Government Polytechnic, Mumbai

Department of Computer Engineering

Semester III

(Course Contents)

For P-23 Curriculum

Programme: Diploma in Computer Engineering

(Sandwich Pattern)

Government Polytechnic, Mumbai
(Academically Atonoums Institute, Government of Maharashtra)
Programme: Diploma in Computer Engineering (Sandwich Pattern)

Teaching and examination Scheme (P23) — **With Effect From Academic Year : 2023-24**

Duration Of Programme : 6 Semester — **Duration : 16 WEEKS**

Semester : Third — **Scheme : (P23)**

Sr No	Course Code	Course Title	Course Type	Total IKS Hrs for Sem	Learning Scheme					Credits	Assesment Scheme														
					Actual Contact Hrs/Week			Self Learning(TW + Assignment)	Notional Lerning Hrs / Week		Paper Duration (hrs.)	Theory					Based on LL & TL Practical						Based on Self Learning		Total Marks
												FA-TH	FA-TH	SA-TH	Total		FA-PR		SA-PR			SLA		
												T1	T2						Max						
					CL	TL	LL					Max	Max	Max	Max	Min	Max	Min	PR	OR	Min	Max	Min	
1	CO23502	Digital Techniques and Microprocessor	DSC	–	3	–	2	1	6	3	2.30	20	20	60	100	40	25	10	–	–	–	25	10	150
2	CO23105	Programming in Java	DSC	–	3	–	4	1	8	4	2.30	20	20	60	100	40	25	10	25#	–	10	25	10	175
3	CO23106	Programing with Python	DSC	–	2	–	4	–	6	3	–	–	–	–	–	–	50	20	50#	–	20	–	–	100
4	CO23107	Computer Networks	DSC	–	3	–	2	1	6	3	2.30	20	20	60	100	40	25	10	–	25#	10	25	10	175
5	CO23108	Database Management Systems	DSC	–	3	–	4	1	8	4	2.30	20	20	60	100	40	25	10	25#	–	10	25	10	175
6	CO23603	Client side Scripting	SEC	–	2	–	2	–	4	2	–	–	–	–	–	–	50	20	50#	–	20	–	–	100
7	UV23302	Universal Human Values-II	VEC	–	–	–	–	2	2	1	–	–	–	–	–	–	–	–	–	–	–	50	20	50
		Total		–	**16**	–	**18**	**6**	**40**	**20**					**400**		**200**		**200**			**150**		**925**

Abbreviations : CL-Classroom Learning, TL-Tutorial Learning, LL- Laboratory Learning, FA-Formative Assessment, SA-Summative Assessment, IKS-Indian Knowledge System, SLA-Self Learning Assessment

Legends :@ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note : 1. FA-TH represents two class tests of 20 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 candidate shall be declared as fail & will have to repeat & resubmit SLA work.

4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.*16 Weeks

5. 1 credit is equivalent to 30 Notional hrs. 6. *Self learning hours shall not be reflected in the TimeTable.

Course Category : Discipline Specific CourseCore(DSC): 5, Discipline Specific Elective (DSE):0,Value Education Course(VEC):1, Intern./Apprenti./Project./ Community(INP):0, Ability Enhancement Course (AEC) : 0, Skill Enhancement Course (SEC) : 1, Interdisciplinary Elective (IE) : 0

Department Coordinator, Curriculum Development, Dept. of Computer Engineering

Head of Department, Dept. of Computer Engineering

In-Charge, Curriculum Development Cell

Principal, Government Poly. Mumbai

Programme : Diploma in Computer Engineering (Sandwich Pattern)													
Course Code: CO23502					**Course Title : Digital Techniques and Microprocessor**								
Compulsory / Optional: Compulsory													
Learning Scheme and Credits						**Assessment Scheme**							
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**		**SA-TH (2.30Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
						T1	**T1**			**PR**	**OR**		
03	---	02	01	6	3	20	20	60	25	-		25	150

Total IKS Hrs. for course: 0

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination

Note:

1. FA-TH represents two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale

The foundation for working of computer and its peripherals are based on electronics. Circuits used in computer and its peripherals utilize electrical energy for their operations. The course has been designed to give fundamental knowledge of electrical and electronics circuits. It will develop skills in students to understand simple electrical and electronic components and circuits, so that they will be able to handle computer hardware and its peripherals.

II. Industry / Employer Expected Outcome

Student will be able to

1. Apply digital techniques and use microprocessors.

III. Course Outcomes:

Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Perform binary arithmetic, Understand different logic gates, their symbols, truth tables and pin configuration
CO2	Simplify Boolean expressions using Boolean laws, K map and realize them using logic Gates.
CO3	Design various combinational and sequential circuits.
CO4	Explain architecture and signal description of 8086.
CO5	Describe the instructions and interrupts of 8086.
CO6	Develop assembly language programs for 8086.

Course Content Details:

Unit No.	Theory Learning Outcomes(TLO's) aligned to CO's.	Topics / Sub-topics
1	**TLO 1.1** Understand the rules of binary addition and subtraction. **TLO 1.2** Understand the concept of complement if binary numbers. **TLO 1.3** Perform binary subtraction using 2's complement method. **TLO 1.4** Learn the signed and unsigned binary numbers. **TLO 1.5** With the concept of parity, find the parity of a number. **TLO 1.6** Understand and draw the symbols and truth table and logical expressions of AND, OR, NOT gates. **TLO 1.7** Understand and draw the symbols and truth table and logical expressions of EX-OR, EX-NOR gates. **TLO 1.8** Understand and draw the symbols and truth table and logical expressions of NAND and NOR gates and derive all gates using universal gates.	**Binary Arithmetic and Logic Gates** 1.1 Rules for Binary addition and subtraction 1.2 Concept of 1's and 2's complement of a binary number 1.3 Binary subtraction using 2's complement 1.4 Signed and unsigned binary numbers 1.5 Parity, Definition of even and odd parity 1.6 Basic Gates (AND, OR, NOT): circuit of basic gates using discrete components, symbol, truth table, logical expression 1.7 Derived gates (EX-OR, EX-NOR): symbol, truth table and logical expression 1.8 Universal gates (NAND, NOR) : symbol, truth table and logical expression, deriving all gates using universal gates **Course Outcome: CO1** **Teaching Hours :06** **Marks: 08**
2	**TLO 2.1.** Learn the Boolean laws and De Morgan's theorems. **TLO 2.2.** Using Boolean laws and De Morgan's theorems. **TLO2.3** Construct logic circuits using logic gates for boolean expressions. **TLO 2.4.** Understand the concept of sum of prducts and products of sum along with minterms and maxterms. **TLO 2.5** Draw the k-map of lgical functions.	**Boolean Algebra** 2.1 Boolean laws, De Morgan's theorems. 2.2 Simplification of Boolean expression using Boolean laws and De Morgan's theorems. 2.3 Construction of logic circuits using logic gates for Boolean expression 2.4 Concept of SOP & POS, Minterm & Maxterm 2.5 Karnaugh map (K-map) representation of logic function 2.6 Simplification of K-map for 2, 3 and 4 variables with don't

	TLO 2.6 Simplify k-map sums of 2,3 or 4 variables along with don't care condition, **TLO 2.7** Using logic gates reduces the expressions.	care condition 2.7 Realization of reduced expression using logic gates. **Course Outcom: CO2** **Teaching Hours :08hrs** **Marks: 10**
3	**TLO 3.1** Design half adder and full adder using k-maps and draw its realization using gates. **TLO 3.2** Design half subtractor and full subtractor using k-maps and draw its realization using gates. **TLO 3.3** Understand the need of multiplexing and demultiplexing, learn the types of multiplexer 2:1,4:1,8:1 and 16:1. **TLO 3.4** Learn the types demultiplexer 1:2, 1:4, 1:8 and 1:16. **TLO 3.5** Compare combinational and sequential circuits. **TLO 3.6** Understand the concept of flip flops. **TLO 3.7** Learn the types of ffs with its symbol, truth table and operations.	**Combinational And Logical Circuits** 3.1 Design of Half adder and full adder using K-map and realization using gates. 3.2 Design of Half subtractor and full subtractor using k-map and realization using gates. 3.3 Multiplexer: Necessity of multiplexing, Principle of multiplexing, types of multiplexing 2:1, 4:1, 8:1 and 16:1, multiplexer tree 3.4 De-multiplexer: Necessity of de-multiplexing, Principle of de-multiplexing, types of de-multiplexing 1:2, 1:4, 1:8 and 1:16, de-multiplexer tree. 3.5 Difference between combinational and sequential circuits 3.6 Basic concept of Flip-flop 3.7 Types of flip flop: SR, JK, D and T flip flops, circuit of SR FF using transistors. Truth table, symbol and operation of all FFs **Course Outcome : CO3** **Teaching Hours :10hrs** **Marks: 12**

4	**TLO 4.1** Understand the limitations of 8085 and need of 8086 **TLO 4.2** Understand the features of 8086. **TLO 4.3** Draw and explain the working of blocks of 8086. **TLO 4.4** Understand the function of each register and its organization. **TLO 4.5** Draw the pin diagram and understand the function of pins in 808**6.** **TLO 4.6** Draw the explain minimum mode of 8086 with its timing diagram. **TLO 4.7** Draw the explain maximum mode of 8086 with its timing diagram.	**Introduction to 8086** 4.1 Limitations of 8 bit microprocessor 4.2 Features/Specifications of microprocessor 8086 4.3 Architecture of 8086 4.4 Register organization of 8086, concept of pipelining 4.5 Pin configuration and signal description of 8086 4.6 Minimum mode of 8086, address/data de-multiplexing 4.7 Maximum mode of 8086 **Course Outcome : CO4** **Teaching Hours :8hrs** **Marks: 10**
5	**TLO 5.1** Understand the machine language format. **TLO 5.2** Understand the addressing modes of 8086. **TLO 5.3** Understand the instructions of 8086. **TLO 5.3.1** Understand the function of data transfer instructions. **TLO 5.3.2** Understand the function of arithmetic and logical instructions. **TLO 5.3.3** Understand the function of control transfer or branching instructions. **TLO 5.3.4** Understand the function of string manipulation instructions. **TLO 5.3.5** Understand the function of processor control instructions. **TLO 5.3.6** Understand the function of bit manipulation instructions. **TLO.5.3.7** Understand the function of iteration control instructions.	**Instruction Set Of 8086** 5.1 Machine language instruction format. 5.2 Addressing modes of 8086 5.3 Instruction set of 8086 5.3.1 Data transfer instructions 5.3.2 Arithmetic and logical instructions 5.3.3 Control transfer or branching instructions 5.3.4 String manipulation instructions 5.3.5 Processor control instructions 5.3.6 Bit manipulation instructions 5.3.7 Iteration control instructions **Course Outcome : CO5** **Teaching Hours :8hrs** **Marks: 10**

