Government Polytechnic Amravati

(An Autonomous Institute of Government of Maharashtra)

Curriculum 2018 (OBE)

Computer Engineering Programme

8.Sample Path

STREAM OF ENTRANCE	ENTRY LEVEL EXEMPTION	FIRST YEAR		SECOND YEAR		THIRD YEAR	
		ODD	EVEN	ODD	EVEN	ODD	EVEN
SSC	NIL	CC1401 ENGLISH (05)	FC1408 APPLIED MATH (06)	FC3403 DT (05)	CM3404 DCN (05)	CM5459 SEMINAR & PROJECT PLANNING(02)	CM5460 CG (05)
		CC1402 BASIC PHYSICS (04)	CC1409 BUSINESS COMM. (02)	FC3405 OOP (08)	FC3408 JAVA PROG.(08)	FC5462 OS (05)	CM5461 PROG.PYTHON (07)
		CC1403 BASIC CHEMISTRY (04)	FC3411 WPD WITH HTML(04)	CM3406 NM (05)	CM3409 MICROPROCESSORS (06)	CM5463 ST (05)	CM5465 CLOUD. COMPUTING (05)
		CC1404 BASIC MATH (06)	FC2404 ETE (05)	FC3407 DS (08)	FC3412 CHM (04)	FC5464 AJP (08)	Elective-II CM5474 FC5475 CM5476 (05)
		CC2401 ENGG.GRAPHICS (06)	FC3401 PIC (08)	FC3410 GUI .net(06)	CC1410 EVS (02)	CM5466 IND.TRAIN. (04)	FC5490 EMGE. TRENDS IN COMPUTER. ENGG. (03)
		CC2402 FUNDAMENTALS OF ICT(04)	FC3402 FUND.OF ELECTRONICS(05)	CC4411-CC4415 VALUE ADDED COURSES (02)	CC4451 EDP (02)	CM5467 CS(3)	CM5468 PROJECT EXECUTION AND REPORT WRITING (04)
		CM2403 COMP.WORKSHOP PRACTICES (04)	CC4411-CC4415 VALUE ADDED COURSES (02)		FC4452 SPM (04)	CM5469 DBMS (07)	
			CC1411 DLS (02)			Elective-I FC5471-FC5473 (05)	
NO. OF COURSES	**0**	**07**	**08**	**06**	**07**	**08**	**06**
CREDITS	**0**	**33**	**34**	**34**	**31**	**39**	**29**
CUMULTIVE CEREDITS	**0**	**33**	**67**	**101**	**132**	**171**	**200**

GOVERNMENT POLYTECHNIC, AMRAVATI

(An Autonomous Institute Of Government of Maharashtra)

CURRICULUM DEVELOPMENT CELL

DIPLOMA PROGRAMME: COMPUTER ENGINEERING
COURSE CODE: CM5460
COURSE TITLE: COMPUTER GRAPHICS
TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V	FC3401	03	-	02	05	16	48	-	32

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
3Hrs.	MAX.	70	30*	100	25#	25^	150
	MIN.	28	-	40	10	10	

@: Internal Assessment #: External Assessment- Practical base
(*) Under the Theory PA, Out Of 30 Marks, 20 Marks is the Average of Two Tests and 10 Marks are for Micro project.
(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.
For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) microproject-40**%.**

1.RATIONALE:

Almost every computer system is set up to allow the user to interact with the system through a graphical user interface, where information on the display screen is conveyed in both textual and graphical forms. Everyone should be aware of this rapidly expanding technology.

Computer graphics is a complex and diversified technology. The output product of Computer graphics is a pictorial image. Hence the computer has become a new tool for the artist and animator. Computer graphics is an extremely effective medium for communication between man and machine through pictures, charts and diagrams.

To use images, pictures in any systems one needs the understanding of generation, editing, processing and conversion of it into other types of images.

Computer graphics techniques can be used in many fields such as Engineering drawing, business graphs, architectural design and also for video games, which provides a new form of entertainment.

2.COURSE OUTCOMES:

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

1. Identify the file structure of display graphics file formats.
2. Apply the algorithms to draw lines, circles & polygons.
3. Use transformation techniques to scale, rotate & translate the object.
4. Draw the line clipping & polygon clipping using algorithm.
5. Develop the logic for drawing the natural objects using different algorithms for curved lines.
6. Illustrate the fundamentals of interactive graphics.

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hour	Marks
Unit 1 **Basics of CG**	1a. Differentiat attributes of the given mode. 1b. Compare features of the given scan display. 1c. Describe application of the given display device. 1d.Write a program to draw the given type of primitives using "C". 1e. Convert the given 2D coordinates to physical device coordinates.	1.1 Introduction to computer graphics, advantages of computer graphics, applications of computer graphics. 1.2 Display devices: Raster scan display, random scan display, Flat panel display, LED display, LCD display, plasma display, touch screen. 1.3 Graphics functions and standards. Types of graphics file formats: General explanation, advantages & disadvantages. 1.4 Latest trends in Computer Graphics. Virtual reality, Augumented reality. 1.5 Co-ordinate systems (2D, 3D): cartesian, Polar.	1	**06**	08
Unit 2 **Line, Circle, and Polygon.**	2a.Write a program to draw line using the given algorithm. 2b.Use the given algorithm to rasterize the given line. 2c.Apply the given algorithm to generate the circle . 2d. Draw the polygon using the given algorithm. 2e. Apply character	2.1 Basic concepts in line drawing, line drawing algorithms:DDA algorithm , Bresenham's algorithm. 2.2 Circle generating algorithms: DDA circle drawing algorithm, Bresenham's circle drawing algorithm,	**2**	**10**	**14**

	generation method to display the given character.	midpoint circle algorithm. 2.3 Polygons – Types of polygons, Inside Outside test, polygon filling: Seed fill algorithms: flood fill, boundry fill, scan-line algorithms. 2.4 Sample problems to illustrate above algorithms.			
Unit 3 Transformations	3a. Perform the given operation in 2D transformation. 3b. Perform the given operation in 3D transformation. 3c. Solve the given problem based on composite transformations. 3d. Apply the given type of projection on object.	3.1 2D transformation: Translation, Rotation, Scaling, Reflection, Shearing. 3.2 Matrix Representation and Homogeneous Co- o rdinates: Translation, Rotation, Scaling, Reflection and Shearing. 3.3 Composite Transformation: Rotation about an arbitrary Point. 3.4 3D Transformations: Translation, rotation , Scaling. .5 Sample problems with sample coordinates to illustrate above algorithms.	**3**	**10**	**14**
Unit 4 Windowing & Clipping	4a. Apply window to viewport transformation on the given object. 4b. Write a program using the given line clipping algorithm. 4c. Apply the given line clipping algorithm to	4.1 Windowing & Clipping Concepts: Window to Viewport transformation. 4.2 Line clipping: Cohen-Sutherland Subdivision Line clipping	**4**	**10**	**14**

	clip the line. 4d. Write a program using the given polygon clipping algorithm.	algorithm, Midpoint subdivision line Clipping algorithm. 4.3 Polygon clipping: Sutherland – Hodgeman Polygon clipping algorithm. 4.4 Sample problems to illustrate above algorithms.			
Unit5 Curves and Fractals	5a. Describe the given curve generation methods. 5b. Draw curve using the given curve algorithms. 5c. State properties of the given curve. 5d. Generate arc using the given algorithm.	5.1 Curve generation: Arc generation using DDA algorithm, Interpolation. 5.2 Types of Curves: Bezier Curve, Hilbert's curve, Koch curve. 5.3 Fractals: Fractal lines,Fractal surfaces.	**5**	**08**	**12**
Unit 6 Interactive Graphics	6a. Apply the graphics standards 6b. Describe the graphical user interface. 6c. Describe the principles for good GUI design. 6d. Describe OpenGL.	6.1 Need for graphics standards, Advantages of Graphics standards, Hazards of Graphics standards. 6.3 Graphical user interface: Introduction, Example. 6.4 Features of GUI, Principles for good GUI design. 6.5 Open GL: What is Open GL, How OpenGL works.	**6**	**04**	**08**

4. LIST OF PRACTICALS:

S.N.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1	Write a program to draw following graphics objects using built in "C" functions. Pixel Lines Circles Rectangle Ellipse	1
2	Implement following algorithms to draw a line. DDA algorithm. Bresenham's algorithm.	2
3	Implement following algorithm's to draw a circle (Any Two). DDA algorithm. Bresenham's algorithm. Midpoint circle algorithm.	2
4	Write a program to fill polygon using following methods: i) Flood fill ii) Boundary fill	2
5	Write a program for two dimensional transformation (Any Two) Translation Scaling Rotation	3
6	Write a program for three dimensional transformation Translation Scaling.	3
7	Write a program to clip line using Cohen-Sutherland algorithm.	4
8	Write a program to clip line using Cohen Midpoint subdivision algorithm.	4
9	Write a program to clip polygon using Sutherland – Hodgeman algorithm.	4
10	Implement Arc generation using DDA algorithm.	5
11	Write a program to draw following type of curves (Any Two). Hilbert's curve Koch curve Bezier curve	5
12	Write a program to develop Tic-Tac-Toe game using OpenGL.	6

Note

i) The entire above listed practical's need to be performed compulsorily, so that the students reaches the `Precision level of Dave's Psychomotor Domain Taxonomy'.

ii) The Process and Product related skills associated with each practical outcome shall be assessed on the basis of following performance indicators.

S. No.	Performance Indicators	Weightage in %
1.	Write program to draw graphics objects	20
2.	Use graphics software tool for programming to create, edit, compile the programs/applications	20
3.	Debug, test & execute the programs/applications	20
4.	Completed the exercise in stipulated time	20
5.	Able to answer oral questions	10
6.	Submit report in time	10
	Total	100%

The above PROs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Handle command prompt environment.
b. Experiment with graphics environment.
c. Plan, construct, compile, debug and test programs.
d. Maintain tools and equipment.
e. Follow ethical Practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organizing Level' in 2nd year and
- 'Characterizing Level' in 3rd year

5. 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 & prepare a report 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. Draw perspective and parallel projection for any object on view plane.
c. Give seminar on relevant topic .
d. Prepare power point presentation or animation for showing different types of graphics applications.
e. Undertake a market survey of different graphics application and compare with the following points.
   i) Available Applications.
   ii) Application Profile.

