SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

SEMESTER-IV

(Scheme – 2023)

SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

Shri Vile Parle Kelavani Mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

Learning and Assessment Scheme for Post S.S.C Diploma Programs

Program Name	: Diploma In Computer Engineering		
Programme Code	: CSE	**With Effect from Academic Year**	: 2023-24
Duration Of Programme	: 6 Semester	**Duration**	: 16 WEEKS
Semester	: IV	**Scheme**	: 2023

Sr No	Course Title & Code	Course Category	IKS (Hrs)	Learning Scheme					Credits	Assessment Scheme								
				Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)	Notional Learning Hrs /Week		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
														Practical (Marks)				
				CL	TL	LL					FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
1	#Operating System (OSY238916)	DSC	-	04	-	02	-	06	03	03	30	70	100	50	25	-	-	175
2	Programming In Python (PRP230807)	SEC	-	02	-	04	02	08	04	-	-	-	-	25	50	-	25	100
3	# Elective – I (Any one)																	
3.1	#Cyber Security (CSY230808)	DSE	-	04	-	02	02	08	04	03	30	70	100	25	25	-	25	175
3.2	#Advanced DBMS (ADB230809)	DSE	-	04	-	02	02	08	04	03	30	70	100	25	-	25	25	175
4	#IoT & Applications (IOT238917)	AEC	-	04	-	02	-	06	03	03	30	70	100	50	-	25	-	175
5	#Network Administration (NWA238918)	AEC	-	02	-	04	-	06	03	03	30	70	100	50	-	25	-	175
6	Project Survey & Practices (PSP230810)	INP	-	-	-	02	02	04	02	-	-	-	-	25	-	-	25	50
7	Generic Elective *** (Any one)	GE	-	02	-	-	-	02	01	-	-	-	-	50				50
	Total		-	**18**	-	**16**	**06**	**40**	**20**	Total papers=04	**120**	**280**	**400**	**275**	**150**		**75**	**900**

Abbreviations : IKS - Indian Knowledge System ,CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, SLA - Self Learning Assessment, TH-Theory, PR-Practical, OR-Oral

Legends : @ Online Examination, # Award Winning, *** As per Annexure AA

Note :1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.

2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.

3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.

4. Notional Learning hours for the semester are (CL+TL+LL+SL)Hrs. x 15 Weeks

5. 1 credit is equivalent to 30 Notional Hrs.

6. ^ Self learning hours shall not be reflected in the Time Table.

7. SA-PR,SA-OR: Assessed by Internal and External Examiners Jointly FA-PR, SLA: Assessed by Internal Examiner Only

Course Category : Discipline Specific Course Core (DSC) : 1, Discipline Specific Elective (DSE) : 1, Value Education Course (VEC) : 0, Intern./Apprenti./Project./Community (INP) : 1, Ability Enhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 1, Generic Elective (GE) : 1

Head of Department | Controller of Examination | Secretary CDC | Principal

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ANNEXURE AA

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

Learning and Assessment Scheme for Post S.S.C Diploma Programs

Program Name	**:Diploma in Computer Engineering ,Information Technology .**		
Programme Code	**: CSE,IT**	**With Effect From Academic Year**	**: 2023-24**
Duration Of Programme	**: 6 Semester**	**Duration**	**: 16 WEEKS**
Semester	**: IV**	**Scheme**	**: 2023**

Sr. No.	Course Name	Course Code
1	Airport & Mass Rapid Transportation	ART238919
2	Disaster Management	DMA238920
3	Modern Trends In Civil Engineering	MTC238921
4	Additive Manufacturing	ADM238922
5	Energy Conservation & Audit	ECA238923
6	Introduction To Green Technology	IGT238924
7	Intellectual Property Rights	IPR238925
8	German Language	GEL238926
9	Digital Marketing	DIM238927
10	Renewable Energy	REN238928
11	Indian Music	INM238929

Head of Department

Controller of Examination

Secretary CDC

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Principal

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: CSE/IT	**Semester: IV**
Course: #Operating System	**Course Category: DSC**
Course Code: OSY238916	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
4	-	2	-	3	3	30	70	100	50	25	-	-	175

Total IKS Hrs for the course :00

3. COURSE OBJECTIVE

The study of operating system is not only the basic understanding of system software but also it provides an insight for developing application software. This course primarily focuses on design and data structures used for managing the resources. It also covers case study on Windows operating system structure.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Implement and analyze various algorithms used for managing resources and processor.**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Describe the basic functions of operating systems
CO2	Simulate algorithms in process scheduling
CO3	Implement Inter process synchronization and deadlock
CO4	Analyze the various memory management techniques
CO5	Interpret functions of File manager and I/O management techniques
CO6	Describe the architecture of GUI Desktop Operating System and RTOS

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6. CO-PO, CO- PSO MAPPING TABLE – Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
#Operating System (OSY238916)	CO1	3	1	1	1	-	1	2	3	-
	CO2	3	3	3	2	-	1	2	3	-
	CO3	3	3	2	2	-	1	3	3	-
	CO4	3	3	3	1	-	1	2	3	-
	CO5	3	2	2	1	-	1	2	3	-
	CO6	2	1	1	1	-	1	1	3	-
	CO Avg.	**2.83**	**2.16**	**2**	**1.33**	**-**	**1.00**	**2.00**	**3.00**	**-**

CO-PO, CO- PSO MAPPING TABLE - Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
#Operating System (OSY238916)	CO1	3	1	1	1	-	1	2	3	-
	CO2	3	3	3	2	-	1	2	3	-
	CO3	3	3	2	2	-	1	3	3	-
	CO4	3	3	3	1	-	1	2	3	-
	CO5	3	2	2	1	-	1	2	3	-
	CO6	2	1	1	1	-	1	1	3	-
	CO Avg.	**2.83**	**2.16**	**2**	**1.33**	**-**	**1.00**	**2.00**	**3.00**	**-**

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	**Introduction to Operating system and Process** 1.1 Operating system services 1.2 System calls and its types 1.3 Layered Operating System 1.4 The process concept 1.5 Systems programmer's view of processes 1.6 Operating system view of processes 1.7 Operating system services for process management
II	**Process Scheduling** 2.1 Basic Concepts 2.1.1 CPU I/O Burst cycle 2.1.2 CPU Scheduler 2.1.3 Preemptive & Non preemptive scheduling 2.2 Types of Schedulers 2.3 Scheduling criteria 2.4 Scheduling Algorithms FCFS, SJF, Priority, Round Robin, Multi-level queue scheduling
III	**Inter process Synchronization and IPC** 3.1 The need for inter process synchronization 3.2 Mutual exclusion concept 3.3 Semaphores 3.3.1 Service Discipline 3.3.2 Semaphore Granularity 3.3.3 Queuing implementation of semaphores 3.4 Classical problems in concurrent programming 3.4.1 Producer/Consumer Problem 3.4.2 Readers/Writers Problem 3.5 Messages 3.5.1 Issues in message implementation 3.6 Deadlock 3.6.1 Deadlock Concept 3.6.2 Deadlock Avoidance 3.6.2 Deadlock Prevention 3.6.3 Deadlock Detection &recovery 3.7 Prevention, Deadlock Avoidance: Banker's Algorithm for Single & Multiple Resources 3.8 Deadlock Detection and Recovery: Dining Philosophers Problem.
IV	**Memory Management** 4.1. Contiguous allocation 4.1.1 Single process monitor 4.1.2 Partitioned memory allocation static 4.1.3 Relocation 4.1.4 Partitioned memory allocation – Dynamic 4.1.5 Segmentation

	4.2. Non-contiguous allocation 4.2.1 Paging 4.2.2 Virtual memory 4.2.3 Page replacement policies FIFO, LIFO, optimal
V	**File Management** 5.1. Command language user's view of the file system 5.2 Systems programmers view of the file system 5.3 Disk organization 5.3.1 Disk Access time 5.4 Disk controller and driver 5.5 Operating system's view of file management 5.5.1 Directories 5.5.1 Disk space management- Contiguous and non-contiguous allocation 5.6 Disk Scheduling algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, C-LOOK
VI	**Case Studies: GUI Operating System and RTOS** 6.1 Design Principles 6.2 System Components 6.3 File System 6.4 Networking

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –10 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO
1	Implement system calls for process, file and I/O management in Linux	2	CO1
2	Program for implementing FCFS scheduling	2	CO2
3	Program for implementing priority scheduling	2	CO2
4	Program for round Shortest Job First scheduling	2	CO2
5	Program for implementation Producer – Consumer problem	2	CO3
6	Program for implementation of dead lock avoidance mechanism	2	CO3
7	Program for Static partitioning – Memory Management	2	CO4
8	Program for Dynamic partitioning – Memory Management	2	CO4
9	Write a program for page replacement strategies for the FIFO algorithm	2	CO4
10	Write a program for page replacement strategies for the LRU algorithm	2	CO4
11	Write a program to implement disk scheduling algorithm: FCFS, SSTF, SCAN (Any two)	4	CO5
12	Write a shell script to display all executable files, directories and zero sized files from current directory.	2	CO6
13	Write a shell script for user authentication	2	CO6
14	Case study on any Operating system architecture covering process management and Memory Management.	2	CO1 to CO6
	TOTAL	30	

9. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments
3. Guest/Expert lectures
4. Slides
5. Self-Learning Online Resources

10. SUGGESTED LEARNING RESOURCES (minimum 3 to 5)

Sr.No.	Title of Book	Author	Publication
1	Operating systems – Concepts and Design	Milan Milenkovic	McGraw-Hill international Edition
2	An introduction to operating Systems	Harvey M. Deitel	Addison- Welley Publishing Company
3	Operating System Concepts	James L Peterson, Abram Silbeerschatz	Addison – Wesley Publishing Company
4	Operating Systems	Dhananjay Dhamdhere	McGraw-Hill Publishing

11. LEARNING WEBSITE & PORTALS (minimum 5)

1. https://en.wikiversity.org/wiki/IT_Fundamentals/Operating_Systems
2. http://www.interaction-design.org
3. https://www.tutorialspoint.com/unix/shell_scripting.htm
4. https://www.javatpoint.com/operating-system
5. https://onlinecourses.nptel.ac.in/

12. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Self-Learning
4. Term Work
5. Seminar/Presentation

Summative Assessment (Assessment of Learning)

1. End Term Exam
2. Tutorial Performance

13. SUGGESTED WEIGHTAGE FOR LEARNING EFFORTS & ASSESMENT PURPOSE (Specification Table)

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Introduction to Operating system and Process	CO1	4	3	2	-	5
II	Process Scheduling	CO2	10	3	3	6	12
III	Inter process Synchronization and IPC	CO3	14	8	5	5	18
IV	Memory Management	CO4	14	5	5	6	16
V	File Management	CO5	12	6	6	-	12
VI	Case Studies: GUI Operating System and RTOS	CO6	6	4	3	-	7
GRAND TOTAL			**60**	**29**	**24**	**17**	**70**

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Neha More
2	Internal	Mrs. Krishna Bhatt
3	External	Mr. Manish Salvi Organization: Senior Lecturer, Computer Engineering Department, Thakur Polytechnic, Kandivali(E).

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Computer Engineering	**Semester: IV**
Course: Programming In Python	**Course Category: SEC**
Course Code: PRP230807	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL Practical (Marks)			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	4	2	4	-	-	-	-	25	50	-	25	100

Total IKS Hrs for the course :00

3. COURSE OBJECTIVE

This course intends to teach the student the basic concepts of Python programming. Python is a multi-paradigm programming language that has primarily been developed as a more concise, straightforward, and easy-to-understand. Python is used for developing desktop GUI applications, web applications, computer vision, embedded applications, machine learning and data analytics. This course is designed to give basic knowledge of Python Programming to the students.

