IP and UDP socket programming.
4. Implement Java programs using databases with Java Data Base Connectivity (JDBC) as interface.
5. Develop applications for Remote Method Invocation (RMI), and Java Bean.
6. Develop programs using Servlets.

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Program to design a form using various controls.	1	02
2.		Program to design a form and handle various events related to each control.		01
3.		Program to display any string using available Font and Font metrics class and their methods.		01
4.		Program to create a menu bar with various menu items and sub menu items. Also create a checkable menu item. On clicking a menu Item display a suitable Dialog box.		01
5.	2	Program to design a form using basic swing components.	1,2	02
6.		Program to demonstrate the use of tabbed panes and scroll panes in Swing.		02
7.		Program to map Directory tree and Table.		01
8.	3	Program to retrieve hostname using methods in InetAddress class.	3	01
9.		Program to demonstrate use of URL and URL Connection class for communication.		01
10.		Program that demonstrates TCP/IP and UDP based communication between client and server.		02
11.	4	An Application program to make connectivity with database using JDBC API.	4	01
12.		Application programs to send queries through JDBC bridge & handle result.		02
13.	5	Create a Client/Server application using RMI .	5	02
14.		Program to develop simple bean using BDK(Beans Developing Kit)		01
15.	6	Program to demonstrate the use of HttpServlet as a parameterized Servlet.	6	02
16.		Program to send username and password using HTML forms and authenticate the user using Servlet.		02

17.		Program to create session using HttpSession class.		02
18.		Program to implement Session tracking using Cookies.		02
19.	All	Complete a micro project based on guidelines provided in Sr. No. 11	1 to 6	04
		Total		32

Sr.No.	Performance Indicators	Weightage in %
a.	Correctness of Program	40
b.	Debugging ability	20
c.	Quality of input and output displayed (messaging and formatting)	10
d.	Preparing assignments (write-ups, program and output).	20
e.	Submit assignment on time.	10
	Total	100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical's, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1.	Computer System with operating System & any latest JDK version to execute "Java" programs,	1 to 17
2.	Notepad	1 to 17
3.	Databases like Oracle, MySQL, Ms-access or any other	11 to 12
4.	Apache Tomcat server version 7 or above web server	14 to 17

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1. Abstract Windowing Toolkit (AWT) (Weightage-20, Hrs- 12)	
1a. Enlist various AWT components. 1b. Describe Event Delegation Model. 1c. Describe various handling events by extending AWT 1d. Design a form containing various AWT components and apply event handling.	1.1 Introduction to AWT, AWT classes, Window fundamentals, working with frame Windows, Creating a frame Window in an Applet, Creating windowed program. 1.2 Display information within a window 1.3 Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, Checkbox Group, Choice Controls, Using Lists, managing scroll Bars, Using a Text Field, Using a Text Area. 1.4 Understanding Layout Managers, Menu Bars and Menus, Dialog Boxes, File Dialog. 1.5 The delegation event model, Event classes,

	Sources of Events, Event Listener Interfaces. 1.6 Handling events by Extending AWT Components, Exploring the Controls, Menus, and Layout manager. 1.7 Adapter classes, Inner classes.
UNIT 2. Swing Component (Weightage-10, Hrs- 06)	
3a. Differentiate between AWT and Swing. 3b. Use swing components to Develop Graphical user interface (GUI) programs. 3c. Develop Graphical user interface (GUI) programs using advanced swing components.	2.1 Introduction to Swing: Swing features, difference between AWT and Swing. 2.2 Swing Components: Japplet, Icons and JLabels ,JText Fields, JButtons. JCombo Boxes, JCheckboxes, JRadio Buttons. 2.3 Advanced Swing Components: Tabbed Panes, Scroll Panes, Trees, Tables, Progress bars, tool tips.
UNIT 3. Networking Basics (Weightage- 12, Hrs-06)	
3a. Define socket. 3b. Compare various sockets. 3c. Write a java programs for client server communication using sockets. 3d. Differentiate between TCP/IP and UDP.	3.1 Socket overview, client/server, reserved sockets, proxy servers, Internet addressing. 3.2 InetAddress, Factory methods, instance method TCP/IP Client Sockets. 3.3 What is URL Format? URL connection, TCI/IP Server Sockets. 3.4 Datagrams: Datagram packets Datagram server & client.
UNIT 4. Java Database Connectivity (JDBC) (Weightage- 14 , Hrs- 08)	
4a. Describe the Basics of JDBC 4b. Develop a program for JDBC connectivity. 4c. Develop program to establish connectivity with the specified database.	4.1 Introduction to JDBC, ODBC 4.2 JDBC architecture: Two tier and Three tier models 4.3 Types of JDBC drivers. 4.4 Driver Interfaces and Driver manger Class: Connection Interface and Statement Interface, Prepared statement Interface, Result Set Interface. 4.5 A JDBC Database Example
UNIT 5. Remote Method Invocation & JAVA Beans (Weightage- 10 , Hrs-06)	
5a. Compare Distributed and Non distributed Java Programs 5b. Draw RMI Architecture 5c. Define stubs and skeletons 5d. Demonstrate working RMI Client side call backs 5e. State advantages of Java Beans 5f. Develop your own Java Bean	5.1 Introduction to Distributed Computing with RMI : Goals, Comparison of Distributed and Non distributed Java Programs 5.2 Java RMI Architecture and Interfaces. 5.3 Naming Remote Objects, Using RMI, Interfaces, Implementation, Stubs and Skeletons, Host Server, Client. 5.4 Running RMI System, Parameters in RMI, Remote Object Parameters 5.5 What is Java Beans? Advantages of Java Beans 5.6 Application Builder Tools, The Bean Developer kit(BDK), JAR Files, Introspection, Developing a simple Bean Using Bound properties Using the BDK

	5.7 Using Bound properties, Using the Bean Info Interface, Constrained properties 5.8 Persistence Customizers, The Java Beans API, Using Bean Builder.
UNIT 6. Servlets (Weightage- 14 , Hrs-10)	
6a. Explain Function of the given method of Servlet life cycle. 6b. Use relevant Generic servlet to develop given web based application. 6c. Use relevant HTTP servlet to develop specified web based application. 6d. Develop servlet for cookies and session tracking to implement the given problem.	6.1 The Life cycle of servlet 6.2 Creating simple Servlet: The Servlet API, javax.servlet Package, Servlet Interface, Servlet Config Interface, ServletContext Interface, Servlet Request Interface, Servlet response Interface, Generic Servlet class 6.3 The java. Servlet.httpPackage: HttpServlet Request Interface, Http Servlet Response Interface, Http Session Interface, Cookie class, Http Servlet class, Http Session Event class, Http Session binding Event class. 6.4 Handling HTTP Requests and Responses Handling HTTP GET Request Handling HTTP POST Requests. 6.5 Cookies and session Tracking.

8. 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
Section - I						
1	Abstract Windowing Toolkit(AWT)	12	06	06	08	20
2	Swing Component	06	02	02	06	10
3	Networking Basics	06	04	02	06	12
Total		24	12	10	20	42
Section - II						
4	Java Database Connectivity (JDBC)	08	04	04	06	14
5	Remote Method Invocation & JAVA Beans	06	04	02	04	10
6	Servlets	10	04	04	06	14
Total		24	12	10	16	38
Total		48	24	20	36	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare

reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in laboratory.
- Follow Coding Standards.
- Give seminar on relevant topic
- Undertake micro-projects.
- Develop variety of program to improve logical skills.
- Develop Application oriented real world programs.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
1	Event Handling and Introducing the AWT	Class room teaching, Laboratory demonstration
2	Swing Component	Class room teaching, Laboratory demonstration
3	Networking Basics	Class room teaching, Laboratory demonstration
4	Java Database Connectivity (JDBC)	Class room teaching, Laboratory demonstration
5	Remote Method Invocation	Class room teaching, Laboratory demonstration
6	Servlets	Class room teaching, Laboratory demonstration

11. SUGGESTED MICRO-PROJECTS

MINI PROJECT: Implement mini project using all the Java concepts studied in the above units.

(Only for Class Declaration Courses)

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-projects are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that she/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Library Management system
- Hospital Management System
- Medical Store Stock Management System
- Online Railway Reservation System

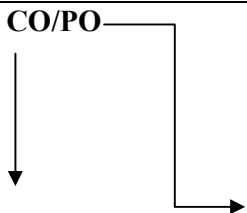
12. LEARNING RESOURCES

Title of Book	Author	Publication
Java2 Programming	Keyur Shah	Tata McGraw hill ISBN :0070435979
Core Java Volume II	Cay S. Horstmann, Pearson	ISBN :9780134177298
Special edition using java1.2	Joseph L.Weber, PHI	ISBN :9780789720184
The Complete Reference Java 2 (Fifth Edition)	Schildt, Herbert	Mcgraw Hill Education, New Delhi ISBN:9789339212094
Java 2 Programming Black Book	Holzner, Steven et al.	Holzner, Steven et al. Dreamtech Press, New Delhi ISBN 10: 817722655X/ ISBN 13: 9788177226553
Java Server Programming Tutorial JAVA EE6 Black Book	Kogent Learning Solutions	Kogent Learning Solutions Dreamtech Press, New Delhi ISBN : 978-81-7722-937-0

13. SOFTWARE/LEARNING WEBSITES

1. <http://www.nptel.ac.in>
2. <https://www.tutorialspoint.com/cprogramming>
3. <https://onlinecourses.nptel.ac.in>

14.PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Develop GUI applications using Abstract Windowing Toolkit (AWT) and event handling.	3	1	3	3	-	1	1
Create GUI applications using Swing.	3	1	3	3	-	1	1
Develop client/server applications using TCP/IP and UDP socket programming.	3	2	2	3	-	1	2
Implement Java programs using databases with Java Data Base Connectivity (JDBC) as interface.	3	2	2	3	-	1	2
Develop applications for Remote Method Invocation (RMI), and Java Bean.	3	2	2	3	-	1	2

Develop programs using Servlets.	3	2	2	3	-	1	2
Summary	2	2	3	3	1	2	3

15. PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO1	-	-	3
CO2	-	-	3
CO3	-	-	3
CO4	-	3	3
CO5	-	-	3
CO6	-	-	3
Summary	-	3	3

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Sign: Name: K.S.Gaikwad. (Course Expert / s)	(Mrs. M. U. Kokate) Signature of Head of the Department (Information Technology)
	(Mr. A. S. Zanpure) Signature of CDC In-charge

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Programme Name	:	Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Internet of Things
Course Code	:	IT4104
Class Declaration	:	NO
Pre-requisite Course Code	:	NA

1. RATIONALE

The Internet of Things enables connection of devices to the Internet. IoT represents a new stage in the digital revolution. IoT devices gather information and send it along to a data server where the information is processed, collated, distilled and used to make host of tasks easier to perform.

2. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above mentioned competency:

1. Explain the need of Internet of Things.
2. Describe protocols for Wireless Sensor Network.
3. Interfacing & Programming for Embedded boards
4. Describe Architecture of Raspberry Pi.
5. Identify hardware & software required for IoT.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	*ESE	PA	75
-	2	2	4	-	-	25	50	

(*)- Oral examination

Legends: L-Lecture; T-Tutorial, P-Practical; C-Credit, ESE - End Semester Examination; PA - Progressive Assessment

4. PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	Interfacing LED, Buzzer & Relay with Arduino/NodeMCU/Raspberry Pi to turn it ON/OFF.	1,3	2

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2	Interfacing Switch with Arduino/NodeMCU/Raspberry Pi	2	2
3	Interfacing LDR with Arduino/NodeMCU/Raspberry Pi to Sense Light Presence	2	2
4	Interfacing Analog Temperature Sensor i.e. LM35 with Arduino to Sense Temperature	2	2
5	Control action using Relay with Arduino/NodeMCU/Raspberry Pi to Turn it ON/OFF when Temperature increases or decreases	2,3	2
6	Interfacing I2C LCD with Arduino/NodeMCU to Display Message	3	2
7	Interfacing DHT11 Sensor with Arduino/NodeMCU/Raspberry Pi to get Temperature and Humidity and display same on I2C LCD	3	2
8	Interfacing PIR Sensor with Arduino/NodeMCU/Raspberry Pi to Detect Motion	4	2
9	Interfacing IR Sensor with Arduino/NodeMCU/Raspberry Pi to Detect Obstacle	4	2
10	Interfacing Ultrasonic Sensor with Arduino/NodeMCU/Raspberry Pi to Measure Distance	4	2
11	Interfacing Bluetooth Module with Arduino & Creating Android Application using MIT App Inventor to control LED /Relay.	3	2
12	Creating Android Application using MIT App Inventor & NodeMCU to control LED / Relay.	3	2
14	Integrating NodeMCU & IFTTT Cloud Service to trigger event and receive notification on Android Device, Email or SMS-communication, sent email, notification	5	2
15	Creating Web Application using Raspberry Pi to display message in Web browser-basic	4	2
18	Interfacing USB Camera to Raspberry Pi to Stream Video on browser using motion service-basic Linux commands	5	2
	Microproject covering 2 or more COs from curriculum. (Refer Point no.11 for sample microproject list)	All	2
	Total		32

Sr.No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recordings	10
e.	Answer to sample questions	10
Total		100

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5. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Arduino/NodeMCU/Raspberry Pi-controllers	ALL
2	Sensors-Switches,LDR,IR,PIR,Ultrasonic Sensor,DHT11,LM35	2 to 10
3	Actuators-LED, Buzzer & Relay	ALL
4	Bluetooth, Wi-Fi,Ethernet	ALL
5	Software tools-Arduino IDE,PUTTY,VNC viewer etc.	ALL

6.THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit	Unit Outcomes (UOs)	Topics and Sub-topics
UNIT 1.Introduction to Internet of Things	1a.Define IoT 2a. Describe Physical Design of IoT 3a.State the IoT Applications	1.1 Basics of IoT: History, Definition, Things, framework, Emerging Trends, Economic Significance, Technical Building Blocks 1.2 Physical design of IoT, Logical design of IoT, Sensors and Actuators, 1.3 IoT Issues and Challenges ,IoT Security and privacy 1.4 IoT Applications
UNIT 2.Wireless Sensor Network	2a. Describe Protocols for IoT 2b.Describe embedded system	2.1 Introduction to IoT networking - Gateways and Routing, IoT Protocols-HTTP, MQTT , CoAP etc. 2.2 IoT enabling technologies (Embedded System, Sensor technology, Wireless network, Cloud Computing, Bigdata & Analytics)
UNIT 3. Interfacing & Programming for Embedded boards	3a.Describe hardware architecture of Arduino Uno	3.1 Arduino Uno & ESP8266 hardware architecture and Peripheral features. 3.2 Arduino programming environments: C Program Structure, Function,Strings, Time, Arrays, I/O Functions, 3.3 PWM(Pulse Width Modulation), I2C, SPI Interfacing sensors & actuators and displaying on LED, LCD, TFT 3.4 Wi Fi connectivity to WEB using ESP8266
UNIT 4.Implementation of	4a.Describe hardware architecture of	4.1 Raspberry Pi Architecture, Features, Linux Programming Environment, , Raspbian OS, Linux Commands,

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Unit	Unit Outcomes (UOs)	Topics and Sub-topics
IoT on Hardware platforms	Arduino Uno	4.2 Installation & settings, Python programming basics for Raspberry Pi
UNIT 5. Case studies of IoT	5a. Identify hardware & software required for IoT.	5.1 Home Automation, Smart City, Intelligent Traffic Control System, Health Care, Logistics, Smart Farming, Industry 4.0 etc., --Study Involves Sensors, Actuators, Wireless Connectivity, IoT Protocols & Platform

7. SPECIFICATION TABLE

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
1	Introduction to Internet of Things	4				
2	Wireless Sensor Network	3				
3	Interfacing & Programming for Embedded boards	4				
4	Implementation of IoT on Hardware platforms	3				
5	Case studies of IoT	2				

8. STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.
- Prepare a sample document with all word processing features.(Course teacher shall allot appropriate document type to each students)
- Prepare PowerPoint Presentation with all the presentation features.(Course teacher shall allot various topics to the groups of students)
- Prepare Database/spreadsheets in groups, related to various Fields/Organizations
- Undertake micro projects

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:

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- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Correlate subtopics with power plant system and equipments.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

10. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Internet of Things: A Hands-On Approach	Arshdeep Bahga, Vijay Madiseti VPT	Paperback 2015, ISBN: 978-0996025515 628/- 2
2	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetti Cisco	Press – Paperback – 16 A ISBN: 978-1- 58714-456- 1 599.
3	Smart Internet of Things projects	Agus Kurniawan	Sep 2016 2012, ISBN:9788131766613
4	The Internet of Things Connecting Objects to the Web	Hakima Chaouchi	Willy Publications 978-1- 84821- 140-7

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not

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be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

Create any real time application using IoT for example

- IOT Temperature & Mask Scan
- IOT Smart Dustbin
- IOT Social Distancing & Monitoring Robot For Queue
- Contactless IOT Doorbell

12. SOFTWARE/LEARNING WEBSITES

- <http://www.nptel.ac.in>
- <https://www.microsoft.com/en-in/learning/office-training.aspx>
- <http://www.tutorialsforopenoffice.org>
- <https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d>

13.PO - COMPETENCY- CO MAPPING

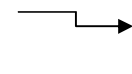
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Explain the need of Internet of Things.	1	2	1	3	1	1	3
Describe protocols for Wireless Sensor Network.	3	3	3	3	3	1	3
Interfacing & Programming for Embedded boards	3	3	3	3	3	1	3
Describe Architecture of Raspberry Pi.	2	1	1	1	-	1	3
Identify hardware & software required for IoT.	3	3	3	3	2	2	3
Summary	3	3	3	3	2	1	3

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PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Explain the need of Internet of Things.	1	-	1
Describe protocols for Wireless Sensor Network.	2	2	2
Interfacing & Programming for Embedded boards	3	-	3
Describe Architecture of Raspberry Pi.	3	-	-
Identify hardware & software required for IoT.	3	3	3
Summary	3	2	2

(Smt.A.D.Kshirsagar)
(Smt.A.B.Bhusagare)
Signature of Course Experts

(Smt. M.U.Kokate)
Signature of Head of Department

(Smt. M.U.Kokate)
Signature of Programme Head

(Mr.A.S.Zanpure)
Signature of CDC In-charge

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Program Name	:	Diploma Programme in IT
Program Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Mobile Application Development
Course Code	:	IT4105
Class Declaration	:	NO
Pre-requisite Course Code		NA

1. Rationale:

Smart phones are more common and nowadays almost everyone in this world make regular use of smart phones in their day to day lives. Students will be given introduction of Android operating system. This course examines the principles of mobile application design and development. Students will learn application development on the Android platform. Topics will include user interface design, user interface building, data handling, use of sensors, and specifics such as GPS. Students will design and build a variety of Apps throughout the course to reinforce learning and to develop real competency.

2. COMPETENCY:

- **Develop Simple Android Application**

3. COURSE OUTCOMES:

After completing this course students will be able to

- Install and configure Android application development tools
- Develop rich user Interfaces by using layouts and controls.
- Develop application using intent and menus.
- Create a complete Mobile application using content provider to handle database operations
- Develop application for providing location based services.
- Deploy android app on Google Play Store

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	*ESE	PA	100
2	-	2	4	--	--	50	50	

(*) : POE (Practical & Oral Examination)

Legends: *L*-Lecture; *T* – Tutorial, *P* - Practical; *C* –Credit, **ESE** - End Semester Examination; *PA* - Progressive Assessment; # –No theory exam , \$ –online examination , * – oral examination

5. PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	CO	Approx. Hrs. Required
1.	I, II	Install and JDK,Android Studio and Android SDK.	CO1,CO2	02
2.	III	Develop a program to Display Hello World On Screen.	CO3	02
3.	IV	Develop an application for login page with Button Click event.	CO4	02
4.	IV	Develop an application for Registration form using various Controls	CO4	02
5	IV	Develop an application for Native Calculator	CO4	02
6.	V	Write A Program to play Audio and Video.	CO5	02
7.	IV	Develop a program to pick up a date from datepicker.	CO4	02
8.	V	Write a program for sensors.	CO5	02
9	V	Write a program for Navigation using Intent.	CO5	02
10.	VI	Develop a program for content provider	CO6	04
11.	IV	Develop a program for sending email	CO4	02
12.	V	Demonstrate Async task using SQLite	CO5	02
13	VI	Demonstrate map based application	CO6	02
14	ALL	Micro project covering 2 or more COs from curriculum. (Refer Point no.11 for sample micro project list)	ALL	04
			Total	32

Sr.No.	Performance Indicators	Weightage in %
a.	Designing of User Interface	30
b.	Application of logic	40
c.	Debugging Ability	10
d.	Answers to sample questions	10
e.	Timely Submission of practicals	10
	Total	100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
a	Computer Systems (Any Computer System with basic configuration)	ALL
b	Any open source tools(e.g. Android Studio/Eclipse IDE,Any	ALL

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
	compatible web browser, any compatible database tool like SQLite)	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit 1: :Introduction to Android OS	
1a. Explain need and features of Android. 1b. Describe Android Architecture.	1.1. Introduction to Android, Open handset alliance, Android Ecosystem. 1.2. Need of Android ,Versions of Android, Features Of Android 1.3. Tools and software required for Android Application 1.4. .Android Architecture.
UNIT 2:Installation and Configuration of Android	
2a. Install and configure Android application development tools 2b. Differentiate between Java JDK. and Android SDK	2.1 Operating System, Java JDK, Android SDK 2.2 Android Development Tools(ADT) 2.3 Android Virtual Devices(AVDs) 2.4 Emulators 2.5 Dalvik Virtual Machine, Difference between JVM and DVM 2.6 Steps to install and configure Android Studio and SDK
UNIT 3.UI and Component Layout	
3a. Develop First Android Application 3b. Apply various layouts to develop Android Application	3.1 Control Flow, Directory Structure 3.2 Understanding components of a screen, Fundamental UI Design 3.3 Linear Layout 3.4 Absolute Layout 3.5 Frame Layout 3.6 Table Layout
UNIT 4 :Designing user Interface with View	
4a. Design and develop rich user Interfaces for the Android platform. 4b. Apply various views to Android application 4c. Develop application to Display Alerts.	4.1 Text View ,Edit Text 4.2 Checkbox ,Toggle Button 4.3 Radio Button And Radio Group 4.4 Progress Bar 4.5 ListView,GridView 4.6 Image View, Scroll View 4.7 Custom Toast Alert 4.8 Time And Date Picker

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 5 Activity And Multimedia with Databases	
5a. Apply various Intents and services in Android application 5b. Develop programs for playing audio and video 5c. Create database and and perform various operations on it.	5.1 Introduction to Intent, Intent Filter 5.2 Activity Lifecycle, Broadcast Lifecycle 5.3 Service: Features Of service, Android platform service, Defining new service, Service Lifecycle, Permission ,example of service 5.4 Android System Architecture ,Multimedia framework, Play Audio and Video, Text to speech, Sensors, sync tasks 5.5 SQLite Database, Need of SQLite Creation and connection of the database ,Extracting value from cursors, Transactions
UNIT 6 :Application Deployment and Security	
6a. Explain the location based services 6b. Explain Android Security Model 6c. Write Steps to deploy android app on Google Play Store.	6.1 SMS Telephony 6.2 Location Based Services: Creating the project, Getting the maps API key, Displaying the map, Displaying the zoom control ,Navigating to a specific location, Adding markers ,Getting location, Geocoding and reverse Geocoding, Getting Location data, Monitoring Location. 6.3 Android Security Model, Declaring and using permissions, Using Custom Permissions 6.4 Android Application Deployment: Creating Small Application, Signing of Application ,Deploy application on Google play store

8. SPECIFICATION TABLE

Not Applicable

9. STUDENT ACTIVITIES

Other than the classroom and laboratory 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:

- Prepare Journal for Practical's
- Prepare Micro projects

10. 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- 'L' in item No. 4** does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.

- c. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
- d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- e. Guide student(s) in undertaking micro-projects

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- 1) Android project on Online Shopping
- 2) Android project on College Result
- 3) Android project on Bus Reservation
- 4) Android project on Time Table

12. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	ANDRIOD	Prasanna Kumar Dixit, Vikas Publications, First Edition 2014	Vikas Publications, New Delhi, 2014 ISBN:9789325977884
2	Pro Andriod 5	David Maclean, Satya Komatineni, Grant Allen	Apress Publication, 2015, ISBN:978-1-4302-4680-0
3	Android Programming for Beginners	Hortan. John	Packet Publication, 2015, ISBN:978-1-78588-326-2

13. SOFTWARE/LEARNING WEBSITES

- a) <https://www.tutorialspoint.com/android>

- b) <http://developer.android.com/guide/index.html>.
- c) <http://developer.android.com/reference/packages.html>
- d) <http://developer.android.com/guide/components/fundamentals.html>
- e) <http://developer.android.com/guide/topics/ui/index.html>
- f) <http://developer.android.com/guide/topics/ui/declaring-layout.html>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Install and configure Android application development tools	1	-	-	3	-	1	3
Develop rich user Interfaces by using layouts and controls.	2	1	1	3	2	1	2
Develop application using intent and menus.	1	1	3	3	1	1	2
Create a complete Mobile application using content provider to handle database operations	2	2	3	3	2	2	2
Develop application for providing location based services.	2	1	1	3	1	2	3
Deploy android app on Google Play Store	2	1	1	3	1	2	3
Summary	2	1	2	3	3	3	3

15. PSO – COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
Install and configure Android application development tools	-	-	3
Develop rich user Interfaces by using layouts and controls.	-	-	3
Develop application using intent and menus.	-	-	3
Create a complete Mobile application using content provider to handle database operations	2	3	3
Develop application for providing location based services.	-	1	3

Deploy android app on google Play Store	-	-	3
Summary	2	2	3

(Smt.N.P.Sarwade) Signature of Course Expert	
(smt. M.U . Kokate) Signature of Programme Head	(Mr.A.S. Zanpure) Signature of CDC In-charge

Government Polytechnic, Pune

'180 OB' – Scheme

Programme	Diploma Programme in Computer Engineering, Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/15/16/17/18/19/21/22/23/24/ 26
Name of Course	Server-Side Scripting Using JSP
Course Code	CM5102
Prerequisite course code and name	NA
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

TEACHING AND EXAMINATION SCHEME									
Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	150
02	00	04	06	Marks	40	10	50	50	
				Exam Duration	2 Hrs	1 Hr			

(*):PoE (Practical & Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-Practical, ESE-End Semester Examination, PA- Progressive Assessment.

2. RATIONALE

In current trends of web world, dynamic and platform independent web applications are required. Java Server Page is an important scripting technology for computer engineering and Information Technology diploma graduates to develop dynamic and platform independent web-based applications. JSP is widely used server-side scripting technology as it allows designing web – based applications using java APIs, JDBC APIs.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Build WebPages using Java Server Page.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following **industry-oriented** COs associated with the above-mentioned competency:

1. Handle HTTP request- response using Servlet.
2. Design simple JSP page using JSP elements.
3. Managing threads, sessions, events, and filters.
4. Perform database operations using JDBC.
5. Deploy web applications.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are Pros (i.e., sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Install Web Server and database tool	CO1	02
2.		Write a program for demonstration of HTTP request and response using Servlet	CO1	02
3.		Develop a program to demonstrate use of all basic elements of JSP (Any 4 programs)	CO2	04
4.	2	Write a simple JSP program for Demonstrating use of expressions, declarations (Any 2 programs)	CO2	04
5.	3	Write a JSP program for Demonstrating use of request dispatching	CO1	04
6.		Write programs to demonstrate attributes of Page Directives	CO1	04
7.		Write a JSP programs for session management using Session tracking	CO3	04
8.		Write a JSP programs for session management using: URL re-writing Hidden Form Field	CO3	04
9.		Write program to insert records using JDBC	CO4	04
10.		Write program to display specific records using JDBC	CO4	04
11.		Write program to search and update records using JDBC	CO4	04
12.		Write program to remove specific records using JDBC	CO4	02
13.	4	Write a program to demonstrate use of JSP Filters	CO3	04
14.		Write a JSP program for Demonstration of Event Listeners	CO3	04
15.	5	Write program to demonstrate use of JSP Standard Tag Library (JSTL)	CO5	10
16.	All	Deploy a mini project in web server.(Refer point 11 for micro project list)	All COs	04
TOTAL				64

S.No.	Performance Indicators	Weightage in %
a.	Arrangement of available equipment / test rig or model	20
b.	Setting and operation	20
c.	Safety measures	10
d.	Observations and Recording	10
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	10
g.	Submission of report in time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Computer system	ALL
2	Any compatible open-source tools (e.g., NetBeans IDE/ Eclipse IDE/ Any equivalent IDE, Any compatible web server, Any compatible database tool e.g., MySQL or any equivalent tool)	ALL

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Section - I	
UNIT 1. Web programming Environment – Introduction (Weightage-06 , Hrs-04)	
1a. Select use of Servlet or JSP for the given problem 1b. Maintain HTTP sessions 1c. Use Servlet for request and response	1.1 Servlet and JSP overview: Servlet Life cycle, Servlet Classes, Threading Models, JSP life-cycle 1.2 Overview of the Hypertext Transfer Protocol (HTTP): The HTTP Specification, HTTP Request-Response Model, HTTP sessions 1.3 The Servlet API, The javax.servlet Package, Reading Servlet Parameters, Reading Initialization Parameter
UNIT 2. Introduction to JSP (Weightage- 06 , Hrs- 06)	
2a Design page using JSP elements and declarations for the given problem 2b Develop web logic using JSP expressions and Scriptlets and declarations for the given problem	2.1 Overview of JSP 2.2 JSP Syntax and semantics: Components of JSP page, JSP Development Model, and complete example. 2.3 Expressions 2.4 Scriptlets 2.5 Declarations
UNIT 3. Request Dispatching and Session and JDBC (Weightage-08 , Hrs- 06)	
3a. Apply the given validation rule. 3b. Use relevant page directive(s) to create page instructions for the given problem 3c. Use relevant session API to manage the session 3d. Use relevant JDBC driver for connecting the given database 3e. Write statements to perform primitive database operations using JDBC	3.1 Request dispatching and Form validation 3.2 Page directives 3.3 Session Management: Session tracking, Session API 3.4 JDBC: Overview of JDBC, JDBC Drivers, ResultSet, Statement, Prepared Statement, Connecting to a Database with Driver Manager

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Section - II	
UNIT 4.Application Event Listeners and Filters(Weightage- 06 , Hrs- 04)	
4a. Write function to handle given event using event listener 4b. Use the relevant JSP Filter to solve the given problem	4.1 Application Event Listeners 4.2 Filters: Filter overview, Developing and deploying a Filter
UNIT 5.JSP Tag Extensions(Weightage- 08 , Hrs- 08)	
5a Select relevant custom tags to design web page for the given problem. 5b. Develop business logic using expression language for the given situation	5.1 Custom Tags: Introduction and how it works 5.2 Tag Handlers and Tag Libraries 5.3 Expression Language 5.4 The JSP Standard Tag Library(JSTL) 5.5 Tag Extensions, Tag Files, and JSP Fragments
UNIT 6.Testing and Deploying web application (Weightage- 06 , Hrs- 04)	
6a. Test and Debug the Web application model. 6b. Deploying Web application.	6.1 JSP Testing and Debugging: Building a Mental Model. 6.2 Testing in Isolation. 6.3 Debugging Tools. 6.4 The web application environment. 6.5 The web archive (war) file. 6.6 The deployment Descriptor.

