

Draft Teaching Scheme and Syllabus of Master of Computer Applications

1st Semester (w.e.f 2024-25)



**Gujarat Technological University
Nr. Visat Three Roads, Visat - Gandhinagar Highway
Chandkheda, Ahmedabad – 382424 – Gujarat**

Draft Teaching Scheme MCA Semester 1 w.e.f 2024-25

Sem	SubjectName	Category	L_h ours	T_h ours	P_h ours	Cre dit	E_ Max	M_ Max	I_M ax	V_ Max	Tota l_M ark
1	Programming with C	Core Course	3	0	4	5	70	30	20	30	150
1	Fundamental of Computer Organization	Core Course	2	0	2	3	70	30	20	30	150
1	Relational Database Management Systems	Core Course	3	0	2	4	70	30	20	30	150
1	Object Oriented Programming using JAVA	Core Course	3	0	2	4	70	30	20	30	150
1	Web Technology Project	Core Course	3	0	2	4	70	30	20	30	150
1	Basic Mathematics	Bridge Course	0	2	2	0	0	50	50	0	100



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Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code :

Course / Subject Name : Programming with C

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Core Course

Prerequisite:	Basic Mathematics and knowledge about number systems
Rationale:	<ul style="list-style-type: none">Learn about the data types, operators and functions in C programming language.To be able to write code in C programming language for simple problems

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
1	Formulate algorithm/ flowchart for given arithmetic and logical problem.	UN
2	Translate algorithm/flowchart into C program using correct syntax of Operator, conditional & branching statements, iteration and execute it.	AP
3	Write C programs using the concepts of array and functions.	AP
4	Write C programs using the concepts of pointers, structure and union.	AP
5	Develop an application using the concepts file management to solve problems.	CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	4	5	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Programming Language, Compiler, Interpreter, Liker, Loader,	7	15%



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Course / Subject Name : Programming with C

	Classification of Programming, Algorithm, Flowchart, Structure of a C Program, First C Program, Comments, C Tokens, Basic data types in C, Variables, Operators & Expression in C, Type conversion and Typecasting.		
2.	Basic Screen & Keyboard Input & Output, Introduction to Decision Control Statements, Conditional execution & selection statements, Iterative Statements, Nested Loops, Special Control Statement.	9	20%
3.	Introduction to Array, One Dimensional Array, Multi-Dimensional Array, Introduction to String, Character & string Functions, Array of String Introduction to User Defined Functions, Using Functions, Function Declaration/Function Prototype, Function Definition, Function call, return statement, Passing Parameters to the function, scope of variables, Storage classes, Recursive Functions, Analysis of Algorithm.	9	20%
4.	Introduction, Understanding Memory Addresses, Address Operator (&), Introduction to Pointers, void Pointer, Null Pointer, Use of Pointers, Arrays and Pointers, Pointer and String, Pointer Arithmetic, Pointers to Pointers, Array of Pointers, Pointers to an Array, Two-dimensional Arrays and Pointers, Pointers to Functions, Dynamic Memory Allocation. Structure, Structure Declaration, Assessing member of structure, Initialization of Structure, Nesting of Structure, Array of Structure, Array within structure, Structure and Function, Structure and Pointer, Union, Enumeration type, Bit fields.	12	25%
5.	Using Files in C, Declaration, Opening and Closing of a File, Working with Text Files and Binary Files, Character Input and Output, End of File (EOF), feof() Function, Direct File Input and Output, Files of Records, Random Access to Files of Records, Other File Management Functions: Bitwise Operator (Bitwise AND, Bitwise OR, Bitwise Exclusive-OR, Bitwise NOT, Bitwise Shift Operator), Command-line Arguments, The C Preprocessor, Type Qualifier.	8	20%
Total		45	100

References/Suggested Learning Resources:

Textbook:

1. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.



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Course / Subject Code :

Course / Subject Name : Programming with C

Reference Books:

1. E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
2. Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.
3. Reema Thareja. "Programming in C", 2nd Edition, Oxford University Press.
4. C: The Complete Reference, by Herbert Schildt, Publisher – Tata McGraw Hill.

Suggested Course Practical List:

1. Write a program to that performs as calculator (addition, multiplication, division, subtraction).
2. Write a program to find area of triangle($a = h * b * .5$)
 a = area h = height b = base.
3. Write a program to calculate simple interest ($i = (p * r * n) / 100$)
 i = Simple interest p = Principal amount r = Rate of interest n = Number of years.
4. Write a C program to interchange two numbers.
5. Write a C program to enter a distance in to kilometre and convert it in to meter, feet, inches and centimetre.
6. Write a program to compute Fahrenheit from centigrade ($f = 1.8 * c + 32$).
7. Write a C program to find that the accepted number is Negative, Positive or Zero.
8. Write a program to read marks of a student from keyboard whether the student is pass or fail (using if else)
9. Write a program to read three numbers from keyboard and find out maximum out of these three. (nested if else)
10. Write a C program to check whether the entered character is capital, small letter, digit or any special character.
11. Write a program to read marks from keyboard and your program should display equivalent grade according to following table(if else ladder)

Marks	Grade
100 - 80	Distinction
79 - 60	First Class
59 - 40	Second Class
< 40	Fail

12. Write a c program to prepare pay slip using following data. Da = 10% of basic, Hra = 7.50% of



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basic, Ma = 300, Pf = 12.50% of basic, Gross = basic + Da + Hra + Ma, Nt = Gross – Pf.