6. SUGGESTED INSTRUCTIONAL STRATEGIES

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. The teacher needs to ensure to create opportunities and provisions for co-curricular

activities.

c. About 10-15% 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. Keep the record of the topics/sub-topics/ contents given to the students.
d. Guide student(s) in undertaking micro-projects.
e. Demonstrate students thoroughly before they start doing the practice.
f. Continuously observe and monitor the performance of students in Lab.

7. 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. 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 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 all semesters, the micro-project could be group-based 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) Program to Design Flying balloons.
b) Program to display a moving car .
c) Develop a miniature tic-tac-toe game.
d) Design an analog clock.
e) Design a rotating fan.
f) Design a smiling face.
g) Design a scientific calculator.
h) Design a traffic signal system.
i) Design a solar system.
j) Design arrival and departure of train.
k) Design a sinking ship.

8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED

S.N.	Equipment Name with Broad Specification	Practical No.
1	Hardware: Personal computer (i3-i5 preferable), RAM minimum 2GB onwards.	For all practicals
2	Operating System: Windows XP / Windows 7 / LINUX onwards	
3	Software: Turbo C with with DOSBOX or Emulated C.	

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Unit Title	Marks per units	Distribution of theory marks		
			R level	U level	A level
1.	Basics of CG	08	4	4	--
2.	Line, Circle & polygon	14	2	4	8
3.	Transformations	14	2	4	8
4.	Windowing &Clipping	14	2	8	4
5.	Curves & Fractals	12	4	4	4
6.	Interactive Graphics	08	4	4	--
	Total	**70**	**18**	**28**	**24**

R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)

Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. LEARNING RESOURCES:

SrNo	TITLE	AUTHOR	PUBLICATION
1	Computer Graphics	Donald Hearn, Baker M. Pauline	Pearson Education ,New Delhi June 2012, ISBN:817758765X
2	Computer Graphics	Maurya Rajesh K.	Wiley-India 2011, Delhi ISBN:978-81-265-3100-4
3	Computer Graphics	Dr. Chopra Rajiv	S. Chand 2016, New Delhi. ISBN:978-93-856-7633-8.
4	Computer Graphics principles & practices	Foley James	Pearson Education ,New Delhi 2014, ISBN:978-0-321-39952-6

11. SOFTWARE/LEARNING WEBSITES.

a. www.tutorialspoint.com
b. www.nptelvideos.in
c. www.dailyfreecode.com
d. www.newtechnologysite.com
e. www.w3schools.com
f. www.codeacademy.com
g. www.howstuffworks.com
h. www.computerhope.com

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

S.N.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	Smt. S. R. Patil	Lecturer in Computer Engineering	Government Polytechnic Amravati
2	Miss. S. S. Chavan	Lecturer in Computer Engineering	Government Polytechnic Amravati
3	Smt. C. P.Ahir	Lecturer in Computer Engineering	Government Polytechnic Amravati

Government Polytechnic, Amravati Programme Board of Studies Computer Engineering has approved the above course curriculum on 14/05/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGG DEPARTMENT
GOVERNMENT POLYTECHNIC, AMRAVATI

The General Board of Studies has approved the above course curriculum on 06/02/2021
The Governing Body has approved the above course curriculum on 13/08/2021.

GOVERNMENT POLYTECHNIC, AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENTOF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING
COURSE CODE: CM5461
COURSE TITLE: PROGRAMMING WITH PYTHON

TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V	--	03	--	04	07	16	48	--	64

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
03	MAX.	70	30*	100	25#	25^	150
	MIN.	28	----	40	10	10	

@: Internal Assessment #: External AssessmentPracticalbased $: online examination
(*) Under the Theory PA, Out Of 30 Marks, 20 Marks is the Average of Two Tests and 10 Marks are for Micro project-
(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.
For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) microproject-40%.

1. RATIONALE:

Python is used for developing desktop GUI applications, websites and web applications. Also, as a high level programming language it allows you to focus on core functionality of the application by taking care of common programming tasks. This course is designed to help the students to understand fundamental syntactic information about 'Python'. Also it will help the students to apply the basic concepts, program structure and principles of' Python' programming paradigm to build given application. The course is basically designed to create a base to develop foundation skills of programminglanguage.

2. COURSE OUTCOMES (COs)

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

1. Write and execute simple 'Python'programs
2. Write 'Python' programs using arithmetic expressions and controlstructure.
3. Develop 'Python' programs using List, Tuples andDictionary.
4. Develop/Use functions in Python programs for modular programmingapproach.
5. Develop 'Python' programs using File Input/outputoperations.
6. Write 'Python' code using Classes andObjects.

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes	Topics and Subtopics	CO No.	Marks	Hours
Unit 1 Introduction	1a. Write and execute simple python Code for the given problem. 1b. Identify different Variables, Keywords and constants 1c. Use indentationin Python for the given Problem	1.1 Introduction: History of Python, Python features. 1.2 Basics of Python: Running Python script, Identifiers, Keywords,Indentation, Variables. 1.3 Input and Output	**1**	**08**	04
Unit 2 Types, Operators and Expression	2a.Write simple'Python' program using the given arithmetic expressions 2b. Use different types of operators for writing different arithmetic expressions. 2c. Write a 'Python' program using decision making structure for two- way branching to solve the givenproblem. 2d. Write a 'Python' program using decision making structure for multi-way branching to solve the given problem.	2.1 Standard Datatypes: Numbers, String, Tuples, List, Dictionary. 2.2 Operators: Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, python operator precedence. 2.3 Control flow: If, IF-ELSE, for loop, while loop, Break statement, Continue statement.	**2**	**10**	06
Unit 3 Data Structures	3a. Write a 'Python' code using Lists, Tuples, Sets and Dictionaries. 3b. Perform Different operations on Lists, Tuples, Sets and Dictionaries. 3c. Use built infunction in Python for Lists, Tuples, Sets, and Dictionaries.	3.1 Python List:Accessing values in list, deleting values in list, updating and lists. 3.2 Basic List Operations: Indexing, slicing. 3.3 Built-in List Functions and Methods**:** cmp, len, max, min, list etc 3.4 Tuples:Accessing values in tuples, deleting values in Tuples and updating Tuples. Basic Tuple Operations. 3.5 Sets:Accessing values in Set, deleting values in Set and updating Set. Basic Setoperations. 3.6 Dictionaries:	**3**	**12**	10

		Accessing values in Dictionary, deleting values in Dictionary and updating Dictionary. Basic Dictionary operations			
Unit 4 Function	4a. Use the given Library Function. 4b. Develop relevant User defined Functions for the Given problem. 4c. Write 'Python' codes to pass the given function parameters 4d. Develop program for handling the given Exception	4.1 Function Arguments: Default arguments, Variable Length arguments. Anonymous functions. Return Statement 4.2 Python Variable: Namespace, Scope of Variables: Global Variable and Local Variable. 4.3 Modules: Import statement. 4.4 Python Packages. 4.5 Exception Handling: try-catch statement, finally statement	**4**	**14**	12
Unit 5 File Handling	5a. Write Python code for reading and Writing the given data from/into the files. 5b. Use Files Mode in python programming	5.1 Opening file in different modes. 5.2 Accessing file Contents using standard library functions. 5.3 Closing a file.	**5**	**12**	06
Unit 6 Object Oriented Programming in Python	6a. Create classes and objects to solve the given problem. 6b. Develop Python code using data hiding. 6c. Develop Python code using data abstraction.	6.1 Creating Classes, Creating Objects. 6.2 Method Overloading and Overriding. 6.3 Data Hiding, Data Abstraction. 6.4 Inheritance: parent class and child class	**6**	**14**	10

4.LIST OF PRACTICALS:

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1	**Write /execute simple 'Python' program:** Develop minimum 2 programs using Arithmetic Operators, exhibiting data type conversion.	1
2	**Write /execute simple 'Python' program:** Develop programs using different data types (numbers, string, tuple, list, dictionary)	1
3	**Write /execute simple 'Python' program:** Calculate the Average of Numbers in a Given List	1
4	**Write /execute simple 'Python' program:** Exchange the Values of Two Numbers without Using a Temporary Variable	1
5	**Write /execute simple 'Python' program:** calculate the area and perimeter of the Square, and the volume & perimeter of the cone.	2
6	**Write /execute simple 'Python' program:** Read Height in Centimeters and then convert the Height to Feet and Inches	2

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
7	**Write /execute simple 'Python' program:** Find the Sum of Digits in a Number	2
8	**Write /execute simple 'Python' program: P**rint all Numbers in a Range Divisible by a Given Number	2
9	**Using List:** Write a programs to: Create a list, add element to list, delete element from the list. Sort the list, reverse the list and counting elements in a list.	3
10	**Write /execute simple 'Python' program:** Merge Two Lists and Sort it	3
11	**Write /execute simple 'Python' program:** Remove the Duplicate Items from a List	3
12	**Using Dictionary:** Write a programs to: (i) Create dictionary, add element to dictionary, delete element from the dictionary**.**	3
13	**Looping:** Write a program to : To print all prime numbers from 1 to N. To read age of 15 person and count total Baby age, School age and Adult age.	4
14	**Looping:** Write a program to : Find factorial of a given number. Generate multiplication table up to 10 for numbers 1 to 5.	4
15	**Functions :** Write a program to : To calculate average, mean, median, and standard deviation of numbers in a list	4
16	**Functions :** Write a program to : To print Factors of a given Number.	4
17	**Exception Handling:** Write a program to : To handle simple runtime error To handle multiple errors with one except statement	4
18	**File Input/output**: Write a program to : Python Program to Read the Contents of a File	5
19	**File Input/output:** Write a program to : To create simple file and write "Hello World" in it. To opens a file in write mode and append Hello world at the end of a file.	5
20	**File Input/output:** Write a program to : To open a file in read mode and write its contents to another file but replace every occurrence of character 'h' by 'a'. To open a file in read mode and print the number of occurrences of a character 'a'.	5
21	Write a program to Count the Number of Words in a Text File	5
22	**Classes and Objects:** Write a Program to: Create a Class which Performs Basic Calculator Operations	6
23	**Classes and Objects:** Write a Program to: Add two complex number using classes and objects. Subtract two complex number using classes and objects	6
24	**Inheritance:** Write a Program to: To create Class Person with attributes First name and Last name inherited by Subclass Student to print Name of Student using PrintMethod( )	6

Note

i. *The entire above listed practical's need to be performed compulsorily, so that the students reach the `Precision level of Dave's Psychomotor Domain'.*

ii. *The Process and Product related skills associated with each practical outcome shall be assessed on basis of following performance indicators*

S. No.	Performance Indicators	Weightage in %
1	Correctness of logic of a program	20
2	Debugging ability	20
3	Quality of input and output displayed (messaging and formatting)	20
4	Answer to sample questions	20
5	Submit report in time	20
	Total	100%

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

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

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organizing Level' in 2nd year and
- 'Characterizing Level' in 3rd year

5. 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 variousOutcomes in this course:

a. 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. Undertake micro projects.