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Session-I						
I	Web programming Environment – Introduction	04	02	01	03	06
II	Introduction to JSP	06	01	02	03	06
III	Request Dispatching and Session and JDBC	06	04	01	03	08
	Total	16	07	04	09	20
Session-II						
IV	Application Event Listeners and Filters	04	01	02	03	06
V	JSP Tag Extensions	08	02	02	04	08
VI	Testing and Deploying web application	04	01	02	03	06
	Total	20	04	06	10	20

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Total		32	11	10	19	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Drawing flowchart and writing algorithms for the given problem statements.
- Prepare practical files with write-ups, programs and its outputs.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

(Only for Class Declaration Courses)

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Develop a sample application using JSP to generate invoice for selected items for any commercial web site
- Develop and deploy a sample application using JDBC to maintain and manipulate records of students of an institute
- Develop JSP application for e-learning portal with the help of JDBC, filters,

and Event Listeners.

d. Develop sample messaging application using JSP

12. SUGGESTED LEARNING RESOURCES

S. No.	Title	Author, Publisher, Edition, and Year of publication	ISBN Number
1	The Complete Reference JSP	Phillip Hanna, McGraw Hill Education; 1st edition, 2017	ISBN-10: 0070531412 ISBN-13: 978-0070531413
2	Head First Servlets and JSP	Bert Bates, Kathy Sierra, Bryan Basham, O'Reilly Media, 2 nd Edition, 2008	ISBN: 9780596516680
3	Java Server Programming Black Book Paperback	Dreamtech Software Team, Dreamtech Press; Platinum edition 2007	ISBN-10: 8177227211 ISBN-13: 978-8177227215

13. SOFTWARE/LEARNING WEBSITES

1. <https://www.javatpoint.com/jsp-tutorial>
2. <http://www.jsptut.com/>
3. <https://beginnersbook.com/jsp-tutorial-for-beginners/>
4. <https://www.studytonight.com/jsp/>
5. <https://onlinecourses.nptel.ac.in>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	-	-	2
CO2	3	2	3	2	-	-	2
CO3	3	2	3	2	-	-	2
CO4	3	2	3	3	-	-	2
CO5	2	2	3	3	-	1	3
Summary	3	2	3	1	1	1	1

	PSO1	PSO2	PSO3
CO1	-	-	3
CO2	-	-	3
CO3	-	1	3
CO4	-	1	3
CO5	-	-	3
Summary	-	1	3

Sign: Name: (Smt.A.S.Paike) (Smt.M.G.Yawalkar) (Smt.K.S.Gaikwad) (Course Expert /s)	Sign: Name: (Mr. U. V. Kokate) (Head of Computer Engineering)
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Sign:- Name:(Mr. U .V. Kokate) (Program Head) (Computer Engineering Department)	Sign: Name: Shri A.S. Zanpure (CDC In-charge)
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Government Polytechnic, Pune

'1800B' – Scheme

Programme Name	Diploma in Computer Engineering, Diploma in Information Technology
Programme Code	01/02/03/04/05/ 06/07/08/16/17/21/22/23/24/26
Course Title	Programming with PYTHON
Course Code	CM5101
Prerequisite course code and name	NA
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (InHours)			Total Credits (L+T+P)		Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	150
2	-	4	6	Marks	40	10	50	50	
				Exam Duration	2 Hrs.	1 Hr.	2 Hrs.		

(*): POE (Practical Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Python is powerful programming language. It has efficient high level data structures and a simple but effective approach to object-oriented programming. Python code is simple, short, readable, intuitive and powerful and thus it is effective for introducing computing and problem solving for beginners. Its elegant syntax and dynamic typing together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Develop applications using Python programming to solve given problems.**

4. COURSE OUTCOMES(COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

1. Develop simple Python programs using Python IDE.
2. Execute programs using operators and control flow statements.
3. Perform Operations using Python Data structures.
4. Develop applications using Functions, Modules and Packages.
5. Develop applications using object-oriented concepts in python.
6. Write Python code for File and Exception Handling.

5. SUGGESTED PRACTICALS/EXERCISES

The practical's in this section are PrOs (i.e., sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Install and configure python IDE.	CO1	01
2.	1	Write simple Python Program to display message on screen.	CO1	01
3.	2	Write simple Python Program using operators: • Arithmetic Operators • Logical Operators • Bitwise Operators	CO2	02
4.	2	Write simple Python Program to demonstrate use of conditional statements: • 'if' Statement • 'if...else' Statement • Nested 'if' Statement	CO2	02
5.	2	Write Python Program to demonstrate use of looping statements: • 'while' loop • 'for' loop • Nested loops	CO2	04
6.	2	Write Python Program to demonstrate use of looping statements: • continue • pass • break	CO2	04
7.	3	Write Python Program to perform following operations on Lists: • Create List • Access List • Update List (Add Item, Remove Item) • Delete List	CO3	04
8.	3	Write Python Program to perform following operations on Tuples: • Create Tuple • Access Tuple • Update Tuple • Delete Tuple	CO3	04
9.	3	Write Python Program to perform following operations on Set: • Create Set • Access Set elements • Update Set • Delete Set	CO3	04

10.	3	Write Python Program to perform following operations on Dictionaries: • Create Dictionary • Access Dictionary elements • Update Dictionary • Delete Dictionary • Looping through Dictionary	CO3	04
11.	4	i. Write Python Program to demonstrate math built-in functions (Any 2 Programs) ii. Write Python Program to demonstrate string built-in functions (Any 2 Programs)	CO4	04
12.	4	Develop user defined python function for given problem: • Function with minimum 2 arguments • Function returning values	CO4	04
13.	4	Write Python Program to demonstrate use of: • Built-in module (e.g., Keyword, math, number, operator) • User defined module	CO4	04
14.	4	Write Python Program to demonstrate use of: • Built-in packages (e.g., NumPy, Pandas) • User defined packages	CO4	04
15.	5	Write Python Program to demonstrate following operations: • Method overloading • Method overriding	CO5	02
16.	5	Write Python Program to demonstrate following operations: • Simple Inheritance • Multiple Inheritance	CO5	04
17.		Write Python Program to demonstrate File Handling through: • Opening file in different modes • Accessing file • Reading and Writing file • Closing file • Renaming and Deleting file	CO6	04
18.	6	Write Python Program to handle user defined exception for given problem.	CO6	04
19	All	Micro-project (Refer point 11 for micro project list)	All COs	04
		Total Hours		64

Sr. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	PrOs. No.
1	Hardware: Personal computer Pentium IV, 2 GHz minimum (i3-i5 preferable), RAM minimum 2 GB.	For all experiments
2	Any open-source tool (SPYDER / Eclipse IDE), Python Interpreter	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION I	
UNIT 1. Introduction to Python Programming (Weightage-04, Hrs.- 04)	
1a. Explain features of Python. 1b. Identify the given variables, keywords and constants in python. 1c. Use Indention, Comments in the given program. 1d. Install the Python IDE and editor. 1e. Write 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. Running Simple Python scripts to display message. Python Data Types: Numbers, Strings, Tuples, Lists, Dictionary, Declaration and use of data types.
UNIT 2. Python Operators and Control Flow (Weightage-06, Hrs.- 04)	
2a. Write simple Python program for the given arithmetic expressions. 2b. Write a Python program using decision making structure for two- way/multi-way branching to solve the given problem.	2.1 Basic Operators: Arithmetic, Comparison/Relational, Assignment, Logical, Bitwise, Membership, Identity Operators. Python Operator precedence. 2.2 Control Flow. 2.3 Conditional Statements (if, if...else, nested if). 2.4 Looping in Python (While loop, for loop, nested loops). 2.5 Loop manipulation using continue, pass, break, else.
UNIT 3. Data Structures in Python (Weightage-10, Hrs.- 08)	
3a. Write python program to use and manipulate lists for the given problem. 3b. Write python program to use and manipulate Tuples for the given problem. 3c. Write python program to use and manipulate Sets for the given problem. 3d. Write python program to use and manipulate Dictionaries for	3.1 Lists: Defining Lists, accessing values in list, deleting values from list, updating lists. Basic List Operations, Built-in List Functions. 3.2 Tuples: Accessing values in Tuples, deleting values from. Tuple and updating Tuples. Basic Tuple operations, Built- in Tuple Functions. 3.3 Sets: Accessing values in Set, deleting values from Set and updating Sets. Basic Set operations, Built-in Set Functions. 3.4 Dictionaries: Accessing values in Dictionary, deleting Values from Dictionary and updating Dictionary. Basic

the given problem.	Dictionary operations, Built-in Dictionary Functions.
SECTION II	
UNIT 4. Python Functions, Modules and Packages (Weightage-08, Hrs.- 06)	
4a. Use the Python standard functions for the given problem. 4b. Develop relevant user defined functions for the given problem. 4c. Write Python module for the given problem. 4d. Write Python Package for the given problem.	4.1 Use of Python built-in functions (e.g., type/data conversion functions, math function setc.). 4.2 User defined functions: Function definition, Function calling, function arguments and parameter passing, return statement, scope of variable: Global variable and Local variable. 4.3 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. 4.4 Python Packages: Introduction, Writing Python Packages, using standard (e.g., math, scipy, Numpy, matplotlib, pantslets.) and user defined Packages.
UNIT 5. Object Oriented Programming in Python (Weightage-06, Hrs.- 04)	
5a. Create Classes and Objects to solve the given problem. 5b. Write Python code for data hiding for the given problem. 5c. Write Python code using data abstraction for the given problem. 5d. Write Python program using inheritance for the given problem.	5.1 Creating Classes and Objects. 5.2 Method Overloading and Overriding. 5.3 Data Hiding. 5.4 Data Abstraction. 5.5 Inheritance and Composition Classes. 5.6 Customization vi inheritance specializing inherited methods.
UNIT 6. File and Exception Handling (Weightage-06, Hrs.- 06)	
6a. Write Python code for the given reading values from keyboard. 6b. Read data from the given file. 6c. Write the given data to a file. 6d. Handle the given exceptions through python program.	6.1 I/O operations: Reading keyboard input, printing to screen. 6.2 File Handling: Opening file in different modes, accessing file contents using standard library functions, reading and writing files, closing files renaming and deleting files. 6.3 Exception Handling: Introduction, 'try: except:' statement, 'raise' statement, user defined exceptions.

8. **SUGGESTED SPECIFICATION TABLE FORQUESTION PAPERDESIGN**

Unit No	Unit Title	Teaching Hrs.	Distribution of Theory Marks			
			R Level	U Level	A Levels	Total Marks
Section I						
I	Introduction to Python Programming	04	2	2	-	04
II	Python Operators and Control Flow	04	-	2	4	06

III	Data Structures in Python	08	2	4	4	10
Total		16	4	8	8	20
Section II						
IV	Python Functions, Modules and Packages	06	2	2	4	08
V	Object Oriented Programming in Python	04	-	2	4	06
VI	File and Exception Handling	06	-	2	4	06
Total		16	2	6	12	20
Total		32	06	14	20	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in laboratory.
- Follow Coding Standards.
- Undertake micro-projects.
- Develop variety of programs to improve logical skills.
- Develop Application oriented real world programs.

10. SUGGESTED 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:

- Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.9, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- Use different Audio-Visual media for Concept understanding.
- Guide student(s) in undertaking micro-projects.
- Demonstrate students thoroughly before they start doing the practice.
- Observe continuously and monitor the performance of students in Lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. *Create an English Dictionary which is able to perform following function*
 - *Add a word and its meaning.*
 - *Delete a word and its meaning.*
 - *Update a word and its meaning.*
 - *Print list of word and its meaning.*
- b. *Create Finance Currency calculator using classes and objects.*
- c. *Develop a game (Hangman, Tick Toe, Snake etc.) using Python data structure, functions and packages.*
- d. *Develop Calculator.*
- e. *Develop Alarm clock.*
- f. *Develop Music player.*

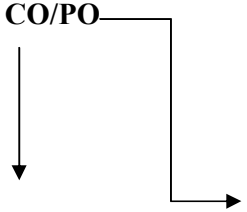
12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Python Programming	K. Nageswara Rao, Shaikh Akbar	• ISBN:9789385983450
2	Learning Python	Mark Lutz	• ISBN-13:978-1449355739
3	Python Essential Reference	David Beazley	• ISBN: 9780672329784
4	Head First Python, 2nd Edition	Paul, Barry	• ISBN: 1491919531

13. 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/>
- g. <https://www.w3resource.com/python-exercises/>
- h. <https://anandology.com/python-practice-book/>

14. PO - CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society	Project Management	Life Long Learning
Develop simple Python programs using Python IDE.	3	1	1	2	-	-	1
Execute programs using operators and control flow statements.	2	2	2	3	-	-	1
Perform Operations using Python Data structures.	2	2	3	3	-	-	2
Develop applications using Functions, Modules and Packages.	2	2	3	3	-	1	3
Develop applications using object-oriented concepts in python.	2	2	3	3	-	2	2
Write Python code for File and Exception Handling	2	2	3	2	-	2	3
Summary	2	2	3	3	-	2	2

15. PSO -CO MAPPING

CO /PSO	Hardware and Networking	Database Technologies	Software Development
Develop simple Python programs using Python IDE.	-	-	3
Execute programs using operators and control flow statements.	-	-	3
Perform Operations on Python Data structures.	-	-	3
Develop applications using Functions, Modules and Packages.	-	-	3
Develop applications using object-oriented concepts in python.	-	-	3
Write Python code for File and Exception Handling	-	2	3
Summary	-	2	3

Sign: Name: 1. Smt S.P.Panchakshari 2. Smt H F Khan 3. Smt A M Galshetwar 4. Smt A B Bhusagare 5. Smt S.A.Ade (CourseExperts)	Sign: Name: Mr. M.U. Kokate (Head of Department) (Information Technology)
Sign: Name: Mr. U.V. Kokate (Programme Head) (Department of Computer Engineering)	Sign: Name: Mr. A.S. Zanpure (CDC In-charge)

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'180 OB' – Scheme

Programme	Diploma in Computer Engineering Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of Course	Programming using PHP
Course Code	CM5103
Prerequisite course code and name	-
Class Declaration	YES

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				Total Marks
					Theory		Practical		
L	T	P	C		ESE	PA	*ESE	PA	
02	-	04	06	Marks	40	10	50	50	150
				Exam Duration	2 Hrs	1 Hr			

(*):PE(Practical Examination)

Legends: *L- lecture-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.*

2. RATIONALE

In the growing field of Web technology it is essential for every Diploma Engineers to learn PHP Language to help them build large and complex web applications. PHP can be used in three Primary ways: for server side scripting, for command line scripting and to develop client side GUI applications.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Develop simple web-based application using PHP language.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

- 1 Write program in PHP for interactive web development.
- 2 Implement different functions and use type conversion methods.
- 3 Write programs using arrays and graphics concepts.
- 4 Apply object-oriented concepts in programming.
- 5 Develop web pages with validations.
- 6 Create and manipulate database in PHP programming

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Installation & Sample PHP program.	CO1	1
2.	1	WAP for different Decision making control structure	CO1	2
3.	1	Write a PHP program to demonstrate the use of Looping structures using a) While statement b) Do-while statement c) For statement d) For each statement	CO1	2
4.	2	WAP for implementing different functions.	CO2	3
5.	3	WAP for array and different function with array.	CO3	2
6.	3	Program using basic drawing functions and on scaling mages.	CO3	2
7.	3	Program on converting an image to text and to create sample PDF document	CO3	2
8.	4	Creating an Object, Accessing Properties and Methods, Declaring a class in PHP program.	CO4	1
9.	4	Create an Overloading and Overriding class using Inheritance.	CO4	2
10.	4	Program on introspection	CO4	2
11.	4	Program on serialization	CO4	1
12.	5	Design a simple web page using following form controls (Text box, Radio button, Check box, Buttons, List box, Combo box, Hidden field box)	CO5	2
13.	5	Write a PHP program for sending and receiving plain text message (email).	CO5	2
14.	6	Develop web page with data validation.	CO5	2
15.	6	To build a sample PHP-database application using database connectivity and displaying database	CO6	2