13. Write a C program to read no 1 to 7 and print relatively day Sunday to Saturday.
14. Write a C program to find out the Maximum and Minimum number from given 10 numbers
15. Write a C program to find factorial of a given number.
16. Write a program to reverse a number.
17. Write a program to generate first n number of Fibonacci series
18. Write a program to calculate average and total of 5 students for 3 subjects (use nested *for* loops)
19. Read five persons height and weight and count the number of person having height greater than 170 and weight less than 50,
20. Write a program to check whether the given number is prime or not.
21. Write a program to evaluate the series $1^2+2^2+3^2+\dots+n^2$
22. Write a C program to find $1+1/2! +1/3! +1/4! +\dots +1/n!$
23. Write a program to print following patterns :

i	*	ii	*	iii	*****
*	*	*	*		****
*	*	*	*	*	***
*	*	*	*	*	**
*	*	*	*	*	*

24. Write a program to print following patterns :

i)	1	ii	12345	iii)	55555	iv)	1
	12		1234		4444		22
	123		123		333		333
	1234		12		22		4444
	12345		1		1		55555

25. Write a program to print following patterns:

i) AAAAAA	ii) ABCDE
BBBBB	ABCD
CCC	ABC
DD	AB
E	A

26. Write a C program to read and store the roll no and marks of 20 students using array.
27. Write a program to find maximum element from 1-Dimensional array.



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28. Write a program to sort given array in ascending order.
29. Write a program to replace a character in given string.
30. Write a program to reverse string.
31. Write a program to convert string into upper case.
32. Write a program that defines a function to add first n numbers.
33. Write a function in the program to return 1 if number is prime otherwise return 0
34. Write a program to find factorial of a number using recursion.
35. Write a function that will scan a character string passed as an argument and convert all lowercase character into their uppercase equivalents
36. Write a program to read structure elements from keyboard.
37. Define a structure type *struct* personal that would contain person name, joining date and salary using this structure to read this information of 5 people and print the same on screen.
38. Define structure data type called *time_struct* containing three member's integer hour, integer minute and integer second. Develop a program that would assign values to the individual number and display the time in the following format: 16: 40:51
39. Design a structure *student_record* to contain name, branch and total marks obtained. Develop a program to read data for 10 students in a class and print them.
40. Write a program to print address of variable using pointer.
41. Write a C program to swap the two values using pointers.
42. Write a C program to print the address of character and the character of string using pointer.
43. Write a program to access elements using pointer.
44. Write a program to read, print and addition of two Matrices using pointer and user define functions.
45. Write a program for sorting using pointer.
46. Write a program to read n integer number from keyboard and store them into a file All.txt. Read All.txt file, separate even and odd numbers and store them into files Even.txt and Odd.txt respectively and display contents of all the three files.
47. Write a program to accept the contents from the user and store it in the file one line at a time and print the contents of the file.
48. Read a text file which name is given in command line and print the total number of character in each line and total number of lines in a file.
49. Write a program to merge two files into the third file.
50. Program for deleting the spaces from the contents of file.



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Level: Post Graduate

Course / Subject Code :

Course / Subject Name : Programming with C

CO- PO Mapping:

Semester 1	Course Name: Programming with C							
	POs & PSOs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	-	-	-	-
CO2	3	3	3	3	-	-	-	-
CO3	3	3	3	3	-	-	-	-
CO4	3	3	3	2	-	-	-	-
CO5	3	3	3	2	-	-	-	-
	3.00	2.75	3.00	2.75	-	-	-	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code :

Course / Subject Name : Fundamental of Computer Organization

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Core Course

Prerequisite:	Basic mathematics, introductory computer science, and foundational knowledge of digital electronics.
Rationale:	<p>The "Fundamental of Computer Organization" course is designed to provide students with a comprehensive understanding of the foundational concepts in digital electronics and computer science. These topics are essential for anyone pursuing a career in computer engineering, information technology, or related fields. The rationale behind this course is to equip students with the necessary skills and knowledge to understand and design digital systems, which are the backbone of modern computing devices. By covering number systems and their conversions, basic and advanced logic gates, Boolean algebra, and the basic structure of computers, students will gain a solid foundation that will enable them to understand how computers process, store, and retrieve information.</p> <p>Furthermore, the course delves into the intricate details of register transfer languages, microoperations, and the memory system, which are crucial for understanding the internal workings of a computer. This in-depth knowledge is vital for designing efficient and effective computing systems. Focusing on practical aspects such as Karnaugh maps and memory performance considerations ensures students can apply theoretical concepts to real-world problems. By the end of the course, students will be well-prepared to tackle advanced topics in computer science and engineering, contributing to technological innovations and the development of sophisticated digital solutions.</p>