4. SKILL COMPETENCY

- **Use Python data structures appropriately.**
- **Develop GUI desktop application.**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to:

CO No.	COURSE OUTCOME
CO1	Implement Python fundamentals and control statements
CO2	Use String, List, Tuple, Dictionary and Sets appropriately in Python Scripts
CO3	Execute functions, modules, and packages proficiently
CO4	Code Object Oriented and Exception Handling concepts robustly
CO5	Use Regular expressions to search for patterns in strings
CO6	Develop GUI desktop application with database connectivity

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6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Programming in Python (PRP230807)	CO1	3	2	2	2	1	2	1	3	1
	CO2	3	2	2	2	2	2	2	3	1
	CO3	3	2	2	2	2	2	1	3	1
	CO4	3	2	2	2	2	2	2	3	1
	CO5	3	2	2	2	2	2	1	3	1
	CO6	3	2	3	2	2	2	2	3	1
	CO Avg.	**3.00**	**2.00**	**2.17**	**2.00**	**1.83**	**2.00**	**1.50**	**3.00**	**1.00**

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7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	TEACHING HRS
I	**Python Basics** 1.1 Introduction 1.1.1. History of Python, 1.1.2. Python Features 1.1.3. Advantages and Disadvantage 1.2 Fundamentals 1.2.1 Python Keywords 1.2.2 Identifiers 1.2.3 Variables and Indentation 1.2.4 Comments and document interlude in Python 1.2.5 Getting User Input 1.3 Python Data Types 1.3.1 Numbers, Strings, Bool 1.3.2 Lists 1.3.3 Tuples, 1.3.4 Dictionary 1.3.5 Set, Frozenset 1.3.6 Mutable and Immutable types 1.4 Operators 1.4.1 Arithmetic Operators 1.4.2 Relational Operators 1.4.3 Logical Operators 1.4.4 Membership Operators 1.4.5 Identity Operators 1.4.6 Bitwise Operators 1.4.7 Assignment Operators 1.4.8 Operators Precedence 1.4.9 Evaluating Expression, Type Conversion 1.5 Conditional Statements 1.5.1 The if Statement, if-else Statement, if-else if Statement 1.5.2 Nested if Statements, Python Indentation 1.6 Looping and Iteration 1.6.1 The for Loop 1.6.2 The While Loop, Loop else Statement 1.6.3 Nested Loops, Pass, 1.6.4 Break and Continue 1.6.5 Loop using range() function ,Types of range() function	CO1	**04**

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II	**String, List, Tuple, and Dictionary and Set Manipulations** 2.1 String 2.1.1 Introduction to Python String 2.1.2 Accessing Individual Elements 2.1.3 String Operators, String Slices 2.1.4 String Functions and Methods 2.2 List 2.2.1 Introduction to Python List 2.2.2 Creating List 2.2.3 Accessing List 2.2.4 Joining List, Replicating List 2.2.5 List Slicing 2.3 Tuple 2.3.1 Introduction to Tuple 2.3.2 Creating Tuples 2.3.3 Accessing Tuples 2.3.4 Joining Tuples, Replicating Tuples 2.3.5 Tuple Slicing 2.4 Dictionary 2.4.1 Introduction to Dictionary 2.4.2 Accessing values in dictionaries 2.4.3 working with dictionaries, Properties 2.5 Set 2.5.1 Introduction to Set 2.5.2 Iteration over Sets 2.5.3 Set Methods, Set Operations, Union of sets 2.5.4 Built-in Functions with Set, Frozenset	CO2	**08**
III	**Functions, Modules and Packages** 3.1 Functions 3.1.1 Built-In Functions 3.1.2 Python Function Types 3.1.3 Structure of Python 3.1.4 Functions, E.g. – map(), reduce(), filter(), any(), chr(), ord(), sorted(), globals(), locals(), all(), etc. 3.1.5 Defining User Defined Functions Invoking User Defined Function, Flow of Execution, Arguments and Parameters, Default Arguments, Named Arguments, Scope of Variables, Lambda function- Recursion Function 3.2 Modules 3.2.1 Built-in Modules 3.2.2. Importing Modules in Python 3.2.3 Programs 3.2.4 Working with Random Modules e.g. - built-ins, os, time, date time, calendar, sys, etc.-	CO3	**04**

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	Organizing python projects into modules - Importing own module as well as external modules- 3.3 Packages 3.3.1 package concept, package initialization 3.3.2 importing packages in python		
IV	**OOP and Exception Handling** 4.1 OOP 4.1.1 Creating a Class 4.1.2 Self-Variables, Constructors 4.1.3 Access Modifiers, Inner Classes 4.2 Inheritance 4.2.1 Polymorphism 4.2.2 The super() Method, Method Resolution Order (MRO) 4.2.3 Operator Overloading, Method Overloading & Overriding, Interfaces in Python. 4.3 Exceptions 4.3.1 Default Exception and Errors 4.3.2 Catching Exceptions, Raise an exception 4.3.3 try.... except statement, Raise, Assert, finally blocks 4.3.4 User defined exception	CO4	**06**
V	**Regular Expression** 5.1 Regular Expressions 5.1.1 Pattern matching and searching 5.1.2 Real time parsing of networking or system data using regex 5.1.3 Password, email, url validation using regular expression 5.1.4 Pattern finding programs using regular expression	CO5	**04**
VI	**GUI Programming with Database Connectivity** 6.1 GUI Programming 6.1.1 Writing a GUI with Python GUI Programming Toolkits 6.1.2 Creating GUI Widgets with Tkinter 6.1.3 Creating Layouts, Frames, Labels, Radio Buttons and Checkboxes, Dialog Boxes. 6.2 Database Connectivity 6.2.1 Python's Database Connectivity 6.2.2 Types of Databases Used with Python 6.2.3 MySQL database Connectivity with Python Performing Insert, Deleting & Update operations on database	CO6	**04**

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8. LIST OF PRACTICALS/ASSIGNMENTS

Term Work Consists of Journal containing minimum no of 14 Experiments

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1.	To install python and to run a Hello World script	2	CO1
2.	To test the functionality of various data types and type conversion of python.	2	CO1
3.	To execute programs related to conditional statements i.e. simple if, elif, nested if and switch case statements (Two problem statements)	2	CO1
4.	To execute programs related to iterative statements i.e. for and while (Two problem statements)	2	CO1
5.	To implement String, List and Tuple oriented Programs.	6	CO2
6.	To implement Dictionary and Set oriented Programs.	6	CO2
7.	To use library functions of python and to develop a user defined function for the given problem. (Two problem statements)	2	CO3
8.	To import and test the functionality of OS, sys, math and statistics modules.	2	CO3
9.	To create and import user defined package.	2	CO3
10	To write an object-oriented script using array of objects concept.	2	CO4
11.	To implement Inheritance in Python.	4	CO4
12.	To handle exception in a Python script.	2	CO4
13.	To execute programs related to user defined exceptions	4	CO4
14.	To validate username, password and url using regular expressions.	4	CO5
15.	To implement Pattern finding programs using regular expression	4	CO5
16.	To develop a desktop application using GUI controls.	6	CO6
17.	To connect database with a desktop application to perform CRUD operations	8	CO6
	TOTAL	**60**	

9. IMPLEMENTATION STRATEGY (PLANNING)

1. Lab Plan
2. Minimum no of practical/assignments
3. Guest/Expert lectures
4. Slides
5. Self-Learning Online Resources

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10. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

1. Micro project

a. Loan Management System – Develop system to issue education, home and car loans
b. Book Store – Create a virtual book store enabling user to search & buy the books
c. Airline Reservation System – Books tickets for domestic/international flights
d. Healthcare System – Implement doctor, patient, and hospital modules with statistical charts
e. College Management System – Develop student admission, course management modules

(Use GUI & Database connectivity concepts along with data structures to develop above Python applications)

2. Assignment

Practice problems on list, dictionary, multithreading, regex and desktop GUI with database connectivity.

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1.	Introducing Python	Bill Lubanovic	O'Reilly
2.	Learning Python	Mark Lutz	O'Reilly
3.	Python Essential Reference	David Beazley	Addison-Wesley Professional
4.	Fundamentals of Python Programming	Richard L. Halterman	Southern Adventist University

12. LEARNING WEBSITE & PORTALS

1. https://www.guru99.com/python-tutorials.html
2. https://www.tutorialspoint.com/python/
3. https://www.tutorialsteacher.com/python
4. https://realpython.com/

13. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Rubrics for COs Assignment
2. Term Work
3. Micro Project
4. Self-Learning

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14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Manishkumar Solanki
2	Internal	Ms. Priti P.Bokariya
3	External	Ms. Ekta Shah Organization: Data Scientist, Quantiphi Analytics

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Computer Engineering	**Semester: IV**
Course: #Cyber Security	**Group: DSE**
Course Code: CSY230808	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL Practical (Marks)			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
4	-	2	2	4	3	30	70	100	25	25	-	25	175

Total IKS Hrs for the course :00

3. COURSE OBJECTIVE

This course is intended to help student's gain fundamental and comprehensive understanding of cyber security. We will focus on an overview of major cyber security issues, technologies, and approaches.

Students who successfully complete this course will have a concept and knowledge of security properties, concerns, Policies, User Authentication, cryptography, Access Control, Malicious Software, Denial-of-Service Attacks.

Students will also have hands on experience in selected cyber security technologies through lab sessions. This course will provide an understanding of principle concepts, major issues, technologies, and basic approaches in cyber security.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Design and test cryptographic tactics**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Understand system security concepts, classical encryption techniques and fundamental knowledge of various attacks.
CO2	Apply user identification and authentication methods.
CO3	Apply cryptographic algorithms and protocols to maintain Computer Security.
CO4	Analyze different attacks on network, performance of firewalls and security protocols like SSL, IPsec, and PGP.
CO5	Maintain secured networks and describe Information Security Compliance standards.

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6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
#Cyber Security (CSY230808)	CO1	3	2	-	2	-	-	2	1	3
	CO2	2	3	1	3	1	-	3	1	3
	CO3	3	3	1	3	1	-	3	1	3
	CO4	2	2	1	3	2	1	3	-	3
	CO5	2	3	2	3	2	1	3	1	3
	CO Avg.	2.4	2.6	1.25	2.8	1.5	1	2.8	1	3

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	**Information Security Concepts** 1.1Foundations of Computer Security: Definition and Need of computer security, Security Basics: Confidentiality, Integrity, Availability, Accountability, Non-Repudiation and Reliability. 1.2 Risk and Threat Analysis: Assets, Vulnerability, Threats, Risks, Counter measures. 1.3 Threat to Security: Viruses, Phases of Viruses, Types of Virus, Dealing with Viruses, Worms, Trojan Horse, Intruders, Insiders. 1.4 Type of Attacks: Active and Passive attacks, Denial of Service, DDOS, Backdoors and Trapdoors, Sniffing, Spoofing, Man in the Middle, Replay, Injection attack.
II	**User Authentication and Access Control** 2.1 Identification and Authentication: User name and Password, guessing password, Password Attacks-Piggybacking, Shoulder surfing. 2.2 Biometrics: Finger Prints, Voice patterns, Signature and Writing patterns. 2.3 Access controls: Definition, Authentication Mechanism, Principle-Authentication, Authorization, Audit, Policies: DAC, MAC, RBAC. 2.4 Digital Signature, Digital Signature Scheme: RSA
III	**Cryptography** 3.1 Introduction: Plain Text, Cipher Text, Cryptography, Cryptanalysis, Cryptology, Encryption, Decryption. 3.2 Substitution Techniques: Caesar's cipher, Modified Caesar's Cipher, Transposition Techniques: Simple Columnar Transposition. 3.3 Steganography: Procedure 3.4 Symmetric and Asymmetric cryptography: Introduction to Symmetric encryption, DES (Data encryption Standard) algorithm, Asymmetric key cryptography.

IV	**Network Security and Applications** 4.1 Network security basics: TCP/IP vulnerabilities (Layer wise), Network Attacks: Packet Sniffing, port scanning. 4.2 Denial of Service: DOS attacks, ICMP flood Distributed Denial of Service. 4.3 Internet Security Protocols: PGP, Network security: IDS, Firewalls. 4.4 Public key infrastructure (PRI): Introduction, Certificates, Certificate authority, X.509 certificate.
V	**Security, Cyber Laws and Compliance Standards** 5.1 IP Security- Overview, Protocols- AH. 5.2 Cyber Crime: Introduction, Hacking Digital Forgery, Cyber Stalking/Harassment. 5.3 Identity Theft and terrorism 5.4 Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments.
VI	**Applications of security** 6.1 Information Security Standard compliances HIPAA, ISO,PCI. 6.2 Ip security- IPSEC architecture, IPSEC services. 6.3 Kerberos: Working, AS, TGS, SS. 6.4 SSL protocol.

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –10 Experiments/assignments

Sr. No.	Title of Assignment	Approx.Hrs required	Cos
1	Set up operating system Updates. And Perform backup and restore of System.	2	CO1
2	Implementing Authentication using any library.	2	CO2
3	Implementing Digital signature.	2	CO2
4	Implement RSA Algorithm	4	CO2
5	Implementation of any steganography algorithm	2	CO3
6	Use Steganography to encode and decode the message using any tool.	4	CO3
7	Write a program to implement Caeser Cipher.	2	CO3
8	Trace the path of web site using Tracert Utility.	4	CO3
9	Implementation of email security using PGP.	4	CO4
10	Implementation of IPsec.	2	CO5
11	Assignment on E-commerce Security.	2	CO5
	TOTAL	**30**	

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9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING):

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

1. **Micro project**
   Implement Text Encryption Using Cryptographic Algorithms.
   Make a review report on various image steganography applications.
2. **Assignment**
   Write 2 case studies on security breaches and its impact.

