Government Polytechnic, Mumbai

Department of Computer Engineering

Semester III
(Course Contents)

For P-19 Curriculum

Programme   Diploma in Computer Engineering (Sandwich Pattern)

GOVERNMENT POLYTECHNIC MUMBAI

(Academically Autonoums Instititute, Government of Maharashtra)
Teaching and Examination Scheme (P19)
With effect from AY 2019-20

Programme: Diploma in Computer Engineering (Sandwich Pattern) **Term / Semester - III**

Course Code	Course Title	Teaching Hours/Contact Hours				Credits	Examination Scheme (Marks)						
							Theory			PR	OR	TW	Total
		L	P	TU	Total		TH	TS1	TS2				
IT19207	Microprocessor	3	2	--	5	5	60	20	20	25	--	25	**150**
CO19303	Programming in Java	3	4	--	7	7	60	20	20	50*	--	25	**175**
CO19304	Functional Programming in Python	2	2	--	4	4	--	--	--	50*	--	50	**100**
CO19305	Computer Networks	3	2	--	5	5	60	20	20	--	50*	--	**150**
CO19306	Database Management Systems	3	4	--	7	7	60	20	20	50*	--	25	**175**
CO19307	LaTex (Spoken Tutorial)	--	2		2	2#	--	--	--	--	--	--	--
	Total	**14**	**16**	**--**	**30**	**30**	**240**	**80**	**80**	**175**	**50**	**125**	**750**
	Student Centered Activity(SCA)				**05**								
	Total Contact Hours				**35**								

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment)

* Indicates assessment by External Examiner else internal practical skill test ,   # indicates Self, on- line learning Mode, @ indicates on line examination

Note: Duration of Examination--TS1&TS2 -1 hour, TH- 2 hours 30 minutes, PR/OR – 3 hours per batch, SCA- Library - 1 hour, Sports- 2 hours, Creative Activity-2 hours
Self, on- line learning Mode through MOOCs /Spoken Tutorials / NPTEL / SWAYAM / FOSSEE etc.

Department Coordinator,   Head of Department   In-Charge   Principal
Curriculum Development,   Dept. of Computer Engineering   Curriculum Development Cell
Dept. of Computer Engineering

Programme : **Diploma in Information Technology and Computer Engineering (Sandwich Pattern)**										
Course Code: **IT19207**				Course Title: **Microprocessor**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
3	**2**	**--**	**5**	**60**	**20**	**20**	**25**	**---**	**25**	**150**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test ,   # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term

Rationale:

Many people throughout the world use laptops, microcomputers, smart phones, digital assistant devices etc. All of these devices utilize a key component: a microprocessor. Microprocessor is brain of all these systems. 8086 is a 16-bit microprocessor. It is the base of all upward developed processors. It is more powerful and efficient computing machine. It overcomes all major limitations of the previous processors. It is able to get interfaced with 8-bit, 16-bit systems. This course covers architecture, signal descriptions and functioning of the 8086 microprocessor. It covers interfacing of memories and input-output devices with microprocessor. It also covers assembly language programming and at the end student will learn to design various microprocessor based systems. This will act as base for the advanced assembly language programming for next generation microprocessors.

Course Outcomes: Student should be able to

CO1	Explain architecture and signal description of 8086.
CO2	Describe the instructions and interrupts of 8086
CO3	Develop assembly language programs for 8086.
CO4	Draw timing diagrams for various instructions
CO5	Interface various memories and I/O devices to 8086 with assembly language programs for interfacing

Course Content Details:

Unit No	Topics / Sub-topics

1	**INTRODUCTION:**
	    1.1 Introduction to single board microcomputer
	        Block diagram of microcomputer
	        Elements of microcomputer
	        Different type of Buses: Address, data and control bus
	        Types of Programming Languages and their comparison.

	1.2 Evolution of microprocessor 1.3 Limitations of 8 bit microprocessor **Course Outcome: CO1** **Teaching Hours :2 hrs** **Marks: 4 (R- 2, U-2, A-0)**
2	**MICROPROCESSOR 8086:** 2.1 Features/Specifications of microprocessor 8086 2.2 Architecture of 8086 2.3 Register organization of 8086, concept of pipelining 2.4 Memory Segmentation, 20 bit physical address generation 2.5 Pin configuration and signal description of 8086 2.6 Minimum mode of 8086, address/data demultiplexing 2.7 Maximum mode of 8086 **Course Outcome: CO1** **Teaching Hours :8 hrs** **Marks: 14 (R- 6, U-8, A-0)**

3	**INSTRUCTION SET OF 8086:**
	3.1 Machine language instruction format
	3.2 Addressing modes of 8086
	3.3 Instruction set of 8086
	     3.3.1 Data transfer instructions
	     3.3.2 Arithmetic and logical instructions
	     3.3.3 Control transfer or branching instructions
	     3.3.4 String manipulation instructions
	     3.3.5 Processor control instructions
	     3.3.6 Bit manipulation instructions
	     3.3.7 Iteration control instructions
	3.4 Assembler Directives
	
	Course Outcome: CO2 **Teaching Hours :9 hrs** **Marks: 8 (R- 2, U-6, A-0)**

4	**ASSEMBLY LANGAUGE PROGRAMMING OF 8086:**
	4.1 Assembler
	     Elements of assembly language programming, Overview of assembly process, Single Pass assembler, Two pass assembler
	4.2 Linker and loader
	4.3 Opcode (machine code) generation **(no question in theory examination on this topic)**
	4.4 Assembly language programming of 8086
	     Addition, Subtraction, Multiplication, Division, Sum of series of numbers, Smallest and largest number from array, Sorting numbers in ascending and descending order, Block transfer etc.
	4.5 Concept of Procedure and Macros, Reentrant and Recursive procedure
	