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	perform conversions between different number systems (binary, decimal, octal, hexadecimal) and design basic logic circuits using fundamental logic gates (AND, OR, NOT, NAND, NOR).	R, U, A
02	apply Boolean algebra laws and De Morgan's Theorems to simplify complex logical expressions and design optimized digital circuits using Karnaugh maps.	R, U, A



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Course / Subject Code :

Course / Subject Name : Fundamental of Computer Organization

03	describe the fundamental components of a computer system, including data representation, the basic operational concepts, bus structures, and performance metrics of different computer types.	R, U
04	explain the concepts of register transfer language and microoperations, and describe the execution of instructions, memory-reference instructions, and addressing modes in a computer system.	R, U
05	Explain the various types of memory systems, including RAM, ROM, cache, and virtual memory, and evaluate their performance considerations and the role of secondary storage and RAID in computer architecture.	R, U

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	UNIT I: NUMBER SYSTEM AND LOGIC GATES Number System: Decimal System, Two-state Devices, Counting in Binary System, Binary Addition and Subtraction, Converting Decimal Number to Binary Numbers, Use of Complements to represent negative numbers in binary and other number systems, Octal and Hexadecimal Number System. Basic Logic Gates: Logic Gates, Logical Multiplication, AND Gate and OR Gate, Complementation and Inverts Evaluation of logical Expression, Evaluation of an Expression containing Parenthesis. NAND Gates and NOR Gates.	4	15
2.	UNIT II FUNDAMENTAL CONCEPTS OF BOOLEAN ALGEBRA: Basic Laws of Boolean Algebra, De Morgan's Theorems, Basic Duality of Boolean Algebra, Derivation of a Boolean Algebra, Interconnecting Gates Sum of Products And Product of Sums, Derivation of POS Expression Derivation of 3 input variables expression	8	25



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	Map Simplification Techniques: Karnaugh Maps – 2, 3, 4 Variables, Don't Care Conditions, De Morgan's Theorems, Sum of Products, Product of Sum.		
3.	UNIT III BASIC STRUCTURE OF COMPUTERS : Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.	6	20
4.	UNIT III: REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS : Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Microoperations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt. Instruction formats. Addressing modes.	8	25
5.	THE MEMORY SYSTEM : Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.	4	15
	Total	30	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	50	30	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Morris Mano, "Computer System Architecture", Third Edition, Pearson Publications
2. P.K. Sinha, "Computer Fundamentals", Sixth Edition, BPB Publications
3. Computer Installation and Servicing By D Balasubramaniam | Tata McGraw Hill Education Private Limited



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Course / Subject Code :

Course / Subject Name : Fundamental of Computer Organization

4. Malvino And Leach, “Digital Computer Electronics”, Third Edition, Tata McGraw-Hill Education

CO- PO Mapping:

Semester 1	Course Name: Fundamental of Computer Organization							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	-	2	-	-	-	-
CO2	3	3	-	-	-	-	-	-
CO3	3	1	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-
CO5	2	1	-	-	-	-	-	-
	2.8	2.25	-	2	-	-	-	-

Legend: ‘3’ for high, ‘2’ for medium, ‘1’ for low and ‘-’ for no correlation of each CO with PO.

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code :

Course / Subject Name : Relational Database Management Systems

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Core Course

Prerequisite:	Basic knowledge of working with computers
Rationale:	<ul style="list-style-type: none">● To understand the fundamental concepts of Database Management Systems and various types of data models.● To understand the concepts necessary for designing, using and implementing database systems and applications● To provide database design approaches using E-R model, EER to Relational Mapping and normalization, Clear understanding for the need of a database and uses the database schema.● To discuss transaction management and concurrency control, and relational management.● To learn various constraints and writing SQL queries.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
1	Describe the core concepts of DBMS & Differentiate various database architectures	Understand
2	Analyze database model and Design relational database using E-R model and UML Classes	Apply
3	Describe functional dependency and Normalize schema relations upto 4NF	Understand, Apply
4	Relate the concept of transaction, concurrency control and recovery in database	Apply
5	Perform DDL and DML SQL queries on schema by enforcing integrity constraints on database	Apply

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create



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Level: Post Graduate

Course / Subject Code :

Course / Subject Name : Relational Database Management Systems

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	P	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Database System Database and Users: Introduction (Basic Concepts: Data, Database, Database systems, Database Management Systems), Characteristics of Database Approach, Actors on Scene, Workers behind the Scene, Advantages of using the DBMS approach. Database System Concepts and Architecture: Data Models, Schemas, Instances, the three schema architectures and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMS, Classifications of Database Management Systems.	6	15 %
2.	Entity Relationship Diagram Using high level conceptual data models for database design (Design Phases of database design), Entity types, Entity Sets, Attributes and keys, Relationship Types, Relationship sets, Roles and structural constraints, Weak entity Types, Refining the ER diagram for company Database, Entity Relationship Diagram Naming conventions Design issues, Example of other Notation: UML class diagram, Relationship types of degree higher than 2 Subclasses, Super Classes, Inheritance Specialization and Generalization Relational Database design by ER and EER to Relational Mapping, Mapping EER model construct to Relations.	11	25 %
3.	Database Design Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal Form.	11	20 %



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4.	Transaction processing Introduction to Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing Schedules based on recoverability and Serializability Relational Model concepts: Relational Model concepts, Relational Model constraints and Relational Database Schemas.	10	25 %
5 (*)	SQL Concepts: Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Savepoint.	7	15 %
Total		45	100

(*): Only Higher order questions / application oriented questions to be asked in the theory exam from Unit 5.