6. SUGGESTED INSTRUCTIONAL STRATEGIES

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

a. Massive open online courses (***MOOCs***) may be used to teach various topics/subtopics.
b. The teacher needs to ensure to create opportunities and provisions for ***co-curricular***Activities.About ***10-15% 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 implementationGuideline for details).
c. Procure various materials required for practical exercises
d. Guide student(s) in undertaking micro-projects.
e. Guide student(s) in undertaking various activities in the lab/workshop.

f. Demonstrate students thoroughly before they start doing the practice.
g. Show video/animation films for handling/functioning of instruments.
h. Observe continuously and monitor the performance of students in Lab.

7. 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 practical's, cognitive domain and affective domain LOs. The microproject 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 all semesters, the micro-project could be group-based(5-6 students)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) Create an English dictionary which is able to perform following function.
b) Add a word its meaning.
c) Delete a word its meaning.
d) Update word or its meaning.
e) Print list of word and its meaning.
f) To create simple calculator using classes and objects.
g) Develop student management system which will able to
h) Add ii) Delete iii) Update iv)Display student related information like
i) Roll No, Name, Age, Address, Email-Id, Contact Numbered.
j) Develop Employee management system which will able to
k) Add ii) Delete iii) Update iv)Display student related information like
l) Emp ID, Name, Age, Address, Email-Id, Contact Numbered.
m) Develop Online mobile recharge system using python
n) Develop Library Management system using python
o) Develop Food Ordering system using python
p) Develop Library Management system using python
q) Develop Alarm Clock using python

Any other micro-projects suggested by subject faculty on similar line.
(Use functions, Classes, Objects and other features of 'Python' to develop above listed applications)

8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED

Sr No.	Equipment Name with Broad Specification	Practical No.
1	Computer system (Any computer system with basic configuration)	For all Experiments
2	'Python' Interpreter	

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction	04	04	--	08
2	Types, Operators and Expression	02	04	04	10
3	Data Structures	04	04	04	12
4	Function	02	04	08	14
5	File Handling	04	04	04	12
6	Object Oriented Programming in Python	02	04	08	14
Total		**18**	**24**	**28**	**70**

10. SUGGESTED LEARNING RESOURCES:

Sr.No.	Title Of Book	Author	Publication
1.	Python Programming	K. Nageswara Rao, Shaikh Akbar	Scitech Publications (India) Pvt. Ltd. **ISBN-10:** 9385983458 **ISBN-13:** 978-9385983450
2.	Learn to program using Python	Alan Gauld	Addison-Wesley **ISBN-10:** 0201709384 **ISBN-13:** 978-0201709384
3.	Fundamentals of Python: Data Structures	Kennet Lambert	Delmar Cengage Learning; **ISBN-10:** 1285752007 **ISBN-13:** 978-1285752006

11. 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/

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	S.S.CHAVHAN	Lecturer in Computer Science	Govt. Polytechnic Amravati
2	K.P.UKEY	Lecturer in Information Technology	Govt. Polytechnic Amravati
3	C. P. AHIR	Lecturer in Computer Science	Govt. Polytechnic Amravati

Govt. Polytechnic, Programme Board of Studies Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC,AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/2021

The Governing Body has approved the above course curriculum on 13/08/2021

GOVERNMENT POLYTECHNIC AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENT OF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING
COURSE CODE: CM5465
COURSE TITLE: CLOUD COMPUTING
TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
VI	CM3404	03	-	02	05	16	48	-	32

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HOURS	ESE		PA	TOTAL	ESE	PA	
3Hrs	MAX.	70	30*	100	25@	25^	150
	MIN.	28	---	40	10	10	

@: Internal Assessment #: External Assessment: Practical Based
(*) Under the Theory PA, Out Of 30 Marks, 20 Marks is the Average of Two Tests and 10 Marks are for Microproject-
(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.
For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) microproject-40%.

1.RATIONALE:

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.

2. COURSE OUTCOMES (COs)

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

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.

3.DETAILED CONTENTS: THEORY

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hr	Marks
Unit 1 Fundamental of Cloud Computing	1a.Explain the specified characteristics of Cloud Computing. 1b.Compare the given Cloud Deployment Models on the given criteria. 1c.Explain the given service offered by identified Cloud Service Model. 1d.Explain the given component of cloud computing architecture 1e. Write steps to use Cloud Based Integrated development Environment to develop the given application.	1.1 Cloud Computing, Essential characteristics of cloud computing 1.2 Cloud Deployment Model: Public cloud, Private cloud, Community cloud, Hybrid cloud 1.3 Cloud Service Models: laaS, PaaS, SaaS 1.4 Cloud Economics and Benefits 1.5 Architecture of Cloud Computing 1.6 Cloud Computing Infrastructure 1.7 Cloud-Based Integrated Development Environment (IDE)	**1**	**04**	**10**
Unit 2 Virtualization	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 VMware on the given OS. 2d.Describe the given disadvantage of Virtualization.	2.1 Introduction, Virtualization Reference Model, Characteristics of virtualized environment 2.2 Virtualization Types 2.3 Technology Example: VMware, Microsoft Hyper-V, KVM , Xen 2.4 Advantages: Virtual Machine(VM), VM Migration, VM Consolidation, VM Management 2.5 Disadvantages of Virtualization.	**2**	**08**	**08**
Unit 3 Storage in Clouds	3a.Explain the given component 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 Virtualized Data Centre (VDC) Architecture, VDC Environment, server, storage, networking, desktop and application virtualization techniques and benefits. 3.3 Block and file level storage virtualization, Virtual Provisioning, and automated storage tiering, Virtual storage area network(V SAN)	**3**	**10**	**16**

		and benefits, 3.4 Cloud file systems: Google File System GFS and Hadoop Distributed File System HDFS.			
Unit 4 Cloud monitoring and mana gement	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 4.2 An architecture of federated cloud computing. 4.3 Service Level Agreement (SLA) management: Types of SLA, Life cycle of SLA. 4.4 Service catalog, management and functional interfaces of services , 4.5 Cloud portal and its functions 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 Optimization	**4**	**10**	**16**
Unit 5 Security in Cloud Computing	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 Identity and Access facility of given Cloud set-up. 5e.Explain the given feature e of Security-As-A-Cloud Service.	5.1 Cloud Security Fundamentals 5.2 Cloud Risk, Cloud Risk division Polity and Organizational Risks. Technical Risks Legal risks 5.3 Technologies for Data security, Data security risk 5.4 Digital identity and access management, 5.5 Content level security 5.6 Security-As-A-Cloud Service	**5**	**08**	**10**

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hr	Marks
Unit 6 Trends and future in cloud	6a.Explain the characteristics of the given Enabling Technology with the IoT. 6b. Select relevant cloud platform. 6c.Compare the feature of the given cloud platform on the given criteria.	6.1 Cloud trends in supporting Ubiquitous Computing 6.2 Enabling Technologies with Internet of Things (RI:11), SermorXS 6.3 Cloud platform such as Amazon EC2,S3,Microsoft Azure and Cloud stack,Google App Engine,Opensource cloud Euclyptus,Open Stack and Open Nebulla etc.	**6**	**08**	**10**

4.LIST OF PRACTICALS:

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1.	Use Google Doc to make spreadsheet and notes	1
2.	Install configure cloud using JustCloud	1
3.	Create/Delete Virtual Machine using VMware (Private Cloud)	2
4.	Implement storage Service on cloud using OpenStack	3
5.	Use OpenStack for file management	3
6.	Monitor cloud using Nagios Tool	4
7.	Create and Host Simple Web Application on Microsoft Azure/Google cloud/Any cloud platform(Part-I)	4
8.	Create and Host Simple Web Application on Microsoft Azure/Google cloud/Any cloud platform (Part-II)	4
9.	Implement Identity Management and Access Management using OpenStack	5
10	Configure Servers using Microsoft Azureto secure it.	5
11	Design a small application based on IoT using Arduino or Raspberry pi (Part-I)	6
12	Design a small application based on IoT using Arduino or Raspberry pi (Part-II)	6

Note

i. The entire above listed practical's need to be performed compulsorily, so that the students reach the 'Precision level of Dave's Psychomotor Domain Taxonomy.

ii. The Process and Product related skills associated with each practical outcome shall be assessed on basis of following performance indicators.

S. No.	Performance Indicators	Weightage in %
1.	Installation Process and Attentiveness of student in practical's	20
2.	Write appropriate code to generate desired output in web application	20
3.	Debug, Test and Execute the programs	20
4.	Presentation of Output	20

S. No.	Performance Indicators	Weightage in %
5.	Able to Answer to oral questions	10
6.	Submission of report in time	10
Total		100%

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Handle and Monitor Cloud using different Tools
b. Experiments with different clouds available.
c. Configuration of Server using clouds.
d. Demonstrate working as a leader or a team member.
e. Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year

5. 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.
b. Undertake micro-projects.

6. SUGGESTED INSTRUCTIONAL STRATEGIES

Following are suggested instructional strategies, which the teacher can adopt for 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 10-15% of the topic/ subtopic/ content which is relatively simple an descriptive in nature may given to the students for self learning, for self directed learning and asses the development of CO's through class room presentation.
c. Guide student(s) in undertaking micro-projects.
d. Demonstrate students thoroughly before they start doing the practice.
e. Use different instructional strategies in classroom teaching.
f. Observe continuously and monitor the performance of student in lab.

7. SUGGESTED MICRO-PROJECTS.

Only one micro-project is to be undertaken by a student in the beginning of the semester. S/he ought to submit it by the end of semester. Each micro-project should include two or more Cos.The micro-project could be industry application based, internet based, laboratory based, field based and survey based. In the all semesters, it could be group-based (5 to 6 Student) to build up skill and confidence in every student. 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 student ought to submit micro-project by the end of the semester to develop the industry oriented COs. A suggested list is given below.

a) Prepare the report on case study of Amazon Cloud Services.
b) Prepare the report on case study of Google App Engine.
c) Create infrastructure as service using OpenStack.
d) Develop Personal Cloud using ownCloud and Raspberry Pi.