10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	William Stallings, "Cryptography and Network Security, Principles and Practice", 6th Edition	William Stallings	Pearson Education, March 2013
2	Behrouz A. Ferouzan, "Cryptography & Network Security", Tata McGraw Hill	Ferouzan	Tata McGraw Hill
3	Behrouz A. Forouzan & Debdeep Mukhopadhyay, "Cryptography and Network Security" 3rd Edition	Ferouzan	Tata McGraw Hill
4	Cyber Laws and IT Protection	Harish Chander PHI Publication, New Delhi,	PHI Publications

12. LEARNING WEBSITE & PORTALS

1 https://community.jisc.ac.uk/library/advisory-services/ipsec-implementation-and-worked-examples

2. https://www.scribd.com/document/573445463/practical-no-15

3. https://www.prepbytes.com/blog/java/caesar-cipher-program-in-java/

4. https://www.varonis.com/blog/pgp-encryption

13.ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Rubrics for COs Assignment
2. Self-Learning
3. Term Work
4. Seminar/Presentation

Summative Assessment (Assessment of Learning)

1. End Term Exam

14. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr.NO	Topic	Aligned CO'S	Teaching Hrs	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
1.	Information Security Concepts	CO1	10	4	4	4	12
2.	User Authentication and Access control	CO2	10	2	4	6	12
3.	Cryptography	CO3	12	2	2	6	10
4.	Network Security and Applications	CO4	10	6	4	4	14
5.	Security, Cyber Laws and Compliance Standards	CO5	10	4	4	4	12
6.	Applications of security	CO5	8	4	4	2	10
Grand			**60**	22	22	26	70

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

15. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Pradnya Natekar
2	Internal	Mr. Siddhesh Masurkar
3	External	Mr. Narendra Shekokar Professor, D.J.Sanghavi college of Engineering

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Computer Engineering	**Semester: IV**
Course: #Advanced DBMS	**Course Category: DSE**
Course Code: ADB230809	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
04	-	02	02	04	03	30	70	100	25	-	25	25	175

Total IKS Hrs for the course :00

3. COURSE OBJECTIVE

This course will introduce the comprehensive contents on various concepts related to database management system, data ware housing and data mining. The student will be able to identify the scope and essentiality of Advanced Database Management System, Dataware house fundamentals, Data Mining concepts.

4. SKILL COMPETENCY

- **Perform Data warehouse administration using ETL tools to create redefined data.**
- **Analyze the principles of dimensional modelling**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Identify the features of Data Warehousing and explore the different design approaches for Data Warehouses
CO2	Use various techniques used for data extraction, transformation, and loading in ETL processes.
CO3	Analyze the principles of dimensional modeling, differentiate between ER modeling and dimensional modeling.
CO4	Apply the concepts of Online Analytical Processing (OLAP), analyze OLAP operations such as drill-down and roll-up.
CO5	Describe the basics of Data Mining
CO6	Analyze and evaluate Data Mining algorithms and techniques

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6. CO-PO, CO- PSO MAPPING TABLE – Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
#Advanced DBMS (ADB230809)	CO1	3	2	2	1	-	2	2	1	3
	CO2	3	3	2	3	-	3	3	1	3
	CO3	3	3	3	2	-	3	3	1	3
	CO4	3	3	3	3	-	3	3	1	3
	CO5	3	3	2	1	-	1	2	1	3
	CO6	3	3	2	2	-	3	3	1	3
	CO Avg.	**3**	**2.8**	**2.3**	**2**	**-**	**2.5**	**2.6**	**1**	**3**

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	**Introduction to Data Warehouse** 1.1 Need of Data Warehousing 1.1.1 Features of Data Warehousing 1.1.2 Data warehouse versus Data Marts 1.1.3 Data warehouse versus Data Lake 1.2 Introduction to Strategic Information, 1.2.1 Source data components 1.2.2 Data Staging components 1.2.3 Data Storage components 1.2.4 Information Delivery Component 1.2.5 Metadata Components 1.3 Benefits of Data Warehousing 1..4 Features of Data Warehouse

II	**Data Extraction, Transformation, and Loading** 2.1 ETL Overview 2.2 Data Extraction 2.2.1 Source Identification 2.2.2 Data Extraction Techniques .2.3 Evaluation of the Techniques 2.3 Data Transformation 2.3.1 Data Transformation: Basic tasks 2.3.2 Major Transformation Types 2.3.3 Data Integration and Consolidation 2.3.4 Transformation for Dimension Attributes 2.4 Data Loading 2.4.1 Applying Data: Techniques and Processes 2.4.2 Data Refresh Versus Update
III	**Principles of Dimensional Modeling** 3.1 ER Modelling Versus Dimensional Modelling. 3.2 The STAR Schema and SNOWFLAKE Schema 3.2.1 Inside a Dimensional Table 3.2.2 Inside the Fact Table 3.2.3 The Factless Fact Table 3.2.4 Data Granularity 3.2.5 STAR Schema Keys 3.2.6 Compare Star and Snowflake Schema models. 3.3 Updates to the Dimension Tables 3.3.1 Slowly Changing the Dimensions 3.3.2 Type 1 Changes: Correction of Errors 3.3.3 Type 2 Changes: Preservation of History 3.3.4 Type 3 Changes: Tentative Soft Revisions
IV	**Online Analytical Processing** 4.1 Introduction to Data Cube and OLAP 4.1.1 Demands for Online Analytical Processing 4.1.2 Need for Multidimensional Analysis 4.1.3 Introduction to Hypercubes 4.2 OLAP operations 4.2.1 Drill-Down and Roll-Up 4.2.2 Slice- and-Dice or rotation 4.3 OLAP Models 4.3.1 The MOLAP Model 4.3.2 The ROLAP Model 4.3.3 Compare OLAP and OLTP tools. 4.3.4 Comparison of OLAP models

V	**Introduction to Data Mining** 5.1 Basics of data mining. 5.1.1 Data mining techniques. 5.1.2 The KDD process. 5.1.3 Data Mining and the Data Warehouse 5.2 Major issues in data mining. 5.3 Applications of Data Mining 5.3.1 Applications in Retail Industry 5.3.2 Applications in Telecommunications Industry 5.3.3 Applications in Banking and Finance 5.4 Social Impacts of Data Mining
VI	**Data Mining Algorithms and Techniques** 6.1 Association Rule Mining 6.1.1 Basic concepts of association rule mining 6.1.2 Association rule mining algorithms 6.2 Classification 6.2.1 Introduction to classification 6.2.2 Decision tree-based classification 6.2.3 Bayesian classification 6.3 Clustering 6.3.1 Clustering algorithms 6.3.2 Evaluation of clustering results

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –10 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1.	Demonstrate the working of Data Warehouse Architecture with suitable diagram.	04	CO1
2.	Perform simple sort transformation using ETL tools	02	CO2
3.	Apply Merge and Merge Join transformation using ETL tools	02	CO2
4.	Perform conditional split using ETL tools	02	CO2
5.	Implement term lookup transformation using ETL tools	02	CO2
6.	Design a report using a report designer	02	CO2
7.	Design a dimensional data model for a given scenario	02	CO3
8.	Create an OLAP cube report.	02	CO4
9.	Build a decision tree to classify a dataset on a sample data set using open-source tools .	04	CO5
10.	Apply K-means clustering technique on sample dataset using open-source tools	02	CO6
11.	Perform association rule mining on the sample data set using opensource tools.	04	CO6
12.	Assignment: Describe various Data Mining Techniques	02	CO5, CO6
	Total	**30**	

9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING):

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

1. Assignment: Practice problems on ETL on following applications and perform various transformation process.

- Bank Management System
- Ecommerce Database Management System

10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources

11. SUGGESTED LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	The Data Warehouse Toolkit: The Definitive Guide to	Ralph Kimball and Margy Ross	John Wiley & Sons Inc
2.	Data Warehousing Fundamentals: A	Paulraj Ponniah	John Wiley & Sons Inc
3.	Building a Data Warehouse: With Examples in SQL Server	Vincent Rainardi	Apress publication
4.	Data Mining: Concepts and Techniques	Jiawei Han, Micheline Kamber, and Jian Pei	Morgan Kaufmann
5.	Mastering Data Mining: The Art and Science of Customer Relationship Management	Michael J. A. Berry and Gordon S. Linoff	John Wiley & Sons Inc

12. LEARNING WEBSITE & PORTALS

1. www.w3schools.com/sql
2. www.tutorialpoint.com/dbms
3. www.khanacademy.org/computing/computer-programming/sql
4. www.techonthenet.com/sql
5. www.beginnersbook.com

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13. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Term Work
4. Seminar/Presentation

Summative Assessment (Assessment of Learning)

1. End Term Exam

14. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Introduction to Data Warehousing	CO1	08	04	02	06	12
II	Data Extraction, Transformation, and Loading	CO2	10	04	06	--	10
III	Principles of Dimensional Modelling	CO3	12	02	04	06	12
IV	Online Analytical Processing	CO4	10	02	04	06	12
V	Introduction to Data Mining	CO5	10	02	04	06	12
VI	Data Mining Algorithms and Techniques	CO6	10	04	08	--	12
GRAND TOTAL			**60**	**18**	**28**	**24**	**70**

R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)

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

15. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Akhilesh R. Gupta
2	Internal	Mr. Siddhesh Masurkar
3	External	Mr. Vaibhav Vasani Organization: K. J. Somaiya College of Engineering, Mumbai

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: CSE/IT	**Semester: IV/IV**
Course: # IoT & Applications	**Course Category: AEC**
Course Code: IOT238917	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL Practical (Marks)			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
04	-	02	-	06	03	30	70	100	50	-	25	-	175

3. COURSE OBJECTIVE

IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system. IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Develop an IoT Application.**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Conceptualize the working of IoT system.
CO2	Discuss the architecture, operation, and business benefits of an IoT solution
CO3	Describe the working of sensors and actuators and their applications in real-world IoT scenarios.
CO4	Execute the setup of IoT boards and connect essential peripherals using sensors.
CO5	Summarize the challenges associated with IoT and cloud integration.
CO6	Demonstrate the utilization of IoT technology in a specific domain application

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6. CO-PO, CO- PSO MAPPING TABLE – Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
# IoT & Applications (IOT238917)	CO1	3	2	3	3	2	-	2	3	-
	CO2	3	3	3	3	2	-	2	3	-
	CO3	2	2	2	2	2	-	2	3	-
	CO4	2	2	2	2	2	-	2	3	-
	CO5	2	2	1	1	-	-	2	3	-
	CO6	2	2	2	2	2	-	2	3	-
	CO Avg.	**2.33**	**2.17**	**2.17**	**2.17**	**2**	**-**	**2**	**3**	**-**

CO-PO, CO- PSO MAPPING TABLE - Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
# IoT & Applications (IOT238917)	CO1	3	2	3	3	2	-	2	-	3
	CO2	3	3	3	3	2	-	2	-	3
	CO3	2	2	2	2	2	-	2	-	3
	CO4	2	2	2	2	2	-	2	-	3
	CO5	2	2	1	1	-	-	2	-	3
	CO6	2	2	2	2	2	-	2	-	3
	CO Avg.	**2.33**	**2.17**	**2.17**	**2.17**	**2**	**-**	**2**	**-**	**3**

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7. COURSE CONTENTS

UNIT NO.	Topic/ Sub-Topics
I	**Introduction to Internet of Things** 1.1 Introduction to Internet of Things 1.2 Definition of IoT 1.3 IoT Characteristics 1.4 Requirements of IoT 1.5 Physical design of IoT – IoT protocol 1.6 Logical Design of IoT 1.7 Functional blocks of IoT 1.8 Communication models and APIs platforms for IoT
II	**Architectural Overview of IoT** 2.1 IoT architecture – state of the art 2.2 IoT reference model 2.3 Architecture reference model 2.4 Introduction to M2M 2.5 Applications of M2M 2.6 M2M value Chains 2.7 IoT value chains 2.8 Emerging industrial structure for IoT.
III	**IoT Sensors and Actuators** 3.1 Need for sensors and actuators 3.2 Types of sensors and actuators 3.3 Introduction to Wireless Sensor Networks 3.4 SDN and NFV for IoT- Software-defined networking, network function virtualization.
IV	**Interfacing and Programming IoT Boards** 4.1 Introduction to IoT boards 4.2 Raspberry Pi specifications and features 4.3 Architecture of Raspberry Pi 4.4 Introduction to GPIO pins 4.5 Basic Programming with Python 4.6 Overview of NodeMCU Architecture 4.7 Setting Up NodeMCU Development Environment 4.8 Programming NodeMCU with Arduino IDE
V	**Cloud computing and data management** 5.1 Introduction to cloud computing 5.2 Characteristics of cloud 5.3 Cloud Deployment Models 5.4 Cloud service models 5.5 Fog computing and Edge computing 5.6 Data management in IoT 5.7 IoT analytics

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VI	**Applications of IoT** 6.1 IoT applications for industry: - Future Factory Concepts - Brownfield IoT - IoT for Retailing Industry - IoT for Oil and Gas Industry - IoT for e-Health 6.2 Domain specific application – Home automation, Surveillance applications, Agriculture, smart cities.