Textbook:

1. Ramez Elmsari, Shamkant B Navathe, “Fundamentals of Database Systems”, Pearson Education, 7th Edition
2. Ivan Bayross, SQL, PL/SQL the Programming Language of Oracle, 4th Edition, BPB Publications

Reference Books:

1. Silberschatz, Korth, Sudarshan, “Database System Concepts”, McGraw Hill Publication. 5th Edition
2. S. K. Singh, “Database Systems : Concepts, Design and Applications”, Pearson Education
3. Peter Rob, Carlos Coronel, “Database Systems : Design, Implementation and Management”, Cengage Learning
4. C. J. Date, A Kannan, S Swaminathan, “An Introduction to Database Systems”, Pearson Education, 8th Edition
5. Steve Suehring, Tim Converse, Joyce Park, PHP 6 and MySQL Bible, Wiley

Suggested Course Practical List:

RDBMS (Module Weightage: 100%)

Tools: Oracle 10g or above



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Course / Subject Code :

Course / Subject Name : Relational Database Management Systems

Topics:

1	Data Types
2	Study of DDL Commands (Create , Alter , drop) Table: The Create Table Command, Creating a table from a table (with data, without data, with all columns, with selected columns), Drop Table, Alter Table, Renaming Tables
3	Study DML Commands (Select, insert, update, delete)
4	Constraints: Defining integrity constraints using create table and the alter table command, Dropping integrity constraints in the alter table command
5	Transaction Control statements: Commit, Rollback
6	Advanced Concepts: View, Index, Sequences, rowid, rownum, Default Value Concept
7	Join (Inner Join, Equi Joins, Self Join, Outer Joins)
8	Study subquery concepts
9	Set Operators
10	Study single row functions: String functions, Numeric Functions, Date Functions, Date Conversion Functions
11	Study aggregate / group functions, having
12	Sorting Data, Handling Null values (IS NULL), Like Clause
13	Basic concepts of PL/SQL
14	Create Triggers
15	Data dictionary
16	Procedure, function, package
17	Desirable : Security / privileges

Set 1

DEPARTMENT (dept_no, dept_name, location)

1. Create the Simple DEPARTMENT Table.
2. Display structure of department table.
3. Insert below records into Department Table

Dept_no	Dept_name	Location
10	Account	NY
20	HR	NY
30	Production	DL
40	Sales	NY



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50	EDP	MU
60	TRG	
110	RND	AH

4. Display all records of Department table
5. Display all department belonging to location 'NY'
6. Display details of Department 10
7. List all department names starting with 'A'
8. List all departments whose number is between 1 and 100
9. Delete 'TRG' department
10. Change department name 'EDP' to 'IT'

Set 2

EMPLOYEE (emp_id, emp_name, birth_date, gender, dept_no, address, designation, salary, experience, email)

DEPARTMENT (dept_no, dept_name, location)

Do as directed:

1. Create the EMP Table with all necessary constraints such as In EMP TABLE: Employee id should be primary key, Department no should be Foreign key, employee age (birth_date) should be greater than 18 years, salary should be greater than zero, email should have (@ and dot) sign in address, designation of employee can be “manager”, “clerk”, “leader”, “analyst”, “designer”, “coder”, “tester”.
2. Create DEPT table with necessary constraint such as
3. Department no should be primary key, department name should be unique.
4. After creation of above tables, modify Employee table by adding the constraints as
5. ‘Male’ or ‘Female’ in gender field and display the structure.
6. Insert proper data (at least 5 appropriate records) in all the tables.
7. Describe the structure of table created
8. List all records of each table in ascending order.
9. Delete the department whose location is Ahmedabad.
10. Display female employee list
11. Display Department wise employee Names
12. Find the names of the employee who has salary less than 5000 and greater than 2000.
13. Display the names and the designation of all female employee in descending order.
14. Display the names of all the employees whose names start with ‘A’ ends with ‘A’.
15. Find the name of employee and salary for those who had obtained minimum salary.
16. Add 10% raise in salary of all employees whose department is ‘IT’.
17. Count total number of employees of ‘IT’ department.



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18. List all employees who born in the current month.
19. Print the record of employee and dept table as “Employee works in department ‘MBA’.
20. List names of employees who are fresher’s (less than 1 year of experience).
21. List department wise names of employees who has more than 5 years of experience.
22. Create Sequence to generate department ID
23. List department having no employees

Set 3

Create the following table:

Salesmen table (SNUM, SNAME , CITY , COMMISSION)

Customers (CNUM, CNAME , CITY , RATING , SNUM)

Orders (ONUM, AMOUNT, ODATE, CNUM, SNUM)

SNUM : A unique number assigned to each salesman. SNAME :The name of salesman. CITY :The location of salesmen. COMMISSION: The Salesmen's commission on orders

CNUM : A unique number assigned to each customer. CNAME : The name of the customer. CITY : The location of the customer. RATING : A level of preference indicator given to this customer. SNUM : The number of salesman assigned to this customer.