	Course Outcome: CO3 **Teaching Hours :10 hrs** **Marks: 14 (R- 0, U-0, A-14)**

5	**TIMING DIAGRAMS AND INTERRUPTS** 5.1 Memory, I/O read and memory, I/O write timing diagram in Minimum mode 5.2 Memory, I/O read and memory, I/O write timing diagram in Maximum mode 5.3 Interrupts of 8086, hardware/software interrupts **Course Outcome: CO4, CO2 Teaching Hours :6 hrs Marks: 8 (R- 0, U-4, A-4)**
6	**MEMORY AND I/O INTERFACING** 6.1 Interfacing techniques: Memory mapped I/O, I/O mapped I/O 6.2 Address generation and decoding techniques 6.3 Interfacing of memories (RAM, ROM, EPROM) 6.4 Interfacing of 8255 6.5 Interfacing of I/O devices 　　LEDs, Seven segment display, ADC, DAC, Stepper motor. 　　(ALP for interfacing of above devices) **Course Outcome: CO5 Teaching Hours :10 hrs Marks: 12 (R- 0, U-0, A-12)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Introduction**	02	02		04
2	**Microprocessor 8086**	06	08		14
3	**Instruction set of 8086**	02	06		08
4	**Assembly language programming of 8086**			14	14
5	**Timing diagrams and interrupts**		04	04	08
6	**Memory and I/O interfacing**			12	12
	Total	**10**	**20**	**30**	**60**

Legends: R- Remember; U-Understand; A- Apply and above levels (Bloom's revised Taxonomy).

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

List of experiments: Total 10 experiments (or turns) out of 15 experiments (or turns)

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	2	CO1	Understand 8086 development board and simulation software	02
2	4	CO2 CO3	8086 Assembly language programming for Addition and subtraction of two 16 bit numbers	02
3	4	CO2 CO3	8086 Assembly language programming for Addition of series of 16 bit numbers	02

4	4	CO2 CO3	8086 Assembly language programming for multi byte addition of two numbers	02
5	4	CO2 CO3	8086 Assembly language programming for multiplication of two 16 bit signed and unsigned numbers	02
6	4	CO2 CO3	8086 Assembly language programming for division of two 16 bit signed and unsigned numbers	02
7	4	CO2 CO3	8086 Assembly language programming for arranging 16 bit numbers in ascending order.	02
8	4	CO2 CO3	8086 Assembly language programming for arranging 16 bit numbers in descending order.	02
9	4	CO2 CO3	8086 Assembly language programming for block transfer of 16 bit data.	02
10	6	CO4 CO5	Interface LEDs to 8086 and develop, simulate an assembly language program to get effect of dancing light.	02
11	6	CO4 CO5	Interface seven segment display to 8086 and develop, simulate an assembly language program to display numbers from 1 to 9 on it.	02
12	6	CO4 CO5	Interface stepper motor to 8086 and develop program to rotate motor in clockwise direction.	02
13	6	CO4 CO5	Develop and simulate assembly language program for Traffic controller.	02
14	6	CO4 CO5	Interface ADC to 8086 and write ALP for it.	02
15	6	CO4 CO5	Interface DAC to 8086 and write ALP to generate square and triangular waveforms.	02

Note: Experiments No. 1, 3, 6, 11, 12 and 15 are compulsory. Remaining 4 experiments should be performed as per the importance of the topic.

References/ Books:

Sr. No.	Book Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Advanced Microprocessor and Interfacing	Badri Ram, McGraw Hill Education; Error edition; July 2017	978-0070434486
2	8086 Microprocessor: Programming and Interfacing the PC	Kenneth Ayala, Delmar Cengage Learning; First edition , January 1995	978-0314012425
3	Advanced Microprocessor and Peripherals	A. K. Ray, K. M. Bhurchandi: Tata McGraw Hill Education, Third Edition 2013	978-1259006135
4	Microprocessor & interfacing (Programming & Hardware)	Douglas Hall; : Tata McGraw Hill Education, Second Edition 1992	978-0070257429

E-References:
1. www.tutorialspoint.com/microprocessor/microprocessor_8086_overview.htm
2. www.javatpoint.com/8086-microprocessor
3. www.geeksforgeeks.org/architecture-of-8086/
4. nptel.ac.in/courses/108/103/108103157/

CO Vs PO and CO Vs PSO Mapping (Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3								1	
CO2	3	2	3	1	1			1		
CO3	3	3	3	3	3		3	3	3	1
CO4	3	2	1					1		
CO5	3	3	3	3	3	3	3	3	3	2

CO Vs PO and CO Vs PSO Mapping (Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3								2	
CO2	3	2	3	1	1			1	2	
CO3	3	3	3	3	3		3	3	3	1
CO4	3	2	1					1	1	
CO5	3	3	3	3	3	3	3	3	3	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. Prathmesh Mhapsekar	Software Engineer	J. P. Morgan Chase & Co.
2	Mrs. Nagargoje	Lecturer in Electronics	Govt. Polytechnic Thane
3	Mr. Vijay Patil	Lecturer in Information Technology	Vidyalankar Polytechnic Mumbai
4	Dr. R. A. Patil (Curriculum Content Designer)	Lecturer in Electronics	Govt. Polytechnic Mumbai

Coordinator,   Head of Department

Curriculum Development,   Department of Information Technology

Department of Information Technology

I/C, Curriculum Development Cell   Principal

Programme : **Diploma in Computer Engineering and Information Technology (Sandwich Pattern)**										
Course Code: **CO19303**				Course Title: **Programming in Java**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 Mins)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
03	**04**	**--**	**07**	**60**	**20**	**20**	**50***	**--**	**25**	**175**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test ,   # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale:

After having sufficient command on structured and object oriented programming in C and C++, Computer Engineering students must learn programming in Java Programming language. Although Java language was developed two decades back, it occupies maximum share of technology in the market due to its continuous and adaptive evolution in the form of versions. Students should make the use of latest features in it such as Web and Mobile Application Development, for better quality of software. In this course, emphasis is given on latest and stable features of Java such as Interfaces, Generics, Lambdas, Collections Framework, Exception Handling, File Handling, I/O, Javadocs, etc. This course is based on the features of Java 8 and above.