16.	AL L UNI TS	Micro-Project	ALL	4
		Total		32

Sr. No.	Performance Indicators	Weightage in %
a.	Problem Selection and its feasibility study	20
b.	Logical thinking to decompose problem into modules	20
c.	Ability to use Performance tuning tricks in code	20
d.	Ability to estimates size and cost of software	20
e.	Presentation and Technical documentation skills	10
f.	Submission of reports within time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Major Equipment/ Instruments Required	PrO. No.
1	Hardware: Computer system (i3 - i5 preferable) (Any computer system with basic configuration)	For All Experiments
2	Operating system: Windows / Linux	
3	Any compatible open-source tools (Any compatible web server, Any compatible database tool e.g., MySQL or any equivalent tool)	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Section-I	
Unit 1: Introduction to PHP (Weightage-04, Hrs.- 04)	
1a. Write programs in PHP using basic syntactical constructs. 1b. Write PHP program using flow control statements.	1.1 History of PHP, Advantages of PHP, Syntax of PHP 1.2 Variables, Data types, Expressions and operators. 1.3 Flow control statements
UNIT 2. Functions and Strings (Weightage-08, Hrs.- 04)	

2a. Write program using parameter passing to call a function. 2b. Use type conversion methods in programs.	2.1 Calling a function, Defining a function, function parameters, Return values and errors from function, Including code. 2.2 Variable Functions, Anonymous Functions 2.3 String functions, Type Conversion
UNIT 3. Arrays and Graphics (Weightage-08, Hrs-08)	
3a. Write programs using arrays. 3b. Create and scale images using graphics concepts. 3c. Write program to create PDF document.	3.1 Creating & Manipulating Array, and Types of Arrays. 3.2 Extracting data from arrays, implode, explode, array flip 3.3 Storing data & comparing arrays 3.4 Extracting Multiple Values, arithmetic array function 3.5 Basics Graphics Concepts, Creating Images, Images with text, Scaling Images, Using PDF extensions.
Section-II	
UNIT 4. Object Oriented Concepts (Weightage-8, Hrs-6)	
4a. Apply object-oriented concepts in programming: Inheritance, Cloning 4b. Write programs using Introspection, Serialization.	4.1 Declaring a class & object, Accessing Properties and Methods, Static Class, Abstract Class, Interfaces 4.2 Inheritance, Overloading and Overriding, Cloning Object. 4.3 Introspection, Serialization
UNIT 5. Browser Handling (Weightage-06, Hrs.- 04)	
5a. Develop web pages using GUI components 5b. Implement validation of web page on client and server side 5c. Describe use and storage of cookies.	5.1 Creating a webpage using GUI Components, Reading data from web page 5.2 Web page validation (Client-Server side) 5.3 Session, Cookies & Sending Email
UNIT 6. Databases (Weightage-06, Hrs.- 06)	
6a. Use database techniques for creating and manipulating databases through PHP. 6b. Write programs for MySQL connectivity.	6.1 Relational Database and SQL using MySQL 6.2 PEAR DB basics, Advanced Database Techniques 6.3 Sample Application for PHP-MySQL Connectivity

8. 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
Section-I						
1	Introduction to PHP & Basics	04	02	01	01	04
2	Functions and Strings	04	02	02	04	08

3	Arrays and Graphics	08	02	02	04	08
Total		16	06	05	09	20
Section-II						
4	Object Oriented Concepts	06	02	02	04	08
5	Browser: Handling	04	01	02	03	06
6	Databases	06	01	02	03	06
Total		16	04	06	10	20
Total		32	10	11	19	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journals based on practical's performed in laboratory.
- Undertake micro-projects.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Correlate subtopics with power plant system and equipments.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

----- (Only for Class Declaration Courses)

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should

not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Develop web application for student attendance management system.
- b. Develop web application for-
 - i. Sending plain text email.
 - ii. Sending HTML message.
 - iii. Sending emails with attachment
- c. Develop web application for Library Management system.
- d. Develop web application for Student feedback system.

(Any other micro-projects suggested by subject faculty on similar line.

(Use structure and other features of 'C' to develop above listed applications)

12. SUGGESTED LEARNING RESOURCES

S.N .	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Rasmus Lerdorf, Kevin.T & Peter M.	Programming PHP, O'Reilly	
2	Steven Holzner	The Complete Reference PHP (Third Edition covers PHP), Tata - McGraw hill	

13. SOFTWARE/LEARNING WEBSITES

1. <https://www.w3schools.com/php/default.asp>
2. <http://www.tizag.com/phpT/>
3. <https://www.tutorialspoint.com/php/index.htm>
4. <https://www.geeksforgeeks.org/php/>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO ↓	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Write program in PHP for interactive web development.	2	-	-	1	-	-	1
Implement different functions and use type conversion methods	2	1	1	2	-	-	2

Write programs using arrays and graphics concepts.	2	1	1	1	-	-	2
Apply object-oriented concepts in programming.	1	2	3	3	2	1	2
Develop web pages with validations.	1	2	3	3	2	1	2
Create and manipulate database in PHP programming	1	2	3	3	2	1	2
Summary	2	3	3	3	2	1	2

PSO - COMPETENCY- CO MAPPING

CO / PSO	Hardware and Networking	Database Technologies	Software Development
Write program in PHP for interactive web development.	-	-	3
Implement different functions and use type conversion methods	-	-	3
Write programs using arrays and graphics concepts.	-	-	3
Apply object-oriented concepts in programming.	-	-	3
Develop web pages with validations	-	2	3
Create and manipulate database in PHP programming	-	2	3
Summary	-	2	3

Sign:

Name:

1. Mrs. R. J.Chavan
2. Mrs. S.B.Gosavi
3. Mrs. L.S.Korade
4. Mrs.A.B.Bhusagare
(Course Expert /s)

Sign:

Name:

Mrs. M.U.Kokate (Programme Head)
(Department of Computer Engineering)

Sign:

Name:

Mrs. M.U.Kokate
(Head of Department)
(Department of Computer Engineering)
Sign:

Name:

Mr. A.S. Zanpure
(CDC In-charge)

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Program Name	:	Diploma in Information Technology
Program Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Database Administration
Course Code	:	IT5101
Prerequisite course code and name	:	IT3104-Database Management Systems
Class Declaration	:	YES

1. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		
L	T	P	C	#ESE	PA	*ESE	PA	150
2	--	4	6	40	10	50	50	

(*) – Oral examination

Legends: *L*-Lecture; *T*– Tutorial, *P* - Practical; *C*–Credit, *ESE* - End Semester Examination, *PA* - Progressive Assessment, # –Online Theory examination

2. RATIONALE

The subject is intended to teach the student Database Architecture, Database Creation and administration, Database backup and recovery techniques and Database security methods which will enable him to Creating, managing, designing, monitoring, executing and maintaining the work related to any database system. This subject serves the knowledge to maintain up to date any database system

3. COMPETENCY

- Monitor and maintain Database system by applying SQL commands

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant Technical skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Describe database Architecture and management
2. Create and manage the database.
3. Create and manage control files & Redo log Files.
4. Backup and Recover Database using RMAN tool.
5. Manage tables, indexes and constraints.
6. Create and manage the database users.

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4. PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Note: Practical should be performed on any latest version of database software.

Example: Oracle 11g and above, Sql Server and Mysql

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Course Outcomes	Practical Hrs.	Tut Hrs
1.	Demonstration of Installation of Oracle Database Software.		CO1	02	-
2.	Study of the Oracle Architecture and its Main components	Basic of the DBA	CO1	-	02
3.	Create Oracle Database using DBCA	Managing an Oracle Instance AND Database	CO2	02	02
4.	Manage oracle instance and Create SPFILE and PFILE	Maintaining Control and Redo Log files AND Storage Management	CO2	02	02
5.	Create and Maintain Control file in Oracle Database		CO3	02	02
6.	Create Initial Online Redo Log File and Alter Online Redo log file with adding Groups and Members in it.		CO3	02	02
7.	Create and Manage Tablespace - Create Different types of Tablespaces - To Extend the Size of a tablespace - To Decrease the size of a tablespace - Making a Tablespace Read only. - Renaming Tablespaces - Dropping Tablespaces - Change the storage settings of tablespaces - Adding Data files to a Tablespace - Manually resizing data files - Obtaining Tablespace Information	Managing Tables, Indexes and Data Integrity	CO2	02	04
8.	Managing Tables with Data Integrity- - Create Table - Create Table using Oracle		CO5	04	04

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	Enterprise Manager • Create Table with Integrity Constraints • Alter Table • Create Temporary Tables • Changing storage and Block Utilization parameters • Reorganize, truncate, drop a table, Drop a column within a table				
9	Managing Indexes- • Create various types of indexes • Altering Indexes • Drop indexes • Get index information from the data dictionary		CO5	02	02
10	Managing Users- • Create new database Users • Alter and Drop existing database Users • Monitor Information about existing Users. • Display existing Users Information		CO6	02	02
11	Managing Privileges: • Grant System and Object Privileges to Users • Revoke System and Object Privileges from users		CO6	02	02
12	Managing Profiles: • Creating Profiles: Password Setting • Altering Profiles: Password Setting • Dropping Profiles: Password Setting	Database Security & Auditing	CO6	02	02
13	Managing Roles- • Create and modify Roles • Enabling and Disabling Roles • Control availability of Roles • Removing Roles • Display Role Information		CO6	02	02
14	Configure RMAN , Create Backup sets using RMAN and Manage Backup. Perform Incomplete Recovery with	Overview of Backup & Recovery	CO4	02	02

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	RMAN				
15	Microproject covering 2 or more COs from curriculum.(Refer Point no.11 for sample microproject list)	All	All	02	2
		Total		32	32

Sr.No.	Performance Indicators	Weightage in %
a.	SQL queries for maintaining database	80
b.	Answer to sample Questions	10
c.	Submit Report in time.	10
Total		100

5. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Computer System.	All
2	Any Database Software.	All

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics
SECTION-I	
Units 1 : Basic of the DBA(Weightage-07 ,Hours-07)	
- Define Responsibilities of DBA - Define the purpose of tablespaces and data files - Create and Manage Tablespaces. - Describe Physical ,Logical and memory structure of Oracle database. - Plan an Oracle installation	1.1 Responsibility of DBA, Oracle Architectural Components-Overview of Primary Components, Oracle server, Oracle instance, Establishing Connection and creating a session, Oracle Database. 1.2 Database Architecture: Physical Structure- Data File, Control File, Redo log File, Memory structure: SGA,PGA, Shared Pool , Database Buffer cache, Redo log buffer, Large Pool , Process Structure –User Process, Background Process, Server Process, Database Writer, Log Writer, SMON , PMON,CKPT, ARCn ,Logical Structure- Blocks ,Extents and Segments, Different Types of Segments, Tablespaces 1.3 Getting Started with the Oracle Server-:

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	Database Administrative Tools - Oracle Universal Installer, DBCA, SQL * plus, OEM 1.4 Managing Tablespaces : Types of Tablespaces , Creating , Altering and Dropping Tablespaces
Unit 2: Managing an Oracle Instance AND Database(Weightage-06 ,Hours-04)	
• Create a database with the Database Configuration Assistant (DBCA) tool. • Create and Manage the database by writing command. • Start and stop the Oracle database and components • Modify database initialization parameters	2.1 Managing an Oracle Instance- Initialization Parameter Files, PFILE, SPFILE, Starting Up a Database. 2.2 Creating Database- Planning & Organizing database, OFA, Prerequisites necessary for Database creation, Creating Database using DBCA, Creating Database Manually 2.3 Alter Database, Opening a Database Restricted Mode and Read Only mode, Shutting down Database using Various Modes.
Unit 3: Maintaining Control and Redo Log files AND Storage Management (Weightage- 07,Hours-05)	
• Create and Manage Redo Log Files and Control Files. • Describe the main concepts and functionality of Automatic Storage Management (ASM) • Describe the mechanism of OMF data file	3.1 Control File- Control File Contents, Creating Control File, Multiplexing Control File, Obtaining Control File Information 3.2 Redo Log Files- Structure of Online Redo Log File, Working of Online Redo Log Files , Creating Initial online Redo Log files, Altering Redo Log Files-Adding Online Redo Log File Groups & Members, Dropping Online Redo Log File Groups & Members, Renaming & Clearing Online Redo Log Files 3.3 Why use Oracle Managed Files (OMFs), The mechanism of OMF, OMF Data File 3.4 Automatic Storage Management ASM Architecture, Data Dictionary, Data Dictionary Contents, How Data Dictionary is Used?
SECTION-II	
Unit 4: Overview of Backup & Recovery(Weightage- 07,Hours-05)	
• Identify the types of failure that may occur in Database • Backup database without shutting it down	4.1 Database Backup: Factors impacting Backup and Recovery, Understand why System Fails, Why Need to be BackupUp?, Different Types of Backup- Logical and physical Backups,

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• Backup database using RMAN tool • Recover Database using RMAN tool.	Operating System Backup, Cold and Hot backup, Whole & Partial Database Backup ,Flash Recovery Area-Benefits, Ways to create Flash Recovery Area, backing Up Flash recovery Area. 4.2 Database Recovery: Types of Database Failure , Different Recovery environment, The Oracle Recovery Process-Crash & Instance Recovery , Media Recovery 4.3 Performing Recovery with RMAN- Recovery Manager, Benefits of RMAN, RMAN Architecture, RMAN's Advantages for Recovery
Unit 5: Managing Tables, Indexes and Data Integrity(Weightage-07 ,Hours-06)	
• Create and Manage tables • Create and manage Indexes on given data. • Apply different constraints on table to maintain integrity.	5.1 Managing Tables: Creating Table, Creating Table Guidelines, Create Table using OEM , Create Temporary table ,Altering Table- Changing Storage and Block utilization parameters, Manually Allocating Extents, Truncating & Dropping Table , Obtaining Table Information 5.2 Managing Index: Classification of Indexes, B-Tree Index, Bitmap index, Creating B-Tree Index & Bitmap Index ,Altering Index- Changing Storage Parameters , Allocating and Deallocating Index Space, Rebuilding Indexes, Checking Index validity, Dropping Index, Obtaining Index Information 5.3 Managing Constraints: Data Integrity, Different Types of Constraints, Primary key constraint, Foreign key constraint, unique constraint, Not Null constraint, Check constraint ,Defining Constraints while creating table, Altering Table ,Constraints- Enabling, Disabling & Renaming Constraints, Dropping Constraints, Obtaining constraint Information
Unit 6: Database Security & Auditing(Weightage-06,Hours-05)	
• Create and Manage Users in Oracle database • Grant and revoke privileges • Create and Manage the User Roles • Create and manage profiles • Implement standard password security features on database.	6.1 Managing User : Creating Users, Altering Users, Dropping Users 6.2 System Privileges and Role: System privileges ,Granting System Privileges, Revoking System Privileges, Object Privileges, Granting Object Privileges, Revoking Object Privileges, Obtaining Privileges information, Roles: Benefits of Roles, Creating Roles, Predefined Roles,

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.	Modifying Roles, Assigning Roles , Revoking Roles From Users, Removing Roles, Obtaining Role information 6.3 Password Management: Enabling Password Management, Password Account Locking, Creating Profile, Altering Profile, Dropping Profile with password setting 6.4 Auditing: Auditing Guidelines ,Statement Auditing, Schema Object Auditing, Fine Grained Auditing, Obtaining Auditing Information
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8. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		Knowledge	Comprehension	Application	
01	Basic of the DBA	04	01	01	07
02	Managing an Oracle Instance AND Database	02	01	02	06
03	Maintaining Control and Redo Log files AND Storage Management	02	02	02	07
04	Overview of Backup & Recovery	02	02	03	07
5	Managing Tables, Indexes and Data Integrity	02	02	04	07
06	Database Security & Auditing	02	02	04	06
	Total	14	10	16	40

9. STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.

10. 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:

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- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals.

11. MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

Take any database application (Library management, Inventory management etc.) and perform following administrative tasks on that

- Identify user needs to create and administer databases
- Design and build new databases
- Ensure that organizational data are secure
- Backup and restore data to prevent data loss
- Ensure that databases operate efficiently and without error
- Make and test modifications to database structure when needed
- Maintain databases and update permissions

12. LEARNING RESOURCES

Sr.No.	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Oracle Database Database Administrator's Guide, 19c	Oracle	

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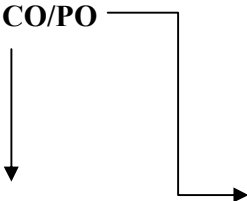
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2	Oracle 9i:DBA Fundamentals	Oracle Education-Tutorialpoints	
3	Oracle 9i : Expert publication		

13. SOFTWARE/LEARNING WEBSITES

a. <https://docs.oracle.com/en/database/oracle/oracle-database/19/admin/toc.htm>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO/PO 	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Describe database Architecture and management	3	3	3	3	2	2	3
Create and Manage the database	3	3	3	3	2	2	3
Create and manage control files & Redo log Files	3	3	3	3	3	3	3
Backup and Recover Database using RMAN tool.	3	3	3	3	3	3	3
Manage tables, indexes and constraints.	3	3	3	3	3	3	3
Create and Manage the database users.	3	3	3	3	3	3	3
Summary	3	2	2	2	1	2	2

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15. PSO - COMPETENCY- CO MAPPING

CO/PSO ↓	Hardware and Networking	Database Technologies	Software Development
Describe database Architecture and management	-	3	-
Create and Manage the database	1	3	1
Create and manage control files & Redo log Files	-	3	-
Backup and Recover Database using RMAN tool.	1	3	1
Manage tables, indexes and constraints.	-	3	1
Create and Manage the database users.	-	3	1
Summary	1	3	1

(Smt.A.D.Kshirsagar
Smt.H.F.Khan)
Signature of Course Expert

(Smt. M.U. Kokate)
Signature of Programme Head

(Mr. A.S. Zanjure)
Signature of CDC In-charge

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Program Name	:	Diploma Programme in Information Technology
Program Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Cloud Technologies
Course Code	:	IT5102
Class Declaration	:	NO

1. 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	PA	*ESE	PA	150
2	-	4	6	40	10	50	50	

(*): Oral Examination

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End Semester Examination, PA- Progressive Assessment.

2. RATIONAL

Cloud computing has evolved as a very important computing model, which enables information, software, and other shared resources to be provisioned over the network as services in an on-demand manner. There are many aspects of cloud computing viz cloud types, storage in cloud, and security in cloud, cloud monitoring and management. Having specific skills in these areas is necessary for diploma pass-outs to create and maintain cloud based services. After learning this course student will be able to implement virtualization, create cloud based storage, Implement security, and manage cloud services.

3. COMPETENCY

- Maintain cloud based services.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Maintain Cloud Based Application.
2. Implement virtualization in Cloud Computing.
3. Maintain Storage System in Cloud.
4. Maintain Cloud Services.
5. Implement Security in Cloud Computing.
6. Implement cloud on different platforms.

5. SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
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1.	1	Use Google Doc to make spreadsheet and note	CO1	02
2.		Install and configure Cloud using JustCloud		02
3.		Use Cloud9 to demonstrate use of different language.		02
4.	2	Create and Delete Virtual Machine using VMWare	CO2	02
5.	3	Implement Storage Service on Cloud Using OpenStack	CO3	02
6.		Use openStack for File Management		02
7.	4	Monitor Cloud using Nagios Tool	CO4	02
8.		Create and Host simple web application on Microsoft Azure/Google Cloud.		02
9.		Work in Convdey to Show Provisioning and scaling a website		02
10.		Implement Identity management and access management using openStack		02
11.		Work in Codenvy to show Provisioning and scaling of website (partII)		02
12.	5	Implement identity management and access management using open stack.	CO5	04
13.		Configure servers using Microsoft Azureto secure it.(Part-I) OR Configure servers using Microsoft Azureto secure it.(Part-II)		
14.	6	Design a small application based on IoT using Arduino or Raspberry pi. (Part-I) OR Design a small application based on IoT using Arduino or Raspberry pi. (Part-II)	CO6	02
15.	ALL	Complete a micro project based on guidelines provided in Sr. No. 11	ALL	04
Total				32

Sr. No.	Performance Indicators	Weightage in %
a.	Preparation of experimental Setup	30
b.	Setting and operation	20
c.	Writing and executing programs to get desired output	10
d.	Observations and Recording	10
e.	Interpretation of result and conclusion	10
f.	Answer to sample questions	10
g.	Submit Report/Assignment on time	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
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Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Computer Systems- Hardware: min 8GB RAM, 512 GB HDD, Gigabit Ethernet network equipment, Software Requirement: Apache Tomcat, Java, Python, Virtualization software (Academic version of any free cloud services) Azure/Google/AWS	All

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit 1: :Introduction to Cloud Computing (Weightage- 06, Hrs.- 04)	
1a. Explain the specified characteristics of Cloud computing. 1b. Compare the given Cloud Deployment Models on the given criteria. 1c. Explain the given services offered by identified Cloud service Model. 1d. Explain the given components of cloud computing architecture. 1e. Write steps to use Cloud Based Integrated Develop the given application.	1.1 Introduction to Cloud Computing: Introduction to Distributed Computing, Grid Computing, Cluster Computing and Utility computing 1.2 Cloud Computing, Essential Fundamentals characteristics of Cloud Computing 1.3 Cloud Deployment Model: Public Cloud ,Private cloud, Community cloud, Hybrid cloud 1.4 Cloud Service Models: IaaS, PaaS,IaaS 1.5 Architecture of Cloud Computing 1.6 Cloud Computing Infrastructure of cloud computing 1.7 Cloud-Based Integrated Development architecture Environment (IDE) to write, run and debug code with browser
UNIT 2.Cloud Economics and Virtualization (Weightage- 06, Hrs- 04)	
2a. Explain the given feature of Virtualization. 2b. Explain the characteristics of the specified Virtualization type. 2c. Write generic steps to build a virtual machine using VMW are on the given OS. 2d. Describe the given disadvantage of Virtualization.	2.1 Introduction, Virtualization Reference Model, Characteristics of virtualized Environment 2.1 Virtualization Types 2.1 Technology Example: VMWare 2.1 Microsoft Hyper-V, KVM , Xen 2.1 Advantages: Virtual Machine(VM),VM Migration, VM Consolidation, 2.1 Disadvantages of Virtualization
UNIT 3.Cloud Storage (Weightage- 08, Hrs- 06)	

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Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
3a. Explain the given components of storage system architecture. 3b. Write steps to design storage system for the given cloud set-up 3c. Compare GFS and HDFS based on the given criteria.	3.1 Storage System Architecture, 3.2 Virtualizes Data Centre (VDC) Architecture, VCD Environment, Storage and networking, desktop and application virtualization technique and applications 3.3 Block and file level storage virtualization, Virtual Provisioning, and automated storage tiring, Virtual storage area network(VSAN) and benefits, 3.4 Cloud file systems: Google File System GFS and Hadoop Distributed File System HDFS
UNIT 4 Cloud Service and Resource Management (Weightage- 08, Hrs- 06)	
4a. Describe the given component of federated cloud computing. 4b. Compare different types of SLA based on the given criteria. 4c. Describe the given cloud interface standard. 4d. Explain the steps to use relevant technique for managing the given Cloud resource.	4.1 Service Provider and users Cloud of federated cloud computing. 4.2 An architecture of federated cloud monitoring 4.3 Service Level Agreement (SLA) management: Types of SLA, Life of SLA 4.4 Service catalog, management and functional interfaces 4.5 Cloud portal and its function 4.6 Cloud Service life cycle phases: Service planning, service creation, service operation and service termination 4.7 Cloud resource management : Ab-initio Resource Assignment, Periodic Resource Assignment
UNIT 5. Security in Cloud Computing (Weightage- 06, Hrs- 06)	
5a. Explain the given security related risk in Cloud Computing. 5b. Explain the specified feature of Key security terminology for data security. 5c. Write steps to implement the given Technology for Securing the Data on cloud. 5d. Write steps to manage the Identify and Access facility of given Cloud set-up. 5e. Explain the given features of Security-As-A-Cloud Service.	5.1 Cloud Security Fundamentals Security in related risk in Cloud 5.2 Cloud Risk, Cloud Risk division • Polity and Organizational Risks Computing • Technical Risk • Legal Risk 5.3 Technologies for Data security, Data Security Risk 5.4 Digital identity and access management 5.5 Content level security Identity 5.6 Security-As-A-Cloud Service given Cloud set-up.
UNIT 6. Trends and future in cloud (Weightage- 06, Hrs- 06)	
6a. Explain the characteristics of the given Enabling Technology with the IoT. 6b. Select relevant cloud platform for the identified application with justification.	6.1 Cloud trends in supporting Ubiquitous Computing 6.2 Enabling Technologies with the Internet of Things(RFID,Sensor, Networks and ZigBee

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Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
6c. Describe the features of the given type of cloud-based smart device. 6d. Compare features of the given cloud platform on the specified criteria.	Technologies, GPS) 6.3 Innovative Applications with the Internet of Things (Ex.:Smart Building and Smart Power Grid) 6.4 Future of Cloud-Based smart Devices, Home Based Cloud Computing, Energy Aware Cloud Computing 6.5 Cloud Platforms: Amazon EC2 and S3, Microsoft Azure, Cloud stack, Intercloud, Google App Engine, Open Source cloud Eucalyptus, Open stack, Open Nebula, etc.,

8. SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Cloud Computing	04	02	02	02	06
II	Cloud Economics and Virtualization	04	02	02	02	06
III	Cloud Storage	06	02	04	04	08
IV	Cloud Service and Resource Management	06	02	04	04	08
V	Security in Cloud Computing	06	02	02	02	06
VI	Recent Trends in Cloud Computing	06	02	02	02	06
Total		32	08	10	22	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal based on practical performed in laboratory.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

Sr. No.	Topic	Instructional Strategy
1	Introduction to Cloud Computing	Class room teaching
2	Cloud Economics and Virtualization	Laboratory demonstration

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3	Cloud Storage	Class room teaching, laboratory demonstration
4	Cloud Service and Resource Management	Class room teaching, laboratory work
5	Security in Cloud Computing	Class room teaching, laboratory work
6	Recent Trends in Cloud Computing	

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Prepare the report on case study of Amazon Cloud Services
- Prepare the charts explaining the types of Cloud.
- E-Learning Platform using Cloud Computing.
- Cloud Based Improved File Handling and Duplication Removal Using MD5.
- Secure File Storage On Cloud.

12. LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Cloud Computing, Principals and Paradigms	Buyya Rajkumar, J.Broberg, A.Goscinski	A John Wily & Sons, Inc., Publication, ISBN: 978-0-470-88799-9
2	Cloud Computing	Sharma Rishabh	Wiley Publication, ISBN: 978-81-265-5306-8
3	Mastering Cloud Computing	Buyya Rajkumar, Vecchiola Christian	McGraw Hill Publication, ISBN 978-1-25-902995-0
4	Cloud Computing	Singh Shailendra	Oxford University Press, ISBN: 9780199477388

13. SOFTWARE/LEARNING WEBSITES

- <http://nptel.ac.in/courses/1061051671/1>

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2. <http://www.techopedia.com/definition/2cloud-computing>
3. <http://onlinelibrary.wiley.com/doi/book/10.1002/9780470940105>
4. <http://www.chinacloud.cn/upload/2011-07/11073107539898.pdf>

14.PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	-	-	1	-	-	1
CO2	1	1	1	2	-	-	2
CO3	1	1	1	1	-	-	2
CO4	1	2	3	3	2	1	2
CO5	1	2	3	3	2	1	2
CO6	1	2	3	3	2	1	2
Summary	2	3	3	3	2	1	2

PSO - COMPETENCY- CO MAPPING

	PSO1	PSO2	PSO3
CO1	-	1	3
CO2	-	-	3
CO3	-	-	3
CO4	-	-	3
CO5	-	2	3
CO6	-	2	3
Summary	-	2	3

Sign:

Sign:

(Smt.N.P.Sawade &

Sign:

Sign:

Name: (Mr.U.V.Kokate)

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Smt.K.S.Gaikwad) Signature of Course Expert	Signature of Head of the Department (Information Technology)
Sign: (Smt. M.U. Kokate) Signature of Programme Head	Sign: (Mr. A.S. Zanpure) Signature of CDC In-charge

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'180 OB' – Scheme

Programme	Diploma in Computer Engineering, Diploma in Information Technology
Programme code	01/02/03/04/05/ 06/07 /08/16/17/21/22/23/24/ 26
Name of Course	Digital Forensics and Ethical Hacking
Course Code	CM5106
Prerequisite course code and name	NA
Class Declaration	Yes

1. TEACHING AND EXAMINATION SCHEME

I. TEACHING AND EXAMINATION SCHEME									
Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Practical		Total Marks
L	T	P	C		ESE	PA	*ESE	PA	150
03	00	02	05	Marks	80	20	25	25	
				Exam Duration	3 Hrs.	1 Hr.			

(*): OE (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment

2. RATIONALE

Digital forensic investigation plays a vital role in predicting and analyzing the digital crime. It is procedure of preservation, identification, analysis and report making of digital evidence stored as data on magnetically encoded information. The data resides in the computer in a hidden way such that only special forensic software tools and standard procedures can fetch/retrieve it. Hacking outlines computer hacker tricks and techniques that one can use to access the security of information system, find vulnerabilities that matter and fix the weaknesses before the criminal hackers and malicious insiders take advantage of them. Ethical hacking is the professional and legal types of security system. So, this course will enable the students to employ security measures and keep an external hackers and malicious users in check.

3. COMPETENCY

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

- **Locate digital evidences in cyber breaches and use ethical hacking techniques as preventive measures.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following **industry oriented** COs associated with the above mentioned competency:

1. Describe Models of Digital Forensic Investigation.
2. Locate the digital evidences in file system.
3. Follow Evidence handling procedures.
4. Select relevant tools for hacking.
5. Detect system and network vulnerabilities.
6. Apply Hacking Methodologies to get into the system.