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

Sr. No.	Title of Experiment/Assignment	Approx. Hrs required	COs
1.	To prepare a survey on various types of sensors & its application	02	CO1
2.	Familiarization with raspberry pi components and perform necessary software installation	02	CO2
3.	To interface LED/buzzer with raspberry pi and write program to turn on LED for specific time interval	02	CO3
4.	To interface push button with raspberry pi and write program to turn on LED.	02	CO3
5.	To interface camera with raspberry pi and write a program to capture an image.	02	CO3
6.	To interface raspberrypi with RFID reader.	02	CO4
7.	To Install and setup Arduino IDE and necessary libraries	02	CO3
8.	To interface LED/buzzer with NodeMCU and write program to turn on LED for specific time interval.	02	CO3
9.	To detect occupancy of an area using PIR sensors	02	CO4
10.	To interface DHT11 sensor with NodeMCU and write a program to print temperature readings.		CO4
11.	Create a web interface to control connected LEDs remotely using Raspberry-Pi/NodeMCU	02	CO3
12.	To send messages to whatsApp account with the ESP8266 NodeMCU board.	02	CO4
13	Introduction to MQTT and sending sensor data to cloud.	02	CO5
14	Case study on IoT applications for Industry	02	CO6
15	Case study on domain specific application of IoT	02	CO6
	TOTAL	30	

9. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical
3. Assignments.
4. Slides
5. Self-Learning Online Resources.
6. Guest/Expert lectures

10. SUGGESTED LEARNING RESOURCES

Sr. no.	Title of book	Author	Publication
1.	Internet of Things (A Hands-on-Approach)	Vijay Madisetti and Arshdeep Bahga	1 st Edition, VPT
2.	IoT Security Advances in Authentication	Madhusanka Liyanage, An Braeken, Mika Ylianttila	Willey
3.	The Internet of Things Enabling Technologies, Platforms, and Use Cases	Pethuru Raj, Anupama C. Raman	CRC Press
4.	Internet of Things with ARDUINO and BOLT	Ashwin Pajankar	BPB

11. LEARNING WEBSITE & PORTALS

1. https://www.udemy.com/internet-of-things-IoT-for-beginners-getting-started/
2. https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT
3. https://www.edureka.co/blog/IoT-applications/
4. https://www.cloudamqp.com/blog/part4-rabbitmq-for-beginners-exchanges-routing-keys-bindings.html
5. https://dotnet.microsoft.com/en-us/learn/iot

12. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Self-Learning
4. Term Work

Summative Assessment (Assessment of Learning)

1. End Term Exam

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13. SUGGESTED WEIGHTAGE FOR LEARNING EFFORTS & ASSESMENT PURPOSE (Specification Table)

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Introduction to Internet of Things	CO1	10	6	3	3	12
II	Architectural Overview of IoT	CO2	10	4	5	3	12
III	IoT Sensors and Actuators	CO4	12	2	4	8	14
IV	Interfacing and Programming IoT Boards	CO3	10	2	2	6	10
V	Cloud computing and data management	CO5	10	2	6	4	12
VI	Applications of IoT	CO6	08	2	4	4	10
GRAND TOTAL			**60**	**18**	**24**	**28**	**70**

R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Sharyu Kadam
2	Internal	Mr. Pankaj Rathod
3	External	Mr. Ashish Taldeokar
		Tech Lead, SustLabs, Mumbai

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SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: CSE/IT	**Semester: IV/IV**
Course: #Network Administration	**Group: AEC**
Course Code: NWA238918	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL Practical (Marks)			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
02	-	04	-	03	03	30	70	100	50	-	25	-	175

Total IKS Hrs for the course :00

3. COURSE OBJECTIVE

This Course will help the students to comprehend the fundamentals of network administration and tools. This course will also familiarize the students in details of ADS. It covers vital issues related to network like Virtual private network, network management tools. It emphasizes on practical approach to administration and monitoring the network using different tools.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Configure ADS and DHCP**
- **Install and use network monitoring tools**
- **Network Troubleshooting**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Identify roles of network administrator, duties of network engineer
CO2	Install windows server edition, configure DHCP, DNS
CO3	Implement Routing and Network management Protocols
CO4	Use remote network access services and monitoring tools
CO5	Configure Directory Services and information models

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COMPUTER ENGINEERING DEPARTMENT

6. CO-PO, CO- PSO MAPPING TABLE: Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
#Network Administration NWA238918	CO1	3	1	3	1	-	1	1	-	3
	CO2	3	2	2	1	-	-	-	-	3
	CO3	3	3	2	3	-	-	-	-	3
	CO4	3	3	3	3	-	2	-	-	3
	CO5	3	2	1	-	-	-	-	-	3
	CO Avg.	**3**	**2.2**	**2.2**	**2**	**-**	**1.5**	**1**	**-**	**3**

CO-PO, CO- PSO MAPPING TABLE: Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
#Network Administration NWA238918	CO1	3	1	3	1	-	1	1	-	3
	CO2	3	2	2	1	-	-	-	-	3
	CO3	3	3	2	3	-	-	-	-	3
	CO4	3	3	3	3	-	2	-	-	3
	CO5	3	2	1	-	-	-	-	-	3
	CO Avg.	**3**	**2.2**	**2.2**	**2**	**-**	**1.5**	**1**	**-**	**3**

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7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	**Network Admin** 1.1 Network Related jobs 1.2 Network Architecture/Designer 1.3 Administrator Responsibility 1.4 Duties of Network Engineer 1.5 Network Design Overview 1.6 Designing a Home or small Office Network 1.7 Designing an Internetwork
II	**Network Management Models** 2.1 RARP, BOOTP 2.2 DHCP objectives 2.3 DHCP Architecture 2.4 Domain Naming, Objectives 2.5 DNS Functions 2.6 DNS Messaging
III	**Routing** 3.1 Static, Dynamic Routing. 3.2 Delivery (Direct Vs Indirect) 3.3 Forwarding - Techniques, Process 3.4 routing Protocols: RIP, OSPF, BGP 3.5 Unicast, Multicast, Broadcast routing.
IV	**Remote Network Access** 4.1 Need of remote access, remote access technology 4.2 VPN-Types 4.3 VPN protocols 4.3.1 IPsec-Modes and security protocols 4.3.2 L2TP, PPTP, SSL 4.4 Network server monitoring tools
V	**Directory services** 6.1 Active Directory Architecture 6.2 Deploying Active Directory 6.3 Designing an Active Directory 6.4 Types of Directories Services 6.5 LDAP, Information Models 6.6 ADS

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8. LIST OF PRACTICALS/ASSIGNMENTS

Term Work consists of Journal containing minimum no of –15 Experiments

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	COs
1.	Demonstrate Network Packet Tracer	2	CO1
2.	Connect the computers in Local Area Network.	2	CO1
3.	Performing an Initial Router Configuration	2	CO1
4.	Design a small home or office network .	4	CO1
5.	To configure WAN	4	CO1
6.	Installing and configuring DHCP and DNS	4	CO2
7.	Implement the concept of static routing.	2	CO3
8.	Implementing RIP in cisco packet Tracer	4	CO3
9.	Implementing OSPF in cisco packet Tracer	4	CO3
10.	Installation and study of various parameters of firewall.	2	CO4
11.	Demonstration on NMap	4	CO4
12.	To configure VLAN on Network packet tracer	4	CO4
13.	To perform network commands- NetStat, PortScan, HostAlive, TraceRoute and Ping, NetCat, WinDump / TCPDump, WiFiMan, SysFiles,EmailVerify, etc	2	CO4
14.	Demonstration on Wireshark	2	CO4
15.	Understanding Wireshark working with filters, menu options	2	CO4
16.	Demonstration on Network monitoring tool	4	CO4
17.	Installation of Nagios	2	CO4
18.	Demonstration on Nagios	4	CO4
19.	Demonstration on installation of Active Directory and to create user/Group in Active Directory Service	2	CO5
20.	A Micro project on Cisco Packet Tracer / Wireshark/ Network Monitoring tool	4	CO4
	Total	**60**	

9. IMPLEMENTATION STRATEGY(PLANNING)

1. Teaching Plan/Tutorials
2. Guest/Expert lectures
3. Slides
4. Case Study
5. Self-learning resources

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	The Complete Reference Networking	Craig Zacker	Tata McGraw-Hill Education
2.	Networking A Beginner's Guide	Bruce Hallberg	Tata McGraw-Hill Education
3.	Data Communication and Networking.	Behrouz A Fourozan	Tata McGraw-Hill
4.	Computer Network Fourth edition	Tanenbaum Andrew S	PHI learning

11. LEARNING WEBSITE & PORTALS

1. http://www.nmap.org.
2. http://www.tamos.com
3. http://www.gfi.com/blog/101-free-admin-tools
4. https://www.cisco.com/c/en_in/solutions/small-business/resource-center.html
5. https://www.fortinet.com/resources/cyberglossary/remote-access

12. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Term Work
4. Seminar/Presentation

Summative Assessment (Assessment of Learning)

1. End Term Exam

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Aligned CO's	Learning Hours	Distribution of Theory Marks			Total Marks
				R Level	U Level	A Level	
I	Network Admin	CO1	5	2	4	4	10
II	Network Management Models	CO2	7	4	4	8	16
III	Routing	CO3	8	4	4	10	18
IV	Remote Network Access	CO4	6	4	4	6	14
V	Directory services	CO5	4	4	4	4	12
Grand Total			**30**	**18**	**20**	**32**	**70**

R: Remembering U: Understanding A: Applying (Bloom's revised Taxonomy levels) Note: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of CO. The actual distribution of marks at different taxonomy levels (R, U, A) in question paper may vary from above table.

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14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1.	Internal	Mrs. Abhilasha More
2.	Internal	Ms. Pradnya Natekar
3.	External	Mr. Prathamesh Churi
		Sr. Manager , SMFG India Credit Company

SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Computer Engineering	**Semester: IV**
Course: Project Survey & Practices	**Course Category: INP**
Course Code: PSP230810	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
-	-	2	2	2	---	-	-	-	25	-	-	25	50

Total IKS Hrs. for the course: 00

3. COURSE OBJECTIVE

Today the I.T field is growing rapidly. The use of latest Mobile devices and websites /apps has created curiosity and interest in students to explore emerging domain / technology. This course allows students to identify reliable web resources and domain, cleansing the data and present the report for the project implementation

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Identify the domain and technologies useful for project implementation.**

5. COURSE OUTCOMES (COs) at the end of the semester student will be able to

CO No.	COURSE OUTCOME
CO1	Select the latest domain / technologies and understand the topic
CO2	Write report on the topic
CO3	Prepare the presentation and deliver the seminar
CO4	Prepare for the project implementation

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6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Project Survey & Practices (PSP230810)	CO1	3	3	2	2	2	-	2	3	3
	CO2	2	-	2	-	-	2	2	2	2
	CO3	1	2	1	1	2	2	3	2	2
	CO4	2	1	2	-	2	2	2	3	3
	CO Average	2.00	2.00	1.75	1.50	2.00	2.00	2.25	2.5	2.5

7. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Sr No	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO
1	To prepare Survey report of Domains	06	CO1
2	Group Discussion for Domain	04	CO1
3	Project idea Presentations	04	CO1
4	To review the search paper	04	CO2
5	To Prepare Topic Selection	04	CO2
6	To present the topic selection	04	CO3
7	To present a review paper and report	04	CO4
	TOTAL	30	

8. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING).

1. Assignment

-Literature Survey

-Tools used for project implementation and documentation

9. IMPLEMENTATION STRATEGY (PLANNING)

1. Minimum no of assignments.
2. Guest/Expert lectures
3. Slides
4. Self-Learning Online Resources

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10. SUGGESTED LEARNING RESOURSES:

Sr. No.	Title of Book	Author	Publication
1.	Managing Machine Learning Projects	Simon Thompson	Manning Publications
2.	AWS: The Complete Beginner's Guide	Stephen Baron	AWS (Amazon Web Services)
3.	Technical Writing for Dummies	-	Tech Publish

11. LEARNING WEBSITES & PORTALS:

1. https://developers.google.com/tech-writing
2. https://www.knowledgehut.com
3. https://shodhgangotri.inflibnet.ac.in
4. https://trainings.internshala.com/

12. ASSESMENT METHODOLOGIES/TOOLS:

The term work will be assessed on the basis of report and presentation. Both the assessments will be done by the guide
Formative Assessment (Assessment for Learning)
1. Term work
2. Seminar

13. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Janardan S. Kulkarni
2	Internal	Mrs. Prachi Arora
4	External	Dr. Dhiraj Mishra

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SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT	**Semester : IV**
Course: Airport & Mass Rapid Transportation	**Course Category: GE**
Course Code: ART238919	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	1	-	-	-	-	50	-	-	-	50

Total IKS Hrs for the course: - 00

3. COURSE OBJECTIVE

The objective of this course is to provide students with fundamental knowledge and practical skills required to design, plan, and manage airport facilities and mass rapid transit systems. The course emphasizes the integration of engineering principles, safety standards, and sustainable practices to develop efficient and reliable transportation infrastructure.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Undertake need assessment exercise for identifying transportation system for mobility of people within and from locality, town, city and region,**
- **Apply knowledge to participate in team's entrusted design and construction of airports and various mass rapid transportation systems.**
- **Able to understand various terms and project management related activities of various MRTS projects.**
- **Able to undertake repair and maintenance of civil works related to airports railways, metro, mono, suburban and bullet trains, coastal roads etc.**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Correlate the requirement of airport and MRTS
CO2	Analyze the essential requirements of airport planning
CO3	Carry out project management activities related to Mono and Metro rails and understand salient features of MRTS Projects