Course Outcomes: Student should be able to

CO1	Develop programmes using basic data types, flow control and arrays in Java
CO2	Understand Java classes, interfaces and packages
CO3	Use Generics and Lambda Expressions
CO4	Develop high quality software using Collections Framework and Stream API
CO5	Handle Exceptions, Files and I/O
CO6	Develop Javadocs for their software

Course Content Details:

Unit No	Topics / Sub-topics
1	**Data Types, Flow Control and Arrays** 1.1 public static void main(String[] args) 1.2 Data Types 1.2.1 Primitive Types and Strings

	1.2.2 Literals, Variables and Assignments
	1.2.3 Blocks and Variable Scope
	1.2.4 Java Operators
	1.3 Flow Control
	1.3.1 Using if and switch Statements
	1.3.2 Using for loop and for each loop
	1.3.3 Using while loop and do while loop
	1.3.4 Using break and continue
	1.3.5 Using Labelled Statements
	1.4 Arrays
	1.4.1 Defining and Using Arrays
	1.4.2 Multidimensional Arrays
	Course Outcome: CO1 **Teaching Hours : 8 hrs** **Marks: 10 (R- 2, U-4, A-4)**
2	**Classes, Interfaces and Packages** 2.1 Defining a Class 2.2 Defining and Using Member Fields 2.3 Constructors and Instantiation 2.4 Defining and Invoking Member Methods 2.5 Inheriting Members from Another Class (superclass) 2.6 Defining and Implementing Interfaces 2.7 Overriding and Overloading methods 2.8 Static Fields and Static Methods 2.9 Defining a Package 2.10 Import Declarations 2.11 Access Control **Course Outcome: CO2** **Teaching Hours : 8 hrs** **Marks: 10 (R- 2, U-4, A-4)**
3	**Generics** 3.1 Generic Classes and Interfaces 3.2 Type Parameters vs Type Arguments 3.3 Generic Methods 3.4 Bounded Generics **Course Outcome: CO3** **Teaching Hours : 5 hrs** **Marks: 6 (R- 2, U-4, A-0)**
4	**Lambda Expressions** 4.1 Nested Classes and Inner Classes 4.2 Anonymous Inner Classes 4.3 Default Methods and Functional Interfaces 4.4 Introduction to Lambda Expressions 4.5 Passing Lambda Expressions as Arguments 4.6 Predefined Functional Interfaces

	Course Outcome: CO3 **Teaching Hours : 5 hrs** **Marks: 6 (R- 2, U-4, A-0)**	

5	**Collections Framework and Stream API**
	
	5.1 Implementing equals, hashcode and toString methods
	5.2 The Comparable interface and Comparator interface
	5.3 The Collection interface, List interface, Map interface
	5.4 Using Lists: ArrayList and LinkedList classes
	5.5 Using Maps: HashMap and TreeMap classes
	5.6 Stream API
	    5.6.1 Retrieving a Stream from a Collection
	    5.6.2 Filtering Streams using filter method
	    5.6.3 Mapping Streams using map method
	    5.6.4 Collecting Streams into Collections using collect method
	    5.6.5 Reducing Streams to values using reduce method
	    5.6.6 Using forEach method	

	Course Outcome: CO4 **Teaching Hours : 10 hrs** **Marks: 16(R- 0, U-4, A-12)**	

6	**Exceptions, Files and I/O**
	
	6.1 Handling Exceptions
	    6.1.1 Catching an Exception Using try and catch
	    6.1.2 Using finally
	    6.1.3 Propagating Uncaught Exceptions using throws
	    6.1.4 Defining Exceptions
	    6.1.5 Throwing Exceptions using throw
	    6.1.6 Try with resources
	6.2 File Handling
	    6.2.1 Creating a Path
	    6.2.2 Creating Files and Directories
	    6.2.3 Using FileWriter and FileReader
	    6.2.4 Automatically Closing Files
	    6.2.5 Copying, Moving, and Deleting Files
	6.3 I/O
	    6.3.1 InputStream abstract class and implementations
	    6.3.2 OutputStream abstract class and implementations
	    6.3.3 System.in and System.out
	    6.3.4 The java.util.Scanner Class	

	Course Outcome: CO5 **Teaching Hours : 6 hrs** **Marks: 8 (R- 0, U-2, A-6)**	
7	**Javadocs and JVM** 7.1 Introduction to Javadocs 7.2 Overview of JVM 7.3 Using the javac and java Commands 7.4 Garbage Collection	

	7.5 Java Version History and Changes in Each Version till the Latest
	Course Outcome: CO6 **Teaching Hours : 3 hrs** **Marks: 4 (R- 2, U-2, A-0)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Data Types, Flow Control and Arrays	2	4	4	10
2	Classes, Interfaces and Packages	2	4	4	10
3	Generics	2	4	0	6
4	Lambda Expressions	2	4	0	6
5	Collections Framework and Stream API	0	4	12	16
6	Exceptions, Files and I/O	0	2	6	8
7	Javadocs and JVM	2	2	0	4
	Total	10	24	26	60

List of experiments:

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	CO1	**Getting started with Java Application Development using IDE** 1.1 Check whether latest version of java (at least JDK 1.8)is installed or not. If not then download and install it. 1.2 Download and install the IntelliJ IDEA Community Edition/ NetBeans IDE 8.1/ Eclipse Neon or later version of IDE 1.3 Create a Java Project/ Application in the IDE 1.4 Create a Java class Person containing two variables name and yearOfBirth of appropriate data types, take inputs from the command line argument, a method to display the name and age of the person. 1.5 Save the project and run it. 1.6 Explore all the features (the menu and shortcuts) of the IDE. Learn about their use.	2
2	1	CO1	2.1 Write a program to print "Hello World". 2.2 Write a program to print addition of two integers. 2.3 Write a program to convert a numeric string into int. 2.4 Write a program to print addition of two integers input from command line arguments.	16