5. SUGGESTED PRACTICALS/ EXERCISES

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approx. Hrs. Required
1.	1	a. Monitor CPU Utilization * and Memory Utilization for detecting unauthorized process activations. *Hint: More CPU utilization as compared to Memory is an indicator of anomaly	CO1, CO2	2
	1	b. Create complete memory dump using windows.		2
	2	c. Read Memory Dump Using Windows Driver toolkit.		
2.	1	Crack passwords using password cracking tools like <i>LC4/John the Ripper/pwdump</i> or any equivalent.	CO1	2
3.	2	Read and Interpret * Operating Systems logs on Windows/Linux file system. *Hint: Check whether the log gives information about file systems. Any such entry indicates some malicious activity.	CO2	2
4.	2	Install Kali Linux.	CO2	2
5.	3	Collect live data on Windows: a) Create a response toolkit on windows having utility <i>cmd.exe</i> , <i>PsLoggedOn</i> , <i>netstat</i>	CO3	2
		b) Establish TCP connection between forensic workstation and the target system using <i>netcat</i>		2
		c) Run trusted <i>cmd.exe</i> , identify logged users and remote access users, Record creation, access times and all the modifications made to the files		2
6.	5	a) Check whether Email is a spam by analyzing the Email Header b) Install software like SpamAssassin (an antispam platform) c) Read and analyze Email Header using software like SpamAssassin	CO5	2
7.	4, 6	a) Install Wireshark tool on Windows/Kali Linux	CO4, CO6	2
		b) Use Wireshark tool to capture network traffic and to understand three-way handshaking concept/Analyze the packet.		2
8.	5,6	Perform port scanning using <i>nmap</i> utility to test whether ports are listening and vulnerable .	CO5, CO6	2
9.	5	Perform Arp poisoning on Kali Linux using <i>Etercap</i> or equivalent tool.	CO5	2
10.	5	Establish DoS attack using TCP/ICMP flooding: a) Ping continuously a particular machine at a time from different machines and observe the machine behavior on Network.	CO5	2
		b) Write shell script for continuously flooding a Machine with ping and observe the machine behavior on Network.		2
11.	All	Micro-project (Refer point 11 for micro project list)	All COs	2
Total				32

S. No.	Performance Indicators	Weightage in %
a	Configuration of Windows/Kali Linux operating system	40

b	Use of different digital forensic and ethical hacking tools	40
c	Submit journal report in time	20
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Experiment Sr. No.
1	Computer system (Any computer system with basic configuration)	All
2	Windows/Linux operating system.	
3	Digital Forensic and Hacking Tools preferably Open source as mentioned in practical's	

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION I	
Unit - I: Basics of Digital Forensics (Weightage-12 , Hrs-06)	
1a. Explain the given rule of digital forensic. 1b. Describe the given model of digital forensic investigation. 1c. Identify whether the given issue in digital forensics is ethical or unethical 1d. Explain characteristics of the given Model of Digital Forensic Investigation.	1.1 Digital forensics: Digital forensic History of forensic, Rules of digital forensic, Digital forensics investigation and its goal 1.2 Models of Digital Forensic Investigation: DFRWS Investigative Model, Abstract Digital Forensics Model (ADFM), Integrated Digital Investigation Process (IDIP), End-to-End digital investigation process (EEDIP), An extended model for cybercrime investigation, UML modeling of digital forensic process model (UMDFPM) 1.3 Ethical issues in digital forensic: General ethical norms for investigators, Unethical norms for investigation.
Unit - II: Hardware and Software Environments (Weightage-12 , Hrs- 08)	
2a. Describe the given nature of digital information. 2b. Show relationship between different categories in the given file system. 2c. Write steps to locate the given evidence in file system. 2d. Describe the indicators of integrity for the given information.	2.1 Computers and the nature of digital information: Magnetic hard drives and tapes, Optical media storage devices, Random-access memory (RAM), Solid-state drive (SSD) storage devices, Network-stored data, The cloud 2.2 File systems that contain evidence: file system category, filename category, metadata category, content category 2.3 Locating evidence in file systems: Determining the means of transgression, opportunity to transgress, and the motive to transgress, Deciding where to look for possible evidence, Indexing and searching for files, Unallocated data analysis 2.4 Password security, encryption, and hidden files: User access to computer devices importance of

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	information confidentiality, information integrity, and information availability, User access security controls, Encrypted devices and files
Unit - III: Digital Evidence (Weightage-16 , Hrs- 10)	
3a. Describe the given rule of digital evidence. 3b. Explain characteristics of the given type of digital evidence. 3c. Explain features of the given Challenge in evidence handling. 3d. Describe the given evidence handling procedure.	3.1 Digital Evidences: Definition, Best Evidence Rule, Original Evidence 3.2 Rules of Digital Evidence 3.3 Characteristics of Digital Evidence: Locard's Exchange Principle, Digital Stream of bits 3.4 Types of evidence: Illustrative, Electronics, Documented, Explainable, Substantial, Testimonial 3.5 Challenges in evidence handling: Authentication of evidence, Chain of custody, Evidence validation 3.6 Volatile evidence 3.7 Evidence handling procedure: Evidence system description, digital photos, evidence tag, evidence label, evidence storage, evidence log, working copies, evidence backup, evidence disposition, evidence custodial audit, evidence safe, shipping evidence media 3.8 Ethical issues/legal principle of digital evidence: Circumstantial and hearsay nature of Digital Evidence, Authorization to conduct Digital Forensics investigation, authenticity of digital evidence, scientific method 3.9 Digital Evidence and metadata
SECTION II	
Unit - IV: Basics of Hacking (Weightage-14 , Hrs-08)	
4a. Explain the features of the given type of attack on computer system. 4b. Describe the features of the given ethical hacking principle to be obeyed. 4c. Explain the process of ethical hacking for the given problem. 4d. Classify the given component of cracking the Hacker Mindset.	4.1 Ethical Hacking: How Hackers Beget Ethical Hackers, Defining hacker, Malicious users 4.2 Understanding the need to hack your own systems 4.3 Understanding the dangers your systems face: Nontechnical attacks, Network-infrastructure attacks, Operating-system attacks, Application and other specialized attacks 4.4 Obeying the Ethical hacking Principles: Working ethically, Respecting privacy Not crashing your systems 4.5 Ethical hacking Process: Formulating plan, Selecting tools, Executing the plan, Evaluating results 4.6 Cracking the Hacker Mindset: What You're Up Against? Who breaks in to computer systems, Identifying the purpose of hacking, Planning and Performing Attacks, Maintaining Anonymity
Unit - V: Types of Hacking (Weightage-14 , Hrs-08)	
5a. Describe the characteristics of the given type of Network Infrastructure	5.1 Network Hacking Network Infrastructure: • Network Infrastructure Vulnerabilities,

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Vulnerability. 5b. Explain features of the given type of operating system Vulnerability. 5c. Describe the given type of best practice followed to minimize e-mail security risk. 5d. Describe the given type of best practice followed to minimize Database Vulnerability.	- Scanning-Ports, Ping swiping - Scanning SNMP, Grabbing Banners - Analysing Network Data and Network Analyzer, MAC-daddy attack Wireless LANs: - Implications of Wireless Network Vulnerabilities, - Wireless Network Attacks 5.2 Operating System Hacking - Introduction of Windows and Linux Vulnerabilities 5.3 Applications Hacking Messaging Systems - Vulnerabilities, E-Mail Attacks- E-Mail Bombs, Banners, - Best practices for minimizing e-mail security risks Web Applications: - Web Vulnerabilities, Directories Traversal and Countermeasures Database system - Database Vulnerabilities - Best practices for minimizing database security risks
Unit - VI: Ethical Hacking Plan and Hacking Methodologies (Weightage-12 , Hrs-08)	
6a. Write steps to develop ethical hacking plan 6b. Select appropriate security assessment tool. 6c. Describe hacking methodologies 6d. Describe vulnerabilities in the system.	6.1 Developing Ethical Hacking Plan - Establishing your Goal - Determining which system to hack - Creating testing standards - Selecting security assessment tools 6.2 Hacking Methodologies - Setting the stage for testing - Seeing what others see - Scanning systems - Determining what's running on open ports - Assessing vulnerabilities - Penetrating the system

8. 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
Section I						
I	Basics of Digital Forensics	06	04	06	02	12
II	Hardware and Software Environments	08	02	04	06	12
III	Digital Evidence	10	02	08	06	16
	Total	24	8	18	14	40
Section II						
IV	Basics of Hacking	08	02	08	04	14
V	Types of Hacking	08	02	08	04	14

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
VI	Ethical Hacking Plan and Hacking Methodologies	08	02	06	04	12
	Total	24	6	22	12	40
	Total	48	14	40	26	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Prepare journals based on practical performed in laboratory.
- b. Prepare report on suggestive case study of digital forensic as give below:
 - i. The Aaron Caffrey case – United Kingdom, 2003
<http://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1370&context=chtlj>
 - ii. The Julie Amero case – Connecticut, 2007
<http://dfir.com.br/wp-content/uploads/2014/02/julieamerosummary.pdf>
 - iii. The Michael Fiola case – Massachusetts, 2008
<http://truthinjustice.org/fiola.htm>.

10. SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations.
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Use different Audio-Visual media for Concept understanding.
- e. Guide student(s) in undertaking micro-projects.
- f. Demonstrate students thoroughly before they start doing the practice.
- g. Observe continuously and monitor the performance of students in Lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Study any Trojan attack. Identify the Trojan attack:
 - i. State the way trojan got installed on particular Machine.
 - ii. State the effects of the Trojan.
 - iii. Elaborate/Mention/State protection/Blocking mechanism for this specific Trojan, example specification of any anti-threats platform which filters the Trojan.
- b. Study Credit card fraud as an identity threat. Identify:
 - i. Use of digital media in carrying out fraud.
 - ii. Vulnerability Exploited.
 - iii. Effect of fraud.
 - iv. Protection/Precaution to be taken against such frauds.
- c. Study any case of forgery /falsification crime case solved using digital forensics:
 - i. Identify the model used for Digital Investigation.
 - ii. Was investigation done ethically or unethically?
 - iii. Where does digital evidence found for crime establishment?
 - iv. State the punishment meted.
- d. Study any case of fake profiling. Identify
 - i. The way digital forensics was used in detecting the fraud.
 - ii. Where was digital evidence located?
 - iii. Effects.

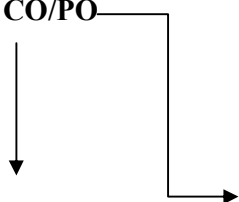
12. SUGGESTED LEARNING RESOURCES

S. No.	Title	Author, Publisher, Edition, and Year of publication	ISBN Number
1	Digital Forensic	Jain,Nilakashi Kalbande, Dhananjat R.	Wiley Publishing, New Delhi, 2017, ISBN: 978-81-265-6574-0
2	The Basics of Digital Forensic	Sammons,John	Elsevier, Netherlands ISBN 978-1-59749-661-2
3	Hacking for Dummies	Kevin Beaver CISSP	Wiley Publishing, New Delhi ISBN: 978-81-265-6554-2

13. SOFTWARE/LEARNING WEBSITES

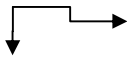
1. <https://resources.infosecinstitute.com/digital-forensics-models/#gref>.
2. <https://docs.microsoft.com/en-us/sysinternals/downloads/psloggedon>
3. <https://docs.kali.org/introduction/download-official-kali-linux-images>
4. www.openwall.com/passwords/windows-pwdump

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Describe Models of Digital Forensic	2	2	3	1	2	1	2

Investigation.							
Locate the digital evidences in file system.	2	2	-	-	1	1	3
Follow Evidence handling procedures.	1	3	2	1	2	2	2
Select relevant tools for hacking.	2	1	2	3	2	2	3
Detect system and network vulnerabilities.	3	2	1	3	3	1	3
Apply Hacking Methodologies to get into the system.	3	2	2	3	3	3	3
Summary	3	2	2	3	3	3	3

15. CO-PSO Mapping

CO /PSO 	Hardware and Networking	Database Technologies	Software Development
Describe Models of Digital Forensic Investigation.	-	-	1
Locate the digital evidences in file system.	1	2	2
Follow Evidence handling procedures.	2	-	1
Select relevant tools for hacking.	-	-	2
Detect system and network vulnerabilities.	2	1	2
Apply Hacking Methodologies to get into the system.	1	-	3
Summary	2	1	2

Sign: Name: Smt. M.U.Kokate. Smt. H.F.Khan Smt. S.P.Ambavane Smt. K.S.Sathawane (Course Expert /s)	Sign: Name: Smt. M. U. Kokate (Head of Department) (Information Technology)
Sign: Name: Shri. U. V. Kokate (Program Head) (Computer Engineering)	Sign: Name: Shri A.S.Zanpure (CDC)

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Programme Name	:	Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Business Intelligence
Course Code	:	IT5105
Prerequisite course code and name	:	NA
Class Declaration	:	YES

1. 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	PA
3	-	2	5	Marks	80	20	25	25
				Exam Duration	3 Hrs	1 Hr	2 Hrs	

(*): OE (Oral Examination)

Legends: L-lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

For any business it is needed to adapt quickly to their changing environment and scenario to improve profitability and develop product to match current trends. It is required to improve visibility of processes, to turn data into actionable information, to improve efficiency, to gain competitive intelligence for any business to flourish. Business Intelligence (BI) is a concept that involves the delivery and integration of useful business information reliably and consistently. It explores how business problems can be solved effectively by using operational data, and then applying tools to gain new insights into organizational operations.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- Use BI tools to represent Business Functionality.

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Understand the Business view of Information Technology Applications.
2. Use slice and dice operations in OLAP.
3. Use pivot tables and charts on the given data set.
4. Use BI tools to apply filters and create meaningful charts/tables.

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5. Use Data Integration and Profiling technologies.
6. Create charts and models using data visualization tools with the given data set.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1	I	Download the data set in Excel sheet(e.g car sales data/population data /any suitable data). Define three attributes of the data set i.e. attributes describing systems and the respective requirements and filter the data accordingly.(get the sample excel sheet from internet e.g. Kaggle.com)	CO1	02
2	I	a) Apply appropriate filters on columns and /or rows. b) Format the table as : i) Dates as dd-mm-yyyy format ii) Expense amounts to be preceded by ₹ sign	CO1	02
3	II	Use slice and dice operations in OLAP. Given a fact table with - sales data (for example sales(market#, product#, time#, amount)) Assuming that we have the following dimension tables: Market (Market_ID, City, Region) Product (Product_ID, Name, Category, Price) Time (Time_ID, Week, Month, Quarter) Sales (Market_ID, Product_ID, Time_ID, Amount) Write an SQL statement that slices the cube to select sales only in week 2, and dice it by regions.	CO2	02
4	II	For any Ecommerce site : a) Identify different transaction types. b) Identify different processes involved in carrying out transactions. c) Identify transaction reversal processes.	CO2	02
5		Draw the flowcharts of each transaction processes described in practical 4.		
6	III	a) Create borders, background colors, assigning inside and outside labels, chart titles, adjust chart sizes to make data clearly visible. b) Create suitable chart for your data set.(aimed as first steps towards using IT tool for Business ready IT applications.)	CO3	02

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Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
7	III	Prepare Pivot table. Use the downloaded data set of Assignment 1. a) Choose the range of data to be used for the pivot table on selected attribute. b) Select fields to add to the table using pivot table menu.	CO3	02
8	III	c) Transform dataset: Specify appropriate column labels, apply report filters to create meaningful pivot table.	CO3	02
9	III	a) Apply appropriate filters on columns and/or rows. b) Format the table as : i) Dates as dd-mm-yyyy format ii) Expense amounts to be preceded by ₹ sign	CO3	02
10	III	Prepare Pivot Chart for the above Pivot table.	CO3	02
11	IV	a) Download any BI tool (like Power BI/JasperSoft/Talend/ Pentaho). b) Connect to any database and retrieve data.	CO4	04
12	IV	Use BI tools (like Power BI/JasperSoft/Talend/Pentaho) on the downloaded data of practical1 above. a) Choose the range of data to be used on selected attribute. b) Select fields to add to the table . c) Specify appropriate column labels, report filters to create meaningful charts/tables.	CO4	02
13	IV	Create a report based on the below sample database: Sample database is Finance excel sheet. You must generate report that will help Finance team of some organization to decide the next strategy. a) Load the data in the tool(Power BI/Excel/ any tool). b) Add new calculated columns as below: i. Gross Sales= Units Sold * Sales Price ii. Sales=Gross Sales-Discout Cost iii. Gross Manufacturing Cost=Units Sold * Manufacturing Price iv. Profit=Sales-Gross Manufacturing Cost	CO4	02