8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRE

Sr No.	Equipment Name with Broad Specification	Practical No.
1	Hardware : Computer system (i3 - i5 preferable) (Any computer system with basic configuration)	**All Practical**
2	Operating system : Windows / Linux	
3	Apache Tomcat, Java, Python, Virtualization software	
4	Academic version of any public cloud (Google/AWS/Azure)	

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Marks per Unit	Distribution of Theory Marks		
			R Level	U Level	A Level
1	**Fundamentals of Cloud Computing**	10	02	04	04
2	**Virtualization**	08	02	02	04
3	**Storages in Clouds**	16	04	08	04
4	**Cloud Monitoring and Management**	16	04	04	08
5	**Security in Cloud Computing**	10	02	04	04
6	**Trends and Future in Cloud Computing**	10	02	04	04
Total		70	16	26	28

R= Remember, **U**= Understanding, **A**=Application and above (*Bloom's Revised taxonomy)*
Note*: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

10. SUGGESTED LEARNING RESOURCES:

Sr.No.	Titleof Book	Author	Publication
1.	Cloud Computing Principles and paradigms	Buyya Rajkumar,J.Broberg,A.Goscinski	A John Willey & Sons,Inc.,Publication ISBN:978-0-470-88799-8
2.	Cloud Computing	Sharma Rishabh	Willey Publication ISBN:978-81-265-5306-8

3.	Mastering Cloud Computing	Buyya Rajkumar,Vecchiola Christian , Selvi S Thamarai	McGraw Hill Publication ISBN:978-1-25-902995-0
4.	Cloud Computing	Singh Shainlendra	Oxforf university Press ,ISBN:9780199477388

11. SOFTWARE/LEARNING WEBSITES.

a. http://nptel.ac.in/courses/106105167/1
b. https://www.techopedia.com/definition/2/cloud-computing
c. https://onlinelibrarywiley.com/doi/book/10.1002/9780470910105
d. https://www.chinacloud.cn/upload/2011-07/11073107539898.pdf

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	Mr. M. R. Torney	Lecturer in Computer Engineering	Government Polytechnic Amravati
2	Dr.P.R.Satav	Lecturer in Computer Engineering	Government Polytechnic Amravati

Govt. Polytechnic, Programme Board of Studies Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC, AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/2021
The Governing Body has approved the above course curriculum on 13/08/2020

GOVERNMENT POLYTECHNIC, AMRAVATI
(AN AUTONOMOUS INSTITUTE OF GOVT. OF MAHARASHTRA)
CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING
COURSE CODE: CM5468
COURSE TITLE: PROJECT EXECUTION AND REPORT WRITING
TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V	CM5459	-	-	04	04	16	-	-	64

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
-	MAX.	-	-	-	50#	50^	100
	MIN.	-	-	-	20	20	-

@: Internal Assessment #: External Assessment- Demonstration(Presentation &viva)$: online examination
(*) Under the Theory PA, Out Of 30 Marks, 20 Marks is the Average of Two Tests and 10 Marks are for Micro project-
(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.

1. RATIONALE

This course is in the continuation with the previous term course Seminar and Project planning. The students are required to implement detailed project plan which they have prepared in the previous term. Therefore it is very important for the students to recapitulate and comprehend the importance, concept and need of project planning. The guide shall develop the skill of learning to learn in the students so that they continued to acquire the knowledge and skill from various experiences during their career in the industries. Project is the purposeful student activity which is planned, designed and performed by the student individually or in a group to solve identified real life problem or field related problem and providing feasible solution. The project is the integration of various types of skills which are developed through three domains of learning e.g. cognitive, psychomotor and affective domain during their programme. This will help the min taking the appropriate decisions in the field situation with confidence.

2. COURSE OUTCOMES (COs)

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

1. Implement the project planning activities planned in previous course.
2. Finalize the problem for project.
3. Collect and use required information /knowledge to identified problem for project.
4. Logically choose relevant possible solution.
5. Generate a project report based on the experiences and project execution carried out.
6. Present the project report using ppt.

+

3. GUIDELINES FOR EXECUTION OF PROJECT

a) The students will finalize/revise one project based on the report submitted in previous term. The revised project shall again be approved by the project guide.
b) The student will maintain a dated project diary indicating all the activities conducted by the students every week in the term.
c) This project diary should be signed by project guide at regular interval for progressive assessment.
d) The project work is mainly experiential learning and it is not research work, so emphasis should be given on work based learning or learning from experiences which develops skills and attitude in the students. So focus of assessment should also be on learning from the process of completing project work .
e) For progressive assessment at the end, students should be asked to give power point Presentation.
f) Student should be prepare project report as guided by Guide.
g) The project guide shall ensure the quality of project done.

4. SUGGESTED STUDENT ACTIVITIES

a) The students are require to prepare activity planning sheet.
b) Maintain project diary throughout the term in which they will record the instruction received from guide and action taken by him regularly.
c) This project diary should be got signed by guide at regular interval for progressive assessment.
d) In every week student show the progress related to project. And if it is any query then discuss with the guide and solved it and maintain in daily diary also.

5. SUGGESTED INSTRUCTIONAL STRATEGIES

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

a. The teacher should guide the student in selecting a topic which is relevant and challenging for students according to their abilities.
b. The teacher should motivate students to maintain daily diary (log book).
c. The teacher should continuously discuss with students about working of group and progress in project and suggest them ways of improving.
d. The project batch size shall be 4 to 8 students
e. The project batches shall be formed as per availability of regular faculty in Computer Engineering Department..
f. Involvement of students in solving real life related projects shall be promoted.
g. Involvement of student in solving OIT based, hardware and software based ,recent technology based projects shall be promoted.

6. PROJECT REPORT

At the end of semester the student will prepare project report with following guidelines.

a. The font for the report shall be Times New Roman.
b. Font size: Title-capital14 bold, subtitle- capital12 bold and running matter 12
c. Margins: Left 1.5, top, bottom & side 1.0
d. Spacing :1.5
e. Sequence of titles/topics in project report shall be, Cover page, Certificate, Acknowledgement, Vision ,Mission of the institute and department and COs , Index, List of figures and tables, Introduction, Literature survey, Methodology, Experimental work, Result

and discussion, Conclusion and Future scope, References (books, journals, papers and website),images, photos.

f. Project report shall be hard binding with black colour cover having lettering in golden colour.
g. Originality of the report would be given more importance.
h. No. of copies per batch shall be no. of students in a batch +2

7. ASSESSMENT OF PROJECT

Assessment of Project has two components End Semester Examination (ESE) & Progressive Assessment (P.A.)

The End Semester Examination (ESE) shall be externally assessed for 50 marks on the basis of Demonstration/ppt presentation and viva. The marks shall be allotted as per the rubrics.

Progressive assessment (P.A.) for 50 marks shall be as per following criteria and Appendix A

Criteria of marks for P.A. for Project-Execution and Report writing

Sr.no.	Assessment Parameters	Weightage to each Parameter(10)
1	Punctuality	
2	Role as a member in team	
3	Communication skill	
4	Discipline knowledge	
5	Overall work execution skills and daily diary maintenance	
6	Decision making skills and attitude	
7	Problem solving attitude	
8	Analytical abilities or fabrication	
9	Report writing skill	
10	Project explaining ability or presentation	
	Total weightage obtained out of 100 marks	
	converted out of 50 marks	

Appendix-A

PROGRESSIVE ASSESSMENT (P.A.) OF PROJECT EXECUTION AND REPORT WRITING

Evaluation Sheet for Internal Assessment

Name of Programme:……..
Name of the Student: ……I.D……
Course Code& Title: CM5468 Project Execution and Report Writing
Title of the Project: ……..
…….

Pos addressed by the Project
……
……
……
……
Pos addressed by the Project
……
……
……
……

OTHER LEARNING OUTCOMES ACHIEVED THROUGH THIS PROJECT
Unit outcomes (Cognitive domain)
……
……
……
……
Practical outcomes (Psychomotor domain)
a)…….
b)……
c)…….

Affective domain outcomes
a)…….
b)…….
c)…….

Signature of Project Guide

.

8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED:

As Per Project requirement

9. SUGGESTED LEARNING RESOURCES

As Per Project requirement

10. SOFTWARE/LEARNING WEBSITES

As Per Project requirement

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	Mr.P.B.Uttarwar	Head of Applied Mechanics Dept.	Govt. Polytechnic Amravati
2	Dr. P.R.Satav	Head of Computer Engg. Dept.	Govt. Polytechnic Amravati
3	Mr.R.C.PACHEKAR	Lecturer in Civil Engineering and C.D.C. Incharge	Govt. Polytechnic Amravati
4	Mr. N.P.TATHE	Lecturer in Civil Engineering and C.D.C. Incharge	Govt. Polytechnic Amravati
5	Mrs.C.P.Ahir	Lecturer in Computer Engg.	Govt. Polytechnic Amravati
6	Mrs V.R.Rathod	Lecturer in Computer Engg.	Govt. Polytechnic Amravati

Government Polytechnic, Programme Board of Studies Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC,AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/2021

The Governing Body has approved the above course curriculum on 30/08/2021

GOVERNMENT POLYTECHNIC, AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENTOF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY
COURSE CODE: FC5490
COURSE TITLE: EMERGING TRENDS IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY(For Academic year 2020-2021)

TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V		02	--	01	03	16	32	--	16

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
02	MAX.	35$	15*	50	25#	25^	100
	MIN.	14		20	10	10	-

@: Internal Assessment #: External Assessment Skill based $: online examination
(*) Under the Theory PA, Out Of 15 Marks, 10 Marks is the Average of Two Tests and 05Marks are for Micro project-
(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.
For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) -40%.

1. RATIONALE:

Advancements and Applications of Computer engineering and Information Technology are ever changing Emerging trends aims at creating awareness about major trends that will define technological disruption in the upcoming years in the field of Computer engineering and Information Technology. There are some emerging areas expected to generate revenue, increasing demand as IT professionals and open avenues of entrepreneurship.

2. COURSE OUTCOMES (COs)

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

1. Describe Artificial Intelligence ,machine learning and deep learning
2. Interpret Internet of Things concepts.
3. Describe Ethical Hacking process and Detect Network Vulnerabilities..