ONUM : A unique number assigned to each order. AMOUNT : The amount of an order. ODATE : The date of an order. CNUM : The number of customer making the order. SNUM : The number of salesman credited with the sale.

Do as directed:

1. Write an Insert script for insertion of rows with substitution variables and insert appropriate data.
2. Produce the order no, amount and date of all orders.
3. Give all the information about all the customers with a specific salesman number.
4. Display the following information in the order of city, sname, snum and commission.
5. List of rating followed by the name of each customer in particular one city e.g. Surat.
6. List of snum of all salesmen with orders in order table without any duplicates.
7. List of all orders for more than certain amount e.g. more than Rs. 1000.
8. List of names and cities of all salesmen in one city e.g. London with commission above 10%.
9. List all customers whose names begins with a letter 'C'.
10. List all customers whose names begins with letter 'A' to 'G'.
11. List all orders with zero or NULL amount.
12. Find out the largest orders of salesman from two value e.g. 1002 and 1007.
13. Count all orders of particular date e.g. October 3, 2023
14. Calculate the total amount ordered.



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15. Calculate the average amount ordered.
16. Count the no. of salesmen currently having orders.
17. List all salesmen with their % of commission.
18. Assume each salesperson has a 15% commission. Write a query on the order table that will produce the order number, salesman no and the amount of commission for that order
19. Find the highest rating in each city in the form : For the city (city), the highest rating is : (rating)
20. List all in descending order of rating.
21. Calculate the total of orders for each day and place the result in descending order.
22. Show the name of all customers with their salesman's name.
23. List all customers and salesmen who shared a same city.
24. List all orders with the names of their customer and salesman.
25. List all orders by the customers not located in the same city as their salesman.
26. List all customers serviced by salespeople with commission above 15%.
27. Calculate the amount of the salesman commission on each order by a customer with rating above 100.
28. Find all pairs of customers having the same rating without duplication.
29. List all orders that are greater than the average of October 4,2023.
30. Find the average commission of salesmen in London.
31. Find all orders attributed to salesmen in 'London' using both the subquery and join methods.
32. List the commission of all salesmen serving customers in 'London'.
33. Find all customers whose cnum is e.g. 1000 above than the snum of name e.g. Sejal.
34. Count the no. of customers with the rating above than the average of one city e.g. 'Surat'.
35. Find all salesmen with customers located in their cities using ANY and IN.
36. Find all salesmen for whom there are customers that follow them in alphabetical order.
37. Find all customers having rating greater than any customer in particular city e.g. 'Rajkot'.
38. List all orders that has amount greater than atleast one of the orders from 6th October, 2023.
39. Find all orders with amounts smaller than any amount for a customer in 'London'.
40. Find all the customers who have greater rating than every customer in one city e.g. 'Anand'
41. Create a union of two queries that shows the names, cities and ratings of all customers. Those with rating of ≥ 200 should display 'HIGH RATING' and those with < 200 should display 'LOW RATING'.
42. Produce the name and number of each salesman and each customer with more than one current order in the alphabetical order of names.
43. Create union of three queries. First select snum of all salesman in Surat, second, the cnum of all customers in 'Surat' and third, the onum of all orders of 3rd Oct. Retain duplicates between the last two queries but remove the duplicates between either of them and the first.
44. Remove all orders from customer Chirag from the orders table.
45. Set the ratings of all the customers of Piyush to 400.
46. Increase the rating of all customers in Rome by 100.



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Set 4

- Write a PLSQL block which will print Employee list (Empno and Name) EMP (empno, empnm, empadd, salary, date_birth, joindt, deptno)
- Write a function that returns total number of incomplete jobs, using table JOB (jobid, type_of_job, status)
- Write a function which displays the number of items whose weight fall between a given ranges for a particular color using table ITEM (itemno, name, color, weight)
- Write a procedure to display top five highest paid workers who are specialized in "PAINTING" using table WORKER (workerid, name, wage_per_hour, specialized_in, manager_id)

Set 5

Create the database EXAM and create given tables with all necessary constraints such as primary key, foreign key, unique key, not null and check constraints.

APPLICANT (AID, ANAME, ADDR, ABIRTH_DT)

ENTRANCE_TEST (ETID, ETNAME, MAX_SCORE, CUT_SCORE)

ETEST_CENTRE (ETCID, LOCATION, INCHARGE, CAPACITY)

ETEST_DETAILS (AID, ETID, ETCID, ETEST_DT, SCORE)

(This database is for a common entrance test which is being conducted at a number of centers and can be taken by an applicant on any day except holidays)

Do as directed:

- Modify the APPLICANT table so that every applicant id has an 'A' before its value. E.g. if value is '1123', it should become 'A1123'.
- Display test center details where no tests were conducted.
- Display details about applicants who have the same score as that of Ajaykumar in 'ORACLE FUNDAMENTALS'.
- Display details of applicants who appeared for all tests.
- Display those tests where no applicant has failed.
- Display details of entrance test centers which had full attendance between 1st Oct 15 and 15th Oct 16.
- Display details of the applicants who scored more than the cut score in the tests they appeared in.
- Display average and maximum score test wise of tests conducted at Mumbai.
- Display the number of applicants who have appeared for each test, test center wise.
- Display details about test centers where no tests have been conducted.
- For tests, which have been conducted between 2-3-17 and 23-4-17, show details of the tests as well as the test centre.
- How many applicants appeared in the 'ORACLE FUNDAMENTALS' test at
- Chennai in the month of February?