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Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
14	IV	a) Split the column 'Date' as 2 more columns month number and year b) Group the data based on: A. Segment B. Country C. Product D. Year c) Create a chart showing the above grouped data in the BI tool	CO4	02
15	VI	Create appropriate chart (Barchart, Piechart, Histogram, Coxcombo, Scattered Plot) for the selected data of practical 1 and 11 above. set aimed as first steps towards using IT tool for Business ready IT applications.	CO6	02
16		Create Microproject covering 2 or more COs from the curriculum. (Refer point no. 11 for sample microproject list)	ALL	02
Total				32

Sr. No.	Performance Indicators	Weightage in %
a.	Correctness of User Interface design	30
b.	Correctness of business logic applied	40
c.	Debugging ability	10
d.	Correctness of answers to sample questions	10
e.	On time submission	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Computer system (Any computer system which is available in laboratory with minimum 2GB RAM)	All
2	Any compatible open source tools (e.g. Android Studio/ Eclipse IDE, Any compatible web server, Any compatible database tool e.g. SQLite)	

7. THEORY COMPONENTS

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Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION I	
Unit I : Business view of Information Technology Applications (Hours-08,Weightage-14)	
1a. Explain the given characteristic of BEO 1b. Explain the given function of BEO. 1c. Explain the key purpose of IT in the given business model. 1d. Describe the characteristics of the specified business ready IT applications. 1e. Describe the given enterprise applications (ERP/CRM). 1f. Explain the importance of pivot table in BI in given situation.	1.1 Business Enterprise Organization (BEO). 1.2 BEO functions and core business process. 1.3 Key purpose of using IT in business. 1.4 The connected world: Characteristics of business ready IT applications. 1.5 Enterprise Applications (ERP/CRM, etc). 1.6 Information Users and their requirements. 1.7 Introduction to Pivot table, Uses of pivot table in BI.
Unit II : Introduction to OLTP and OLAP (Hours-08,Weightage-14)	
2a. Explain the given steps in OLTP 2b. Explain the given phase in OLAP. 2c. Describe the given OLAP architecture component. 2d. Compare OLTP with OLAP on the given criteria. 2e. Explain the given data models for OLAP. 2f. Explain the given data models for OLTP. 2g. Describe the role of the given OLAP tools in BI	2.1 Online Transaction Processing (OLTP), Online Analytical Processing(OLAP) 2.2 Different OLAP architectures 2.3 OLTP and OLAP, Data models for OLTP and OLAP 2.4 Role of OLAP tools in BI architecture 2.5 Leveraging ERP data using Analytics
Unit III : Introduction to Business Intelligence (BI) (Hours-08,Weightage-12)	
3a. Explain decision support using the given analytical information. 3b. Describe effective and timely decisions in the given situation 3c. Compare data, information and knowledge in the given situation. 3d. State the need of BI in the given example.	3.1 Using analytical information for decision support, Effective and timely decisions 3.2 Data, information and knowledge, Information sources before dawn of BI 3.3 BI Defined: Evolution of BI, Role of DSS,EIS, MIS and Digital Dashboard, Need of BI at virtually all levels, BI for past, present and future, BI value chain 3.4 Creating Pivot Table: Calculate values in a PivotTable, Filter, sort data in a Pivot Table.

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Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
3e. Write steps to create Pivot for the given dataset.	
SECTION II	
Unit IV : BI Component Framework (Hours-08,Weightage-14)	
4a. Explain the given BI applications. 4b. Describe the given roles and responsibilities of BI. 4c. Explain data integration in the given application. 4d. Describe the given data integration technology.	4.1 BI Component Framework: Business Layer, Administration and Operational Layer, Implementation layer. 4.2 Who is BI for: Users, Applications. 4.3 BI Roles and Responsibilities. 4.4 Best Practices in BI. 4.5 Popular BI Tools.
Unit V : Data Integration (Hours-08,Weightage-12)	
5a. Define Data Warehouse and Data Mart. 5b. Explain Data Mapping and Data Staggering. 5c. Explain Data Integration approaches and Data Quality. 5d. Describe Data Integration technologies.	5.1 Data Warehouse: Need, Definition. 5.2 Data Mart and ODS. 5.3 Data Sources. 5.4 Extract, Transform, Load: Data Mapping, Data Staggering. 5.5 Data Integration approaches and technologies. 5.6 Data Quality. 5.7 Data Profiling.
Unit VI : Multidimensional Data Modeling (Hours-08,Weightage-14)	
6a. Explain features of the given Data Model. 6b. Describe the significance of the given fact table and dimension table. 6c. Describe the significance the given dimensional models. 6d. Explain the data visualization in the given situation. 6e. Explain advantages and disadvantages of the given data visualization tool.	6.1 Introduction: Data Modeling Basics, Types of Data Model. 6.2 Data Modeling Techniques: Fact Table, Dimension Table. 6.3 Typical Dimensional Models: Data Visualization, Histogram, Barchart, Piechart, Scattered Plot, Coxcomb Chart. 6.4 Data Visualizations.

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks

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Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
SECTION I						
I	Business view of Information Technology Applications	08	4	8	2	14
II	Introduction to OLTP and OLAP	08	6	4	4	14
III	Introduction to Business Intelligence (BI).	08	6	4	2	12
	Total	24	16	16	08	40
SECTION II						
IV	BI Component Framework	08	6	6	2	14
V	Data Integration	08	6	6	-	12
VI	Multidimensional Data Modeling	08	2	4	4	14
	Total	24	14	16	06	40
Total		48	30	32	14	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Study any ERP/CRM system and prepare report.
- Study any open source BI tool like BIRT and enlist its salient features.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are

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group-based. However, in the fifth and sixth semesters, it should be preferably be *individually* undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should *not exceed three*.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a) **Download any data set of your choice. Extract subset of data having following characteristics:**
 - i. With minimum 7 columns
 - ii. Minimum three dimensional attributes
 - iii. Minimum 2 factual attributes
- b) **Present the data using visualization tool (traditional charts and tools):** Identify limitations of these tools with respect to the chosen data set.
- c) **Use Power BI tools for overcoming the limitations**

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Fundamentals of Business Analytics	Prasad R.N, Seema Acharya	Wiley Publications, New Delhi ISBN 97881265437912016
2	Business Intelligence: Data Mining and Optimization for Decision Making	Carlo, Vercellis	John Wiley and Sons, Ltd, Publication, New Delhi, 2009 ISBN: 978-0-470-51138-1
3	Business Intelligence Strategy	Boyer, John Bill Frank, Brian Green and Tracy Harris	MC Press Online, LLC, US, 2010, ISBN:9781583473627
4	Decision Support and Business Intelligence Systems	Turban, Efraim Ramesh Sharda, Dursun Delen	Pearson, New Jersey, US 2013 ISBN: 9780136107293

13. SOFTWARE/LEARNING WEBSITES

- a. List of Power BI documentation: <https://docs.microsoft.com/en-us/power-bi/desktop-getting-started>
- b. <https://mva.microsoft.com> – for online videos
- c. List of Jaspersoft community: <https://community.jaspersoft.com/documentation?version=49176>
- d. Pentaho documentation: <https://help.pentaho.com/Documentation/8.1>

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e. Talend documentation:

<https://help.talend.com/reader/opWUcmBVI6JYw7Gpj9W49Q/7qR7WWxoC SfMiczu2VrAwg>

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO/PO ↓	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Understand the Business view of Information Technology Applications.	3	-	-	1	-	-	3
Use slice and dice operations in OLAP.	3	2	1	2	-	1	3
Use pivot tables and charts on the given data set.	3	2	1	2	-	1	3
Use BI tools to apply filters and create meaningful charts/tables.	3	2	1	3	-	-	3
Use Data Integration and Profiling technologies.	3	1	1	2	1	-	3
Create charts and models using data visualization tools with the given data set.	3	1	1	2	-	-	3
Summary	3	2	1	2	1	1	3

PSO-CO MAPPING

CO /PSO ↓	Hardware and Networking	Database Technologies	Software Development
Understand the Business view of Information Technology Applications.	-	1	-
Use slice and dice operations in OLAP.	-	3	1
Use pivot tables and charts on the given data set.	-	3	-

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Use BI tools to apply filters and create meaningful charts/tables.	-	3	1
Use Data Integration and Profiling technologies.	-	3	1
Create charts and models using data visualization tools with the given data set.	-	3	-
Summary	-	3	1

Name: 1. Smt. M.U.Kokate 2. Smt. H.F. Khan 3. Smt. A.D.Kshirsagar 4. Smt. P.L.Sonawane (Course Experts)	Sign:	Sign: Name: Smt. M.U. Kokate Head of the Department (Information Technology)
Sign: Name: Smt. M.U. Kokate (Programme Head)		Sign: Name: Mr.A.S. Zanpure (CDC)

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'180OB' – Scheme

Programme Name	:	Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Graphics and Gaming Technologies
Course Code	:	IT5103
Prerequisite course code and name	:	NO
Class Declaration	:	YES

1. 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	PA	150
3	-	2	5	Marks	80	20	25	25	
				Exam Duration	3 Hrs	1 Hr	3 Hrs		

(*):OE(External Oral Examination)

Legends: *L-lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End Semester Examination, PA- Progressive Assessment.*

2. RATIONALE

Today's graphics oriented PCs require that students explore and understand a dazzling array of graphics techniques and technologies. Graphics under 'C' details the fundamentals of graphics programming for the Personal Computers and compatibles, teaching 'C' programmers of all level how to create impressive graphics easily and efficiently. An important characteristic of technical education is an emphasis on their challenging nature, the structured character of the concepts, the critical role of quantitative problem solving, and the importance of qualitative reasoning.

3. COMPETENCY

- Create the most conducive environment for innovation in technology and digital.

4. COURSE OUTCOMES (COs)

1. Explain components in Computer Graphics.
2. Write 'C' programs to draw line, circle and fill the polygons.
3. Compute 2D and 3D transformations using two dimensional and three dimensional Matrices..
4. Explain back-face removal algorithms ,shading algorithms and color models
5. Use methods of controlling animation and achieve real-time animation using Maya/OpenGL.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	Study of Video Display Devices.	CO1	02
2.	2	Programs for displaying the point on the screen, graphics demonstration program.	CO2	02
3.	2	Programs for drawing: Lines, circles and ellipse.	CO2	02
4.	2	Programs for drawing and filling polygon.	CO2	02
5.	3	Programs for two-dimensional translation, scaling, rotation & reflection.	CO3	04
6.	3	Programs for drawing 3-D figures.	CO3	02
7.	3	Programs for three-dimensional translation, scaling, rotation.	CO3	04
8.	4	Case study of some (Minimum 03) popular video games.	CO4	04
9.	5	Use at least One Advanced Technology Programming (Any one). 1. Use OpenGL ES to draw a line for Android Mobile. 2. Use Microsoft IDE to Draw a line Diagram. 3. Use VRML to draw a line Diagram. 4. Use Parallel programming using Cuda to draw a Polygon.	CO5	04
10.	5	Use Direct3D/Maya or open source equivalent to draw a Bouncing ball animation.	CO5	04
11	All	Micro-project (Refer point 11 for Micro Project list)	All COs	02
		Total Hours		32

Sr.No.	Performance Indicators	Weightage in %
a.	Distinguish between Normal and Graphical window	20
b.	Logical thinking to apply line and circle drawing algorithms in program	30
c.	Ability to apply mathematical calculations	30
d.	Importance of Computer Animation	10
e.	Applications of Graphics and Gaming concepts	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Hardware: Personal Computer (i3-i5 preferable), RAM minimum 2 GB.	For all Experiments
2	Operating System : Windows 7/Windows 8/Windows10/Linux or any other.	
3	Software tools: Any compiler.	

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (In Cognitive domain)	Topics and Sub-topics
Section I	
Unit –1 Graphics Systems(Weightage-12 , Hrs- 06)	
1a. Define the scope of Graphics 1b. State all Graphics input devices 1c. Explain the advantages and future scope of graphics in Computer 1d. Compare Raster scan and Random scan display devices	1.1 Need of Computer Graphics, Applications, Advantages, Future Scope. 1.2 Graphics Software, Graphics Functions & Standards 1.3 Video display Devices 1.4 Graphics input devices and Coordinate representations
UNIT 2. Raster Scan Graphics(Weightage-16 , Hrs- 10)	
2a. Apply Bresenham's and DDA algorithms to draw line,circle 2b. Use of polygon filling methods. 2c. Compare Boundary fill and Flood fill algorithms 2d. Discuss Character generation Methods	2.1Line Drawing Algorithms: Digital Differential Analyzer, Bresenham's Algorithm 2.2Circle Generation- Bresenham's Algorithm 2.3Polygon Filling : Seed fill algorithms: Flood fill, Boundary fill, scan line algorithms 2.4Character Generation:-Stroke method, Starburst method, Bitmap method ,Introduction to Frame Buffers

Unit Outcomes (UOs) (In Cognitive domain)	Topics and Sub-topics
2e. Compare DDA line and circle drawing with Bresenham's line and circle drawing algorithms	
UNIT 3. Two and Three Dimensional Transformations (Weightage-12 , Hrs-08)	
3a. Define Translation, scaling and rotation 3b. Apply 2D Transformations using Translation, scaling and rotation factors 3c. Apply Composite Transformations using Translation, scaling and rotation factors 3d. Compare 2D and 3D transformations.	3.1 Basic 2D Transformations: Translation, Scaling, Rotation 3.2 Matrix representations & homogeneous coordinates 3.3 Composite Transformations-Scaling relative to a fixed pivot, rotation about a pivot point 3.4 Other 2D transformations 3.5 Three dimensional transformation
Section II	
UNIT 4 . Curves, Fractals, Hidden Surfaces, Light and Color Models (Weightage-18 , Hrs-12)	
4a. Discuss object space and image space methods 4b. Learn the various color models 4c. Explain various Shading algorithms 4d. Compare Point source and Diffused illumination methods 4e. Define properties of Bezier curve 4f. Describe advantages of RGB over HIS	4.1 Hidden surfaces: Introduction, back-face removal algorithm: Painter's algorithm 4.2 Light and Color: Introduction, Diffused illumination, point source illumination. 4.3 Shading Algorithms, reflections, shadows. 4.4 Color models and tables: RGB, HIS, CMY. 4.5 Introduction to curve generation: Bezier Curve and its properties
UNIT 5 . Animation and Gaming Platforms (Weightage-14 , Hrs- 08)	
5a. Enlist methods for controlling animation 5b. Explain animation languages used for	5.1 Introduction, Conventional and Computer based Animation. 5.2 Real Time animation by look up Table 5.3 Methods for controlling Animation: Full Explicit Control, Procedural Control.

Unit Outcomes (UOs) (In Cognitive domain)	Topics and Sub-topics
Animation 5c. Evaluate Look-Up table to achieve Real time animation 5d. Discuss basic guidelines used for animation	5.4 Basic Guidelines of Animation. 5.5 Animation Languages: Linear list notations, General purpose languages, Graphical Languages.
UNIT 6. Gaming Technologies(Weightage-8 , Hrs- 04)	
6a. Use of OpenGL using its syntax 6b. Discuss the connection between CPU and GPU 6c. Discuss OpenGL syntax,Headerfiles. 6d. Demonstrate Complete OpenGL program 6e. Demonstrate Computer animation using various Graphics Tools.	6.1 Introduction to OpenGL: Basic OpenGL Syntax, Related Libraries, Header files, Display window Management, Complete OpenGL Program, OpenGL ES 6.2 NVIDIA GPU: Connection between CPU and GPU, Architecture 6.3 Graphics Memory Pipeline 6.4Introduction to Graphics Tools:-Maya,3D Studio Max.

8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks
Section - I						
I	Graphics Systems	06	06	04	02	12
II	Raster Scan Graphics	10	08	04	04	16
III	Two and Three Dimensional Transformations	08	04	04	04	12
Total		24	18	12	10	40
Section - II						
IV	Curves, Fractals, Hidden Surfaces, Light and Color Models	12	04	04	10	18
V	Animation and Gaming Platforms	08	04	08	02	14
VI	Gaming Technologies	04	03	02	03	08
Total		24	11	14	15	40
Total		48	29	26	25	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- a. Prepare journal based on practical performed in laboratory.
- b. Give seminar on relevant topic
- c. Undertake micro-projects.