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes	Topics and Subtopics	CO No.	Marks	Hours
Unit-1 Artificial Intelligence	1a.Describe the concept of AI 1b.State the components of AI 1c.List Applications of AI 1d.Differentiate between machine learning & deep Learning	**1.1 Introduction of AI** Concept Scope of AI Components of AI Types of AI Application of AI **1.2 Concept of Machine Learning and Deep Learning**	**1**	**07**	**06**
Unit 2 Internet of Things	2a. State the domains and application areas of Embedded Systems 2b.Describe IoT systems in which information and knowledge are inferred from data 2c.Describe designs of IoT 2d. State IoT Issues and challenges in deployment	**2.1 Embedded Systems:** Embedded system concepts. Purpose of Embedded system, Architecture of Embedded system, Types of Embedded processors–PIC,ARM, AVR, ASIC **2.2 Internet of Things : Definition and Characteristics of IoT** Physical design of IoT Things of IoT IoT Protocols Logical design of IoT, IoT functional Blocks, IoT communication models, IoT communication APIs, IoT Enabling Technologies IoT levels and Deployment Templates, Iot Issues and Challenges, Applications IoT devices and its features: Arduino, Uno, Rasperry Pi, Node Microcontroller unit	**2**	**14**	**14**
Unit 3 Basics of Hacking	3a.define Hackers 3b.Describe the need of hack your systems 3c.Descibe the dangers in systems 3d.Describe the Ethical Hacking process 3e.Describe Network Infrastructure Vulnerabilities	**3.1 Ethical Hacking** Defining hacker, Malicious users **3.2 Need to hack your own system.** **3.3 Mention the dangers your systems face** Nontechnical attacks Network-infrastructure attacks Operating-system attacks Application and other specialized attacks **3.4 Obeying the Ethical hacking Principles** Working ethically	**3**	**14**	**12**

		Respecting privacy Not crashing your systems **3.5 The Ethical hacking process** Formulating your plan Selecting tools Executing the plan Evaluating results Moving on **3.6 Network Hacking** **3.6.1 Network Infrastructure:** Network Vulnerabilities Scanning-Ports Ping sweep Scanning SNMP Grabbing Banners Analyzing Network Data and Network Analyzer MAC-daddy attack			

4.LIST OF PRACTICALS:

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1.	Write a simple program using PROLOG.	1
2	Write a program to transfer serial data on your thingspeak account using Node MCU	2
3	Write a program to transfer serial data on your thingspeak account using Raspberry Pi	2
4	Write a program to transfer data to thingspeak cloud using Interface LM35 Temperature sensor to Node MCU8266	2
5	Use of network reconnaissance tools like WHOIS, dig, traceroute, nslookup to gather information about networks and domain registers	3
6	Download and install nmap. Use it with different options to scan open ports, perform OS fingerprinting, do a ping scan, tcp port scan, udp port scan, etc.	3

Note

i. The entire above listed practical's need to be performed compulsorily, so that the students reach the `Precision level of Dave's Psychomotor Domain'.

ii. The 'Process' and 'Product' related skills associated with each PrO are to be assessed according to a suggested sample given below.

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental setup	20
2	Setting and operation	20
3	Follow safety precautions	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20

S. No.	Performance Indicators	Weightage in %
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	100%

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

- Work collaboratively in team.
- Follow ethical Practices

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organization Level' in 2nd year and
- 'Characterization Level' in 3rd year

5. 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 following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (students) portfolio which will be useful for their placement interviews:

a. Prepare report on suggestive case study of Hacking as given below:

i.) The Aaron Cafferey case-United Kingdom ,2003
http://digitalcommons.law.scu.edu/cgi/viewcontent.gi?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

b. Prepare report on any given case study of IoT..

6. SUGGESTED INSTRUCTIONAL STRATEGIES

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

a. Massive open online courses (***MOOCs***) may be used to teach various topics/subtopics.
b. The teacher needs to ensure to create opportunities and provisions for ***co-curricular*** Activities.
c. About ***10-15% 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. Procure various materials required for practical exercises
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.

7. 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 the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs.

The microproject 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 all semesters, the micro-project could be group-based(4 to 5 students) 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.
A Suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:
a.IoT Based Humidity and Temperature Monitoring

i. The need of IoT Based Humidity and Temperature Monitoring .
ii. The hardware requirements for designing this system.
iii. The software requirements for designing this system.
iv. Describe the circuit designed for this system along with its working
v. Design an IoT application and mention how to store and retrieve a data on it.

b.IoT based Weather Monitoring System

i. The need of IoT Based Weather Monitoring System
ii. The hardware requirements for designing this system
iii. The software requirements for designing this system.
iv. Describe the circuit designed for this system along with its working
v. Design an IoT application and mention how to store and retrieve a data on it .

c. Study Credit card fraud as an identity threat. Identify

i. Use of digital media in carrying out fraud.
ii. Vulnerability Exploided.
iii. Effect of fraud.
iv. Protection /Precaution to be taken against such frauds.

d. 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.

8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED

Sr No.	Equipment Name with Broad Specification	Practical No.
1	PROLOG	1
2	Node MCU and Peripherals (e.g. LEDs, Sensors like Temp. sensor LM35, Ultrasonic sensor etc.)	2,3,4
3	Raspberry Pi	2,3.,4
4	Arduino IDE (Open source software)	2,3,4
5	Python Software	2,3,4
6	Kali Linux	5,6
7	WHOIS, dig, traceroute, nslookup tools	5
8	n-map tool	5

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Marks per Unit	Distribution of Theory Marks		
			R Level	U Level	A Level
1	Artificial Intelligence	07	3	2	2
2	Internet of Things	14	4	6	4
3	Basics of Hacking	14	4	6	4
Total		35	11	14	10

R= Remember, U= Understanding, **A**=Application and above (*Bloom's Revised taxonomy)*

***Note**: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table*

10. SUGGESTED LEARNING RESOURCES:

Sr.No.	Title Of Book	Author	Publication
1.	Artificial Intelligence	R.B.Mishra	PHI Learning Pvt. Ltd
2.	Introduction to Embedded Systems	Shibu K.V.	Tata Mcgraw Hill ISBN 978-0-07-014589-4
3.	Internet Of Things –A Hands –on Approach	Arshadeep Bahga,Vijay Madisetti	McGraw Hill Education, Private Limited,New Delhi,2010,ISBN:978-0-07-068178-1
4.	Hacking for Dummies	Kevin Beaver CISSP	Willey Publishing Inc. ISBN:978-81-265-6554-2

11. SOFTWARE/LEARNING WEBSITES.

a. https://www.allitebooks.in/the-internet-of-things/
b. https://www.versatek.com/wp-content/uploads/2016/06/IoT-eBook-version5.pdf
c. Https://www.tutorialspoint.com/internet -of-things/intrnet-of-thins_tutorial.pdf
d. http://www.spmkck.co.in/Notes/Learning%20Internet%20of%20Things.pdf
e. https://docs.microsdoft.com/en-us/sysinternals/downloads/psloggedon
f. www.openwall.com/passwords/windows-pwdump
g. https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_process.htm
h. https://slideplayer.com/slide/7480056

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1.	Dr.P.P.Karde	H.O.D Information Technology	Govt. Polytechnic Amravati
2.	Dr. P R Satav	Lecturer in Computer Engineering	Govt. Polytechnic Amravati
3.	A.P.Jane	Lecturer in Information Technology	Govt. Polytechnic Amravati
4.	R.R.Bhoge	Lecturer in Information Technology	Govt. Polytechnic Amravati

Govt. Polytechnic, Programme Board of Studies of Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC,AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/2021

The Governing Body has approved the above course curriculum on 13/08/2021

GOVERNMENT POLYTECHNIC, AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENT OF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING
COURSE CODE: CM5474
COURSE TITLE: LINUX OPERATING SYSTEM

TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V	FC5462	03	-	02	05	16	48	-	32

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
3Hrs	MAX.	70	30*	100	25#	25^	150
	MIN.	28	---	40	10	10	

@: Internal Assessment #: External assessment-Practical based $: online examination
(*) Under the Theory PA, Out Of 30 Marks, 20Marks is the Average of Two Tests and 10 Marks are for Micro project-
(^) under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.
For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) microproject-40%.

1. RATIONALE:

Operating System is the interface between the user and the computer system. Nowadays LINUX is one of the most widely used operating system. Knowledge of LINUX operating system is essential as it provides many features such as multitasking, multiuser, security etc. which are mainly used in both server and workstation systems. So, this course will enable the students to inculcate the basics of LINUX Operating System, writing Shell scripts as well as administer the network.

2. COURSE OUTCOMES (COs)

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

1. Install Linux Operating System.
2. Evaluate the basic linux OS commands and its utilities.
3. Develop Shell program for solving different problems.
4. Maintain Linux Operating System.
5. Manage Disk related operation in Linux operating System.
6. Maintain Linux Network Services.