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14. Display details about applicants who appeared for tests in the same month as the month in which they were born.
15. Display the details about APPLICANTS who have scored the highest in each test, test centre wise.
16. Design a read only view, which has details about applicants and the tests that he has appeared for.
17. Write a procedure which will print maximum score centre wise.
18. Write a procedure which will print details of entrance test showing Centre name, candidate id, date and score:
19. Write a trigger which do not allow insertion / updation / deletion of Entrance test details on Sunday.

Set 6

EMP (empno, empnm, empadd, salary, date_birth, joindt, deptno)

DEPT (deptno, deptnm)

Write a PL/SQL block (table above EMP-DEPT table) which takes as input Department name and displays all the employees of this department who has been working since last five years

Set 7

CUSTOMER (cid, fname, lname, city, country, phone)

ORDER (oid, oDate, oNumber, cid, oTotalAmount)

1. List the number of customers in each country. Only include countries with more than 100 customers.
2. List the number of customers in each country, except China, sorted high to low. Only include countries with 5 or more customers.
3. List all customers with average orders between Rs.5000 and Rs.6500.
4. Create a trigger that executes whenever country is updated in CUSTOMER table.
5. Create a function to return customer with maximum orders.
6. Create a procedure to display month names of dates of ORDER table. The month names should be unique.

Set 8

EMPMAS (empno, name, pfno, empbasic, deptno, designation)

DEPT (DNO, DNAME)

Rules: HRA = 15% of basic

DA = 50% of basic

Medical = 100

PF = 8.33% of basic

Print Salary slip. Design your own format

Set 9

Consider the Bank schema as



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ACCOUNT (AC_NO, NAME, AC_TYPE, BALANCE_AMT, BALANCE_DATE)

TRANSACTION (AC_NO, DATE, TR_TYPE, AMOUNT, PREV_BALANCE, REMARK)

Note: 1. AC_type may be S for saving or C for current, 2. TR_type may be D for deposit or W for withdrawal.

- a. Write a procedure to print the Bank Transaction details by passing from and to dates.

Set 10

Employee (eid, fname, lname, salary)

1. Use a Cursor for Loop inside a function to calculate and return total paid salary to all employees by the company.
2. Modify the function created above to become a procedure and display the total paid salary from the procedure itself. Instead of calculating for all employees, calculate only for those employees whose name starts from a character passed as parameter to the procedure and hence to the cursor.

List of Laboratory/ Active Learning Assignment: If any

Consider Leave Management process includes defining the leave types, assigning entitlements and calculating carry over leaves, employees applying for leaves, managers approving or rejecting the leave requests, importing the leave data into payroll for calculations etc.

Prepare Database design presentation which includes:

1. Purpose of database
2. Find/ Identify Information required for application
3. Conceptual Design
4. Logical Design
5. Physical Design

Apply the concepts learned of conceptual design and logical database design

Learning Resources Required: If Any

- 1) https://onlinecourses.nptel.ac.in/noc24_cs21/preview
- 2) <https://docs.oracle.com/en/database/index.html>
- 3) <https://docs.oracle.com/database/121/SQLRF/toc.htm>

Additional Exercises: If Any

NoSQL Database (Desirable)

Tools: MongoDB

1	Introduction, Installation
2	Create Database, Drop Database
3	Create Collection, show collection



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4	Insert document, Query Document, Update document, delete document
5	Projection
6	Limiting rows
7	Export and Import

<https://docs.mongodb.com/manual/mongo/>

CO- PO Mapping:

Semester1	Relational Database Management System							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	-	-	-	-	-	-	-
CO2	3	3	3	2	-	-	-	-
CO3	3	3	3	3	-	-	-	-
CO4	3	1	2	1	-	-	3	-
CO5	3	3	3	3	-	-	1	-
	3	2.5	2.75	2.25	-	-	2	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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Course / Subject Name : Object Oriented Programming using JAVA

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Core Course

Prerequisite:	Knowledge of the C programming language and Object Oriented Concept
Rationale:	<ul style="list-style-type: none">To develop proficiency in creating console based applications using the Java Programming Language.To interpret the concepts of object oriented Programming Language and easily use these concepts in Java program.To develop application using java.util package (Java data structure).To implement multi-threaded applications using the Java Programming Language.To implement application including different file operations.