6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Airport & Mass Rapid Transportation ART238919	CO1	1	1	3	-	2	2	2	3	2
	CO2	1	-	3	-	2	1	-	3	1
	CO3	1	3	3	3	2	2	1	2	3
	CO Avg.	**1**	**2**	**3**	**3**	**2**	**1.66**	**1.50**	**2.66**	**2.0**

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	Hrs	CO
I	**Introduction** Introduction to airport engineering, development of air transport in India, Hub air ports. Recent scenario of other transport system. Need of MRTS in towns, metro and mega cities. Airport planning and design standards, selection of site, stages of development of airport, orientation of runways, length of runways, design standards, estimate of future traffic requirement.	8	CO1
II	**Airport Essentials** Airport terminal area and layout, terminal requirements, typical airport requirements, types of pavements, flexible, rigid and LCN system of pavement. Airport drainages, surface, underground, special features of	12	CO2

UNIT NO.	TOPIC/Sub-topic	Hrs	CO
	airport drainage, traffic aids, marking terminal read control, run ways, lighting of runways, accidents and causes, navigational aids, landing categories.		
III	**Mass Rapid Transportation Systems (MRTS)** Metro and mono rails, BRTS, Coastal Road, Need, Concept and construction, High speed M.R.T.S: Bullet trains and superfast Express trains. **Management and Maintenance of MRTS projects** Feasibility, safety, new modes like sky walks, station traffic control systems, Linkages, Trans Harbor link, link roads, FOBs, common ticketing, point to point services, Government initiatives for private sector to participate in MRTS, Maintenance of civil works related to MRTS like metro, mono, BRTS, Coastal Road etc. Customer facilities: Parking, AC trains and busses, E-bikes	10	CO3

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Guest/Expert lectures
3. Demonstrations
4. Site Visits
5. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1.	Arora Airport Planning and Design	S K Khanna M G	Nem Chand & Bros,
2.	Airport Engineering	Rangwala	Charotar Publication
3.	Optimization of Mass Rapid Transit systems	Danny Tandela	Danny Tandela
4.	Urban Mass transit: The Life story of a technology	Johns Hopkins University Press	Johns Hopkins University Press

5.	Advanced transportation systems, analysis, modelling and evaluation of performance.	Janic and Milan	Springer books

10. LEARNING WEBSITE & PORTALS

1. Delhi Metro Rail Corporation: DMRC: http://www.delhimetrorail.com/
2. Mumbai Metro Rail Corporation: MMRCL: https://www.mmrcl.com/
3. Gujarat Metro Rail Corporation: GMRCL: https://www.gujaratmetrorail.com/
4. Lucknow Metro Rail Corporation: www.lmrcl.com
5. Madhya Pradesh Rail Corporation limited: http://www.mpmetrorail.com/index.php
6. Hyderabad Metro Rail Ltd: www.ltmetro.com
7. Kolkata Metro Rail Corporation Ltd: www.kmrc.in
8. Chennai Metro Rail Ltd: chennaimetrorail.org
9. Kochi Metro Rail Ltd: kochimetro.org

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Assignments
2. Visit Reports
3. Rubrics for COs Assignment

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Neelam N. Petkar
2	Internal	Dr. Sandeep Ranshur
3	External	Mr. Dheeraj Pandirkar
		Organization: Chief Engineer, MHADA

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SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT **Semester: IV**

Course: Disaster Management **Course Category: GE**

Course Code: DMA238920 **Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	1	-	-	-	-	50	-	-	-	50

Total IKS Hrs for the course: - 00

3. COURSE OBJECTIVE

The objective of the Disaster Management course is to equip students with the knowledge, skills, and strategies necessary to identify, assess, and mitigate risks associated with natural and man-made disasters. The course emphasizes the role of civil engineers in disaster preparedness, response, recovery, and prevention, ensuring the development of resilient infrastructure and sustainable practices.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **To assess various hazard, vulnerability, capacity and risk associated with the district.**
- **To prepare various measures and guidelines for prevention and mitigation.**
- **To differentiate the preparedness measures for all stakeholders**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Discuss different types of disaster and remedial measures.
CO2	Know early warnings and safety measures of disasters and Risk assessment
CO3	Use Prevention, Mitigation, Preparedness, Response and Recovery, Rehabilitation & Reconstruction methods appropriately

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6. CO-PO, CO- PSO MAPPING TABLE

Civil Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Disaster Management (DMA238920)	CO1	-	-	-	3	2	3	3	1	1
	CO2	-	-	-	3	1	3	3	1	1
	CO3	-	-	-	3	2	3	3	1	1
	CO Avg.	**-**	**-**	**-**	**3**	**1.66**	**3**	**3**	**1**	**1**

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	Hrs	CO
I	**1.0 Introduction on Disaster Different Types of Disaster** Definition, Classification, Natural and Anthropogenic, Accidents, Disaster Profile of India. Geo-climatic and social conditions, Past records, Vulnerable areas of the country, national response approach. Types of disaster, A) Natural Disaster: such as Flood, Cyclone, Earthquakes, and Landslides etc. B) Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures (Building and Bridge), War & Terrorism etc. Causes, effects and practical examples for all disasters.	6	CO1
II	**2.0 Prediction & Preparation** Prediction and forecasting, disaster preparedness, data base Assessment of disaster relief and Rehabilitation measures, Mobilization of men and material, Legal frame work, Trigger mechanism – Water, Climate and Geologically related Chemical, Industrial, Nuclear, GIS enabled Disk 6net, Activities, Agencies, Resources and Funds, Implementation and Monitoring Flood Hazard Map, Quick response flow chart, Emergency	6	CO2

UNIT NO.	TOPIC/Sub-topic	Hrs	CO
	operation center, Emergency support functions, Disaster specific modules.		
III	**3.0 Risk Assessment** Risk assessment, Contingency Planning, Major Natural disasters, Earth Quake, Cyclone, Flood, Epidemics, Check list-Agencies, Personnel, Equipment, Materials, Services and Time management, Risk and Vulnerability Analysis: Risk concept and analysis, Risk Reduction, Vulnerability: Its concept and analysis, Strategic Development for Vulnerability Reduction.	6	CO2
IV	**4.0 Disaster Preparedness:** Concept and Nature, Disaster Preparedness Plan, Prediction, Early Warnings and Safety Measures of Disaster, Role of Information, Education, Communication, and Training, Role of Government, International and NGO Bodies, Role of IT in Disaster Preparedness, Role of Engineers on Disaster Management.	6	CO3
V	**5.0 Rehabilitation, Reconstruction and Recovery:** Reconstruction and Rehabilitation as a Means of Development, Damage Assessment, Post Disaster effects and Remedial Measures, Creation of Long-term Job Opportunities and Livelihood Options, Disaster Resistant House Construction, Sanitation and Hygiene, Education and Awareness, Dealing with Victims' Psychology, Long-term Counter Disaster Planning, Role of Educational Institute.	6	CO3

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Guest/Expert lectures
3. Demonstrations
4. Site Visits
5. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
6.	W. Nick Carter	Disaster Management Handbook	Asian Development Bank
7.	Sapir Ghua-D, Parry CV, Degomme O (Belgium) & Joshi, PC, Arnold Saulina JP (India)	Risk factors for mortality and injury: Post tsunami epidemiological findings from Tamil Nadu	Cred
8.	Anil Sinha	Disaster Management – Lessons drawn and strategies for future.	NIDM – National Institute of Disaster Management
9.	M.C. Gupta, L. C. Gupta, B.K. Tamini & Vinod K. Sharma	Disaster Management	NIDM - National Institute of Disaster Management
10	Arun Jha & A. A. Khan	Manual on Disaster Management in India	NIDM - National Institute of Disaster Management
11	National Institute of Disaster Management	Natural Disasters in India – some recent case studies	NIDM - National Institute of Disaster Management

10. LEARNING WEBSITE & PORTALS

1. https://nptel.ac.in/courses/124/107/124107010/
2. https://nptel.ac.in/courses/105/104/105104183/
3. http://dm.mcgm.gov.in/home
4. http://www.dmc.gov.lk
5. https://www.mohfw.gov.in

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Assignments
2. Visit Reports
3. Rubrics for COs Assignment

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Neelam N. Petkar
2	Internal	Dr. Sandeep Ranshur
3	External	Mr. Dheeraj Pandirkar
		Organization: Chief Engineer, MHADA

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.

SHRI VILE PARLE KELAVANI MANDAL'S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT	**Semester: IV**
Course: Modern Trends In Civil Engineering	**Course Category: GE**
Course Code: MTC238921	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	1	-	-	-	-	50	-	-	-	50

Total IKS Hrs for the course: - 00

3. COURSE OBJECTIVE

To equip students with a comprehensive understanding of emerging trends, innovative practices, and advanced technologies in civil engineering. This course aims to develop skills for sustainable design, smart infrastructure, and resilient construction methods, fostering an ability to analyze, adapt, and implement modern engineering solutions in real-world scenarios.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Demonstrate an understanding of modern technologies such as Building Information Modelling (BIM), Internet of Things (IoT) applications in smart cities, and advanced construction materials.**
- **Apply principles of sustainability to design and construction, emphasizing renewable resources, energy efficiency, and minimal environmental impact.**
- **Stay updated with advancements like modular construction, 3D printing, and AI-driven engineering processes, integrating them into project designs.**
- **Work effectively within multidisciplinary teams to design and execute civil engineering projects using cutting-edge practices.**

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5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Analyze and articulate the latest trends and innovations in civil engineering, including advanced materials, smart construction methods, and cutting-edge technologies.
CO2	Develop sustainable solutions for civil engineering projects by integrating eco-friendly materials, energy-efficient designs, and green building standards.
CO3	Work effectively in interdisciplinary teams to address real-world challenges, integrating knowledge from various engineering domains.

6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Modern Trends In Civil Engineering (MTC238921)	CO1	3	2	2	1	2	2	2	3	1
	CO2	2	2	1	1	2	2	1	3	1
	CO3	1	3	2	1	2	2	2	3	1
	CO4	1	2	1	1	3	3	1	3	1
	CO Avg.	1.75	2.25	1.5	1	2.25	2.25	1.5	3	1

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	Hrs	CO
I	**Introduction to Modern Trends in Civil Engineering** Overview of civil engineering advancements. • Role of technology in transforming construction and infrastructure. • Importance of sustainability and smart infrastructure	2	CO1
II	**Sustainable Civil Engineering Practices** • Concepts of green building and eco-friendly construction.	4	CO2

UNIT NO.	TOPIC/Sub-topic	Hrs	CO
	• Sustainable materials: Recycled aggregates, fly ash, and geo-polymer concrete. • Energy-efficient construction techniques. • Case studies on sustainable projects.		
III	**Advanced Construction Materials** • High-performance concrete and self-healing concrete. • Fiber-reinforced polymers (FRPs). • Nano-materials in construction. • Smart materials and their applications in civil engineering.	6	CO2
IV	**Modern Construction Techniques** • Prefabrication and modular construction. • 3D printing in civil engineering. • Robotics in construction. • Advanced excavation and tunnelling methods.	6	CO2
V	**Building Information Modelling (BIM)** • Introduction to BIM and its components. • Role of BIM in planning, design, and construction. • Hands-on demonstration of BIM software (basic exposure).	2	CO2
VI	**Practical Component (wherever applicable)** • Field visits to smart city projects or sustainable construction sites. • Demonstrations of modern surveying tools like drones and GIS. • Hands-on workshops on BIM and basic construction technologies. Application IoT in Civil Engineering.	10	CO3

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Guest/Expert lectures

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3. Demonstrations
4. Site Visits

9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1.	Handbook of Modern Construction Practices	Jay P. Singh and Bibhuti Bhusan Das	Springer
2.	Sustainable Construction: Green Building Design and Delivery	Charles J. Kibert	John Wiley & Sons
3.	Artificial Intelligence and Machine Learning for Civil Engineers	Afaq Ahmad, Vagelis Plevris, Nikos D. Lagaros	IGI Global
4.	3D Printing in Concrete: Applications and Challenges	Arnaud Perrot	John Wiley & Sons
5.	Disaster Resilient Infrastructure	Mukesh Khare and Gopalakrishnan Nair	Asian Development Bank

10. LEARNING WEBSITE & PORTALS

1.www.nptel.ac.in
2. https://www.wiley.com
3.www.swayam.gov.in
4. www.researchgate.net
5. https://www.smartdatacollective.com

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1.Assignments
2.Visit Reports
3.Rubrics for COs Assignment

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COMPUTER ENGINEERING DEPARTMENT

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Neelam N. Petkar
2	Internal	Dr. Sandeep Ranshur
3	External	Mr. Dheeraj Pandirkar
		Organization: Chief Engineer, MHADA

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT	**Semester: IV**
Course: Additive Manufacturing	**Course Category: GE**
Course Code: ADM238922	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL Practical (Marks)			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	-	-	-	-	-	50	-	-	-	50

Total IKS Hrs for the course: -

3. COURSE OBJECTIVE

To educate students with fundamental and advanced knowledge in the field of Additive manufacturing technology by exploring the applications of Additive Manufacturing (AM) processes in various fields to select the suitable material and process for fabricating a given product.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

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

- Understand the basics of different tooling and its methods for AM
- Design and develop basic model of AM Process

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Understand the working principle of AM processes
CO2	Develop the optimal modeling of AM components for product.
CO3	Select the suitable AM process for manufacturing a given product.
CO4	Understand the different post processing methods of AM part.