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hrs	Marks
Unit 1. Features of Linux Operating System	1a Describe the use of given system call of Linux OS. 1b Determine the file type on the basis of first character of Is command output for the given computer system. 1c Outline salient features of the given Linux shell.	1.1 Features of Open Source Operating Systems, Core Linux Distributions, Architecture, OS Services, System Calls, Run Levels. 1.2 File System: Hierarchical File System, File System features. 1.3 Shell: Login into the system, Concept of Shell, Various Linux Shell and their Features.	**1**	**08**	**10**
Unit 2. Linux Commands and Utilities	2a Classify the given command as internal or external. 2b Use the relevant command to produce the specified output. 2c Use relevant file and directory command(s) to perform the specified operation. 2d Apply the specified permissions to file and directory	2.1 Locating Commands, Internal & External Commands, Arguments, Options & Filenames, Online help 2.2 General Purpose Utilities cal, date, who, whoami, tty, uname, passwd, echo, tput, be,script, wall, write, mail. 2.3 Navigating the File System Concepts: Files, Directories, Paths, Home Directory, Parent-Child Relationship, Handling Command.- pwd, cd, mkdir, rmdir,ls Ordinary Files --_, handling commands: cat, cp,rm,mv, - cmp,comm,diff 2.4 File Attributes : File Permissions listing file, permissions, chmod Command 2.5 grep Family: Regular expressions, grep, egrep, fgrep, tr.	**2**	**11**	**14**
Unit 3. Shell Program	3a Use vi editor in the specified mode to carry out the given operation.	3.1vi Editor: Modes of vi, commands in various modes - creating,	**3**	**11**	**16**

m ing	3b	Apply relevant wild card for the given pattern matching.	editing, saving and quitting 3.2 Shell, sh Command, Pattern Matching-the Wild Cards, Escaping-the Backslash(\), Quoting, Redirection, Pipes, Tees, Command Substitution, Shell Variables 3.3 Shell Programming: Shell Scripts, read Statement, Command Line Arguments Positional Parameters, Exit Status of Command, Logical Operators && and 11, exit Statement, if and case Statements, expr Statement, while, until and for Statements, Sample Validation & Data Entry. 3.4 Simple Scripts, Scripts Using Simple Commands			
	3c	Create conditional statement using logical and relational operators to implement the given criteria.				
	3d	Write shell scripts for the given problem.				
Unit 4. Basic Linux System Administration	4a	Write procedure to perform the given task of System Administrator.	4.1 System Administration: Role of Administrator, root- Administrator's Login, su: Acquiring superuser Status, Administrator's Privileges- passwd Commands, Task Scheduling using cron, Maintaining Security. 4.2 Operations: Startup and shutdown, System run levels 4.3. User management: User configuration and password file, Managing Users and Groups.	**4**	**06**	**10**
	4b	Explain purpose of using the given run level.				
	4c	Write procedure to perform the given operation for managing the users/groups.				

Unit	Unit Outcomes		Topics and subtopics	Co No.	Hrs	Marks
Unit 5. Basic Linux Disk management	5a 5b 5c	Use relevant command as per the given disk management operation. Managing Linux disks and the file systems that reside on them Creation and deletion of disk partition.	5.1 Managing Disk Space: df, du, find command-Locating files dd, Command-Copying Disks, disk management-RAID. 5.2 Backups: Need of backup, cpio & tar commands. 5.3 Linux commands for disk management, fdisk, pydf , parted, lsblk, sfdisk, cfdisk. 5.4 Creation and deletion of partition in linux, formatting partition :mkfs	**5**	**06**	**10**
Unit 6. Basic Network Management	6a 6b 6c 6d	Configure the given TCP/IP settings in a network. Configure the given setting in DHCP Server/Client. Write method to configure setting in firewall to apply the given network security feature. Use specified utility/ software for Network Intrusion	6.1 IP address configuration: TCP/IP Network address, TCP/IP Configuration files, Network Interfaces and Routes :if config, route, ping, netstat, tcpdump commands 6.2 DHCP Server Configuration Configuring DHCP Client and Server,Dynamic Address, Fixed Addresses. 6.3 NIS, NFS, SAMBA introduction. 6.4 Firewall and Internet Security: Limiting Network Services, Designing Firewall. 6.5.Network Intrusion Detection: Host based Intrusion Detection Software using tripwire any relevant utility	**6**	**06**	**10**

4. LIST OF PRACTICALS:

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1	Install and configure Linux operating system environment.	1
2	Use pipe to concatenate the General Purpose Linux command.	2
3	Use pattern Searching using grep family commands.	2
4	Write a Shell script using following Control Structures : a) if then else structure and nested if then Structure.	3

	b) Case Statement	
5	Write a Shell script using expr to perform arithmetic Operations.	3
6	Write a Shell script using test command to check a) Two variables using -eq, -ge, -gt, -le, -it, - Ile. b) Existence of file, file as a directory, file size greater than zero.	3
7	Write a login Shell script to perform a) Verify that your Shell , Looking at Current Values b) Editing Current Values, Test New Prompts.	3
8	Manage users and groups in Linux as a Super user,.	4
9	Mange various administrative privilege commands and startup and shut down of Linux OS.	4
10	Use relevant command as per the given disk management operation.	5
11	Create and delete of disk partition.	5
12	Configure TCP/IP settings and perform ICMP commands such as traceroute, ping.	6

Note

i. The entire above listed practical's need to be performed compulsorily, so that the students reach the 'Precision level of Dave's Psychomotor Domain Taxonomy.

ii. The Process and Product related skills associated with each practical outcome shall be assessed on basis of following performance indicators.

Sr. No.	**Performance Indicators**	**Weightage in %**
a	Configuration of Linux operating system	20
b	Correctness of Executing various commands	20
c	Writing and executing shell script to get desired output	20
d	Debugging the program	15
e	Submit journal report in time	15
f	Question on term work	10
	Total	100

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

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

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organizing Level' in 2nd year
- 'Characterizing Level' in 3rd year

5. 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.
b. Undertake micro-projects.

6. SUGGESTED INSTRUCTIONAL STRATEGIES

Following are suggested instructional strategies, which the teacher can adopt for 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. The teacher needs to ensure to create opportunities and provisions for ***co-curricular activities***.
c. Guide student(s) in undertaking micro-projects.
d. Demonstrate students thoroughly before they start doing the practice
e. Use different instructional strategies in classroom teaching.
f. Observe continuously and monitor the performance of student in lab.
g. About 10-15% of the topics/sub-topics/contents which is relatively simpler or descriptive in nature may be given to the students for self-directed learning and assess the development of the COs through classroom presentations. Keep the record of the topics/sub-topics/contents given to the students.

7. SUGGESTED MICRO-PROJECTS.

Only one micro-project is to be undertaken by a student in the beginning of the semester. S/he ought to submit it by the end of semester. Each micro-project should include two or more Cos. The micro-project could be industry application based, internet based, laboratory based, field based and survey based. In the all semesters, it could be group-based (group 5-6 student) to build up skill and confidence in every student. 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 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 following Common Services (Client AND Server)
b) DHCP, DNS, LDAP, Email (SMTP, POP, IMAP)
c) Build a NAS
d) Configure NFS, Samba
e) Configure Proxy Server, Web server, Squid, Apache
f) Outline salient features of the given Linux shell.
g) Write a grep/egrep script to find the number of words character, words and lines in a file.
h) Installation of Virtual Box (VMware) on a PC having other operating system.
i) Shell script program to count number of files in a Directory.
j) Shell script program to copy contents of one file to another.
k) Create directory, write contents on that and Copy to a suitable location in your home directory.

8. MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED

Sr No.	Equipment Name with Broad Specification	Practical No.
1	Computer system (Any computer system with basic configuration)	All
2	Linux or alike operating system such as Ubuntu, CentOS or any other.	

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Marks per Unit	Distribution of Theory Marks		
			R Level	U Level	A Level
1	Features of Linux Operating System	10	02	04	04
2	Linux Commands and Utilities	14	02	04	08
3	Shell Programming	16	04	04	08
4	Basic Linux System Administration	10	02	04	04
5	Basic Linux Disk management	10	02	04	04
6	Basic Network Management	10	02	04	04
Total		70	14	24	32

R= Remember, **U**= Understanding, **A**=Application and above (*Bloom's Revised taxonomy)*
***Note**: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

10. SUGGESTED LEARNING RESOURCES:

Sr. No.	Title Of Book	Author	Publication
1.	Unix Concept and Programming	Das, Sumitabha	McGraw Hill education, New Delhi, 2015, ISBN: 978-0070635463
2.	Linux Command Line and Shell Scripting Christine Bible,3rd Edition	Blum, Richard, Bresnahan , Christine	Wiley Publication, New Delhi, 2015,ISBN:- 978-1-118-98384-3
3.	Red Hat: The Complete Reference Enterprise Linux and Fedora Edition	Piterson, Richard	McGraw Hill education, New Delhi , ISBN:-0-7-058709-4
4.	Red Hat Linux Networking and System Administration	Coiling, Terri & Wall, Kurt	Red Hat ISBN: 0-7645-3632-X ISBN: 978-007063546

11. SUGGESTED SOFTWARE/LEARNING WEBSITES

a. https ://www.li node . com/docs/tool s-referenee/linux-system-administration-basics.
b. http ://training.linuxfoundation.org/free-linux-training.
c. https ://www.j avatpo int.com/linux-tutori al
d. http ://www.tutorialspoint.com/listtutori als/linux/1
e. https ://www.digitalocean .com/community/tutorials/how-to-customize-your-bash-prompt-on-a-linux-vps
f. https://spoken-tutorial.org/tutorial search/?search_foss=Linux&search_language=English

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	Dr.P.R.Satav	Lecturer in Computer Engineering.	Government Polytechnic Amravati
2	Smt.V.R.Rathod	Lecturer in Computer Engineering.	Government Polytechnic Amravati

Government Polytechnic, Amravati Programme Board of Studies Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC, AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/21
The Governing Body has approved the above course curriculum on 13/08/2021

GOVERNMENT POLYTECHNIC, AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENT OF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING
COURSE CODE: CM5475
COURSE TITLE: DATA WAREHOUSING AND MINING

TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V	CM5469	03	-	02	05	16	48	-	32

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
3Hrs	MAX.	70	30*	100	25#	25^	150
	MIN.	28	---	40	20	10	

@: Internal Assessment #: External Assessment: Practical based $: Online Examination
(*) Under the Theory PA, Out Of 30 Marks, 20 Marks is the Average of Two Tests and 10 Marks are for Micro project-
(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.
For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) microproject-40%.

1. RATIONALE:

Data mining and warehousing are the essential components of decision support systems for the modern days in industry and business. These techniques enable the knowledge to take better and faster decisions. The objective of this course is to introduce the student to various Data Mining and Data Warehousing concepts and techniques. This course introduces principles, algorithm, architecture, design and implementation of data mining and data warehousing techniques. Learning this course would improve the employment potential of students in the information management sector.