Programming in Java (CO19303)   *(Approved Copy)*   *(P19 Scheme)*

			2.5 Write a program to take two integers from command line, subtract the smaller number from the greater and print the result. 2.6 Write a program to take n integers from command line and print their sum of product (product of first number and last number added to product of second number and second last number and so on). 2.7 Consider any two integers. Write a program to print sum of their squares. 2.8 Write a program to find square root of a given positive integer using Heron's method to find square root. 2.9 Write a program to sort and print the names of students taken from command line in alphabetical order. 2.10 Write a program to print total numbers of vowels and consonants in a given string. 2.11 Given two English words, write a program to check if the first word is anagram of the second word. (An anagram is a word or phrase formed by rearranging the letters of a different word or phrase, typically using all the original letters exactly once. (Example: Anagram of TOM MARVOLO RIDDLE is I AM LORD VOLDEMORT.) 2.12 Write a program to print a missing number in a sorted integer array. 2.13 Write a program to find all the pairs of numbers on an integer array whose sum is equal to a given number.	
3	2	CO2	3.1 Define the following classes/ interfaces with the help of above shortcuts: 1. Person(id, name, dateOfBirth, age, street, city, pin : default and parameterized constructors and setters and getters) 2. Department(id, name, dateOfEstablishment, headOfficeLocation, headId, numberOfEmployees : default and parameterized constructors and setters and getters) 3. Point(x, y, z : default and parameterized constructors and setters and getters) 4. Vehicle(registrationNumber, rcBookNumber, manufacturer, numberOfWheels, vehicleType, model, numberOfSeats : default and parameterized constructors and setters and getters) 5. Laptop(imeiNumber, processorName, processorSpeed, primaryMemoryType, primaryMemoryCapacity, secondaryStorageType, secondaryStorageCapaciry, screenResolution, screenType, isLED, listOfPorts, osInstalled : default and parameterized constructors and setters and getters) 6. interface Taxable(public int cost(), public intpercentGST()) 3.2 Check whether feature of Encapsulation has been followed in 3.1. If not make necessary changes. 3.3 Define classes Car, Train and Truck with necessary member fields, constructors and methods. Make them extend class Vehicle.	14

			3.4 Define a class Gadget with necessary member fields, constrictors and methods. Modify the class Laptop to extend the class Gadget. 3.5 In main method, declare a reference variable vehicle of class Vehicle and create an object of class Car which will be referenced by vehicle. Call getName() method on the object. (Hint: Reference Variable Casting) 3.6 Modify the classes Vehicle and Gadget implement the interface Taxable. Hence override respective methods. 3.7 Modify the classes Car and Laptop to override the implemented methods in 3.6. 3.8 Modify the class Gadget to add a data member gadgetCount such that its value will incremented as soon as a new object is initialized. Create 5 objects of the class Print its value after initializing each object.	
3	2, 3	CO2	4.1 Create a package com.gpm.complex. Create an interface Complex in it with following member methods: realPart(), imgPart(), magnitude() and argument() along with default methods plus(), minus(), into() and divideBy() having appropriate parameters and return types. 4.2 In the same package create class CartesianComplex with real and img and class PolarComplex with r and theta as their member fields. Make the classes implement the Complex interface. Override all non-default methods in the interface. Also override toString(). 4.3 Now in main(), create one objects of both the classes defined in 4.2 and print their addition and multiplication. 4.4 Create a Java swing frame by creating a subclass of javax.swing.JFrame class. Add a java.awt.event.MouseListener by passing an object of an anonymous subclass of java.awt.event.MouseAdapter on the JFrame. Display the coordinates of point at which mouse is clicked.	6

5	5	CO3, CO4	Using Stream API implement following programs.
			5.1 Write a generic method to count the number of elements in a collection that have a specific property (for example, odd integers, prime numbers, palindromes).
			5.2 Write a method which takes a list of words as an argument, groups the words by their lengths and returns the groupings in the form of Map<Integer, List<String>>. (The keys in the map are the lengths and the values are the lists of words of that length.)
			5.3 Given a List<List<String>> write a program to convert it into a List<String>. (Hint: Use flatMap method in Stream interface)
			5.4 Given:
			class Album{
			     public final String name;
			     public final int yearOfRelease;
			     public final List<String> tracks;
				14

Page 6

			``
			}
			class Track{
			        public final int rating;
			}
			``
			a) Write a method which takes a list of albums as an argument and returns a list of names of all albums sorted by the year of release.
			b) Write a method which takes a list of albums as an argument and returns a list of names of all albums containing at least one track having rating more than four. The returned list should be sorted by the year of release.	

6	6	CO3, CO5	6.1 Create a csv file which will contain 10 integers in a spreadsheet. Read the file using class java.util.Scanner and display the sum of the numbers in the file.
			6.2 Write a Java program to create, read and modify a file.
			6.3 Create two objects of class Path viz., source and target. Perform the following operations
			    a. Create a file at source
			    b. Copy a file from source to target
			    c. Move a file from source to target
			    d. Delete a file from source
			    e. Retrieve information about source and target.
				6

9	7	CO6	Generate complete Javadocs for any two of the above experiments.	2
			Total	**60**

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Java™ The Complete Reference Ninth Edition or Later Edition	Herbert Schildt, Oracle Press, 2014	978-0-07-180856-9
2	Java SE 8 for the Really Impatient, 1/e	Horstmann, Pearson Education India; 1 edition (2014)	9332539081 978-9332539082
3	Java 8 in Action, First Edition	Raoul-Gabriel Urma, Mario Fusco, Alan Mycroft, Dreamtech Press, 2014	9351197433 978-9351197430

E-References:
1. https://docs.oracle.com/en/java/javase/14/
2. http://www.angelikalanger.com/
3. http://www.angelikalanger.com/GenericsFAQ/JavaGenericsFAQ.html#TOC
4. http://www.angelikalanger.com/Lambdas/TOC.html
5. https://docs.oracle.com/en/java/javase/14/books.html
6. https://docs.oracle.com/en/java/javase/14/language/java-language-changes.html#GUID-B06D7006-D9F4-42F8-AD21-BF861747EDCF
7. https://docs.oracle.com/javase/tutorial/collections/interfaces/list.html
8. https://docs.oracle.com/javase/tutorial/collections/interfaces/map.html

CO Vs PO and CO Vs PSO Mapping (Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	1	-	1	3	1	2	2
CO2	1	3	3	2	-	3	3	2	2	3
CO3	1	3	3	2	-	3	3	3	3	3
CO4	-	3	3	2	1	3	3	3	3	3
CO5	-	3	3	2	1	3	3	3	3	3
CO6	3	3	3	1	-	1	3	1	1	2