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6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Additive Manufacturing (ADM238922)	CO1	3	-	1	-	1	-	2	3	-
	CO2	2	-	3	1	2	-	2	3	-
	CO3	2	2	2	1	2	-	2	2	-
	CO4	2	2	1	-	1	-	2	2	-
	CO Avg.	2.25	2	1.75	1	1.5	-	2	2.5	-

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	Hours
I	**Introduction to Additive Manufacturing** **1.1** Overview of Additive Manufacturing (AM); AM history **1.2** Classification of AM **1.3** Advantages, limitations and applications of AM process **1.4** Introduction to AM software's. **1.5** Types of materials for AM.	**CO1**	**04**
II	**CAD Data Processing for AM** **2.1** CAD model development; Overview on Data requirements **2.2** Data formats (STL, SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP) **2.3** Data interfacing, Part orientation and support generation; Design of support structure for AM; Overview on slicing methods; Tool path generation for AM.	**CO2**	**10**
III	**Liquid, Solid & Powder Based AM Technologies** **3.1** Working Principles, materials, merits, drawbacks and applications of 3.1.1 Stereo lithography 3.1.1 FDM 3.1.3 LOM	**CO3**	**12**

	3.1.4 Multijet Modelling 3.1.5 SLS 3.1.6 Direct Metal Laser Sintering 3.1.7 3-Dimensional Printing **3.2 Direct Energy Deposition AM Process:** Working principles, products, benefits and drawbacks, applications of **3.**2.1 Laser Engineered Net Shaping (LENS) **3.**2.2 Direct Metal Deposition (DMD) **3.**3.3 Electron Beam based metal deposition **3.3** Overview on new & Hybrid AM technologies.		
IV	**Post Processing of AM Part** 4.1Overview on support material removal, 4.2Surface quality and aesthetic improvement. Applications of AM. 4.3Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.	**CO4**	**04**

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Assignments.
3. Demonstrations
4. Slides
5. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling	D.T. Pham, S.S. Dimov	Springer 2001
2	Rapid Prototyping: Principles and Applications in Manufacturing	Rafiq Noorani	John Wiley & Sons, 2006
3	3D Printing and Additive Manufacturing: Principles & Applications	Chua Chee Kai, Leong Kah Fai,	World Scientific

10. WEB REFERENCES

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1. https://library.fiveable.me/additive-manufacturing-and-3d-printing/unit-1/history-additive-manufacturing/study-guide/2aKxu5iTHiCEskfBhttps://www.youtube.com/watch?v=TJ4jGyD-WCw
2. https://application.wiley-vch.de/books/sample/3527347917_c01.pdf
3. https://home.iitk.ac.in/~nsinha/Additive_Manufacturing%20I.pdf
4. https://www.lboro.ac.uk/research/amrg/about/materials/
5. https://www.studocu.com/in/document/rashtreeya-vidyalaya-college-of-engineering/materials-manufacturing-processes-for-designers/unit-5-data-formats-rp-r-v-college-of-engineering/53948980
6. https://www.metal-am.com/introduction-to-metal-additive-manufacturing-and-3d-printing/metal-3d-printing-additive-manufacturing-processes/
7. https://www.postprocess.com/2022/09/what-is-post-processing-in-additive-manufacturing/
8. https://www.mdpi.com/1996-1944/16/13/4610
9. https://www.youtube.com/watch?v=NLoB52nPuao&list=PL3lLIrnJwjW5nKT71mMX7LuyaIiyb_BLy
10. https://www.youtube.com/watch?v=I-0E-eiJdWk
11. https://www.youtube.com/watch?v=33vzF_pce0A

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

Rubrics for COs Assignment

Term Work

Students should prepare a journal containing assignments based on each topic.

Seminar/Presentation

Students should prepare and give a presentation on latest trends or case studies on additive manufacturing.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Dr. Pravin R. Parate
2	Internal	Shri Girish B. Deshpande
3	External	Shri Aloke Chaudhary
		Organization: Director, S M TECHNOCRATS PVT. LTD.

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS:

Programme: Diploma in CSE/IT	**Semester: IV**
Course: Energy Conservation & Audit	**Course Category : GE**
Course Code: ECA238923	**Duration: 16 Weeks**

2. LEARNING & ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration(Hrs.)	Theory (Marks)			Based on LL & TL			Based onSelf Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	01	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE

This course is categorized under generic technology subjects, Rapid Developments in the standard of living of countrymen results into increased energy consumption. But due to limited availability of conventional sources and difficulties in their tapping and uneconomical and insufficient R and D aspect of non-conventional sources, energy conservation is the most important tool to some extent, to face the problem of the increased demand. Hence electrical engineers must have knowledge of various methods of energy conservation and concept of energy audit and its implementation.

4. SKILL COMPETENCY:

- **Undertake energy audit of small, medium and large organisation and recommend suggestions for power saving**

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COMPUTER ENGINEERING DEPARTMENT

5. COURSE OUTCOMES (COs): At the end of the semester students will be able to: -

CO. No.	COURSE OUTCOMES
CO1	Interpret energy conservation policies in India.
CO2	Implement energy conservation techniques in electrical machines.
CO3	Apply energy conservation techniques in electrical installations.
CO4	Develop energy audit and Prepare report of energy audit

6. CO- PO, CO – PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Energy Conservation & Audit (ECA238923)	CO1	2		-	2	2	3	1	1	1
	CO2	2	2	1	-	3	-	1	2	2
	CO3	2	2	1	-	3	-	1	2	2
	CO4	2		-	2	2	3	1	3	3
	CO Avg.	**2.00**	**2.00**	**1.00**	**2.00**	**2.50**	**3.00**	**1.00**	**2.00**	**2.00**

7. COURSE CONTENTS

UNIT NO.	Topic/Sub-Topics	CO	Hours
I	**1.0 Energy Conservation Basics** 1.1 Energy Scenario: Primary and Secondary Energy, 1.2 Energy demand and supply, 1.3 National scenario. Energy conservation and Energy audit; 1.4 concepts and difference Indian Electricity Act 2001; 1.5 Relevant clauses of energy conservation 1.6 BEE and its Roles 1.7 MEDA and its Roles 1.8 Star Labelling: Need and its benefits.	**CO1**	**05**
II	**2.0 Energy Conservation in Electrical Machines** 2.1 Need for energy conservation in induction motor and transformer. 2.2 **Energy conservation techniques in induction motor by:** - Improving Power quality. - Motor Survey Matching motor with loading. - Minimizing the idle and redundant running of motor.	**CO2**	**10**

	- Operating in star mode. Rewinding of motor. - Replacement by energy efficient motor - Periodic maintenance - Energy efficient motor; significant features, advantages, applications and limitations. 2.3 **Energy conservation techniques in Transformer.** - Loading Sharing Parallel Operation Isolating techniques. - Replacement by energy efficient transformers. - Periodic maintenance. 2.4 Energy Conservation Equipment: - Soft starters, - Automatic star delta convertor, - Variable Frequency Drives, - Automatic p. f. controller (APFC), - Intelligent p. f. controller (IPFC)		
III	**3.0 Energy conservation in Electrical Installation systems** 3.1 Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level. 3.2 **Technical losses; causes and measures to reduce by.** a) Controlling I2 R losses. b) Optimizing distribution voltage c) Balancing phase currents d) Compensating reactive power flow Commercial losses: 3.3 pilferage, causes and remedies 3.4 **Energy Conservation in Lighting System** a) Replacing Lamp sources. b) Using energy efficient luminaries. c) Using light controlled gears. d) Installation of separate transformer / servo stabilizer for lighting. e) Periodic survey and adequate maintenance programs. 3.4 Energy Conservation techniques in fans, Electronic regulators.	**CO3**	**10**
IV	**4.0 Energy Audit of Electrical System** 4.1 Energy audit (definition as per Energy Conservation Act) 4.2 Energy audit instruments and their use. 4.3 Questionnaire for energy audit projects. 4.4 Energy flow diagram (Sankey diagram) Simple payback period, 4.5 Energy Audit procedure (walk through audit and detailed audit). 4.6 Energy Audit report format.	**CO4**	**05**
	Total Hours		**30**

8. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Industrial Visits
3. Guest/Expert Lectures
4. Demonstrations
5. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURSES

Sr. No.	Title of Book	Author	Publication
1	Guide books no.1 to 4 for NationalCertification examination for Energy Managers &Energy auditors	Bureau of Energy Efficiency (BEE)	Bureau of Energy Efficiency(Forth Edition 2015)
2	Energy Resources &Management	Renu Dhupper	Cbs Publication ISBN - 978812392575
3	Energy management &Conservation	K V Sharma P Venkataseshaiah	I.K. International PublishingHouse Pvt. Ltd. ISBN:978-93-81141-29-8
4	Energy Management	Umesh Rathore	SK Kataria & Sons ISBN 978-93-5014-101-4
5	Electrical Energy Conservation &Auditing	Er. Udit Mamodiya	Ashirwad Publication ISBN - 139788194250692
6	Power Factor Correction Management & Energy Audit	Siemens	New Age Vol.38 2005

10. LEARNING WEBSITES & PORTALS

1. https://beeindia.gov.in/
2 www.nptel.ac.in
3. https://www.worldenergy.org/
4 https://www.electricalindia.in/energy-management-and-conservation/
5.https://www.technicalbookspdf.com/power-electronics-handbook-fourth-edition/

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)
Term Work (Assignments)

1. Identify star labelled electrical apparatus and compare the data for various star ratings
2. Determine the '% loading' of the given loaded Induction motor.

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3. Determine the reduction in power consumption in star mode operation of Induction motor compared to delta mode.
4. Use APFC unit for improvement of p. f. of electrical load.
5. Compare power consumption of different types of TL with choke, electronic ballast and LED lamps by direct measurements.
6. Determine the reduction in power consumption by replacement of lamps in a class room / laboratory.
7. Determine the reduction in power consumption by replacement of Fans and regulators in a class room / laboratory
8. Estimate energy saving by improving power factor and load factor for given cases.
9. Collect electricity bill of a residential consumer and suggest suitable means for conservation and reduction of the energy bill.
10. Prepare a sample energy audit questionnaire for the given industrial facility.
11. Prepare an energy audit report (phase –I, II and III)

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	NAME	
1	Internal	Mr. N D Adate
2	Internal	Ms. U H Sawant
3	External	Dr. P. N. Padghan
		Organization : Government Polytechnic Mumbai

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT	**Semester: IV**
Course: Introduction To Green Technology	**Course Category: GE**
Course Code: IGT238924	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	1	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE

Introduction to Green Technology is an introductory science course that prepares students for further learning in the emerging engineering fields of green technologies, environmental technology, and renewable energy forms.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

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

- **To seek opportunities for alternative sourcing, conservation, efficiency and repurposing through an understanding of product life cycles from origins to recycling or inevitable disposal.**
- **To combine technical and scientific skills with an understanding of the environment, renewable energy management, waste utilization, resource management and land based industries who can contribute to the national and global development.**

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5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	Introduce the concept of Green Technology.
CO2	Impart the Knowledge of Carbon emission.
CO3	Introduce the concept of Life cycle Assessment.
CO4	Learn the importance of green fuels and its impact on environment.