6	**TLO 6.1** Learn the elements of ALP and. **TLO 6.2** Understand the concept of linker and loader. **TLO 6.3** Understand the concept of linker and loader. **TLO 6.4** Write the codes of given topics along with input and output data.	**ASSEMBLY LANGAUGE PROGRAMMING OF 8086** 6.1 Assembler Elements of assembly language programming, Overview of assembly process, Single Pass assembler, Two pass assembler 6.2 Linker and loader 6.3 Op-code (machine code) generation (no question in theory examination on this topic) 6.4 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. **Course Outcome: CO6** **Teaching Hours: 08hrs.** **Marks: 10**

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Practical / Tutorial / LaboratoryLearning Outcome (LLO)	Laboratory Experiment / PracticalTitles / Tutorial Titles	Number of hrs.	Relevant COs
1	LLO: 1. Using ICs verify truth tables of basic gates and draw them.	To verify Truth Table of basic gates AND, OR, NOT using ICS.	02	CO1
2	LLO: 1. For given expressions draw the truth table and verify it.	To implement given Boolean expression using logic gates.	02	CO2
3	LLO: 1. Using ICs verify the truth table of given gates and draw them.	To verify Truth Table of NAND, NOR, Ex-OR, Ex-NOR gates using ICS.	02	CO1
4	LLO: 1 Design half adder and half subtractor and draw the truth table and verify it.	To construct Half Adder and Half subtractor & verify the Truth	02	CO3
5	LLO: 1. Design the circuit of De Morgan's theorems and verify them.	To verify De Morgan's theorems	02	CO2
6	LLO: 1. Design full subtractor and draw the truth table and verify it.	To construct Full subtractor & verify the Truth table	02	CO3
7	LLO: 1. Write the alp for addition and subtraction and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for Addition and subtraction of two 16 bit numbers	02	CO6

8	LLO: 1. Write the alp for addition of series of numbers and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for Addition of series of16 bit numbers.	02	CO6
9	LLO: 1 Write the alp for multiplication and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for multiplication of two 16 bit signed and unsigned numbers	02	CO6
10	LLO: 1. Write the alp for division and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for division of two 16 bit signed and unsigned numbers	02	CO6
11	LLO: 1. Write the alp for arranging numbers in ascending order and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for arranging 16 bit numbers in ascending order.	02	CO6
12	LLO: 1. Write the alp for arranging numbers in descending order and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for arranging 16 bit numbers in descending order.	02	CO6
13	LLO: 1. Write the alp for block transfer and execute it 2. Write the input data, output data and flags generated.	8086 Assembly language programming for block transfer of 16 bit data.	02	CO6

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Make a poster showing various representations of number system.
2. Make a poster showing various semiconductors devices.
3. Make a poster showing types of Rectifiers.

VI. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Binary Arithmetic And Logic Gates	04	04	--	08
2	Boolean Algebra	02	04	04	10
3	Combinational And Logical Circuits	04	04	04	12
4	Introduction to 8086	02	04	04	10
5	Instruction Set Of 8086	--	04	06	10
6	Assembly language programming of 8086	--	04	06	10
	Total	**12**	**24**	**24**	**60**

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment based on practical performance indicators and self-learning assessment.

Summative Assessment (Assessment of Learning)

End term examination, practical performance.

VIII. Suggested Cos – Pos Matrix Form

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO-3
CO1	1			2			1		1	
CO2	1			2			1	2		
CO3	2			2	1				2	
CO4	2			3	1		2		3	1
CO5	2			3					3	1
CO6	2			3	1			2	3	1

Legends: - High:03, Medium:02, Low:01, No Mapping: --

IX. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Modern Digital Electronics	R. P. Jain, Tata McGraw Hill, Education, Fourth Edition, 2009	978-0070669116
2	Digital Principles and Applications	Malvino A. P. and Leach, Tata McGraw Hill, Education, Seventh Edition, 2011	978-0070141704
3	8086 Microprocessor: Programming and Interfacing the PC	Kenneth Ayala, Delmar Cengage Learning; First edition , January 1995	978-0314012425
4	Microprocessor & interfacing (Programming & Hardware)	Douglas Hall; : Tata McGraw Hill Education, Second Edition 1992	978-0070257429

X. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://www.vlab.co.in/	
2	https://www.electricaltechnology.org/#google_vignette	
3	www.tutorialspoint.com/microprocessor/microprocessor_8086_overview.htm	
4	www.geeksforgeeks.org/architecture-of-8086/	
5	nptel.ac.in/courses/108/103/108103157/	

XI. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Prof. P. S. Sadafule	Lecturer in Computer Engineering	Govt Polytechnic Mumbai
2	Mrs. Leena Bharmbe	Lecturer in Electronics Engineering(Visiting)	Govt Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Computer Engineering

Head of Department
Department of Computer Engineering

I/C, Curriculum Development Cell
Government Polytechnic, Mumbai

Principal
Government Polytechnic, Mumbai

Programme : Diploma in Computer Engineering (Sandwich Pattern)													
Course Code: CO23105					**Course Title : Programming in JAVA**								
Compulsory / Optional: Compulsory													
Teaching Scheme and Credits						**Examination Scheme**							
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**		**SA-TH (2.30 Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
						T1	**T2**			**PR**	**OR**		
3	---	04	1	8	4	20	20	60	25	25#	--	25	175

Total IKS Hrs. for course: 0

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination

Note:

1. FA-TH represents two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end term examination.

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

II. Industry / Employer Expected Outcome

Student will be able to

1. Demonstrate program on three pillars of OOP
2. Develop mini projects using database connection.

III. Course Outcomes:

Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Implement program using data types, control flow statements and arrays in Java.
CO2	Implement encapsulation in Java.
CO3	Implement reusability, extensibility concept and import, create packages.
CO4	Demonstrate multithreaded program and handle runtime exception.
CO5	Establish connection between database and java program.

IV. Course Content Details:

Unit No.	Teaching Learning Outcome	Topics / Sub-topics
1	**TLO 1.1.** Develop Java Program using Data Types. **TLO 1.2.** Develop Java Program using operators. **TLO 1.3.** Develop Java Program using Control Flow Statements. **TLO 1.4.** Develop Java Program using arrays in java.	**Basics of Java** 1.1 History, Features of Java Programming. 1.2 public static void main(String[] args) 1.3 Data Types 1.2.1 Primitive Types and Strings 1.2.2 Literals, Variables and Assignments 1.2.3 Blocks and Variable Scope 1.4 Operators in Java. 1.5 Control Flow Statements 1.5.1 Using if and switch Statements. 1.5.2 Using for loop and for each loop. 1.5.3 Using while loop and do while loop. 1.5.4 Using break and continue. 1.5.5 Using Labeled Statements. 1.6 Arrays 1.6.1 Defining and Using Arrays 1.6.2 Multidimensional Arrays **Course Outcome: CO1 Marks:08 Teaching Hours: 6 hrs.**

2	**TLO 2.1.** Create class and object for given application. **TLO 2.2** Demonstrate method overloading in program. **TLO 2.3.** Develop Java programs using constructor. **TLO 2.4** Use various string functions in program. **TLO 2.5** Develop programs using Vectors in java. **TLO 2.6** Use wrapper classes in java.	**Classes and Wrapper Classes** 2.1 Declare and Define classes, define member function of a class. Create instance/object of class. 2.2 Command line arguments, garbage collector, Object as function arguments, Method overloading. 2.3 Constructor and their types, constructor overloading, this keyword. 2.4 Strings class, string constructors. String functions: string length, concatenation, comparison. 2.5 Vectors and its methods. 2.6 Wrapper classes: Number: Double, Float, Byte, Short, Integer, Long. **Course Outcome: CO2 Marks: 10 Teaching Hours: 8 hrs.**
3	**TLO 3.1.** Identify the use of inheritance. **TLO 3.2.** Apply appropriate type of inheritance in given program. **TLO 3.3.** Demonstrate multiple inheritances using interface. **TLO 3.4** Make use of built in packages in java. **TLO 3.5** Create and use user defined packages in java.	**Inheritance and packages** 3.1 Inheritance: Need of inheritance, creating subclasses, Use of super keyword, types: single inheritance, Multilevel inheritance, Multiple Inheritance, hierarchical Inheritance, hybrid inheritance. 3.2 Method overriding, final keyword, finalize method, abstract method & class. 3.3 Interface: Defining interface, Extending interface, implementing interface, Accessing interface variable. 3.4 Packages: introduction to all build in packages. 3.5 Creating user defined packages, sub packages, accessing packages, adding classes and interfaces to a package, Using user defined packages & sub-packages. **Course Outcome: CO3 Marks: 14 Teaching Hours: 7 hrs.**

4	**TLO 4.1.** Identify exceptions occurred in a program. **TLO 4.2.** Detect exception and handle that exception in a given application. **TLO 4.3.** Develop a thread for given program. **TLO 4.4** Handle thread exceptions in java.	**Exception handling and Multithreading** 4.1 Types of error, exception. 4.2 Exception handling mechanism using try-catch statements, throw, throws, finally. 4.3 Creating User defined exception classes in Java. 4.3 Thread, thread life cycle. 4.4 Creating thread: by extending thread class and implementing runnable class. 4.5 Stopping & blocking a thread, thread exception. 4.6 Thread priority, synchronization. **Course Outcome: CO4 Marks: 12 Teaching Hours: 8 hrs.**
5	**TLO 5.1.** Use input stream and output stream classes. **TLO 5.2.** Use character byte stream classes for writing and reading data. **TLO 5.3.** Identify components of JDBC. **TLO 5.4.** Design a code to connect to database using java.sql. Connection. **TLO 5.5.** Develop an application to read and write data from and to database using statement and result set classes.	**I/O Basics and JDBC** 5.1 I/O stream classes: Input stream classes, Output stream classes, Byte stream classes, and Character stream classes. 5.2. Other I/O stream classes: random access file, stream tokenizer. 5.3. Introduction to JDBC: JDBC Architecture, Common JDBC Components. JDBC Driver types. 5.4. Java.sql, Connection, Statement, and Result set, SqlException. **Course Outcome: CO5 Marks: 08 Teaching Hours: 08 hrs.**
6	**TLO 6.1** Select appropriate class for designing window. **TLO 6.2** Create an applet for given application. **TLO 6.3** Create frame for given application. **TLO 6.4** Draw different shapes using graphics function.	**Introduction to AWT** 6.1 Introduction to AWT package's classes and interfaces. 6.3 How applets & application are different. Applet life cycle, applet tag, creating Applets & parameters to applets. 6.4 Working with frame windows, creating a frame window in applet, display information within a window. 6.5 Creating Graphics & Colors: graphical class, lines, rectangle, circle & ellipse, drawing arc, drawing & fillings text & font, creating font objects, using color Objects. **Course Outcome: CO6 Marks: 08 Teaching Hours: 8 hrs.**

V. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr. No.	Laboratory Learning Outcome	Laboratory Experiment / Practical Titles / Tutorial Titles	Number Of hrs.	Relevant COs
1	**LLO 1.1**. Perform numerous operations using JAVA code. **LLO 1.2.** Understand Arrays used in JAVA.	Install JDK for java.	10	CO1
		Write a simple java program		
		Implement programs using arithmetic Operators for given problem.		
		Demonstrate programs using condition statements for given problems		
		Demonstrate program using 1D array for given problem		
		Demonstrate program using 2D array for Given problem.		
2	**LLO 2.1** Understand use of Encapsulation in JAVA.	Write Program To Create Instance & Class Variable and member function for given problem	10	CO2
		Implement program for method overloading.		
		Demonstrate constructor and its type for Given problem.		
		Write a java program to demonstrate use of Command Line Argument		
		Write a java program to demonstrate string Functions, vector data type.		
		Demonstrate a program for use of wrapper Classes in given problem.		
3	**LLO 3.1** Demonstrate the use of Inheritance.	Write a java program to demonstrate for inheritance and its types	14	CO3
		Write a java program Using Method Overriding		
		Write Program for multiple inheritances using interface.		
		Write Program to use built in packages in given Problem and write a program for creating user defined packages.		
4	**LLO 4.1**. Apply multithreading. **LLO 4.2.** implement use of Exceptional handling	Write a java program for implementing Multithreading using both methods.	8	CO4
		Write a java program to implement concept of Exceptional handling		

5	**LLO 5. 1.** Apply the use of I/O stream classes. **LLO 5. 2.** Connect and manipulate database.	Implement program for writing data from keyboard using I/O stream classes Write a program to select data from database and display selected data. Write a program to insert data in database and display inserted data.	10	CO5
6	**LLO 6.1.** Demonstrate the use of Applets.	Write a Simple Program On Applets. Write a java program Using Graphics To Draw, Fill, Use Color Create Small Application For frame Create Small Application using graphics in frame	8	CO6

VI. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Install IDE for java such as Net beans, eclipse
2. Develop program to create GUI for registration form.
3. Install any one database (My SQL, SQL server, Oracle) and develop login program.
4. Develop graphics program using.

VII. Specification Table:

Unit No.	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Basics of Java	2	4	2	8
2	Classes and Wrapper Classes	2	4	4	10
3	Inheritance and packages	2	4	8	14
4	Exception handling and Multithreading	2	4	6	12
5	I/O Basics and JDBC	2	2	4	08
6	Introduction to AWT	2	2	4	08
Total		12	20	28	60

VIII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- Rubrics for continuous assessment based on process and product related performance indicators (25 marks)

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance (25 marks)

IX. Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2	PSO- 3
CO1	3	--	--	1	2	1	3	3	2	3
CO2	3	2	3	3	2	2	3	3	3	3
CO3	3	2	3	3	2	2	3	3	3	3
CO4	2	2	3	3	2	2	3	3	2	3
CO5	2	3	3	1	-	3	2	3	2	3
CO6	2	3	3	1	-	3	2	3	2	3
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

X. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Patrick Naughton, Herbert Schildt	Complete reference for java	Tata McGraw Hill
2	E. Balagurusamy.	Programming with java	BPB
3	Keyur Shah	Java2 Programming	Tata McGraw Hill
4	John R.Hubbard	Programming with Java	Tata McGraw Hill

XI. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	**Creating a GUI using AWT** http://www.tutorialspoint.com/awt/	-
2	**JDBC Database Access** https://docs.oracle.com/javase/tutorial/jdbc/ https://www.tutorialspoint.com/jdbc/index.htm https://www.tutorialspoint.com/jdbc/jdbc_tutorial.pdf	

XII. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Atul Jadhav	Founder	9TH Legends Pvt, Ltd
2	Mr. Jayghosh Wankar	Associate Java Developer	Falabella Pvt. Ltd. Banglore
3	Ms. P. S. Sadafule	Lecturer in Computer Engineering	Government Polytechnic, Mumbai
4	Ms. A. V. Wankar	Lecturer in Computer Engineering	Government Polytechnic, Mumbai

Coordinator,
Curriculum Development,
Department of Computer Engineering

Head of Department
Department of Computer Engineering

I/C, Curriculum Development Cell
Government Polytechnic, Mumbai

Principal
Government Polytechnic, Mumbai

Programme: Diploma in Computer Engineering (Sandwich Pattern)												
Course Code: CO23106					**Course Title: Programming with Python**							
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits						**Examination Scheme**						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH (2.30Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
2	---	4	--	6	3	---	---	50	50#	--	--	100

Total IKS Hrs. for course: 0

Abbreviations: CL-Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

Note:

1. FA-TH represents two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end-term examination.

I. Rationale

In an era of the Data Age, Processing and analyzing large data has become a challenging task. Python is a powerful language for this. 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. It has an efficient, high-level data structure and a simple but effective approach to object-oriented programming. Its elegant syntax and dynamic typing together with its interpreted nature make it an ideal language for scripting and rapid application development in many areas and most platforms.

II. Industry / Employer Expected Outcome

Students will be able to

1. Use Python to design applications in various fields.

III. Course Outcomes:

Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Install and configure different programming platforms such as Command Line, PyCharm, Jupyter Notebook, Google Colab, etc. and execute simple program on it.
CO2	Develop Python programs using Control Flow Statements.
CO3	Perform operations on Data Structures in Python.
CO4	Develop Python programs using Functions, Modules, and Packages in Python.
CO5	Develop Python programs using an object-oriented programming approach.
CO6	Develop Python programs using file handling.

Course Content Details:

Unit No.	Teaching Learning Outcome	Topics / Sub-topics
1	**TLO 1.1.** Use basic concepts to display a message on the screen. **TLO 1.2.** Use operators in Python.	**Features and Basic Concepts of Python Programming** 1.1 Features of Python - Interactive, Object-oriented, Interpreted, platform-independent 1.2 Python building blocks - Identifiers, Keywords, Indention, Variables, Comments 1.3 Python environment setup – Installation and working of IDE 1.4 Running Simple Python scripts to display 'welcome' message. 1.5 Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types. 1.6 Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity Operators, Python Operator Precedence. **Course Outcome: CO1** **Teaching Hours: 04 hrs.**
2	**TLO 2.1.** Write a 'Python' program using a decision-making structure for two-way branching to solve the given problem. **TLO 2.2.** Write a 'Python' program using a decision-making structure for multi-way branching and looping to solve the given problem.	**Control Flow Statements** 2.1 Conditional Statements (if, if ... else, nested if) 2.2 Looping in Python (while loop, for loop, nested loops) 2.3 loop manipulation using continue, pass, break, else. **Course Outcome: CO2** **Teaching Hours: 04 hrs.**
3	**TLO 3.1** Write a Python program to use and manipulate lists for the given problem. **TLO 3.2** Write a Python program to use and manipulate Tuples for the given problem. **TLO 3.3** Write a Python program to use and manipulate Sets for the given problem. **TLO 3.4** Write a Python	**Data Structures in Python** 3.1 Lists: a) Definition, accessing values in lists, deleting values, and Updating lists. b) Basic List Operations c) Built-in List functions 3.2 Tuples: a) Accessing values in Tuples, deleting values in Tuples, and Updating Tuples. b) Basic Tuple operations. c) Built-in Tuple functions 3.3 Sets: a) Accessing values in Set, deleting values in Set and updating

	program to use and manipulate Dictionaries for the given problem. **TLO 3.5** Write a Python program to use and manipulate strings for the given problem.	Sets. b) Basic Set operations. c) Built-in Set functions 3.4 Dictionaries: a) Accessing values in Dictionary, deleting values in Dictionary, And updating Dictionary. b) Basic Dictionary operations. c) Built-in Dictionaries functions 3.5 Strings: a) Introduction: Indexing, slicing, Combining Strings, Iterating Strings, Format method. b) Methods of Strings: Length, Conversions, Casing Methods, and Is Alpha, Split, Strip, Join, Capitalize, Replace, Count and Find etc. **Course Outcome: CO3** **Teaching Hours: 06 hrs.**
4	**TLO 4.1** Use the Python standard functions for the given problem. **TLO 4.2** Develop relevant user-defined functions for the given problem using Python code. **TLO 4.3** Write a Python module for the given problem. **TLO 4.4** Write a Python package for the given problem.	**Python Functions, Modules & Packages.** 4.1 Functions: a) Use of built-in functions, data conversion functions, and Math functions. b)User-defined functions: Function definition, function Calling, parameter passing, return statement. c) Scope of variables: Global & Local variables. 4.2 Modules: Writing modules, importing modules, importing objects from modules, python built-in modules, namespace & Scoping. 4.3 Python packages: Introduction, using predefined Python Packages, writing user-defined packages. **Course Outcome: CO4** **Teaching Hours: 06 hrs.**
5	**TLO 5.1** Create classes and objects to solve the given problem. **TLO 5.2** Write a Python program using inheritance for the given problem. **TLO 5.3** Handle the given exceptions through the Python program.	**Object Oriented Programming:** 5.1 Creating Classes and Objects. 5.2 Constructors & Destructors in Python 5.3 Method Overloading and Overriding. 5.4 Inheritance 5.5 Exception Handling: Exception Handling: Introduction, Exception handling - 'try: except:' statement, 'raise' statement. 5.6 User-defined exceptions. **Course Outcome: CO5** **Teaching Hours: 06 hrs.**