CO Vs PO and CO Vs PSO Mapping (Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	1	-	1	3	1	2	2
CO2	1	3	3	2	-	3	3	2	2	3
CO3	1	3	3	2	-	3	3	3	2	3
CO4	-	3	3	2	1	3	3	3	2	3
CO5	-	3	3	2	1	3	3	3	2	3
CO6	3	3	3	1	-	1	3	1	-	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Ms. Varshali Cholake-Landge	Senior Software Engineer	Volkswagen IT Services India Pvt. Ltd.
3	Ms. Rupali Komatwar	Lecturer in Computer Engineering	Government Polytechnic Arvi
2	Mr. Mohan Khedkar	Lecturer in IT	Government Polytechnic, Nashik
4	Ms. Jijnasa S. Patil (Curriculum Content Designer)	Lecturer in Computer Engineering	Government Polytechnic Mumbai

Coordinator,   Head of Department

Curriculum Development,   Department of Computer Engineering

Department of Computer Engineering

I/C, Curriculum Development Cell   Principal

Programming in Java (CO19303)   *(Approved Copy)*   *(P19 Scheme)*

Programme : **Diploma in Computer Engineering (Sandwich Pattern)**		
Course Code:**CO19304**	Course Title: **Functional Programming in Python**	
Compulsory / Optional: **Compulsory**		

Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 Mins)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
02	**02**	**--**	**04**	**--**	**--**	**--**	**50***	**--**	**50**	**100**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test ,   # indicates Self, on- line learning Mode, @ indicates on line examination

Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term.

Rationale:

Python is interpreted, high level programming language. It supports multiple programming paradigms. Python uses dynamic typing and a combination of reference counting and a cycle-detecting garbage collector for memory management. Python is the leading language of many data scientists. Due to its power and simplicity, Python has become the scripting language of choice for many large organizations, including Google.

Course Outcomes: Student should be able to

CO1	Install & understand the working of IDE.
CO2	Understand various operators, looping in Python.
CO3	Develop functions & apply them in Python.
CO4	Performvarious operations in data structures using Python.
CO5	Perform File Handling operations.

Course Content Details:

Uni t No	Topics / Sub-topics
1	**Introduction and syntax of Python Programming**
	1.1 Features: Open source, Interactive, Object-oriented, Platform independent etc. Installation &working of IDE.
	1.2 Python building blocks: Identifiers, Indentation, Comments, Variables.
	1.3 Running simple Python script to display "Welcome" message.
	1.4 Data Types: Numbers, String, Tuples, List, Dictionary and declaration of data types.
	Course Outcome: CO1Teaching Hours :04

2	**Python Operators & Control flow statements** 2.1: Arithmetic, Comparison(Relational), Assignment, Logical, Bitwise, Membership, Identity Operators & Python operator precedence. 2.2: Decision making: if, else if. 2.3 Looping: while loop, for loop, nested lops. Loop manipulation using continue, pass, break etc. **Course Outcome: CO2 Teaching Hours:06**	

3	**Python Functions, Modules & Packages.**
	3.1 Functions: Use of built-in functions, data conversion functions, math functions.
	    User defined functions: Function definition, function calling, parameter passing, return statement. Scope of variables: Global & Local variables.
	3.2Modules: Writing modules, importing modules, Importing objects from modules, python built-
	   in modules, namespace & scoping.
	3.3 Python packages: Introduction, writing python packages, user defined packages.
	Course Outcome: CO3 Teaching Hours :08	

4	**Data Structures in Python.** 4.1 Lists:Basic List operations(defining lists, accessing values in list, deleting & updating list etc), built-in functions. 4.2Tuples & Sets. 4.3 Dictionaries, basic dictionary operations. built-in dictionary operations. **Course Outcome: CO4 Teaching Hours :06**	
5	**Exception Handling and File I/O Handling.** 5.1 Exception Handling: Introduction, try:except statement, raise statement. User denied exceptions. 5.2 I/O operations: Reading keyboard input, Printing on screen. 5.3 File Handling: Opening file in different modes, accessing file contents, reading & writing into files, renaming & deleting files, file & directory related standard functions. **Course Outcome: CO5 Teaching Hours :06**	

List of experiments:Total 10-12 experiments(or turns) out of 15-16 experiments(or turns)

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	CO1	Install & configure Python IDE	02
2	2	CO2	Write a simple Python program using Operators	02
3	3	CO3	Write a Python program to demonstrate math built-in functions (any two)	02

4	4	CO4	Write a Python program to perform following operations on list:
			  a) Create
			  b) Access
			  c) Update
				02

			d) Delete	
5	5	CO5	Write a program in Python to use try except statement.	02
6	1	CO1	Study various application domains of Python along with its features.	02
7	2	CO2	Write a Python program to demonstrate the use of if and if else.	02
8	3	CO3	Develop a user defined Python function to demonstrate the use of parameterized function & value return functions.	02
9	4	CO4	Write a Python program to perform following operations on Tuples: a) Create b) Access c) Update d) Delete	02
10	5	CO5	Write a Python program to read keyboard input & print it to the screen.	02
11	1	CO1	Write a Python program to display a message on the screen.	02
12	2	CO2	Write a Python program to demonstrate the use of looping statements.	02
13	3	CO3	Write a Python program to demonstrate the use of built-in packages & user defined packages.	02
14	4	CO4	Write a Python program to perform operations on Sets.	02
15	5	CO5	Write a program in Python to extract data from csv /txt	02
		Total		**30**

Note: Experiments No. 1 to 5 (or 6) are compulsory and should   map all units and Cos.Remaining experiments are to be performed as per importanceof the topic.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Python Programming	Rao, K. Nageshwara, Shaikh Akbar, Scitech Publications(India) Pvt. Ltd.	ISBN: 9789385983450
2	Learning Python	Lutz, Mark, O'Reilly Publication, 5th Edition.	ISBN-13: 978-1449355739
3	Head First Python	Paul, Barry, O'Reilly Publication, 2nd Edition.	ISBN: 1491919531
4	Python Essential Reference	Beazley, David, Addison-Wesley Professional, 4th Edition.	ISBN: 9780672329784