2. COURSE OUTCOMES (COs)

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

1. Establish scope and necessity of Data Mining forvarious applications.
2. Establish scope and necessity of Warehousing for various applications.
3. Design data mining system usingthe concept of data mining components and techniques
4. Use data mining tools for different applications.
5. Apply basic Statistical calculations on Data
6. Apply clustering technique on given dataset

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hr	Marks
Unit – I Introduction to Data Warehousing	1a. Describe need and architecture for given Data warehousing. 1b.Explain the benefits of Data warehousing of the given application. 1c. Describe the given Data Warehouse Models. 1d. Describe Extraction, Transformation and Loading for the given data warehouse 1e.Describe Metadata Repository for the given Data warehouse.	1.1 Data warehousing, Difference between operational Database System and Data warehouse 1.2 Need for data warehousing 1.3 A Multi-tiered Architecture Of data warehousing. 1.4 Data Warehouse Models: Enterprise Warehouse, Data Mart, and Virtual Warehouse. 1.5 Extraction, Transformation, and Loading. 1.6 Metadata Repository 1.7 Benefits of Data warehousing	**1**	**08**	**08**
Unit– 2 Data Warehouse Modeling and Online Analytical Processing I	2a. Describe Data Cube and OLAP for the given data warehouse 2b. Explain Schemas for Multidimensional data models for the given data warehouse 2c. Compare Stars and Snowflakes Schema Models for the given data warehouse 2d. Describe the given OLAP operations 2e. Explain the benefits of the given OLAP tool.	2.1 Data Warehouse Modeling: Data Cube and OLAP, Data Cube: A Multidimensional Data Model 2.2 Stars, Snowflakes, and Fact Constellations. 2.3 OLAP: Need of OLAP, OLAP guidelines 2.4 Typical OLAP operations	**2**	**14**	**14**
Unit– 3 Online Analytical Processing	3a. Describe design Process for the data warehouse. 3b. Compare OLAP and OLTP tools, based on the given criteria 3c. Design the given data warehouse 3d. Explain Bitmap and Join Index for the given OLAP. 3e.Compare OLAP server Architectures for the given data warehouse	3.1 Data Warehouse Design and Usage 3.2 A Business Analysis Framework for Data Warehouse Design 3.3 Data Warehouse Design Process 3.4 Data Warehouse Usage for Information Processing. From Online Analytical Processing to Multi-dimensional Data Mining 3.5Data Warehouse Implementation – Efficient Data Cube Computation: An Overview. 3.6Indexing OLAP Data: Bitmap	**3**	**10**	**12**

		Index and Join Index, Efficient Processing of OLAP Queries. 3.7OLAP Server Architectures : ROLAP Versus MOLAP VersusHOLAP .			
Unit-4 Introduction to Data Mining	4a. Explain concept of Data Mining. 4b. Describe the given Data Mining steps. 4c. Explain Major issues in given data 4d.Explain the given data objects and attributes types. 4e.Describe methods of Data Preprocessing for the given data. 4f. Explain data cleaning process for the given data	4.1Introduction to Data Mining: Steps in the processof knowledge discovery of Database(KDD) . 4.2 What Kind of data can be Mined? Major issues in data mining 4.3 Data Objects and Attributes types 4.4 Data Preprocessing: Why Preprocess the data? Major Tasks in Data Preprocessing 4.5 Data Cleaning :Missing Values, Noisy data, Data cleaning as a process	**4**	**14**	**14**
Unit –5 Mining Frequent Patterns and Cluster Analysis	5a. Define the Frequent Item sets and Closed Item sets. 5b. Describe the given AssociationRules 5c. Explain clustering methods for the given data 5d.Analyze Apriori Algorithm for the given Data	5.1 Mining Frequent Patterns, Basic Concepts :Market Basket Analysis, Frequent Item sets, Closed Item sets, and Association Rules 5.2 Frequent Item sets Mining Method: The Apriori Algorithm: Finding Frequent Item setUsing Candidate Generation 5.3 Generating Association Rules from Frequent Item sets.	**5**	**10**	**12**
Unit –6 Cluster Analysis	6a. Explain clustering methods for the given data 6b.Explain application of Cluster	6.1 What is Cluster Analysis? Requirements for Cluster Analysis 6.2 Overview of Basic Clustering Methods. 6.3 General Applications of Clustering	**6**	**08**	**10**

4.LIST OF PRACTICALS:

Sr No.	**PRACTICAL OUTCOMES (PrOs)**	**CO NO.**
1	Install Oracle Database Server and Client	1
2	Import Source Data structures in Oracle	1
3	Develop Target data structures in Oracle	2
4	Install data mining tool WEKA.Study the GUI explorer on WEKA	2
5	Develop an application to implement OLAP and its operations like rollup, drilldown, slice and dice.	3
6	Implement data cleaning technique I (Data Preprocessing—Finding and replacing Missing value in sample Dataset.)	4

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
7	Preprocess dataset WEATHER.arff including creating ARFF file and reading it into WEKA , and using the WEKA explorer.	4
8	Demonstration of Preprocessing on dataset Customer.arff Attributes Selection and Normalization	4
9	Demonstration of Preprocessing on dataset Customer.arff . Draw various graphs using WEKA	4
10	Perform Association technique on Customer dataset I.(Implementing Apiori algorithm on customer dataset.)	5
11	Perform Association technique on Customer dataset II.(Using classification algorithm of KNN on sample dataset)	5
12	Apply clustering technique on Customer dataset I.(Using K-means clustering on sample weather datset)	6

Note

i. *The entire above listed practical's need to be performed compulsorily, so that the students reach the `Precision level of Dave's Psychomotor Domain'.*

ii. *The Process and Product related skills associated with each practical outcome shall be assessed on basis of following performance indicators.*

S. No.	Performance Indicators	Weightage in %
1.	Installation and configuration of database server and client	20
2.	Analysis and implementation ability	20
3.	Quality of input and output displayed	20
4.	Answer to Sample Questions	20
5.	Submission of report in time	20
	Total	100%

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/a team member.
d. Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organizing Level' in 2nd year and
- 'Characterizing Level' in 3rd year.

5. 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 practical.
b. Undertake micro-projects.
c. Prepare a chart to classify Data Structures.
d. Prepare charts for logical representation of Data Structures.

6. SUGGESTED INSTRUCTIONAL STRATEGIES

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

a. Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b. Guide student(s) in undertaking micro-projects.
c. Demonstrate students thoroughly before they start doing the practice.
d. Encourage students to refer different websites to have deeper understanding of the subject.
e. Observe continuously and monitor the performance of students in Lab.
f. **'**About ***10-15% 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).

7. SUGGESTED MICRO-PROJECTS.

Only one micro-project is planned to be undertaken by a student assigned to him/her in thebeginning of the semester. S/he ought to submit it by the end of the semester to develop theindustry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practical's, cognitive domain and affective domain LOs. The microproject could be industry application based, internet-based, workshop-based, laboratory-basedor 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. Thetotal duration of the micro-project should not be less than ***16 (sixteen) student engagementhours*** during the course.In the all semesters, the micro-project could be group-based (5-6 students) to build up the skill and confidence in everystudent to become problem solver so that s/he contributes to the projects of the industry.

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

a. Perform Association technique on Customer dataset/Agriculture dataset
b. Weather Dataset
c. Create data warehouse for any medical shop having 2 or more branches.
d. Predict traffic conditions for allocating more buses on various routes by bus controller.
e. Predict Job opportunities in Computer/ IT field looking into the work generated last year.
f. Design a Data Mart and Data warehouse for any organization.

8. MAJOR EQUIPMENTS/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	PrO S. No.
	Computer system (Any computer system which is available in laboratory)	All
	ORACLE Client and Server , Data Mining tool:WEKA	

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Marks per Unit	Distribution of Theory Marks		
			R Level	U Level	A Level
1	Introduction to Data Warehousing	08	04	04	-
2	Data Warehouse Modeling and online Analytical Processing	12	04	04	04
3	Online Analytical Processing	14	02	04	08
4	Introduction to Data Mining	14	02	04	08
5	Mining Frequent Patterns	12	04	04	04
6	Cluster Analysis	10	02	04	04
Total		**70**	**18**	**24**	**28**

R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
***Note**: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table*.

10. SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	Data mining concepts and techniques	Jiawei Han and MichelineKamber, Third Edition, Elsevier, 2012	Morgan Kaufmann Publications. Elsevier 2012,ISBN:978-0123814791
2	Data warehousing , data mining and OLAP	Alex Berson, Hill Edition, Thirteenth Reprint 2008,	Tata McGraw Hill New Delhi 2008 ISBN-13:978-0070062726
3	The Data warehouse life cycle tool Kit	Ralph Kimball.	John Wiley Third Edition ISBN:978-0-471-20024-6
4	Data Based Management	Dr.RajendraKawle	Devraj Publication ISBN:978-93-86492-00-5

11. SOFTWARE/LEARNING WEBSITES.

a. http://docs.oracle.com/
b. http://www.guru99.com/online-analytical-processing.html
c. http://www.tutorialspoint,com/dwh/dwh_relational_olap.html
d. http://www.tutorialride.com/big-data-analytics/stream-cluster-analysis.html

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	Dr. P.P.KARDE	Lecturer in Information Technology.	Govt. Polytechnic Amravati
2	S. S. CHAVHAN	Lecturer in Computer Engineering.	Govt. Polytechnic Amravati
3	S A KALE	Lecturer in Information Technology.	Govt. Polytechnic Amravati

Government Polytechnic Amravati Programme Board of Studies Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC, AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/2021

The Governing Body has approved the above course curriculum on 13/08/2021.

GOVERNMENT POLYTECHNIC, AMRAVATI

(AN AUTONOMOUS INSTITUTE OF GOVERNMENT OF MAHARASHTRA)

CURRICULUM DEVELOPMENT CELL

PROGRAMME TITLE: DIPLOMA IN COMPUTER ENGINEERING

COURSE CODE: CM5476

COURSE TITLE: ADVANCE DATABASE MANAGEMENT SYSTEM

TEACHING SCHEME:

LEVEL OF COURSE	PRERE-QUISITE	WEEKLY CONTACT HRS.			TOTAL CREDITS	TOTAL WEEKS	TOTAL CONTACT HOURS		
		L	T	P			L	T	P
V	CM5469	03	-	02	05	16	48	-	32

EXAMINATION SCHEME:

THEORY(Marks)					PRACTICAL(Marks)		TOTAL (Marks)
ESE PAPER HRS.	ESE		PA	TOTAL	ESE	PA	
3Hrs	MAX.	70	30*	100	25#	25^	150
	MIN.	28	---	40	10	10	

@: Internal Assessment #: External Assessment:Practical based $: Online Examination

(*) Under the Theory PA, Out Of 30 Marks, 20 Marks is the Average of Two Tests and 10 Marks are for Micro project-

(^) Under practical PA Continuous Assessment of Practical Work is to be done by Course Teacher as per CDC norms.

For the courses having only practical examination, PA has two parts (i) Continuous Assessment of Practical work - 60% and (ii) microproject-40%.