Course Outcome:

After completion of the course, student will able to:

No.	Course Outcomes	RBT Level*
CO1	Describe Java features, OOP concepts and Write console java program syntax and semantics using datatypes, variables, control and looping statements.	RM, UN, AP
CO2	Explain and Implement class, object, encapsulation and polymorphism in JAVA.	RM, UN, AP
CO3	Apply the concept of inheritance, package and exception handling for reusable, structured and error free programs.	RM, UN, AP
CO4	Use wrapper class and Collection interface to convert and manage list of data.	RM, UN, AP
CO5	Describe and Implement multithreaded programs, Generic class and IO programs.	

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<p>Introduction to Java</p> <p>Java Fundamentals: The Origins of Java, Java's Lineage: C and C++, How Java Impacted the Internet, Java's Magic: The Bytecode, Moving Beyond Applets, The Java Buzzwords, Object-Oriented Programming (Encapsulation, Polymorphism, Inheritance), Obtaining the Java Development Kit, A First Simple Program, Handling Syntax Errors</p> <p>A Second Simple Program, Another Data Type, Two Control Statements (The if Statement and The for Loop), Create Blocks of Code, Semicolons and Positioning, Indentation Practices, The Java Keywords, Identifiers in Java, The Java Class Libraries</p> <p>Try This 1-1: Converting Gallons to Liters, Try This 1-2: Improving the Gallons-to-Liters Converter</p> <p>Introducing Data Types and Operators: Why Data Types Are Important, Java's Primitive Types(Integers, Floating-Point Types, Characters), The Boolean Type, Literals (Hexadecimal, Octal, and Binary Literals, Character Escape Sequences, String Literals), A Closer Look at Variables(Initializing a Variable, Dynamic Initialization), The Scope and Lifetime of Variables, Operators, Arithmetic Operators (Increment and Decrement), Relational and Logical Operators, Short Circuit Logical Operators, The Assignment Operator, Shorthand Assignments, Type Conversion in Assignments, Casting Incompatible Types, Operator Precedence, Expressions (Type Conversion in Expressions, Spacing and Parentheses)</p> <p>Try This 2-1: How Far Away Is the Lightning? Try This 2-2: Display a Truth Table for the Logical Operators</p> <p>Program Control Statements: Input Characters from the Keyboard, The if Statement, Nested ifs, The if-else-if Ladder, The switch Statement, Nested switch Statements, The for Loop, Some Variations on the for Loop, Missing Pieces (The Infinite Loop), Loops with No Body, Declaring Loop Control Variables Inside the for Loop, The Enhanced for Loop, The while Loop, The do-while Loop, Use break to Exit a Loop, Use break as a Form of goto, Use continue, Nested Loops, Try This 3-1: Start Building a Java Help System,</p>	7	15%



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	Try This 3-2: Improve the Java Help System, Try This 3-3: Finish the Java Help System,		
2	Class Fundamentals Introducing Classes, Objects, and Methods: Class Fundamentals (The General Form of a Class, Defining a Class), How Objects Are Created, Reference Variables and Assignment, Methods (Adding a Method to the Vehicle Class), Returning from a Method, Returning a Value, Using Parameters (Adding a Parameterized Method to Vehicle), Constructors, Parameterized Constructors, Adding a Constructor to the Vehicle Class, The new Operator Revisited, Garbage Collection, The this Keyword, Try This 4-1: Creating a Help Class A Closer Look at Methods and Classes: Controlling Access to Class Members (Java's Access Modifiers), Pass Objects to Methods (How Arguments Are Passed), Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding static (Static Blocks), Introducing Nested and Inner Classes, Varargs: Variable-Length Arguments (Varargs Basics, Overloading Varargs Methods, Varargs and Ambiguity) Try This 6-1: Improving the Queue Class, Try This 6-2: Overloading the Queue Constructor, Try This 6-3: The Quicksort	10	25%
3	Inheritance Basics Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass Constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, When Are Constructors Executed?, Superclass References and Subclass Objects, Method Overriding, Overridden Methods Support Polymorphism, Why Overridden Methods? (Applying Method Overriding to TwoDShape), Using Abstract Classes, Using final, (final Prevents Overriding, final Prevents Inheritance, Using final with Data Members), The Object Class Try This 7-1: Extending the Vehicle Class Packages: Packages (Defining a Package, Finding Packages and CLASSPATH, A Short Package Example), Packages and Member Access (A Package Access Example), Understanding Protected	10	25%