E-References:
1. https://www.tutorialspoint.com/python/index.html
2. https://www.w3schools.com/python/default.asp
3. nptel.ac.in/courses/117106113/34
4. http://spoken-tutorial.org/

Functional Programming in Python (CO19304)   (Approved Copy)   (P19 Scheme)

CO VsPO and CO Vs PSOMapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	2	2	3	2	2
CO2	2	2	2	2	2	2	2	3	2	2
CO3	3	3	3	3	2	2	2	3	2	2
CO4	3	3	3	2	2	2	2	3	2	2
CO5	3	3	3	2	2	2	2	3	2	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. Atul Mairale	HOD	KVMIT Malad Polytechnic
2	Ms. Amruta Chalke	Business Analyst	Elegant Microweb Technologies Pvt Ltd
3	Ms. Pooja S. Chame	Lecturer	Govt. Polytechnic Mumbai

Coordinator,   Head of Department

Curriculum Development,   Department of Computer Engineering

Department of Computer Engineering

I/C, Curriculum Development Cell   Principal

Programme: **Diploma in Computer Engineering and Information Technology (Sandwich Pattern)**										
Course Code:**CO19305**				Course Title: **Computer Networks**						
Compulsory / Optional: **Compulsory**										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 Mins)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
3	**2**	**--**	**5**	**60**	**20**	**20**	**--**	**50***	**--**	**150**

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale: In today's age of Technology many applications send information from one place to another place. Computer network organizes this information in such a way that it can be sent anywhere over wide geographical area and output remote information at a push of button. This indicates the type of networks used. Here we study basic concept of networking, its applications, topologies, network devices, protocol used, OSI reference model, TCP/IP model, IP addressing and various types of the communication protocols.

Course Outcomes: Student should be able to

CO1	Classify types of Computer Networks.
CO2	Classify different transmission medias and switching techniques.
CO3	Identify network devices and describe their functions.
CO4	Compare and explain OSI reference and TCP/IP models
CO5	Explain functions of various protocols in TCP/IP model.
CO6	Configure Wired and Wireless LAN.

Course Content Details:

Unit No	Topics / Sub-topics
1	**Basics of Computer Network** 1.1Introduction to Computer Network: Definition of Computer network, sharing information, sharing resources, file sharing. 1.2 Categories of Network: Based on scope - LAN, MAN, WAN .Based on Connection - Peer to Peer network, Client- Server Network, Centralized network, Distributed network. 1.3 Network Architecture:-Features and Applications 1.4 Applications and Benefits of Computer Network. **Course Outcome: CO1Teaching Hours :06 hrs Marks:08(R- 2, U-4, A-2)**
2	**Transmission Media and Switching** 2.1 Communication Media : Guided Transmission Media :Twisted pair cable,Coaxial cable,Fibre optic cable.2.2 Unguided Transmission Media : Radio waves,Microwaves,Infrared,Satellite. 2.3 Line-of-Sight Transmission : Point to point ,Broadcast. 2.4 Multiplexing: Frequency Division Multiplexing,Time division Multiplexing.

	2.5 Switching : Circuit Switched networks, Packet Switched Networks.
	Course Outcome:CO2Teaching Hours :04 hrs Marks: 08(R- 2 , U- 4 ,A-2)
3	**Network Topologies and Devices** 3.1 Network Topologies : Introduction, Definition,Selection Criteria,Types of Topologies – Bus,Ring,Star,Mesh,Tree,Hybrid. 3.2 Network Connecting Devices: NIC (Network Interface Card),Hub,Switch,Router,Repeater,Bridge,Gateway,Modem,Wireless infrastructure Components. **Course Outcome:CO3Teaching Hours : 04 hrsMarks: 06 (R- 2 , U- 4)**
4	**Network Reference Models** 4.1 OSI Reference Model : Layered Architecture ,Peer-to-Peer Processes,Interfaces between layers,Protocols,Organization of layers,Functions and features of each layer. 4.2 TCP/IP Model : Layered Architecture,Organization of layers,Functions and features of each layer. 4.3 Comparisionbetween OSI Model and TCP/IP Model. **Course Outcome:CO4Teaching Hours :12 Marks: 14 (R-4 , U- 6 , A-4)**
5	**TCP/IP Protocols** 5.1Network Access/Link layer protocols :Ethernet, Token Ring,, Network access to Internet layer Mapping: ARP and RARP protocol 5.2 Internet Layer: IP Protocol, IP Address, Classful and Classless Addressing, IPV4 and IPV6 protocol.DHCP Protocol,Network Address Translation(NAT) protocol, ICMP protocol. 5.3 Transport Layer : Connection Oriented and Connection less service,TCP and UDP protocol. 5.4 Application Layer Protocols : HTTP,HTTPS,SMTP ,SNMP,TELNET,DNS and FTP protocol. **Course Outcome:CO5Teaching Hours :12 Marks: 14 (R- 4 , U- 6 , A- 4)**
6	**Wired and Wireless LAN** 6.1 Wired LAN : Ethernet,Fast Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet,Ethernet IEEE standard 802.3,Bridged Ethernet,Switched Ethernet ,Full Duplex Ethernet. 6.2 Multiple Access Random Access : ALOHA,CSMA,CSMA/CD,CSMA/CA 6.3 Wireless LANs : wireless communication system, Bluetooth Architecture,Bluetooth layers connecting LANs , Wi-Fi Architecture ,Wi-Fi connecting LAN, Introduction to Li-Fi. **Course Outcome:CO6Teaching Hours :07 Marks: 10 (R-2 , U- 4 , A- 4)**

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Basics of Computer Network	2	4	2	8
2	Transmission Media and Switching	2	4	2	8
3	Network Topologies and Devices	2	4	--	6
4	Network Reference Models	4	6	4	14
5	TCP/IP Protocols	4	6	4	14
6	Wired and Wireless LAN	2	4	4	10
	Total	**16**	**28**	**16**	**60**

List of experiments:

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1,3	CO1,CO3	Identify components of Network and study Local Area Network in your Lab.	2
2	2	CO2	Draw network layout and type of topology used for computer lab networking.	2
3	2	CO2	Create network cable by crimping the straight and cross CAT 5 cables and test it using CableTester	2
4	3	CO3	Install Network Interface card and locate MAC address of computer.	2
5	6	CO6	Connect computers in Network using given topology with wired media	2
6	6	CO6	Connect computers using Wireless Media	2
7	3	CO1,CO3	Sharing files , folders and Printer in a Network.	2
9	3	CO1,CO3	Connect your system to the Internet.	2
10	5	CO5	Configure Static and dynamic IP addresses	2
11	6	CO6	Install and Configure Wireless LAN using Wi-fi and configure hotspot.	2
12	5	CO5	Execute basic Networking commands : Ping,ipconfig,tracert,netstat,route.	2
13	5	CO5	Install Wireshark and configure as Packet Sniffer.	2
14	1,3,5	CO1,CO3, CO5	Identify and troubleshoot the problem in any non functioning LAN.	2
15	All	All	Arrange Industrial visit to observe Networking and Resource sharing.	---
16	All	All	Mini Project to be completed by group of 3 or 4 students	4
Total				**30**

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Data Communication and Networking	Behrouz , Forouzan TMH 1999	ISBN-13: 978-0073376226
2	Computer Networks	Tanenbaum Fourth edition	**ISBN** 13: 9780132126953
3	Computer Networking: A Top-Down Approach (6th Edition)	Kurose and Ross	**ISBN**-13: 978-8131790540
4	Data Communication and Networking	Godbole Achyut	**ISBN**-13: 978-0071077705

E-References:
1. https://ndl.iitkgp.ac.in/   2.www.tutorialspoint.com
3. www.nptel.com4. www.udemy.com
5.www.netacad.com

Computer Networks(CO19305)   *(Approved Copy)*   *(P19 Scheme)*

CO VsPO and CO Vs PSO Mapping (Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	2	1	1	1	2	3	2	2
CO2	3	1	2	2	2	2	2	3	2	2
CO3	2	1	2	2	2	2	2	3	2	2
CO4	3	3	3	2	2	2	2	3	3	3
CO5	3	3	3	3	2	2	2	3	3	3
CO6	2	3	3	2	2	2	2	3	2	3

CO VsPO and CO Vs PSO Mapping (Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	2	1	1	1	2	2	1	1
CO2	3	1	2	2	2	2	2	3	2	2
CO3	2	1	2	2	2	2	2	3	2	2
CO4	3	3	3	2	2	2	2	3	3	3
CO5	3	3	3	3	2	2	2	3	3	3
CO6	2	3	3	2	2	2	2	3	2	3

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr.Hemant Vachhaney	Service Delivery Manager	Intertec Software Ltd.
2	Ms. Dipali Sapkal	Lecturer	Govt. Polytechnic Thane
3	Mrs. Neha Vachani	Lecturer	Govt. Polytechnic Mumbai

Coordinator,   Head of Department

Curriculum Development,   Department of Computer Engineering

Department of Computer Engineering

I/C, Curriculum Development Cell   Principal

Programme : **Diploma in Computer Engineering and Information Technology (Sandwich Pattern)**	
Course Code:**CO19306**	Course Title: **Database Management Systems**
Compulsory / Optional: **Compulsory**	

Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs30 Min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
3	4	--	7	60	20	20	50*	--	25	175

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale: Database management system creates, stores, manages a large amount of data which can be used by different software application. In comparison to file processing systems, use of this system increases efficiency of business operations and reduces overall costs. For Developing and managing efficient and effective database applicationsit requires understanding the fundamentals of database management systems, techniques for the design of databases, and principles of database administration. The course focuses on the fundamentals of database management systems and the recent developments.

Course Outcomes:Student should be able to

CO1	Describe fundamental concepts of database.
CO2	Create, manage Database using SQL commands ,Apply different constraints on database
CO3	Develop databases using Entity Relationship modelling approach.
CO4	Apply data normalization and techniques on database
CO5	Maintain transaction processing in Database System.
CO6	Write PL/SQL code for database , create functions and procedures ,apply triggers on database .

Course Content Details:

Unit No	Topics / Sub-topics
1	**Database System Concepts** 1.1 An Introduction to Database: Data, Database, Database Management Systems, advantages of DBMS over file processing system, Applications of DBMS 1.2 Data abstraction, Data dictionary, Instance and schema, 1.3 Data independence-Logical and Physical Independence 1.4 Components of a DBMS and overall structure of a DBMS , Database Users, functions of Database Administrator . 1.5 Data Modeling: Relational , Hierarchical ,Network **Course Outcome: CO1Teaching Hours :6 hrs Marks: 10(R- 4, U-4, A-2)**

Database Management System (CO19306)   (Approved Copy)   (P19 Scheme)