1. RATIONALE:

Advanced database management system contain a comprehensive contents on various concepts related to database system database design and management discuss about parallel and distributed database systems database transaction big data management and advance in database data. The student will get a detail introduction about database administration and management the role of machine learning in big data management. This course includes study of structured and unstructured database like mongo DB SQL and XML for data management. The concept big data is used to in today's information dry driven business world of managing big data after learning the subject students will be able to ADBMS as a backend for developing database.

2. COURSE OUTCOMES (COs)

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

1) Differentiate various Database Architecture.
2) Use Object Oriented and Advanced XML on Database.
3) Manipulate data using MongoDB commands.
4) Use Data Warehousing Concepts.
5) Use Data Mining Concepts.
6) Use Big Data Concepts.

3. DETAILED CONTENTS: THEORY

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hr	Marks
Unit 1 Database Architecture	1a. Describe the given client server database model. 1b. Use the given locking protocols for concurrency control 1c. Apply parallel and distributed database techniques in given situation 1d.Differentiate between parallel and distributed databases	1.5 Introduction to client server database model : Two Tier client server model , Three Tier client server model 1.6 Currency control technique : concurrency control protocol, lock based protocol granting of locks, two phase locking protocol 1.7 Introduction to parallel database : Parallel database system architecture ,Types of parallelism ,parallel database implementation 1.8. Introduction to distributed database :Distributed database system architecture, benefits of distributed database system	**1**	**08**	**12**
Unit 2 Object Based Databases and XML	2a. create the given object based database and XML to create the given object database using SQL 2b. Write given SQL queries using table inheritance 2c. Write given SQL queries using array and multiset 2d. Implement SQL queries to refer the given object using object identity 2e. Write XML queries on given data.	2.1 Object based data bases overview 2.2 Complex data types 2.3 structure types and inheritance in SQL 2.4 Table inheritance 2.5 Array and multiset types in SQL 2.6 Object identity and reference types in SQL 2.7. XML introduction structure of XML data ,XML document schema, Xpath, XQuery FLOWER expression joins nested queries sorting functions ,Functions and types .	**2**	**10**	**14**
Unit 3 Advanced Database techniques	3a. Differentiate structured and unstructured data 3b. Use No SQL database to solve given queries 3c. Use MongoDB to solve given queries. 3d. Differentiate SQL and NoSQL databases	4.1. Structured versus Unstructured data 4.2. NoSQL database concepts :Types of NoSQLdatabases,NoSQL data modeling ,Benefits of NoSQL,comparison between SQL and NoSQL database	**3**	**10**	**14**

	3e. Write query to execute find () functions on given data 3f. Implement basic operations performed on MongoDB sale on given data. 3g. Write query using aggregate() method on given data	system 4.3. NoSQL using MongoDB, introduction to MongoDB shelled running the MongoDB shell MongoDB client basic operations with MongoDB shell basic data types are embedded documents. 3.4. Quarrying with MongoDB: Find() function ,specifying which keys to return, Query criteria,ORqueries, Types specific Querying 3.5 Aggregation introduction : Aggregation Pipeline , Aggregation using MapReduce ,Single purpose aggregation			
Unit 4 Data Warehousing	4a. Define Data Mart and Meta Data 4b. Explain Architecture of Data Warehousing 4c. Define OLAP, MOLAP, ROLAP	4.1 Introduction to Data Warehouse : characteristics and types of architecture of data Warehousing 4.2 Data Marts, Data Warehousing Life Cycle 4.3 Data modeling (Multidimensional Database) for data Warehousing 4.4 OLAP, MOLAP, ROLAP 4.5 Data warehouse and views, Future open issue for data warehouse	**4**	**06**	**08**
Unit 5 **Data Mining**	5a. Analyze Given Data using Data Mining 5b. Describe the features of 5c.BI and BI components 5d. Explain use of Spatial Databases in given Situation	5.1 Introduction to Data Mining : Data mining Technology and its relationship to Data warehousing, Association rules, Classification and Clustering, Application Of Data Mining 5.2 Introduction to Business Intelligence : Features , Frameworks, Types and Approaches for Machine Learning 5.3 Introduction to Multimedia Databases, Mobile Databases, Digital Databases	**5**	**08**	**10**

Unit	Unit Outcomes (UOs) (In cognitive domain)	Topic and Sub-topics	CO No.	Hr	Marks
Unit 6 Big Data Management	6a.Analyze the given Situation for the use of Big Data 6.b Describe the given architecture of Hadoop 6.c Explain use of Cloudera in given situation 6.d Explain given Features of R-Programming	6.1 Big Data 6.2 Introduction to Hadoop: Building blocks, components, Hadoop Architecture, HBase, HIVE, solid –state Drive 6.3 Cloudera, Oracle Cloud 6.4 Introduction to R - Programming	**6**	**06**	**12**

4.LIST OF PRACTICALS:

Sr No.	PRACTICAL OUTCOMES (PrOs)	CO NO.
1	Implementing Locking Protocols	1
2	Create Database using XML attributes and Elements	2
3	Implement queries based on flower expressions and join using X query	2
4	Implement queries based on functions and types using X query	2
5	Execute queries using structure type in SQL	2
6	Execute queries using type inheritance and table inheritance in SQL	2
7	Execute queries using object identity and reference types in SQL	2
8	Design and develop mongo DB queries using basic operations	3
9	Implement aggregation queries using MongoDB	3
10	Import Source Data structures in Oracle	4
11	Install and configure any data mining tool (like WEKA)	5
12	Install and configure RStudio tool	6

Note

i. *The entire above listed practical's need to be performed compulsorily, so that the students reach the `Precision level of Dave's Psychomotor Domain'.*

ii. *The Process and Product related skills associated with each practical outcome shall be assessed on basis of following performance indicators.*

S. No.	Performance Indicators	Weightage in %
1.	Installation and Configuration of Database System	20
2.	Coding of Queries and MongoDB Programming	20
3.	Quality of Result Displayed by Queries	20
4.	Answer to Sample Questions.	20
5.	Submission of report in time	20
	Total	100%

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/a team member.
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The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organizing Level' in 2nd year and
- 'Characterizing Level' in 3rd year.

5. 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 practical.
b. Undertake micro-projects.
c. Prepare a chart to classify Data Structures.
d. Prepare charts for logical representation of Data Structures.

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

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c. Demonstrate students thoroughly before they start doing the practice.
d. Encourage students to refer different websites to have deeper understanding of the subject.
e. Observe continuously and monitor the performance of students in Lab.
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7. SUGGESTED MICRO-PROJECTS.

Only one micro-project is planned to be undertaken by a student assigned to him/her in thebeginning of the semester. S/he ought to submit it by the end of the semester to develop theindustry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practical's, cognitive domain and affective domain LOs. The microproject could be industry application based, internet-based, workshop-based, laboratory-basedor 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. Thetotal duration of the micro-project should not be less than ***16 (sixteen) student engagementhours*** during the course.In the all semesters, the micro-project could be group-based (5-6 students) to build up the skill and confidence in everystudent to become problem solver so that s/he contributes to the projects of the industry.

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

a) Develop and maintain XML database for Employee Information System.
b) Design and Develop MongoDB Database for Library Management System.
c) Perform Preprocessing of data using any data mining tool (WEKA).
d) Install and Configure Hadoop.
e) Perform database connectivity with any front end tool.
f) Create an any XML application using any database and any programming Language (JAVA, VB.NET-ASP.NET)

g) Implement Active Database using PL/SQL.
h) Develop a tracker to track news from several news websites and then store them in MongoDB database.
i) Create application for Aadhar Based Analysis using Hadoop

8. MAJOR EQUIPMENTS/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**.**

S. No.	Equipment Name with Broad Specifications	PrO S. No.
1	Computer System(any computer system with basic configuration)	All
2	Any RDBMS software(MYSQL/SQL Server/Oracle/MongoDB	2-15
3	Rstudio software	16

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Marks per Unit	Distribution of Theory Marks		
			R Level	U Level	A Level
1	**Database Architecture**	**12**	**04**	**04**	**04**
2	**Object Based Databases and XML**	**14**	**02**	**04**	**08**
3	**Advanced Database techniques**	**14**	**02**	**04**	**08**
4	**Data Warehousing**	**08**	**04**	**04**	**--**
5	**Data Mining**	**10**	**02**	**04**	**04**
6	**Big Data Management**	**12**	**-**	**06**	**06**
Total		**70**	**14**	**26**	**30**

R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)

***Note**: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table*.

10. SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Fundamentals of Database Systems-6e	RamezElmasri ShamkantNavathe	Addison Wesley, New Delhi 2003 ISBN 13: 978-0-136-08620-9
2.	Database Management System Application	Kogent Learning Solutions Inc.	Dreamtech Press 2014,ISBN-978-93-5119-476-7
3.	Database System Concepts	Korth Henry	Tata McGraw Hill Education,6th Edition,ISBN-13:978-93-329-0138-4
4.	Complete Reference:Mysql	VaswaniVikram	McGrawHill Education,ISBN-13:9780070586840
5.	SQL,PL/SQL The Programming Language of ORACLE	Bayross Ivan	BPB Publications,3rd Edition ISBN-13:978-8176569644

11. SOFTWARE/LEARNING WEBSITES.

a. http://nptel.ac.in/courses/106102064/1
b. www.oopweb.com/algorithms
c. www.studytonight.com/data-structures/
d. www.cs.utexas.edu/users
e. www.Iiscs.wssu.edu
f. http://www.academictutorials.com/data-structures
g. http://www.sitebay.com/data-structure/c-data-structure
h. http://www.geeksforgeeks.org/data-structures/

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

SR. NO.	NAME	DESIGNATION	INDUSTRY/INSTITUTE
1	S. S. CHAVHAN	Lecturer in Computer Engineering.	Govt. Polytechnic Amravati
2	A.P.JANE	Lecturer in Information Technology.	Govt. Polytechnic Amravati
3	Dr. P.P.Karde	Lecturer in Information Technology.	Govt. Polytechnic Amravati

Government Polytechnic Amravati, Programme Board of Studies Computer Engineering has approved the above course curriculum on 30/12/2020 and is adopted for Computer Engineering Programme.

CHAIRMAN
PROGRAMME BOARD OF STUDIES,
COMPUTER ENGINEERING
GOVERNMENT POLYTECHNIC, AMRAVATI.

The General Board of Studies has approved the above course curriculum on 06/02/2021

The Governing Body has approved the above course curriculum on 13/08/2021