6	**TLO 6.1** Write Python code for the given reading values from the keyboard. **TLO 6.2** Read data from the given file. **TLO 6.3** Write the given data to a file.	**File I/O Handling** 6.1 I/O Operations: Reading keyboard input, Printing to screen. 6.2 File Handling: Opening files in different modes, accessing file contents using standard library functions, Reading and writing files, closing a file, Renaming and deleting files, Directories in Python, File and directory-related standard functions. **Course Outcome: CO5** **Teaching Hours: 04 hrs.**

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr. No.	Laboratory Learning Outcome	Laboratory Experiment / Practical Titles / Tutorial Titles	No. of hrs.	Relevant COs
1	**LLO 1.1** Install different IDE platforms	Install and configure different programming platforms such as Command Line, PyCharm, Jupyter Notebook, Google Colab, etc. and execute simple programs on them.	4	CO1
2	**LLO 1.2** Develop simple Python programs using basic concepts.	Write Python programs to understand Expressions, Variables, operators, and Data Types (At least four Programs).	2	CO1
3	**LLO 2.1** Develop Python programs using decision-making statements.	Develop programs using decision-making statements (At least four programs).	2	CO2
4	**LLO 2.2** Develop Python programs using looping statements.	Develop programs using decision-making statements (At least four programs).	2	CO2
5	**LLO 2.2** Develop Python programs using looping statements for pattern printing.	Develop various pattern printing programs (At least five programs).	2	CO2
6	**LLO 3.1** Develop programs using a list data structure in Python.	Develop Python programs to use different methods to perform various operations on the list such as swapping two elements, adding an element, deleting an element, updating elements, accessing elements, finding length, copying a list, reversing a list, sorting elements of the list, counting occurrences of elements in a list, minimum element, maximum element, etc. (Min. four programs)	4	CO3
7	**LLO 3.2** Develop programs using a tuple data structure in Python.	Develop Python programs to use different methods to perform various operations on the tuple such as finding length, accessing elements, updating elements, unpacking elements, finding	4	CO3

		repeated elements, minimum element, maximum element, etc. (Min. four programs)		
8	**LLO 3.3** Develop programs using a set data structure in Python.	Develop Python programs to use different methods of the set to perform various operations on the set such as finding length, accessing elements, updating elements, adding elements, finding repeated elements, minimum element, maximum element, union, intersection, set difference, etc. (Min. four programs)	4	CO3
9	**LLO 3.4** Develop programs using a dictionary data structure in Python.	Develop Python programs to use different methods of a dictionary to perform various operations on dictionaries such as finding length, accessing elements, adding an element/s, updating elements, searching key, finding value for the key, sorting elements, reversing elements, copying elements, etc. (Min. four programs)	4	CO3
10	**LLO 3.5** Develop programs using strings in Python.	Develop Python programs using different methods of strings in Python.	4	CO3
11	**LLO 4.1** Develop programs using functions in Python.	a) Write a Python program to demonstrate built-in functions (math, string, etc.) (Any 2 programs). b) Develop a user-defined Python function for a given problem: i) Function with a minimum of 2 arguments. ii) Function returning values	4	CO4
12	**LLO 4.2** Develop programs using modules in Python.	Write a Python program to demonstrate the use of: i) Built-in module (e.g. keyword, math, number, operator) ii) user-defined module.	4	CO4
13	**LLO 4.3** Develop programs using packages in Python.	Write a Python program to demonstrate the use of: i) built-in packages (e.g. NumPy, Pandas) ii) user-defined packages.	4	CO4
14	**LLO 5.1** Develop a program using classes and objects	Develop programs using the concept of classes and objects for the given problem.	2	CO5
15	**LLO 5.2** Write a program in Python to demonstrate the concept of method overloading and method overriding.	Write a program in Python to demonstrate the following operations: i) Method overloading ii) Method overriding	2	CO5
16	**LLO 5.3** Write a program in Python to demonstrate the	Write a program in Python to demonstrate the following operations:	4	CO5

	concept of inheritance.	i) Simple Inheritance ii) Multiple Inheritance		
17	**LLO 5.4** Write a program in Python to demonstrate the concept of exception handling.	Write a program in Python to handle user-defined exceptions for a given problem. (Minimum two programs)	4	CO5
18	**LLO 6.1** Develop programs using file-handling concepts in python.	Develop programs using file handling such as reading contents of files, writing to files, counting characters, words, lines, etc.	4	CO6

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Countdown timer.
2. Games in Python.
3. Notepad in Python.
4. QR code generator.
5. Bot applications in Python.
6. Desktop Notifier.
7. Netflix Data Analysis in Python.
8. IMDB rating.

VI. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- Rubrics for continuous assessment based on process and product-related performance indicators (25 marks)

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance (25 marks)

VII. Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2	PSO- 3
CO1	3	2	2	3	-	-	1	-	2	-
CO2	3	2	2	2	-	-	1	-	2	-
CO3	3	3	3	2	-	-	1	-	3	-
CO4	3	2	2	2	-	-	1	-	3	-
CO5	3	2	2	2	-	-	1	-	2	-
CO6	3	2	2	2	-	-	1	-	2	-

Legends: - High:03, Medium:02, Low:01, No Mapping: -

VIII. Suggested Learning Materials / Books

Sr. No.	Author	Title	Publisher
1	Martin C Brown	Python: The Complete Reference	McGraw Hill Publication
2	Yashavant Kanetkar	Let us Python	BPB publication.
3	Dr. R. Nageswara Rao 2017 Edition Dreamtech Press.	Core Python Programming	Dreamtech Press.
4	Mark Lutz, David Ascher, O'Reilly Publication	Learning Python	O'Reilly Publication
5	Beazley, David	Python Essential Reference	Addison-Wesley Professional, ISBN: 9780672329784
6	Paul, Barry	Head First Python	O'Reilly Publication

IX. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	Python Bootcamps: Learn Python Programming and Code Training | Udemy	Online course
2	Python Courses & Tutorials | Codecademy	Online course
3	Programming for Everybody (Getting Started with Python) Course by University of Michigan | Coursera	Online course

X. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Atul Jadhav	Founder	9th Legends Pvt., Ltd
2	Ms. Priyanka Khadtare	Developer	Nykaa Pvt. Ltd. Mumbai
3	Ms. A. V. Wankar	Lecturer in Computer Engineering	Government Polytechnic, Mumbai
4	Dr. Rupali M. Komatwar	Lecturer in Computer Engineering	Government Polytechnic, Mumbai

Coordinator,
Curriculum Development,
Department of Computer Engineering

Head of Department
Department of Computer Engineering

I/C, Curriculum Development Cell
Government Polytechnic, Mumbai

Principal
Government Polytechnic, Mumbai

Programme : Diploma in Computer Engineering (Sandwich Pattern)													
Course Code: CO23107					**Course Title : Computer Networks**								
Compulsory / Optional: Compulsory													
Teaching Scheme and Credits						**Examination Scheme**							
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**		**SA-TH (02.30 Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
						T1	**T2**			**PR**	**OR**		
03	--	02	01	06	03	20	20	60	25	--	25#	25	175

Total IKS Hrs. for course:

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination

Note:
1. FA-TH represents two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale

In this era of globalization almost everyone is connected to each other using computers, smart devices, gadgets and appliances.. Everyone wants remote access of their gadgets and appliances. This is possible using the networks which connect all these devices, gadgets and appliances. Students of Computer Engineering should know how these devices are connected to each other. They should also understand what are networking protocols addressing, Internet, wired and wireless networking, etc. The knowledge of TCP / IP Protocol Suite is also essential for them. This course tries to encapsulate all possible concepts of computer networking. Despite of the concepts of computer networking being very vast some concepts are covered in details and some are covered superficially. Considering the grasping level of students and limited time given to learn the course.

II. Industry / Employer Expected Outcome

Students will be able to

1. Understand the OSI and TCP/IP reference models of networking
2. Understand different layers in TCP/IP reference model.
3. Understand different networking protocols.
4. Solve problems regarding networking based on different protocol.

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	To understand the TCP/ IP Protocol Suite
CO2	To understand underlying wired and wireless technology of TCP/ IP Protocol Suite
CO3	To understand the network layer protocols of TCP/ IP Protocol Suite
CO4	To understand the transport layer protocols of TCP/ IP Protocol Suite
CO5	To understand the application layer protocols of TCP/ IP Protocol Suite

IV.Course Content Details:

Unit No.	Learning Outcome	Topics / Sub-topics
1	**Course Outcome:** CO 1 TLO1.1To Understand the today's Internet TLO1.2To Understand Protocol And Standards TLO1.3To understand Protocol Layers of TCP/ IP Protocol Suite TLO1.4Compare and Contrast TCP/IP Protocol Suite and OSI Model TLO1.5To Understand Physical, Logical, Port AND Application Specific Addresses	**The TCP / IP Protocol Suite** 1.1 The Internet Today, World Wide web 1.2 Protocols and Standards ,Standards Organizations 1.3 Protocol Layers: Hierarchy, Services 1.4 Reference Models: Introduction to OSI Reference Model and TCP/IP Protocol Suite: 1.5 Comparison between OSI and TCP/IP Protocol Suite, 1.6 Layers in TCP/IP Protocol Suite 1.7 Addressing: Physical Addresses, Logical Addresses, Port Addresses, Application-Specific Addresses **Course Outcome : CO1 Teaching Hours :04 hrs Marks: 06**
2	**Course Outcome:** CO 2 TLO2.1 To understand Ethernet Frame Format and Addressing TLO2.2 To understand types of Ethernet TLO2.3 To understand Fiber Optic LAN TLO2.4 To understand Wi-Fi technology 802.11 and its extensions TLO2.5 To understand MAC Sublayer and Addressing TLO2.6 To understand Bluetooth and Wi-Fi Direct	**Underlying Technologies** 2.1 Wired LANs 2.1.1 IEEE Standards (802.3) 2.1.2 Ethernet Frame Format 2.1.3 Addressing 2.1.4 Standard Ethernet, Fast Ethernet, Gigabit Ethernet, Ten-Gigabit Ethernet 2.1.5 Fiber Optic LAN 2.2 Wireless LANs 2.2.1 IEEE 802.11 (Wi-Fi) 2.2.2 Extensions of IEEE 802.11: b/a/g/n/ac/ax/be/bn 2.2.3 MAC Sublayer 2.2.4 Addressing 2.2.5 Bluetooth and Wi-Fi Direct **Course Outcome : CO2 Teaching Hours :04 hrs Marks: 06**