2	**Relational Data Model**
	2.1 .Basic Concepts of Relational Model- Domain, Attributes, Tuples and Relations
	2.2 2.2Codd's rules of RDBMS
	2.3 Structured Query Language: Data types in SQL ,DDL, DML ,TCL,DCL.
	2.4 Clauses in SQL: Where, Having ,Group by, Order by clauses
	2.5 Functions in SQL: Date functions, Time functions, String functions, Aggregate functions
	2.6 Concept of Nested Query
	2.7 Concept of Join: Equi ,Non-equi ,outer ,self join
	2.8 Views Creating , updating , Dropping Views.
	2.9 Key Concepts-Super Key, Candidate Key, Primary Key, Foreign Key.
	2.10 Integrity Constraints- constraints on a single relation, not null constraint, unique constraint, check constraint, Primary key constraint, Foreign Key constraint.
	2.11 Authorization
	2.12 Fundamental Relational Algebra Operations: Select , Project ,
	2.13 Composition of Relational operations: Union ,Set Difference , Cartesian Product Rename .
	Course Outcome: CO2Teaching Hours :12 hrs Marks: 14(R- 4, U-4, A-6)
3	**Database Design Using E-R Model**
	3.1 Data Modeling Using the E-R Model: Entity ,Entity Sets-Weak Strong Entity Set
	3.2 Relationship sets, Attributes, Types of attribute ,Mapping Cardinalities,Shortcomings of ER Model.
	3.3 Enhanced ER (EER) model: Subclass, super class, Specializationand Generalization
	3.4 Case studies: Bank, library, education, organization, hotel management, hospital management.
	Course Outcome: CO3Teaching Hours :5hrs Marks: 06(R- 2, U-4, A-)
4	**Normalization**
	4.1 Normalization , Data redundancy and updating anomalies
	4.2 Normalization based on Functional dependencies and Multi-valued Dependencies.
	4.3 Normal Forms : 1NF, 2NF, 3NF,BCNF
	Course Outcome: CO4 Teaching Hours :6 hrs Marks: 10(R- 4, U-4, A-2)
5	**Transaction Processing**
	5.1 Transaction concept: Transaction properties(ACID), Transaction states
	5.2 Concurrent Execution of Transactions.
	5.3 Schedule : Serial ,Concurrent ,Cascade less Schedule .
	5.4 Lock based protocols- Locks, Granting of locks, Lock Based Protocol,
	Course Outcome: CO5Teaching Hours : 8hrs Marks: 10(R- 4, U-4, A-2)
6	**PL/SQL Programming**
	6.1 Introduction of PL/SQL, Advantages of PL/SQL, The PL/SQL Block Structure , PL/SQL execution environment , PL/SQL data types,Variables,Constants.
	6.2 Control Structure: Conditional Control, IterativeControl ,Sequential Control.
	6.3 Exception Handling :Predefined Exception ,User Defined Exception.

	6.4 Cursor:Implicit and Explicit Cursors,Declaring,Opening and Closing a Cursor, Fetching a record from Cursor, Cursor for loops, parameterized Cursor.
	6.5 Functions: Advantage, Creating ,Executing and Deleting a Functions.
	6.6 Stored Procedures: Advantage, Creating ,Executing and Deleting a Stored Procedures.
	6.7 Database Triggers: Use Of Database Triggers ,How to apply database Triggers, Types of Triggers, Syntax for creating Trigger, Deleting Trigger.
Course Outcome: CO6 Teaching Hours :8 hrs Marks: 10(R- 4, U-4, A-2)	

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Database System Concepts	4	4	2	10
2	Relational Data Model	4	4	6	14
3	Database Design Using E-R Model	2	4		06
4	Normalization	4	4	2	10
5	Transaction Processing	4	4	2	10
6	PL/SQL Programming	4	4	2	10
	Total	22	24	14	60

List of Experiments:Total 10-12 experiments(or turns) out of 15-16 experiments(or turns)

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	CO1	Install any open source database Product like My SQL.	2
2	2	CO2	Create a New Database And Perform Following operations on that Database.a)Create table b)Alter the table c)Rename Table, d)Insert values in that table e)Update the table f) Delete the contents of the table, g)Drop the table,	4
3	2	CO2	Create a table and apply following clauses on it: Where , Having ,Group by, Order by clauses.	4
4	2	CO2	Implement the following Functions in SQL a) Date functions b) Time functions c) String functions d) Aggregate functions. Implementation of all types of Joins.	6
5	2	CO2	Write SQL code for creating of View Perform Insert ,Modify, Delete records through view, Delete the View. Working with Nested -Query.	4
6	2	CO2	Implementation of DCL commands: Grant, Revoke Implementation of TCL commands :Commit, Rollback, Savepoint.	4
7	2	CO2	Create table and Apply constraints such as NOT NULL, UNIQUE, Check, Default, Primary key ,Foreign key, on the table.	4
8	2	CO4	Implementation of 1NF and 2NF.	4
9	2	CO5	Case study Transaction, Scheduling.	4

10	6	CO6	Write a PL/SQL programs using if then else, for, while, nested loop.	4
11	6	CO6	Write a PL/SQL code to implement implicit and explicit cursors.	4
12	6	CO6	Write a PL/SQL programs based on Exception Handling (Predefined and User-defined Exceptions).	4
13	6	CO6	Write a PL/SQL code create Procedures and Functions.	4
14	6	CO6	Write a PL/SQL programs to create triggers on given database.	4
15	6	CO3	Case Study on ER Model And EER Model	4
		Total		**60**

Note: Experiments No. 1 to 15 are compulsory and should   map all units and Cos.Remaining experiments are to be performed as per importanceof the topic.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Database System concepts	Abraham Silberschtz, Henry Korth& S. Sudarshan, Tata McGraw Hill International	9789332901384
2	Fundamentals of Database Systems"	Elmasri and Navathe Pearson Education	9780136086208 .
3	Database Management Systems	Gupta G. K. McGraw Hill Education, New Delhi 2013,	978-07-107273-1
4	PL/SQL	IvanBayross BPB publication	9788176566919

E-References:
1. https://www.w3schools.com/ 2.www. google.com
3. https://www.youtube.com/watch?v=IoL9Ve2SRwQ&list=PLIwC9bZ0rmjSkm1VRJROX4vP2YMIf4Ebh

CO Vs PO and CO Vs PSO Mapping(Computer Engineering)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	3	1	3	3	2	3	3
CO2	2	2	3	3	1	3	2	2	3	2
CO3	2	3	3	2	-	2	2	2	2	2
CO4	2	3	2	3	2	3	3	2	3	3
CO5	1	2	3	3	2	3	3	2	3	3
CO6	2	2	3	3	2	3	3	2	1	3

CO Vs PO and CO Vs PSO Mapping(Information Technology)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	3	3	2	3	3
CO2	2	2	3	3	1	3	2	2	3	2
CO3	2	3	3	2	2	2	2	2	2	2
CO4	2	3	2	3	2	3	3	2	3	3
CO5	1	2	3	3	2	3	3	2	2	3
CO6	2	2	3	3	2	3	3	2	2	3

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. Vaibhav Vasani	Assistant Professor	k J. Somaiya Engg College
2	Mr. Shubham Shimpi	Analyst	Course5i
3	Mrs. Vandana S.Lokhande	Lecturer	Govt. Polytechnic Mumbai

Coordinator,   Head of Department

Curriculum Development,   Department of Computer Engineering

Department of Computer Engineering

I/C, Curriculum Development Cell   Principal