6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Introduction to Green Technology (IGT238924)	CO1	1	1	-	-	3	-	2	2	-
	CO2	1	2	2	-	-	-	-	2	-
	CO3	-	2	-	-	2	-	1	2	-
	CO4	1	-	2	-	3	-	-	2	-
	CO Avg.	**1**	**1.67**	**2**	**-**	**2.5**	**-**	**1.5**	**2**	**-**

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	Hours
I	**Introduction to Green Technology** 1.1 Definition and its importance 1.2 Principles of Green Technology 1.3 Advantages and disadvantages of green technologies 1.4 Factors affecting green technologies 1.5 Role of industry, Government and institution 1.6 Introduction to industrial Ecology and role of industrial ecology in green technology	CO1	04

II	**Cleaner Production** 2.1 Definition and its Importance 2.2 Principles and its benefits 2.3 Role of industry, Government and institution in Cleaner production 2.4 Clean development mechanism 2.5 Reuse, Recovery, Recycle 2.6 Raw material substitution- Wealth from waste.	CO2	08
III	**CP Awareness and life cycle Assessment (LCA)** 3.1 Pollution prevention and cleaner production awareness plan 3.2 Waste audit 3.3 Environmental statements 3.4 Carbon credit and carbon trading 3.5 Introduction to LCA and elements of LCA	CO3	06
IV	**Energy sources** 4.1 Availability and need of conventional energy resources, 4.2 Major environmental problems related to conventional energy resources, 4.3 Future possibilities of energy need and availability	CO4	06
V	**Green Fuels** 5.1 Definition of green fuels 5.2 Benefits and challenges 5.3 Comparison of green fuel with conventional fossil fuels with reference to environmental, economic and social impact 5.4 Public policies and market driven initiatives.	CO4	06
	Total Hours		30

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Industry visit
3. Guest/Expert lectures
4. Demonstrations
5. Self-Learning Online Resources (Swayam NPTEL)

9.SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Pollution prevention: Fundamentals and practices	Paul Bishop	McGraw Hill International
2	Cleaner Production Audit (1995)	Prasad Modak, C Visvanathan and Mandar Parasnis	Environmental system review, Asian institute of technology, Bangkok
3	Handbook of organic waste conversion	Bewik M W M	Bewik M W M

10. LEARNING WEBSITE & PORTALS

1. www.researchgate.net/publication/350443477_Green_Technology_and_its_Implications_Worldwide
2. www.jetir.org/papers/JETIREW06032.pdf
3. www.wipo.int/edocs/pubdocs/en/wipo-pub-1080-en-green-technology-book.pdf
4. ripublication.com/ijaes17/ijaesv12n5_18.pdf
5. https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

Term Work (Assignments)

Sr. No.	Title of Assignment
1	Definition of Green technology, its importance and advantages and disadvantages
2	Role of industrial ecology in Green technology
3	Principles of Cleaner production and its benefits
4	Clean development mechanism, wealth from waste
5	Carbon credit and carbon trading
6	Introduction to LCA and its elements
7	Comparison of conventional and non-conventional energy sources
8	Device and technology used in solar energy conversion
9	Green fuels, their benefits and challenges
10	Concept of biomass energy utilization, types of biomass
11	Suitability of wind, tidal and geothermal energy in Indian context

12.COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Jyoti S Sangle
2	Internal	Mr. M. M. Belwalkar
3	External	Prof. Pradeep. G. Talwelkar
		Organization: D.J.Sanghavi College of Engineering

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT	**Semester: IV**
Course: Intellectual Property Rights	**Course Category: GE**
Course Code: IPR238925	**Duration:16 Weeks**

2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Mark
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	1	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE

As per NEP guidelines a diploma holder is expected to have multidisciplinary knowledge. This course is designed to introduce the basics of Intellectual Property Rights from legal perspective for an engineering student. In addition to this, it is important to make the students aware of their rights for the protection of their invention done in their project work and to get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks.

4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Apply concepts of Intellectual property rights in relevant fields.**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Recognize the importance of intellectual properties.
CO2	Understand the significance of Copyright Act 1957.
CO3	Understand the various aspects of Patents.
CO4	Elaborate the procedure of obtaining Patents.
CO5	Interpret the basic concepts of Trademarks

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6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Intellectual Property Rights (IPR238925)	CO1	1	-	3	-	3	2	2	1	1
	CO2	2	1	2	1	2	2	1	-	-
	CO3	-	-	2	-	2	2	1	1	-
	CO4	1	-	1	1	1	-	1	-	1
	CO5	1	-	2	-	-	2	-	-	-
	CO Avg.	**1.25**	**1**	**2**	**1**	**2**	**2**	**1.5**	**1**	**1**

7. COURSE CONTENTS

UNIT	TOPIC/Sub-topic	CO	Hrs
I	**Introductory** The meaning of Intellectual property Competing rationales of the legal regimes for the protection of intellectual property The main forms of intellectual property: copyright, trademarks, patents, designs The competing rationales for protection of rights in: Copyright, Trademarks, Patents, Designs, Trade secrets Other new forms such as plant varieties and geographical indications Introduction to the leading international instruments concerning intellectual property rights: The Berne Convention, Rome Convert Universal Copyright Convention, TRIPs Paris Convention	CO1	08
II	**Copyright Act 1957** Historical evolution Meaning of Copyright, Copyright in literary, dramatic and musical works Copyright in sound records and cinematographic films Copyright in computer programs Ownership of copyright, Assignment of copyright Author's special rights Notion of infringement, Criteria of infringement	CO2	06

	Infringement of copyright by films of literary and dramatic works Importation and infringement Fair use provisions Piracy in internet Aspects of copyright justice Remedies, especially, the possibility of Anton pillar injunctive relief in India		
III	**Patent Act 1970** Concept of Patent Historical view of patents law in India Patentable inventions with special reference to biotechnology products entailing creation of new forms of life Patent protection for computer programs Process of obtaining a patent: application, examination, opposition and sealing of patents: general introduction	CO3	06
IV	Procedure for filing patents: Patent Co-operation Treaty Some grounds for Opposition The problem of limited locus standee to oppose Wrongfully obtaining the invention Prior publication or anticipation Obviousness and the lack of inventive step Insufficient description Rights and obligations of a patentee Patents as chose in action Duration of patents; law and policy considerations Use and exercise rights Right to secrecy The notion of 'abuse' of patent rights Compulsory license Remedies Infringement, Criteria of infringement Modes of Infringement; the Doctrine of Colorable Variation Defenses in suits of Infringement Injunctions and related remedies	CO4	06

V	**Intellectual Property in Trade Marks** The rationale of protection of Trade marks as (a) an aspect of commercial and (b) of consumer rights Definition and concept of Trade marks Registration Distinction between Trade mark and property mark The doctrine of honest Current User The doctrine of deceptive similarity Offences relating to Trade Marks, Passing Off, Penalties.	CO5	04

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of assignments.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations
6. Slides
7. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Intellectual Property Rights and the Law	Dr. G.B. Reddy	Gogia Law Agency
2	Law of Intellectual Property	Dr. S.R. Myneni	Asian Law House
3	Law relating to Intellectual Property	Dr. B.L. Wadehra	Universal Law Publishing Co

10. LEARNING WEBSITE & PORTALS

1. https://ipindia.gov.in/acts-patents.htm
2. https://vajiramandravi.com/quest-upsc-notes/intellectual-property-rights/
3. https://www.startupindia.gov.in/content/sih/en/intellectual-property-rights.html
4. https://www.meity.gov.in/ipr-initiatives

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Self-Learning
4. Term Work
5. Seminar/Presentation

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12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. P.S.Dhuri
2	Internal	Mr. N.G.Farkade
3	External	Mr. Ramkumar Maurya
		Rizvi College of Engineering.

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS:

Programme: Diploma in CSE/IT	**Semester: IV**
Course: German Language	**Course Category: GE**
Course Code: GEL238926	**Duration: 16 Weeks**

2. LEARNING & ASSESSMENT SCHEME:

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	01	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE:

Learning aims in the subject German as a foreign language are realized by means of fulfilling the objectives of the ultimate goal which have been set in accordance with the four basic skills: Reading, Listening, Speaking & Writing. The course prepares students to navigate straightforward day-to-day situations, to read simple texts, and to write short, basic paragraphs. The course provides a communicative approach that helps students to express their own experiences while also encountering the cultural and social life of people in German-language regions. It enables students gain greater understanding of a foreign culture and to understand the grammar of the language and apply the same practically to structure their conversations.

4. SKILL COMPETENCY:

- **Communicate in public places**

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5. COURSE OUTCOMES (COs) : At the end of the semester students will be able to: -

CO. No.	COURSE OUTCOMES
CO1	The student can understand and use everyday expressions and frame very simple sentences, which relate to the satisfying of concrete needs.
CO2	The language introduces learners to diverse cultures and a range of ways of expression and communication with other speakers of the German language in a variety of contexts.

6. CO- PO, CO – PSO MAPPING TABLE:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
German Language (GEL238926)	CO1	2		-	-	2	3	1	1	1
	CO2	2	1	-	-	3	-	1	2	2
	CO Avg.	**2.00**	**2.00**	**1.00**	**2.00**	**2.50**	**3.00**	**1.00**	**2.00**	**2.00**

7. COURSE CONTENTS:

UNIT NO.	Topic/Sub-Topics	CO	Hours
I	**Theme 1: Self and 3rd Person introduction** Skills: Greet each other, say goodbye, ask how we are, how to say email address Grammar: W-Questions, Statements, Verb conjugation and personal pronouns in 1st Vocabulary: Numbers 1-20, Countries and Languages **Theme 2: Personal Information** **Skills:** talk and write about work and personal matters **Grammar:** Definite articles, Verb conjugation and personal pronouns in 2nd Person, Yes-No Questions, Plural forms of the nouns **Vocabulary:** Hobbys, Weekdays, Months & Seasons, Number 20 onwards, Profession	**CO1**	**6**
II	**Theme 3: City Orientation** **Skills:** evaluate a place, ask about facilities and Understand directions, write routes. **Grammar:** Indefinite articles, negation, Imperative – formal **Vocabulary:** Places and Buildings (railway station, subway, hotel,	**CO1**	**3**

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	restaurants, river, cityhall, library etc.)		
III	**Theme 4: Meals & Beverages** **Skills:** Talking about food preferences and eating habits, conversing about eating, to plan shopping, conversation at market, supermarket, mall **Grammar:** Verb position in a simple sentence, introduction to nominative and accusative case, verb – to like (mogen) and would like to (mochten) **Vocabulary:** Meals, food, grossary shop, Beverages	**CO1**	**4**
IV	**Theme 5: Daily Routine** **Skills:** describe daily routines, talk about family, apologize for being late, to arrange for appointments. **Grammar:** Prepositions of time (am, um, von…bis), Possessive pronouns in nominative case, modal verbs- **Vocabulary:** Daily routine, Time, family members & relatives,	**CO2**	**4**
V	**Theme 6: Contacts** **Skills:** To arrange appointments (formal), to talk about learning languages, to understand the conversations, to read and understand the letters. **Grammar:** Personal pronouns, definite and indefinite articles in dative case, dative prepositions, possessive pronouns in accusative case. **Vocabulary:** Standard letters, everyday office life.	**CO2**	**4**
VI	**Theme 8: Apartment & Types of Housing** **Skills**: To describe an apartment, to plan the furnishing of the house, to write a short invitation for Housewarming party, **Grammar:** Adjectives, case changing prepositions, **Vocabulary:** Apartments, rooms, colors, furniture and appliances, types of housing	**CO2**	**3**
VII	**Theme 9: Work** **Skills:** Talk about the past events, opinions about jobs, to understand the telephonic conversations **Grammar:** Present participle – regular and irregular verbs, Conjunctions – and, but, or **Vocabulary:** Professions and workplaces, jobs, studies	**CO2**	**3**
VIII	**Theme 11: Health** **Skills:** To name the body parts, to understand the sports exercises, conversation at the doctor's clinic, to understand and give health tips **Grammar:** Imperative – informal, modal verbs – sollen, durfen,mussen **Vocabulary:** Body parts, personal Hygiene, diseases, Medicines, Professions	**CO2**	**3**
	Total Hours		**30**

8. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Guest/Expert Lectures
3. Demonstrations
4. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURSES:

Sr. No.	Title of Book	Author	Publication
1	Netzwerk – Deutsch als Fremdsprache A1		

10. LEARNING WEBSITES & PORTALS:

1 http://www.lsa.umich.edu/german/hmr/index.html

2 https://www.learngermanonline.org/

11. ASSESMENT METHODOLOGIES/TOOLS:

1. Formative Assessment (Assessment for Learning)
2. Term Work (Assignments)

13. COURSE EXPERT COMMITTEE MEMBERS:

Sr. No.	NAME	
1.	Internal	Mr. J S Kulkarni
2.	Internal	Mrs. N. G Kadukar
3.	External	Mrs. Jayanti Vasudeo
		Organization: Centre for international studies ,NMIMS

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS:

Programme: Diploma in CSE/IT	**Semester: IV**
Course: Digital Marketing	**Course Category: GE**
Course Code: DIM238927	**Duration: 16 Weeks**

2. LEARNING & ASSESSMENT SCHEME:

Learning Scheme				Credits	Assessment Scheme									
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	-	-	-	01	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE:

Digital marketing allows businesses to reach a global audience, breaking geographical barriers Compared to traditional marketing methods, digital marketing is often more affordable and offers a higher return on investment. The course allows students to learn digital marketing basics and various tools used in digital marketing.