3	**Course Outcome**: CO 3 TLO3.1To understand connectionless and connection oriented services TLO3.2To understand network layer services TLO3.3To understand network layer issues TLO3.4To understand IPv4 Addressing TLO3.5To understand Classful and Classless Addressing TLO3.6To understand Special Addresses TLO3.7To understand NAT TLO3.8To understand IPv4 Protocol in details TLO3.9To understand ARP in brief TLO3.10 To understand Inter- and Intra-domain routing TLO3.11 To understand Unicasting, Multicasting and Broadcasting To understand multicast routing in brief	**Network Layer** 3.1 Introduction 3.1.1 Packet Switching at Network Layer: Connectionless Service, Connection-Oriented Service 3.1.2 Network Layer Services: 3.2 Network Layer Issues: 3.3 IPv4 Addresses 3.3.1 Address Space, Notation, Range of Addresses, Operations 3.3.2 Classful Addressing: Classes, Classes of Blocks, Two Level Addressing, Three Level Addressing: Subnetting, Supernetting 3.3.3 Classless Addressing: Variable Length Blocks, Two Level Addressing, Block Allocation, Subnetting 3.3.4 Special Addresses 3.4 Network Address Translation (NAT) 3.5 Internet Protocol Version 4 (IPv4): 3.5.1 Datagrams 3.5.2 Fragmentation: Maximum Transfer Unit (MTU), Fields related to Fragmentation 3.5.3 Options: Format, Option Types 3.5.4 Checksum: Calculation at Sender and Receiver, Checksum in the IP Packet 3.6 IPV6 Addressing and IPV6 protocol 3.7 Address Resolution Protocol (ARP): Introduction 3.8 Unicast Routing Protocols 3.8.1 Cost or Metric, Static versus Dynamic Routing Tables, Routing Protocol 3.8.2 Intra- and Inter-Domain Routing 3.8.3 Distance Vector Routing 3.9 Link State Routing 3.10 Multicast Addresses 3.11 Virtual Private Network (VPN) **Course Outcome : CO3 Teaching Hours :15 hrs Marks: 18**
4	**Course Outcome**: CO 4 TLO4.1To understand Transport Layer Services and Protocols TLO4.2To understand UDP Protocol in details TLO4.3To understand TCP Protocol in details TLO4.4To understand QUIC Protocol in brief	**Transport Layer** 4.1 Introduction to Transport Layer 4.1.1 Transport Layer Services 4.1.2 Transport Layer Protocols 4.2 User Datagram Protocol (UDP) 4.2.1 User Datagram 4.2.2 UDP Services: Process-To-Process Communication, Connectionless Services, Flow Control, Error Control, Congestion Control, Encapsulation and Decapsulation 4.3 Transmission Control Protocol (TCP) 4.3.1 TCP Services 4.3.2 TCP Features 4.3.3 Segment

		4.3.4 A TCP Connection 4.3.5 Windows in TCP 4.3.6 Flow Control 4.3.7 Error Control 4.3.8 Congestion Control 4.3.9 TCP Timers 4.3.10 Options 4.4 QUIC Protocol **Course Outcome : CO4 Teaching Hours :06 hrs Marks: 08**
5	**Course Outcome**: CO 5 TLO 5.1 To understand client server and peer-to-peer paradigms TLO 5.2 To understand world Wide Web in details TLO 5.3 To understand web documents TLO 5.4 To understand HTTP Protocol TLO 5.5 To understand HTTP versions TLO 5.6 To understand TLS, VPN, SSL, in brief TLO 5.7 To understand HTTPS To understand Digital Certificates Issuing Authorities	**HTTP and HTTPS** 5.1 Introduction to Application Layer 5.1.1 Client-Server Paradigm 5.1.2 Peer-To-Peer Paradigm 5.2 World Wide Web Architecture: Hypertext and Hypermedia, Web Client (Browser), Web Server, Uniform Resource Locator (URL) 5.3 Web Document: Static, Dynamic, Active Documents 5.4 HTTP: HTTP Transaction, Conditional Request, Persistence, Cookies, Web Caching (Proxy Server), HTTP Security 5.5 Versions of HTTP 5.5.1 HTTP1.0 and HTTP1.1 5.5.2 HTTP2 5.5.3 HTTP3 5.6 Overview of TLS, SSL, Websocket 5.7 HTTPS 5.8 Certificate Issuing Authority,: Let's encrypt (free), digicert, digisign, verisign 5.9 **Course Outcome : CO5 Teaching Hours :08 hrs Marks: 10**
6	**Course Outcome**: CO 5 TLO 6.1 To understand DHCP Protocol in details TLO 6.2 To understand DNS in details TLO 6.3 To perform remote login using TELNET and SSH TLO 6.4 To understand FTP in details TLO 6.5 To understand Electronic Mail TLO 6.6 To understand Packet Filter and Proxy Firewalls	**Other Application Layer Protocols** 6.1 Host Configuration: DHCP 6.1.1 Overview of Protocols: RARP, BOOTP, DHCP 6.1.2 Configuration: Static & Dynamic Address Allocation 6.2 Domain Name System (DNS): Need for DNS, Domain, Generic Domain, Country Domain, Registrar, Resolution: Mapping Names to Addresses, Mapping Addresses to Names 6.3 Introduction to Remote Login: 6.3.1 TELNET 6.3.2 Secured Shell (SSH) 6.4 File Transfer Protocol: FTP, TFTP, SFTP 6.4.1 FTP: Connection, File Transfer 6.4.2 Overview of TFTP and SFTP 6.5 Overview of Electronic Mail: User Agent, Message Transfer Agents (SMTP), Message Access Agent (POP, IMAP) 6.6 Firewalls: Packet Filter Firewall and Proxy Firewall **Course Outcome : CO5 Teaching Hours :09 hrs Marks: 12**

V. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Laboratory Learning Outcomes	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	LLO1 Download and install WireShark Network Traffic Analyzer and Cisco Packet Tracer Software.	Download and install WireShark Network Traffic Analyzer and Cisco Packet Tracer Software.	02	CO1
2	LLO2 Download and install GNS3 Software.	Download and install GNS3 Software.	02	CO1
3	LLO3 Check and setup network settings on a computer.	3.1 Check the Physical Address, Logical Address of a computer. 3.2 Check the manual proxy setup of a computer.	02	CO1
4	LLO4 Configure a wired LAN in Packet Tracer.	Configure a wired LAN in Packet Tracer.	02	CO2
5	LLO5 Configure a wireless LAN in Packet Tracer.	Configure a wireless LAN in Packet Tracer.	02	CO2
6	LLO6 Simulate the networking topology of the institute in Packet Tracer	Simulate the networking topology of the institute in Packet Tracer	02	CO2
7	LLO7 Assign the IP classful addresses to the the computing and networking devidces	Assign the IP classful addresses to the the computing and networking devidces simulated in previous experiment.	02	CO3
8	LLO8 Perform initial switch configuration in Packet Tracer. LLO9 Perform initial router configuration in Packet Tracer.	Perform initial switch configuration in Packet Tracer. Performinitial router configuration.	02	CO3
9	LLO10 Analyze the network traffic and capture the packets of IP, ARP, ICMP protocols and analyze them in Packet Tracer or Wireshark.	Analyze the network traffic and capture the packets of IP, ARP, ICMP protocols and analyze them in Packet Tracer or Wireshark.	02	CO3
10	LLO11 Analyze the network traffic and capture the packets of UDP, TCP, SCTP QUIC protocols and analyze them in Packet Tracer or Wireshark	Analyze the network traffic and capture the packets of UDP, TCP, SCTP QUIC protocols and analyze them in Packet Tracer or Wireshark	02	CO4
11	LLO12 Execute nslookup, traceroute/ tracert and netstat commands on command prompt / terminal	Execute nslookup, traceroute/ tracert and netstat commands on command prompt / terminal	02	CO4
12	LLO13 Download and install Caddy Server. Create a Caddy file and Perform the actions such as start, stop, restart the server, etc.	Download and install Caddy Server. Create a Caddy file and Perform the actions such as start, stop, restart the server, etc.	02	CO5

13	LLO14 Write a program to send emails.	Write a program to send emails.	02	CO5
14	LLO15 Perform remote login using TELNET and SSH. in Packet Tracer	Perform remote login using TELNET and SSH in Packet Tracer	02	CO5
15	LLO16 Create your own FTP server to download and upload files using FTP Protocol in Packet Tracer	Create your own FTP server to download and upload files using FTP Protocol in Packet Tracer	02	CO5

VI. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Market survey of networking devices
2. Numerical problems on Ethernet Frame format
3. Numerical Problems on IP Addressing
4. Numerical Problems on Header formats of given protocols
5. Explore Caddy Server
6. Create a proxy server
7. Create a VPN

VII. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	The TCP/ IP Protocol Suite	04	02	--	06
2	Underlying Technologies	02	04	--	06
3	Network Layer	02	06	10	18
4	Transport Layer	02	06	--	08
5	HTTP and HTTPS	--	04	06	10
6	Other Application Layer Protocols	02	04	06	12
	Total	**12**	**26**	**22**	**60**

VIII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- Rubrics for continuous assessment based on process and product related performance indicators(___ marks)

Summative Assessment (Assessment of Learning)

- End term examination, Viva-voce, Workshop performance (__marks)

IX. Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO - 1	PSO - 2	PSO - 3
CO1	03	03	01	03	01	--	03	03	03	03
CO2	03	03	01	03	01	--	03	03	03	03
CO3	03	03	03	03	--	02	03	03	03	03
CO4	03	03	03	03	--	02	03	03	03	03
CO5	03	03	03	03	--	03	03	03	03	03
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

X. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Behrouz A. Forouzan	The TCP/ IP Protocol Suite, Fourth Edition	McGraw-Hill Forouzan Networking Series
2	Andrew Taninbaum	Computer Networks, Sixth Edition	Pearson Education

XI. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	Wireshark · Download	Link to download WireShark Network Traffic Analyzer Software and its documentation
2	Cisco Packet Tracer - Networking Simulation Tool (netacad.com)	Link to download Cisco Packet Tracer Software and its documentation
3	GNS3 Windows Install | GNS3 Documentation	Link to download GNS3 Software and its documentation
4	Caddyfile Quick-start — Caddy Documentation (caddyserver.com)	Link to download Caddy Server and its documentation
5	Configuring LAN in Packet Tracer - CCNA TUTORIALS	Configure a wired LAN in Packer Tracer
6	https://www.computernetworkingnotes.com/ccna-study-guide/how-to-configure-wireless-network-in-packet-tracer.html	Configure a wireless LAN in Packer Tracer