10. SUGGESTED 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. Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- b. About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations.
- c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- d. Use different Audio-Visual media for Concept understanding.
- e. Guide student(s) in undertaking micro-projects.
- f. Demonstrate students thoroughly before they start doing the practice.
- g. Observe continuously and monitor the performance of students in Lab.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of **PrOs, UOs and ADOs**. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

- a. Sinking Ship. ...
- b. Arrival and departure of the train. ...
- c. Scientific calculator. ...
- d. Tower of Hanoi. ...
- e. Windmill. ...
- f. Steam engine.

- g. Festival celebration
- h. Walking man in rain with Umbrella

12. SUGGESTED LEARNING RESOURCES

S.N.	Title of Book	Author	Publication
1	Computer Graphics,	Donald Hearn and M. Pauline Baker	Prentice-Hall, ISBN:9788177587654.
2	Game architecture and Programming,	Radha Shankamani,Sauabh Jain,Gaurang Sinha.	Wiley India, ISBN- 10:9788126528875
3	Procedural Elements for Computer Graphics	David F.Rogers	McGraw-Hill,1998 ISBN:0070535485, 9780070535480

13. SOFTWARE/LEARNING WEBSITES

- <https://www.sciencehq.com/computing-technology/graphics-concepts.html>
- https://www.tutorialspoint.com/computer_graphics/index.htm

14. PO - COMPETENCY- CO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO ↓	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life Long Learning
Explain components in Computer Graphics.	2	-	-	-	-	-	2
Write 'C' programs to draw line,circle and fill the polygons.	3	3	3	2	2	1	3
Compute 2D and 3D transformations using two dimensional and three dimensional matrices..	3	3	3	2	2	2	3
Explain back-face removal algorithms ,shading algorithms and color models	2	1	1	3	-	2	3
Use methods of controlling animation and achieve real-time animation using Maya/OpenGL	2	3	3	3	1	1	3

Summary	3	3	3	3	2	2	3
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PSO - COMPETENCY- CO MAPPING

CO / PSO ↓	Hardware and Networking	Database Technologies	Software Development
Explain components in Computer Graphics	-	-	1
Write 'C' programs to draw line, circle and fill the polygons.	-	-	3
Compute 2D and 3D transformations using two dimensional and three dimensional matrices.	-	-	3
Explain back-face removal algorithms, shading algorithms and color models	-	-	1
Use methods of controlling animation and achieve real-time animation using Maya/OpenGL.	-	-	3
Summary	-	-	2

(Smt.A.B.Bhusagare)

Signature of Course Expert

(Smt. M.U. Kokate)

Signature of Head of Department

(Smt. M.U. Kokate)

Signature of Programme Head

(Mr.A.S. Zanpure)

Signature of CDC In-charge

Government Polytechnic, Pune

'180OB' – Scheme

Programme Name	:	Diploma in Information Technology
Programme Code	:	01/02/03/04/05/06/07/08/15/16/17/18/19/21/22/23/24/26
Course Title	:	Information Security
Course Code	:	IT5104
Prerequisite course code and name	:	-
Class Declaration	:	YES

1. TEACHING AND EXAMINATION SCHEME

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

(*) : OE (Oral Examination)

Legends: L- lecture, T-Tutorial/teacher guided theory practice, P-practical, ESE-End semester examination, PA- Progressive Assessment.

2. RATIONALE

Information security is an important aspect in today's world. Now days due to various threats securing the Organization and Information are an important consideration. It is essential to understand basic security principles, various threats to security and techniques to address these threats. The student will be able to recognize potential threats to confidentiality, integrity and availability and also able to implement various computer security policies.

This course will introduce basic cryptographic techniques, fundamentals of Information security, risks faced by computers and networks, user authentication and control. Also it will create awareness about Cyber crimes, Cyber Laws and Compliance standards.

3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Maintain Computer and Information security of organization.**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Identify Threats to Information Security and types of attacks.
2. Understand Information security Risk Management.
3. Identify User Authentication & Access Control Mechanisms
4. Apply cryptographic algorithms to maintain Information Security.
5. Detect threats and Prevent attacks to provide security of network.
6. Understand Cyber Crime, Cyber Laws and compliance standards.

5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

Sr. No	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Relevant CO	Approximate Hours Required.
1.	1	i. Install and configure Antivirus software on system (any). ii. Set up operating system Updates	CO1	02
2.	1	Set up passwords to operating system and applications.	CO1	02
3.	2	Information Gathering: i. Gather information of any website using any Open Source/Free tool.(Eg.whois.net, yougetsigna.com etc) ii. Find the operating system on which the website is hosted. iii. Find the information on which platform the site is hosted.	CO2	04
4.	3	Apply security to file folder or application using access permissions and verify.	CO3	02
5.	3	Perform following tasks using any Free/Open Source tool (Eg. nmap) : i. Find Live machine in your laboratory. ii. Discover open ports of that machine. iii. Scan the machine beyond IDS. iv. Identify the vulnerability.	CO3	04
6.	4	Write a program to implement the following techniques: i. Caesar Cipher ii. Vernam Cipher	CO4	02
7.	4	Write a program to implement Simple Columnar Transposition technique.	CO4	02
8.	4	Create and verify Hash Code for given message.	CO4	02
9.	4	Create and verify digital signature using any Free/Open source tool (e.g. Cryptool).	CO4	02
10.	4	Use Steganography to encode and decode the message using any tool.	CO4	02

11.	5	Install and Configure firewall settings on any operating system.	CO5	02
12.	5	Install and Configure IDS on any operating system.	CO5	04
13.		Microproject covering 2 or more COs from curriculum. (Refer Point no.11 for sample microproject list)	ALL	02
		Total Hours		32
Following is the list of extra practical that can be given to Fast learner student.				
1.		Trace the path of web site using Tracert Utility.		
2.		PGP Email Security 1. Generate Public and Private Key Pair. 2. Encrypt and Decrypt message using key pair.		
3.		Trace the origin of Email using any tool (e.g. emailTrackerPro)		

Sr. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem (Process)	40
b.	Quality of output achieved (Product)	30
c.	Complete the practical in stipulated time	10
d.	Observations and Recording	10
e.	Answer to sample questions	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr.No.
1	Hardware: Personal computer Pentium IV, 2 GHz minimum (i3-i5 preferable), RAM minimum 2 GB.	For all experiments
2	Encryption Decryption tool(any)	8,9
3	Web tracing tool(any)	3
4	Network Mapper tools (any)	5
5	C/C++ Compiler	6,7

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
SECTION I	

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
UNIT 1 . Basics of Information Security (Weightage-12 , Hrs- 08)	
1a. Explain criteria for information classification. 1b. Define Security and Basic principles of security. 1c. Describe three pillars of information security. 1d. Enlist security threats. 1e. Explain various types of attacks.	1.1 Information Security Overview: Information, Need and Importance of Information, information classification, criteria for information classification. 1.2 Security, need of security, Basic principles of information security. 1.3 Three pillars of information security 1.4 Security Threats- Compromises to Intellectual Property, Deliberate Software Attacks, Deviations in Quality of Service, Human Error or Failure, Information Extortion, Missing, Inadequate, or Incomplete Organizational Policy or Planning and control etc. 1.5 Types of Attacks: Malicious Code, Hoaxes, Back Doors, Brute Force, Dictionary ,Denial-of-Service (DoS) and Distributed Denial-of-Service ,(DDoS), Spoofing, Man-in-the-Middle, Sniffers, Social Engineering, TCP/IP Hacking, Encryption attacks
UNIT 2 . Information security and Risk Management (Weightage-14 , Hrs- 08)	
2a. Describe Risk Management Security Policies. 2b. Explain Protection Mechanisms in a trusted Computing Base. 2c. Describe Trusted computer security Evaluation Criteria. 2d. Describe Confidentiality and Integrity 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 3 . User Authentication & Access Control (Weightage-14 , Hrs- 08)	
3a. Describe various password attacks. 3b. Explain various biometric patterns. 3c. Describe Authentication Mechanism. 3d. Compare DAC, MAC and RBAC.	3.1 Identification and Authentication: User name & Password, Guessing password, Password attacks-Piggybacking, Shoulder surfing, Dumpster diving. 3.2 Biometrics: Finger Prints, Hand prints, Retina, patterns, Voice patterns, Signature and Writing patterns, Keystrokes. 3.3 Access controls: Definition, Authentication Mechanism, principle-Authentication, Authorization, Audit, Policies:

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	DAC, MAC, RBAC.
SECTION II	
UNIT 4 . Cryptography (Weightage-14 , Hrs- 08)	
4a. Explain Encryption and Decryption process. 4b. Explain various substitution technique. 4c. Describe Steganography. 4d. Explain DES, Digital Signature. 4e. Compare Symmetric and Asymmetric cryptography.	4.1 Introduction: Plain Text, Cipher Text, Cryptography, Cryptanalysis, Cryptology, Encryption, Decryption. 4.2 Substitution Techniques: Caesar's cipher, Modified Caesar's Cipher, Playfair Cipher, Vigenere cipher, Vernam Cipher (One-Time Pad) , Book Cipher (Running Key Cipher 4.3 Transposition Techniques: Rail fence technique, Simple columnar. 4.4 Steganography : Procedure 4.5 Hashing : Definition, Properties. 4.6 Symmetric and Asymmetric cryptography: Introduction to Symmetric encryption, DES (Data encryption Standard) algorithm, Asymmetric key cryptography: Digital Signature.
UNIT 5 . Firewall and Intrusion Detection System (Weightage-14 , Hrs- 10)	
5a. Describe various types of firewall. 5b. Explain firewall policies. 5c. Describe VPN architecture. 5d. Describe various IDS. 5e. Compare Network-Based and Host-Based IDS.	5.1 Firewall : Need of Firewall, Types of firewall- Packet Filters, Stateful Packet Filters, Application Gateways, Circuit Gateways. 5.2 Firewall Policies, Configuration, limitations, DMZ. 5.3 Virtual Private Network : Introduction, Architecture. 5.4 Intrusion Detection System : Vulnerability Assessment, Misuse detection, Anomaly Detection, Network-Based IDS, Host-Based IDS, Honeypots.
UNIT 6 . Cyber Crime and Cyber Laws (Weightage-12 , Hrs- 06)	
6a. Explain the given cyber crime. 6b. Explain need of cyber laws. 6c. Explain Compliance standards	6.1 Cyber Crime : Introduction, Hacking , Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography , Identity Theft & Fraud , Cyber terrorism, Cyber Defamation, OS fingerprinting. 6.2 Cyber Laws : Introduction, need, Categories : Crime against Individual, Government, Property. 6.3 Compliance Standards: Implementing an Information security Management system, ISO 27001,ISO 20000,S 25999,PCI,DSS,ITIL Framework, COBIT Framework.

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Unit Title	Teaching Hrs	Distribution of Theory Marks			
			R Level	U Level	A and above Levels	Total Marks

Section - I						
1	Basics of Information Security	08	04	08	-	12
2	Information security and Risk Management	08	04	10	-	14
3	User Authentication & Access Control	08	-	08	06	14
	Total	24	08	26	06	40
Section - II						
4	Cryptography	10	04	06	06	16
5	Firewall and Intrusion Detection System	08	04	08	04	16
6	Cyber Crime and Cyber Laws	06	04	04	-	08
	Total	24	12	18	10	40
	Total	48	20	44	16	80

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Prepare journal of practicals.

10. SUGGESTED 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:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the development of the COs through classroom presentations (see implementation guideline for details).
- With respect to item No.8, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various components, operation and
- Teacher should ask the students to go through instruction and Technical manuals

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.*

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- a. Technologies for Monitoring of Computer Security: A Case Study
- b. Case Studies in Secure Computing: Achievements and Trends.
- c. Implement Client/Server communication using cryptography tools in your laboratory.
- d. Create digital certificate for your departmental/ personal communication.
- e. Implement communication system using steganography. Encrypt image and message using any cryptography technique.
- f. Implement communication system using steganography using audio files. Encrypt audio file and message using any cryptography technique.
- g. Three Level Password Authentication System.
- h. Case study on Cyber laws in India.
- i. Case study on Cyber Crimes in India.
- j. Any other micro-projects suggested by faculty teaching the course on similar line.

Many more.....

12. SUGGESTED LEARNING RESOURCES

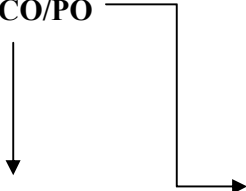
Sr. No.	Title of Book	Author	Publication
1	Computer Security Third Edition	Dieter Gollmann	Wiley Publication ISBN : 978-0-470-74115-3
2	Cryptography and Network Security Third Edition	Atul Kahate	McGraw Hill Education, New Delhi ISBN 13: 978-1-25-902988-2
3	Information Security: Principles and Practice	Mark Stamp	Wiley Publication ISBN 978-0-470-62639-9
4	Information Security Policies, Procedures, and Standards	Thomas R. Peltier	Auerbach Publications ISBN 0-8493-1137-3
5	Cryptography and Network Security	Behrouz A. Forouzan	McGraw Hill ISBN: 9789339220945
6	Cyber Laws And IT Protection	Harish Chander	PHI Publication, 2012 ISBN: 978-81-203-4570-6
7	Computer Security: Principles and Practice	William Stallings, Lawrie Brown	Pearson ISBN-13: 978-0134794105 ISBN-10: 0134794109

13. SOFTWARE/LEARNING WEBSITES

- a. <http://nptel.ac.in/courses/106105162/>

- b. https://www.tutorialspoint.com//computer_security/computer_security_quick_guide.htm
- c. <http://learnthat.com/introduction-to-network-security/>
- d. <https://freevideolectures.com/course/3027/cryptography-and-network-security>
- e. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-858-computer-systems-security-fall-2014/video-lectures/>
- f. <http://stylesuxx.github.io/steganography/>
- g. <https://smartninja-pgp.appspot.com/>
- h. <http://www.cyberlawsindia.net/cyber-india.html>
- i. <https://www.upcounsel.com/cyber-law>
- j. <http://cyberlaws.net/cyber-law/>

14. PO - COMPETENCY- CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentations and Testing	Engineering Practices for Society ,Sustainability and Environment	Project Management	Life Long Learning
Identify Threats to Information Security and types of attacks.	3	2	-	2	2	-	3
Understand Information security Risk Management.	3	1	1	-	-	-	3
Identify User Authentication & Access Control Mechanisms	3	2	-	1	-	-	3
Apply cryptographic algorithms to maintain Information Security.	3	3	3	2	2	2	3
Detect threats and Prevent attacks to provide security of network.	3	3	2	2	2	2	3
Understand Cyber Crime ,Cyber Laws and compliance standards	3	1	-	-	-	2	3
Summary	3	3	2	2	2	2	3

PSO - COMPETENCY- CO MAPPING

CO / PSO	Hardware and Networking	Database Technologies	Software Development
Identify Threats to Information Security and types of attacks.	2	1	1

Understand Information security Risk Management.	-	-	1
Identify User Authentication & Access Control Mechanisms	1		1
Apply cryptographic algorithms to maintain Information Security.		1	3
Detect threats and Prevent attacks to provide security of network.		1	3
Understand Cyber Crime ,Cyber Laws and compliance standards	-	-	-
Summary	1	1	2

Name: Smt. H.F.Khan Smt. N.P.Sarwade (Course Experts)	Sign: Name: Smt. M.U. Kokate Head of the Department (Information Technology)
Sign: Name: Smt. M.U. Kokate Programme Head	Sign: Name: Mr.A.S. Zarpure (CDC)