4. SKILL COMPETENCY:

- **Marketing skills on digital media**

5. COURSE OUTCOMES (COs): At the end of the semester students will be able to: -

CO. No.	COURSE OUTCOMES
CO1	Describe the traditional and digital Marketing
CO2	Plan and create website
CO3	Improve the website's visibility on search engines Search Engine Optimization (SEO)
CO4	Create and share content and use of Email for Digital Marketing
CO5	Using platforms like Facebook, Instagram, and LinkedIn

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6. CO- PO, CO – PSO MAPPING TABLE:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Digital Marketing (DIM238927)	CO 1	3	1	-	-	-	-	1	2	-
	CO 2	3	2	2	1	-	-	1	2	-
	CO 3	3	2	2	1	1	-	2	2	-
	CO 4	3	1	2	1	-	1	2	2	-
	CO 5	3	2	3	1	1	-	2	2	-
	CO Average	**3**	**1.6**	**2.25**	**1**	**1**	**1**	**1.6**	**2**	**-**

7. COURSE CONTENTS:

UNIT NO.	Topic/Sub-Topics	CO	Hours
I	**Introduction to Digital Marketing** 1.1 Introduction to digital marketing Importance of digital marketing 1.2 Difference between traditional and digital marketing recent trends and current scenario of the industry 1.3 Digital Marketing Channels: SEO, search advertising, display advertising, social media marketing, affiliate marketing, email marketing, content marketing, and mobile marketing.	CO1	05
II	**Planning and creating a website** 2.1 Website development basics: How Websites Work: Learn about web servers, browsers, and how they interact. 2.2 Domain Names and Hosting: Understand how to register a domain and choose a hosting provider. 2.3 Content Management Systems (CMS): 2.4 WordPress: The most popular CMS, great for beginners. Other CMS Options: Joomla, Drupal, etc. 2.5 Responsive Design: 2.6 Mobile-Friendly Design: Ensure your website looks good on all devices. 2.7 Media Queries: Techniques to apply different styles based on device characteristics. 2.8 User experience (UX) design: Principles of UX Design, UI Design Basics	CO2	10

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III	**Search Engine Optimization (SEO)** 3.1 Introduction to Search Engine Optimization, Search Engine working On-page SEO – concepts like content research, keyword research, meta tags Off-page SEO – link building 3.2 Keyword Research Factors affecting the rank of a webpage Keyword Research: Creating Ads, Setting Up Campaigns, Bidding and Budgeting, Targeting, Ad Auctions, Monitoring and Optimization and Tools and Platforms	CO3	10
IV	**Content creation and email marketing** 4.1 Content creation: concept 4.2 Content bucketing 4.3 Creating a social media content calendar for a brand 4.4 Content marketing tools 4.5 Guest Blogging 4.6 Influencer Marketing 4.7 Email Marketing 4.8 How to build the right subscriber list 4.9 Build a database by segmenting based on demographics, mode of acquisition, target group 4.10 Finessing email marketing tools and software 4.11 Designing email copies & automating emails 4.12Extracting information from email campaign analytics	CO4	05
V	**Social Media Marketing** 5.1 Benefits of Social Media Marketing 5.2 Key Platforms for Social Media Marketing 5.3 Creating a Social Media Marketing Strategy	CO5	05
	Total Hours		30

8. IMPLEMENTATION STRATEGY (PLANNING):

1. Minimum no of assignments
2. Guest/Expert Lectures
3. Slides
4. Self-learning Online Resources

9. SUGGESTED LEARNING RESOURSES:

Sr. No.	Title of Book	Author	Publication
1.	Digital Marketing for Dummies	Ryan Deiss and Russ Henneberry	NA
2.	Digital Marketing	Babu KG Raja Sabarish Anbazhagan	Sultan Chand & Sons
3.	Digital Marketing	Mathur Vibha	PHI Publication

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10. LEARNING WEBSITES & PORTALS:

1. https://www.reliablesoft.net/
2. https://digitalmarketinginstitute.com/

11. ASSESMENT METHODOLOGIES/TOOLS:

Formative Assessment (Assessment for Learning)

1. Term work
2. Seminar

12. COURSE EXPERT COMMITTEE MEMBERS:

Sr. No.	NAME	
1.	Internal	Mr. Janardan S. Kulkarni, HOD, Computer Engineering
2.	Internal	Mr. Pratik Shah, Lecturer, Computer Engineering
3.	External	Mr. Rahil Shah
		Co-Founder: 3Folks Media, Mumbai

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma CSE/IT	**Semester: IV**
Course: Renewable Energy	**Course Category: GE**
Course Code: REN238928	**Duration:16 Weeks**

2. LEARNING AND ASSESMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Mark
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
02	-	-	-	01	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE

The objective of this course is to understand present and future scenario of world energy use and aware of renewable energies such as Solar, Wind, Bio and different available non-conventional energy sources.

4. SKILL COMPETENCY

- **Usage of energy**
- **Identify suitable energy sources as per application considering location**
- **Utilize natural resources for energy generation**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

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CO No.	COURSE OUTCOME
CO1	Understand present and future energy scenario of the world
CO2	Understand various methods of solar energy harvesting.
CO3	Identify various wind energy systems
CO4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5	Identify suitable energy sources for a location.

6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Renewable Energy (REN238928)	CO1	3	1	1	1	2	-	1	1	-
	CO2	2	-	-	-	-	-	-	1	-
	CO3	2	-	-	-	-	-	-	-	-
	CO4	2	-	-	-	-	-	-	-	-
	CO5	2	-	-	-	-	-	-	-	-
	CO Avg.	**2.2**	**1**	**1**	**1**	**2**	**-**	**1**	**1**	**-**

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7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	Hours
I	**UNIT-I: Introduction:** 1.1 World Energy Use; 1.2 Reserves of Energy Resources; 1.3 Environmental Aspects of 1.4 Energy Utilization; 1.5 Renewable Energy Scenario in India and around the World; 1.6 Potentials; 1.7 Achievements / Applications; 1.8 Economics of renewable energy system	**CO1**	**06**
II	**Unit-II: Solar energy:** 2.1 Solar Radiation; 2.2 Measurements of Solar Radiation; 2.3 Flat Plate and Concentrating Collectors; 2.4 Solar direct Thermal Applications; 2.5 Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; 2.6 Solar Cells; 2.7 Solar PV Power Generation; 2.8 Solar PV Applications.	**CO2**	**06**
III	**Unit-III: Wind Energy:** 3.1 Wind Data and Energy Estimation; 3.2 Types of Wind Energy Systems; 3.3 Performance; 3.4 Site Selection; 3.5 Details of Wind Turbine Generator; 3.6 Safety and Environmental Aspects.	**CO3**	**06**
IV	**Unit-IV: Bio-Energy:** 4.1 Biomass direct combustion;4.2 Biomass gasifiers; 4.3 Biogas plants; 4.4 Digesters; 4.5 Ethanol production; 4.6 Bio diesel; 4.7 Cogeneration; 1.1 Biomass Applications.	**CO4**	**06**
V	**Unit-V: Other Renewable Energy Sources** 5.1 Tidal energy; 5.2 Wave Energy; 5.3 Open and Closed OTEC Cycles; 5.4 Small Hydro-Geothermal Energy; 5.5 Hydrogen and Storage; 5.6 Fuel Cell Systems; 5.7 Hybrid Systems.	**CO5**	**06**
	Total Hours		**30**

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8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Energy Technology	O.P. Gupta	Khanna Publishing House, Delhi (ed. 2018)
2	Renewable Energy Sources	Twidell, J.W. & Weir, A.	EFN Spon Ltd., UK, 2006.
3	Solar Energy	Sukhatme. S.P	Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997
4	Renewable Energy, Power for a Sustainable Future	Godfrey Boyle,	Oxford University Press, U.K., 1996.
5	Fundamental of Renewable Energy Sources	GN Tiwari and MK Ghoshal	Narosa, New Delhi, 2007
6	Renewable Energy and Environment-A Policy Analysis for India	NH Ravindranath, UK Rao, B Natarajan, P Monga	Tata McGraw Hill
7	Energy and The Environment, Second Edition	RA Ristinen and J J Kraushaar	John Willey & Sons, New York, 2006
8	Renewable Energy Resources	JW Twidell and AD Weir	ELBS, 2006

10. LEARNING WEBSITE & PORTALS

1. https://www.suzlon.com/
2. https://www.mahaurja.com/meda/en/grid_connected_power/wind_power
3 https://earth.org/what-is-tidal-energy/
4. https://gpcl.gujarat.gov.in/
5. https://sbmurban.org/indore-bio-cng-plant

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Term Work
2. Quiz

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3. Case study
4. Seminar/Presentation

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	**Internal**	Mrs. Neeta Kadukar
2	**Internal**	Mrs. Swapna Naik
3	**External**	Mr. Dhul shetty
		Organization: Government Polytechnic, Mumbai

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COMPUTER ENGINEERING DEPARTMENT

1. COURSE DETAILS

Programme: Diploma in CSE/IT **Semester: IV**

Course: Indian Music **Course Category: GE**

Course Code: INM238929 **Duration:16 Weeks**

2. LEARNING AND ASSESMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL^) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
									Practical (Marks)				
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR	SLA (Marks)	
02	-	-	-	1	-	-	-	-	50	-	-	-	50

3. COURSE OBJECTIVE: To introduce students to the fundamentals of Indian classical music, including its origin, its ancient form and the progression to current form, basic elements of music, theoretical principles, the raga system, its categorisations and how it evolved, and rhythmic patterns, invoking appreciation and love for one of the finest of the arts rooted in our culture, tradition and diaspora.

4. SKILL COMPETENCY

By completing the course on Indian classical music, students will be able to

- **Identify, analyze, and understand the form of Khyaal Gayaki, its basic ragas and taals, understanding their structure, mood, and aesthetic nuances with reference to gharanas in last 100 years.**
- **Prepare a Document of the learnt bandishes of different Ragas in suitable Taals.**

5. COURSE OUTCOMES (COs): At the end of the semester student will be able to**: -**

CO No.	COURSE OUTCOME
CO1	To understand the basic foundations of Indian classical music such as Swara ,Laya, Shrutis.
CO2	To classify and practice different types of Ragas based on Moods, time, bandishes.
CO3	To acquaint with writing the notations of various Raga Bandishes in suitable Taals.
CO4	To understand **Dhrupad and Thumri**, including its stylistic nuances, structural elements, alaap techniques, and compositional forms

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6. CO-PO, CO- PSO MAPPING TABLE -

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Indian Music (INM238929)	CO1	1	-	-	-	-	-	2	-	-
	CO2	2	-	-	-	-	-	3	-	-
	CO3	1	-	-	-	-	-	1	-	-
	CO4	2	-	-	-	-	-	1	-	-
	CO Avg.	1.5	-	-	-	-	-	1.75	-	-

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	**UNIT-I:** Hindustani Music - A World of Colour, Romance, and History, Classical of Shastriya - Dhrupad, Khayal and Instrumental Music – A Bird's-eye View Hindustani Music as Raga Sangeet, The Textual Tradition, Swara and Shruti. Tone and Microtone, Swara and Shruti in the Textual Tradition, Tanpura - The King of Overtones, Entering the World of Raga - Raga and Swara. The World of Raga - 2: Strong and Weak Notes. The World of Raga – 3, Ornament, The World of Raga - 4: Paths of a Rags, Raga and Time Association
II	**Unit-II:** Raga Lakshana or Features of Raga, Defining Raga, Classification of Ragas - the Mela or Thaat System, Classification of Ragas - the Raagaanga System, Classification of Ragas - the Raga Ragini system. Extending the Raga Corpus - Winds from the South, Extending the Raga Corpus - Jod Ragas, Principles of Time in Hindustani Music - Tala and Laya, Some Aspects of Tala and a Few Important Tala-s, Tabla as Keeper of Tala in Khayal Khayal-A Compositional Form, Some Contemporary Composers of Khayal Write Notations of the bandishes learnt in various ragas

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III	**Unit-III:** The chhota Khayal Improvisation in Khayal: Elements of Raga Vistaar, The Eight Limbs of Ashtanga of Khayal and the nature of Tabla accompaniment., A Typical Khayal Presentation, Raga Profiles as Captured in Bandish Gharanas of Hindustan Music - Introduction The Harmonium as a solo and accompanying instrument.
IV	**Unit-IV:** Acquaint Dhrupad: style and structure, alaap, compositional forms, song texts The Enchanting World of Thumri.

8.IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources

9. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Music Contexts: A Concise Dictionary of Hindustani Music	Ashok Rimade,	Bibliophile South Asia, 2006
2	Keywords and Concepts Hindustani Classical Music	Ashok Ranade	Promilla, 2012
3	Music In India: The Classical Traditions	Bonnie C. Wade,	Manohur, revised edition 2021
4	Gandharva Mahavidyalay books for music education	Akhil Bharatiya gandharva Mahavidyalaya	
4	Lost world of Hindustani Music	Kumar Prasad Mukherjee	Penguin India, 2006 Sources on the internet

10. LEARNING WEBSITE & PORTALS (minimum 5)

1. https://www.swarganga.org/
2. https:// www.parrikar.org
3 Hindustani music terminology - Wikipedia
4. https://mohannadkarni org

11. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Read part of Natya Shastra written by Bharat Muni, read books on Lives of Great Musicians, listen to great Musicians perform and particular Basic ragas taught in class.
2. Make a Project documentation and aesthetic presentation of ragas and Bandishes taught in class and its experience
3. Quiz on the material read heard and experienced
4. Assignment: Attend the Music festivals as well as intimate concerts to get the feel of contemporary classical musical scenario.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Radhika S. Patwardhan
2	Internal	Mrs. Neeta Kadukar
3	External	Rashmi Manjure
		Faculty at Vrindaban Gurukul, Mumbai

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