XII. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Vivek Pawar	Director and CEO	Atoconn Systems Pvt. Ltd.
2	Prof. Nirmala Shinde-Baloorkar	Assistant Professor, Department of Computer Engineering	K. J. Somaiya College of Engineering
3	Mrs. Jijnasa S. Patil	Lecturer in Computer Engineering	Government Polytechnic, Mumbai

Coordinator,
Curriculum Development,
Department of Computer Engineering

Head of Department
Department of Computer Engineering

I/C, Curriculum Development Cell
Government Polytechnic, Mumbai

Principal
Government Polytechnic, Mumbai

Programme : Diploma in Computer Engineering													
Course Code: CO23108						**Course Title : Database Management system**							
Compulsory / Optional: Compulsory													
Teaching Scheme and Credits						**Examination Scheme**							
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**		**SA-TH (**2Hrs.30 Min**)**	**FA-PR**	**SA**		**SLA**	**Total**
						T1	**T2**			**PR**	**OR**		
3	--	4	1	8	4	20	20	60	25	25#	--	25	175

Abbreviations: CL- ClassRoom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination
Note:
1. FA-TH represents Total of two class tests of 20 marks each conducted during the term.
2. FA-PR represents Tutorial Term work of 25 Marks
3. SLA represents self learning Assessment of 25 Marks
4. SA-TH represents the end term examination of 60 Marks

I. Rationale

Database management system creates stores and manages a large amount of data which can be used by different software applications. 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 applications it 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.

II. Industry / Employer Expected Outcome

Engineers applying DBMS concepts should proficiently solve real-world problems, enhancing decision- making, design and innovation with precision and efficiency.

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning.

CO1	Describe fundamental concepts of database.
CO2	Design database using Entity Relationship modeling approach.
CO3	Design normalized database.
CO4	Create and manage Database using SQL commands and constraints.
CO5	Understand transaction processing in Database System.
CO6	Understand database backup and recovery techniques.
CO7	Write PL/SQL code for database, create functions and procedures, apply triggers on database

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's) aligned to CO's.	Topics / Sub-topics
1	TLO 1.1 Understand the basic concepts of database systems. TLO 1.2 Understand the concept of data abstraction. TLO 1.3 Understand the concept of data independence. TLO 1.4 Describe overall structure of DBMS. TLO 1.5 Describe different data models.	**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 data Independence **1.4 Overall structure of DBMS:** Components of DBMS, DBMS system Architecture, Database Users, functions of Database Administrator. **1.5 Data Modeling:** Relational, Hierarchical, Network models
	Course Outcome : CO1	**Teaching Hours : 05** **Marks: 08**
2	TLO 2.1 Design database using E-R model. TLO 2.1 Understand data relationships using the concepts of EER model. TLO 2.2 Learn functional dependency in DBMS. TLO 2.2 Design normalised database using different normal forms.	**Database Design** **2.1 Database Design Using E-R Model** **2.1.1 Data Modeling Using the E-R Model:** • Entity, Entity Sets-Weak , Strong Entity Set • Relationship sets • Types of attributes • Mapping Cardinalities • Shortcomings of E-R Model. **2.1.2 Enhanced ER (EER) model:** • Subclass, super class, Specialization and Generalization • Case studies: EER model for Bank, library, education, organization, hotel management, hospital management. **2.2 Relational Database Design**: **2.2.1 Dependencies:** • Functional dependencies • Armstrong's axioms for FD's • Closure of a set of FD's **2.2.2 Normalization:** • Need of Normalization: Data redundancy, Insert, Update and Delete anomalies • Normal Forms : 1NF, 2NF, 3NF,BCNF
	Course Outcome : CO2, CO3	**Teaching Hours : 06** **Marks: 10**

3	TLO 3.1 Understand the basic concepts of Relational database systems. TLO 3.2 Learn different SQL commands. TLO 3.3 Understand the concept of Keys in DBMS. TLO 3.4 Learn different clauses in DBMS. TLO 3.5 Understand to maintain data integrity using constraints in DBMS. TLO 3.6 Learn different built-in functions in SQL. TLO 3.7 Understand the concept of nested query. TLO 3.8 Learn to access data from multiple tables using Join operations. TLO 3.9 Learn basic relational algebra operations. TLO 3.10 Learn to manage indexes on table.	**Relational Data Model** **3.1 Basic Concepts of Relational Model:** Domain, Attributes, Tuples and Relations, Codd's rules of RDBMS, E.F. Codd's rules of RDBMS **3.2 Structured Query Language:** • Data types in SQL • DDL Commands: CREATE, ALTER, DROP, TRUNCATE, RENAME • DML Commands: SELECT, INSERT, UPDATE, DELETE, EXPLAIN PLAN • TCL Commands: BEGIN TRANSACTION, COMMIT, ROLLBACK, SAVEPOINT • DCL Commands. GRANT, REVOKE **3.3 Keys in DBMS**-Super Key, Candidate Key, Primary Key, Foreign Key. **3.4 Clauses in SQL:** Where, Having ,Group by, Order by clauses **3.5 Integrity Constraints:** NOT NULL, UNIQUE, CHECK, PRIMARY KEY, FOREIGN KEY **3.6 Functions in SQL:** Date and Time functions, String functions, Aggregate functions **3.7 Concept of Nested Query** **3.8 Database Join:** Inner Join (Equi join, Non-equi join), Outer join (Left, Right, Full Outer Join), self-join **3.9 View in DBMS:** Create, Update, Drop View **3.10 Fundamental Relational Algebra Operations:** Select, Project, Union, Set Difference, Cartesian Product, Rename **3.11 Indexes in DBMS:** Types of Indexes, Creating Indexes, Drop Index
	Course Outcome : CO4	**Teaching Hours : 13** **Marks: 14**
4	TLO 4.1 Understand the concept of database transaction. TLO 4.2 Describe serial and concurrent executions of transaction. TLO 4.3 Learn to manage database sharing among transactions using Locks.	**Transaction Processing** **4.1 Transaction concept:** Transaction properties(ACID), States of Transaction **4.2 Concurrent Execution of Transactions.** **4.3 Schedule:** Serial, Concurrent, Cascade less schedule. **4.3 Lock based protocols:** • Types of Locks: Shared lock, Exclusive lock • Granting of locks • Lock Based Protocol: Simplistic Lock, Pre-Claiming Lock, Two-Phase Locking, Strict Two-Phase Locking, • Starvation and Deadlock
	Course Outcome : CO5	**Teaching Hours : 07** **Marks: 08**

5	TLO 5.1 Understand the need of data security. TLO 5.2 Learn to Create and manage database users. TLO 5.3 Learn to manage database users privileges. TLO 5.4 Learn database backup and recovery techniques.	**Database Security** **5.1 Data Security Requirements** **5.2 Database Users:** Create, Alter, Delete users **5.3 Authorization:** Assign and revoke privileges **5.4 Database Backup:** Types of failures, causes of failure, Create backup of database **5.5 Database Recovery Techniques**
	Course Outcome : CO6	**Teaching Hours : 06 Marks: 10**
6	TLO 6.1 Understand PL/SQL programming environment. TLO 6.2 Learn control structures in PL/SQL. TLO 6.3 Learn exception handling in PL/SQL. TLO 6.4 Learn to work with data using cursors. TLO 6.5 Learn the concepts of functions and stored procedures in PL/SQL. TLO 6.6 Learn database triggers.	**PL/SQL Programming** **6.1 Introduction of PL/SQL** • PL/SQL Block Structure • PL/SQL execution environment • PL/SQL data types • Advantages of PL/SQL **6.2 Control Structure:** Conditional Control, Iterative Control, Sequential Control **6.3 Exception Handling:** Predefined Exception, User Defined Exception. **6.4 Cursor:** • Implicit and Explicit Cursors • Declare, open and close Cursor • Fetching a record from Cursor, Cursor for loops, parameterized Cursor **6.5 Functions:** Create, Execute and Delete functions. **6.6 Stored Procedures:** Create, Execute and Delete Stored Procedures. **6.7 Database Triggers:** • Use of Database Triggers • Types of Triggers • Creating Trigger, Deleting Trigger
	Course Outcome : CO7	**Teaching Hours : 10 Marks:10**

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Practical/Tutorial/Laboratory Learning Outcome (LLO)	**Sr No**	**Laboratory Experiment / Practical Titles / Tutorial**	**Number of hrs.**	**Relevant COs**
Install open source database product.	1	Install any open source database Product like My SQL.	4	CO1
Execute DDL operations on table.	2	Create a New Database and Perform Following DDL operations: a) Create table b) Alter the table c) Rename Table d) Drop the table.	4	CO4
Execute DML operations on table.	3	Create a New Database and Perform Following DML operations: a) Create a table b) Insert values in the table c) Update table d) Delete contents of the table	4	CO4
Apply different clauses on table.	4	Create a table and apply following clauses on it: Where, Having, Group by, Order by clause	4	CO4
Apply different integrity constraints on table.	5	Create table and apply constraints such as NOT NULL, UNIQUE, CHECK, DEFAULT, PRIMARY KEY, FOREIGN KEY on the table.	4	CO4
Execute different built-in functions.	6	Implement the following Functions in SQL a) Date functions b) Time functions c) String functions d) Aggregate functions.	4	CO4
Perform DML operations on data using View.	7	Write SQL code for creating of View and perform operations Insert, Modify, Delete records through view, Delete the View.	4	CO4
Execute Join operations on tables.	8	Implement Inner Join, Outer Join and Self-Join operation on tables.		CO4
Execute DCL and TCL commands.	9	Execute DCL commands: Grant, Revoke. Execute TCL commands: Commit, Rollback, Savepoint.	4	CO4
Create indexes on table.	10	Create different types of indexes on table.	4	CO4
Execute PL/SQL program using different control structures.	11	Write a PL/SQL programs using control structures: if then else, for loop, while loop.	4	CO7
Write PL/SQL program for cursors.	12	Write a PL/SQL code to implement implicit and explicit cursors.	4	CO7
Write PL/SQL program for Exception handling.	13	Write a PL/SQL programs based on Exception Handling (Predefined and User-defined Exceptions).	4	CO7
Write PL/SQL program for Function and procedure.	14	Write a PL/SQL code create Procedures and Functions.	4	CO7
Write PL/SQL program for triggers.	15	Write a PL/SQL programs to create triggers on a database.	4	CO7

Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Survey on various database systems.
2. Design E-R diagram for different database systems: Hospital/Bank/Education/Library etc.
3. Design Normalized database for: Hospital/Bank/Education/Library etc.
4. Apply trigger for different conditions.

V. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Database System Concepts	04	04	--	08
2	Database Design	02	04	04	10
3	Relational Data Model	04	--	10	14
4	Transaction Processing	--	04	04	08
5	Database Security	04	06	--	10
6	PL/SQL Programming	--	04	06	10
	Total	**14**	**22**	**24**	**60**

VI. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- TH- Progressive /Periodic Test each of 20 Marks
- TL - Continuous Assessment of Tutorials for 25 Marks
- SL - Continuous Assessment of Self Learning for 25 Marks

Summative Assessment (Assessment of Learning)

- **TH -** Term End examination of 60 Marks

VII. Suggested Learning Materials / 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

VIII. Learning Websites & Portals

1. https://www.w3schools.com/
2. www. google.com

https://www.youtube.com/watch?v=IoL9Ve2SRwQ&list=PLIwC9bZ0rmjSkm1VRJROX4vP2YMIf4Ebh

IX. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Vaibhav Vasani	Assistant Professor	K J. Somaiya Engg. College
2	Mr. Shubham Shimpi	Analyst	Course5i
3	Mrs. Vrushali A. Patil	Lecturer in Computer Engineering	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Computer Engineering

Head of Department
Department of Computer Engineering

I/C, Curriculum Development Cell
Government Polytechnic, Mumbai

Principal
Government Polytechnic, Mumbai

Programme : Diploma in Computer Engineering (Sandwich Pattern)												
Course Code: CO23603					**Course Title : Client Side Scripting**							
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits						**Examination Scheme**						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH (2.30Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
02	---	02	---	4	2	---	---	50	50#	--	---	100

Total IKS Hrs. for course: 0

Abbreviations: CL- ClassRoom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination
Note:
1. FA-TH represents two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale

Client-side scripting plays a crucial role in modern web development by enabling dynamic, interactive, and responsive web applications that provide a better user experience. It is mostly used for dynamic user interface components including pull-down menus, navigation tools, animation buttons, and data validation. In this course, students will learn about the JavaScript as a client side scripting language. With JavaScript, students can build modern web applications to interact directly without reloading the page every time.

Industry / Employer Expected Outcome

Student will be able to
1. Design web page.
2. Develop interactive dynamic webpages using JavaScript.

II. Course Outcomes:

Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Create interactive webpages using JavaScript control flow structure, arrays, functions and strings
CO2	Develop webpage to handle form events using JavaScript.
CO3	Create webpage using cookies and validating form with regular expression.
CO4	Develop webpage with Object and DOM.
CO5	Use of node.js, JSON and angular.js framework

III. Course Content Details:

Unit No.	Teaching Learning Outcome	Topics / Sub-topics
1	**TLO 1.1.** Differentiate between Server side & Client Side Scripting **TLO 1.2.** Use different control structures.	**Introduction to Java Script** 1.1 Web Scripting Fundamentals, Server- Versus Client-Side Programming 1.2 History, Features, JavaScript statements, A Simple Example, Code Editing Tools, The HTML Document, Keywords, Literals, JavaScript Values, Comments 1.3 Variables and data types 1.4 Expressions and Operators, Arithmetic Operators, Comparison Operators, Logical (or Relational) Operators, Assignment Operators, Conditional (or ternary) Operators 1.5 If else statement, if else if statement, nested if statement, switch case 1.6 Loop statement – for loop, for ---in loop, while loop, do – while loop, continue statement 1.7 Inserting the JavaScript into an HTML document, using external java script files with examples **Course Outcome:CO1 Teaching Hours: 4 hrs**
2	**TLO 2.1.** Demonstrate the use of an Array **TLO 2.2.** Demonstrate the use of an Function. **TLO 2.3.** Use different string methods	**ARRAY, FUNCTIONS AND STRING** 2.1 Declare array, Initializing an Array, defining a array element, access the array element, Using array with Loop, Understanding the properties and methods of the Array Object, Using Associative array 2.2 Function – declaring function, defining function, Adding parameters to function, scope of variable and arguments 2.3 Calling a function with and without an argument, calling function from HTML, function calling another function, returning a value from function 2.4 String – String and string methods **Course Outcome: CO1 Teaching Hours: 6hrs**
3	**TLO 3.1.** Create different forms by using various form fields **TLO 3.2.** Create Script using event handler .	**FORM & EVENT HANDLING** 3.1 Building blocks of the form :- forms basics, Accessing forms, Form Fields- textbox, password field, radio buttons, checkboxes, pull-down menus, scrolled lists, buttons, hidden fields, common Input Element Properties, Form Validation 3.2 Introduction to Event Handler, 3.3 Form Events – Abort Event, Blur Event, Change Event, Click Event, Focus Event, Keydown, Keypress, Keyup Event, Load Event, Mousedown, Mousemove, Mouseup, Mouseover, Mouseout, Reset , Submit, Unload Event 3.4 Creating Script using Event Handler **Course Outcome: CO2 Teaching Hours: 6hrs**

4	**TLO 4.1.** Perform various operations on cookie **TLO 4.2.** Know about the regular expression	**COOKIES, SESSION & REGULAR EXPRESSION** 4.1 Cookies – Definition, the document. Cookie property, Cookie ingredients, writing a cookie, reading a cookie, deleting a cookie, writing multiple values in a single cookie 4.2 Session: Introduction to Session &its working. 4.3 Regular Expression – Need of regular expression, Concept of regular expression, finding non matching characters, entering a range of characters, matching digits and non-digits, matching punctuation and symbols, matching words, Using String replace () with a Regular Expression **Course Outcome:CO3** **Teaching Hours: 6hrs**
5	**TLO 5.1.** Demonstrate the use of an Object	**OBJECT & DOCUMENT OBJECT MODEL** 5.1 Defining Objects, creating Object, Accessing Object Properties, Accessing Object Methods 5.2 Browser Properties -opening a window, giving a new window focus, JavaScript location and history 5.3 Defining the Document object, Using the properties of Document Object, Using the methods of document object **CourseOutcome:CO4** **Teaching Hours: 4hrs**
6	**TLO 6.1** Use Node.js & Angular.js	**JAVASCRIPT FRAMEWORK & CROSS-PLATFORM RUNTIME ENVIRONMENT** 6.1 Introduction to Node .js, a simple example application 6.2 Introduction to Angular.js, a simple example application 6.3 Difference between Node.js and Angular.js 6.4 Introduction to JSON, example **Course Outcome: CO5** **Teaching Hours: 4hrs**

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Laboratory Learning Outcome	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	**LLO1.1**. Identify the different data types **LLO 1.2.** Uses of variables	Write a javascript with HTML program using variables and datatypes.	2	CO1
2	**LLO 2.1** Understand use of javascript with HTML	Create Webpage with javascript to insert into HTML and using external javascript file.	2	CO1
3	**LLO 3.1** Demonstrate the use of arithmetic, logical, assignment and conditional operators.	Write javascript to demonstrate use of operators.	2	CO1

4	**LLO 4.1** Use of condition statement and looping.	Implement JavaScript program using if condition statement and looping .	4	CO1
5	**LLO 5.1** Apply the use of array and associative array	Implement JavaScript to use array and associative array.	2	CO2
6	**LLO 6.1** Demonstrate the use of string methods **LLO 6.2** Recognize using functions	Write JavaScript program to implement string methods and functions	4	CO2
7	**LLO 7.1** Apply all form fields.	Design a webpage in JavaScript to implement form fields.(Assume any website)	2	CO2
8	**LLO 8.1** Perform form events on webpage **LLO 8.2** Understand working of form events	Create a webpage to implement registration form for e-commerce website. Apply all form events.	2	CO2
9	**LLO 9.1**. Use of all cookies function	Create a webpage to implement all cookies function.	2	CO3
10	**LLO 10.1** Create session **LLO 10.2** Use of Session object	Create a webpage to implement session	2	CO3
11	**LLO 11.1** Able to validate webpage form fields with different criteria using regular expression	Develop a webpage for validation of form field using regular expressions. .	2	CO3
12	**LLO 12.1** Demonstrate the use of object and document object model	Implement JavaScript program using concept of object and DOM object.	2	CO4
13	**LLO 13.1** Recognize the use of node.js and angular.js **LLO 13.2** Understand JSON	Write program using node.js, JSON and angular.js framework	2	CO5

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Create a WebPage that displays buyers information for e-commerce website such as Amazon, Flipkart, containing name, contact details, phone no, address, email id, purchased items, wishlist items, purchased product ID, payment mode. Apply different validation rules for user inputs. Use javascript and regular expression to perform error handling. Apply cookies and even handling concept.
2. Create a webpage for your Institute. Create login system for faculty and student. Apply validation rules, regular expression, cookies concept.
3. Create a webpage for Student Course Registration System for your Institute. Apply validation rules, regular expression, cookies concept.
4. Any other micro projects suggested by subject faculty on similar line.

VI. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- Rubrics for continuous assessment based on process and product related performance indicators(25 marks)

Summative Assessment (Assessment of Learning)

1	Algorithm/ Flowchart and Program	20
2	Results/Observations/Output	10
3	Logical thinking and approach	10
4	Oral	10

VII. Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO-3
CO1	--	1	2	3	1	--	1	3	2	3
CO2	1	2	3	3	1	1	1	3	3	3
CO3	1	2	2	2	1	--	--	3	3	3
CO4	1	2	2	2	1	1	--	3	2	3
CO5	1	1	2	1	2	--	1	3	2	3

Legends: - High:03, Medium:02, Low:01, No Mapping: --

VIII. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	John Pollock	A JavaScript Beginner Guide	McGraw Hill Companies,
2	Thomas Powell	JavaScript The complete Reference	Publisher(s):McGraw-Hill ISBN: 9780071741217

IX. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	http://www.w3schools.com/html	
2	https://www.javascripttutorial.net/	
3	http://www.2createawebsite.com	
4	http://webdesign.about.com	

X. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Ms. Priyanka Khadtare	Developer	Nykaa Pvt. Ltd. Mumbai
2	Ms. A. V. Wankar	Lecturer in Computer Engineering	Government Polytechnic, Mumbai
3	Mrs. R.V. Molawade	Lecturer in Computer Engineering	Government Polytechnic, Mumbai

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Head of Department
Department of Computer Engineering

I/C, Curriculum Development Cell
Government Polytechnic, Mumbai

Principal
Government Polytechnic, Mumbai

Programme : Diploma in ME/CE/EE/CO/IF/IS/EC/RT/LT/LG (Sandwich Pattern), AIML												
Course Code: UV23302			**Course Title : Universal Human Values-II**									
Compulsory / Optional: Compulsory												
Learning Scheme and Credits						**Assessment Scheme**						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH**	**FA- PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
01	–	–	01	02	01	–	–	–	–	–	50	50

Total IKS Hrs. for course: 04

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

Note:

1. FA-TH represents an average of two class tests of 30 marks each conducted during the term.

2. SA-TH represents the end term examination.

Rationale:

Universal Human Values-I course helped students to discover themselves and comfortably connect with their peers. Students experienced living in harmony with nature by visiting a nature park and participating in activities like tree plantation, beach cleaning and institute cleaning.

The Universal Human Values-II course is more focused on helping students to create health consciousness and experience living in harmony with their bodies. It will help to create a holistic perspective based on self-exploration about themselves, family, society and nature. Patriotic values will be imbibed by learning about the constitution of India.

Through experiential learning, an ideal personality will be developed to excel in the field of work. It is the journey of thought process from 'my family' to 'world family'. In essence, it promotes human values, inculcates ethics and develops the best citizens.

Industry / Employer Expected Outcome

To demonstrate value based behavior at the workplace.

Course Outcomes:

On completion of this course, Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Understand and appreciate duties and civic responsibilities.
CO2	Develop health consciousness.
CO3	Develop respect and recognition for others' work.
CO4	Understand the importance of living in harmony with nature and society.
CO5	Internalize lessons from great souls who exemplified nobility, courage and righteousness.
CO6	Develop holistic well-being through balancing individual needs with common good.

Course Content Details:

Sr. No	CO	Activity	Related Value/s	Methodology of Implementation	Student's Role	Mentor's role	Resources Required
1	CO1 CO3	Read preamble of constitution and list down duties and responsibilities of a citizen	Patriotism Integrity Loyalty Harmony Righteousness	Read preamble of constitution of India from internet website	Brainstorm to understand the importance of preamble.	Motivate students to present different stories related to Indian constitution	https://www.constitutionofindia.net/constitution_of_india/preamble
2	CO6	Prepare your own SWOT Analysis	Self-exploration, Honesty	Analysis and report writing	Thoughtfully analyze self	Explain process of SWOT analysis	Case studies
3	CO2	Student will prepare a diet chart, analyze food consumption habit-List food consumed during last 3 days and identify its nutritional effects on body	Health consciousness	Balanced diet chart preparation	Find out the ways to maintain balanced diet chart	Provide information resources	Internet websites, Professional dietician

4	CO3 CO5	Identify 5 personalities from the areas like sports, defence, politics,, businesses and social work who have demonstrated great spirit of integrity in their life and write a report. e.g. **Rajendra singh**- Water man of india, **Dr. A P J Abdul kalam**- scientist and former president of india. **Mohammed Yunus**- Bangladeshi social entrepreneur, **Kapil Dev**-Cricketer of the century. **David Packard**- Chairman of Hewlett- Packard (HP)	Integrity, respect	Information collection and analysis	Identify personalities and study their extra-ordinary work	Guide students to identify various dimensions of the personality	Internet websites, Institute Library
5	CO4 CO6	Study the Sustainable Development Goals of the United Nations for peace and prosperity of people and the planet, now and into the future by visiting the following website: https://sdgs.un.org/goals	Social Gratitude, Empathy, Compassion, Accountability	Visit the website, study history and List 17 sdgs	Study the sdg in detail (assigned to your group by mentor), prepare presentation	Assign 17 sdgs to different groups of students	Local NGOs working for UN

6	CO2 CO6	Understanding Eight limbs (Ashtanga) of Yoga for gaining the best mental health. **IKS hours**- Cultural and spiritual history of India- eight fold path of yoga.	Health consciousness Social gratitude	Arrange the session of a meditation expert to understand the philosophy of Yoga.	Students will need to understand and practice the principles of the eight limbs of yoga. Practice it daily for the best physical and mental health.	Mentors will need to provide guidance on understanding and practicing the principles of the eight limbs of yoga and provide feedback on students' progress.	Resources such as yoga mats or printed materials on the eight limbs of yoga may be required.
7	CO5	1. Seven blunders told by Mahatma Gandhi and practice them as an ethic in your daily life to be a moral citizen. 2. Swami Vivekananda and his philosophy 3.Bharatratna Dr Babasaheb Ambedkar and his philosophy, teachings Any other social reformer **IKS hours**- Cultural history of India- Religious and Civic philosophies.	Character Humanity Sacrifice Honesty Accountability Patriotism	Select anyone topic. Prepare Group presentations on selected topics.	Students will need to prepare and present a group presentation on a selected topic.	Mentors will need to provide guidance on preparing and presenting a group presentation and provide feedback on students' presentations.	

8	CO3 CO6	Visit websites of reputed industries and study their Corporate Social Responsibility (CSR) activities. Also arrange an interview of a successful entrepreneur.	Social Gratitude Accountability	Visit CSR section of the website of selected industry	Students will need to research and report on the CSR activities of a selected industry.	Mentors will need to provide guidance on researching and reporting on CSR activities and provide feedback on students' reports.	Access to the internet or relevant industry publications may be required.
9	CO3	Analyze behavior pattern of self and group member while performing any group activity	Harmony in behavior	List different group activities, select anyone from the list and perform it.	Students will need to analyze their own behavior and that of their group members during a group activity and record their observations.	Mentors will need to provide guidance on observing and recording behavior patterns and provide feedback on students' observations.	Guidelines for observing and recording behavior patterns may be necessary.

10	CO5	Read and create abstract of biography like, 1. Ek Hota Carver 2.Biography of a yogi 3. JRD Tata 4. Mahatma Gandhi 5. Pant pratinidhi 6. Shriman Yogi	Righteousness	Visit library, find out books, read and prepare the report	Students will need to select a biography to read and create an abstract that summarizes the key ideas and messages in the biography.	Mentors will need to provide guidance and support to help students select an appropriate biography and create a well-written abstract.	Access to a library or online resources to select a biography to read and create an abstract.
11	CO1 CO3 CO4	NDRF one day training OR Police Mitra training OR Red cross training OR Fire safety training OR Self defense training for Girls OR CPR training	Accountability Empathy	Plan training with the help of related agencies	Students will need to attend a one-day training session.	Mentors will need to provide guidance on attending the selected training session and ensuring safety.	Access to training facilities and materials may be necessary.

Methodology:

1. The course teacher will be the mentor.
2. In consultation and under supervision of a mentor, the student/ Group of students has to complete the activity.
3. The mentor will work as a facilitator/ advisor.
4. The strategies to learn the course is "Self- Exploratory" and "Experiential Learning"
5. The onus of responsibility for completing the activities is with students.
6. **Out of eleven activities the student has to complete at least five no. of activities throughout the term. Activity number two is compulsory.**

Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

During self learning hours students have to register online **(https://www.mahayouthnet.in/)** for the following "Youth Leadership for Climate Action" self-paced online courses. After completion of these courses students will appear for the online exam of these courses and earn a certificate of completion. Students will submit these 4 certificates to the mentor.

Sr. No.	Unit	Marks
1	Living with Climate Change	10
2	Water Management and Climate Action	
3	Energy Management and Climate Action	05
4	Waste Management and Climate Action	05
5	Bio-cultural diversity Conservation and Climate Action	05
6	The student has to complete at least **five** no. of activities out of the 11 activities mentioned in the course content details throughout the term and submit the reports. Each activity carries 05 marks.	25
	Total	50

Note: 1. Unit 1 and Unit 2 are presented together and carry one certificate.
2. Unit 3,4, and 5 are individual units.

Assessment methodologies/Tools:

Formative Assessment(Assessment for Learning)

The student has to complete at least **five** no. of activities throughout the term. Each activity carries 05 marks.

Criterion No.	Criterion	Max. Marks	Not Satisfactory	Good	Excellent
1	Attendance	01	0	1	1
2	Knowledge	02	0	1	2
3	Presentation / Performance	02	0	1	2
	Total	05			

Suggested CO-PO Matrix form:

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools, Experimentation and Testing	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	3	3	2	3	2	3	-	1	2
CO2	-	1	1	1	1	1	3	-	-	-
CO3	-	1	-	-	-	-	2	2	2	2
CO4	-	1	1	-	1	-	2	1	1	1
CO5	1	1	1	1	1	1	3	3	3	3
CO6	-	1	1	-	-	-	2	1	1	1
Legends :- High:03, Medium:02,Low:01, No Mapping: -										

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	978-8-174-46781-2
2	Human Values	A.N. Tripathy, New Age International Publishers, 2003	978-8-122-42589-5
3	Teacher's Manual - A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	-
4	Science and Humanism, Towards a Unified World View	PL Dhar, RR Gaur, Commonwealth Publications, 1992	978-8-171-69222-4
5	Education for values in schools- a framework	NCERT	
6	Value oriented education	E N Gawande	

E-References:

1) **https://youtu.be/kOJu1vj_BVk (The 10 MostImportant Human Values)**
2) **Dr. Prakash Baba Amte- Movie**
3) **https://youtu.be/QeogOlzG2ls (Value of Education -short film)**

E-References for mentors:

1) **https://www.edutopia.org/**
2) **https://sdgs.un.org/goals**
3) **https://www.mahayouthnet.in/**

Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Dr. L.A. Patil	Principal (Retired)	Pratap College, Amalner
2	Dr. Nitin Deshpande	Lead Consultant	Dnyanpeeth Academy, Pune
3	Dr. Chandrakant Shahasane	Founder Trustee	Karnala Charitable Trust, Pune
4	Mr. K. V. Patil	Lecturer, Mechanical Engineering	Government Polytechnic, Mumbai
5	Mrs. P. A. Khande	Lecturer, Electronics Engineering	Government Polytechnic, Mumbai
6	Mrs. Vrushali A. Patil	Lecturer, Computer Engineering	Government Polytechnic, Mumbai
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