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	<p>Members, Importing Packages, Java's Class Library Is Contained in Packages</p> <p>Interfaces: Interfaces, Implementing Interfaces, Using Interface References, Variables in Interfaces, Interfaces Can Be Extended, Default Interface Methods (Default Method Fundamentals, A More Practical Example of a Default Method, Multiple Inheritance Issues), Use static Methods in an Interface, Private Interface Methods, Final Thoughts on Packages and Interfaces, Try This 8-1: Creating a Queue Interface</p> <p>Exception Handling: The Exception Hierarchy, Exception Handling Fundamentals (Using try and catch, A Simple Exception Example), The Consequences of an Uncaught Exception (Exceptions Enable You to Handle Errors Gracefully), Using Multiple catch Statements, Catching Subclass Exceptions, Try Blocks Can Be Nested, Throwing an Exception (Rethrowing an Exception), A Closer Look at Throwable, Using finally, Using throws, Three Additional Exception Features, Java's Built-in Exceptions, Creating Exception Subclasses</p> <p>Try This 9-1: Adding Exceptions to the Queue Class</p>		
4	<p>Autoboxing, java.lang package</p> <p>Autoboxing, Type Wrappers, Autoboxing Fundamentals, Autoboxing and Methods, Autoboxing/Unboxing Occurs in Expressions</p> <p>Java.lang package (String, String Buffer, Comparable interface)</p> <p>The collection Framework: Introduction, Collection framework (Collection interface, list interface, set interface, sorted set interface), The collection class, Array list and Link list classes (maintaining the capacity and the link list class), iterating elements of collection (the list iterator interface), hash set and tree set classes</p>	8	15%
5	<p>Multi-Threading, Generic, I/O</p> <p>Multithreaded Programming Multithreading Fundamentals, The Thread Class and Runnable Interface, Creating a Thread, (One Improvement and Two Simple Variations), Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, Using Synchronized Methods, The synchronized Statement</p>	10	20%



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Try This 11-1: Extending Thread, Try This 11-2: Using the Main Thread, Generic: Generics Fundamentals, A Simple Generics Example, A Generic Class with Two Type Parameters, The General Form of a Generic Class), Using I/O: Java's I/O Is Built upon Streams, Byte Streams and Character Streams, The Byte Stream Classes, The Character Stream Classes, The Predefined Streams, Using the Byte Streams (Reading Console Input, Writing Console Output), Reading and Writing Files Using Byte Streams (Inputting from a File, Writing to a File), Automatically Closing a File, Reading and Writing Binary Data		
Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	70	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Textbook:

1. Herbert Schildt, Java™: A Beginner's Guide, 7th Edition
2. Hari Mohan Pandey, JAVA Programming, 978-8131733110, Pearson

Reference Books:

1. Pravin Jain, "The class of Java" Pearson Education, (2010).
2. Paul J. Deitel, Harvey M. Deitel, Java SE8 for Programmers, ISBN: 9789332539068, Pearson
3. Cay S Horstmann, Gary Cornell, "Core Java 2, Volume 1 – Fundamentals", Pearson Education (8th edition – 2008).
4. Ivor Horton's "Beginning Java 2" JDK 5 Edition, Wiley Computer Publishing, (2007).
5. Ken Arnold, James Gosling, David Holmes, "The Java Programming Language", Addison-Wesley Pearson Education (4th Edition – 2005).
6. Raj Kumar Buyya, S. Thamarai Selvi, & Xing Chen Chu, "Object-Oriented Programming with Java: Essentials & Applications", Tata McGraw Hill
7. Cay Horstmann, "Big Java", Wiley Computer publishing (2nd edition – 2006).



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8. Sharan Zakhour, Scott Hommel, Jacob Royal, Isaac Rabinovitch, Tom Risser, Mark Hoeber "The Java Tutorial", Addison-Wesley Pearson Education(4th Edition),
9. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, "The Java Language

Suggested Course Practical List:

1	Install the JDK (Download the JDK and install it.) <ul style="list-style-type: none">• Set path of the jdk/bin directory.• Create the java program• Compile and run the java program Write a simple "Hello World" java program, compilation, debugging, executing using java compiler and interpreter.
2	Write a program to pass Starting and Ending limit and print all prime numbers and Fibonacci numbers between this ranges.
3	Write a java program to check whether number is palindrome or not. Input: 528 Output: It is not palindromenumber Input: 545 Output: It is not palindrome number
4	Write a java program to print value of x^n . Input: $x=5$ Input: $n=3$ Output: 125
5	Write a java program to check Armstrong number. Input: 153 Output: Armstrong number Input: 22 Output: not Armstrong number
6	Write a program in Java to find minimum of three numbers using conditional operator.
7	Write a java program which should display maximum number of given 4 numbers.
8	Write a program in Java to multiply two matrix. Declare a class Matrix where 2D array is declared as instance variable and array should be initialized, within class.
9	Write a java program to create a class "Matrix" that would contain integer values having varied Numbers of columns for each row. Print row-wise sum of the integer values for each row.
10	Write a Java application which takes several command line arguments, which are supposed to be names of students and prints output as given below: (Suppose we enter 3 names then output should be as follows).. Number of arguments = 3 1. First Student Name is = Arun 2. Second Student Name is = Hiren 3. Third Student Name is = Hitesh
11	Write a Java application to count and display frequency of letters and digits from the String given by user as command-line argument.
12	Create a class "Student" that would contain enrollment No, name, and gender and marks as instance variables and count as static variable which stores the count of the objects; constructors and display(). Implement constructors to initialize instance variables. Also demonstrate constructor chaining. Create objects of class "Student" and displays all values of objects.



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13	Write a program in Java to demonstrate use of this keyword. Check whether this can access the Static variables of the class or not. [Refer class student in Q12 to perform the task]
14	Create a class “Rectangle” that would contain length and width as an instance variable and count as a static variable. Define constructors [constructor overloading (default, parameterized and copy)] to initialize variables of objects. Define methods to find area and to display variables’ value of objects which are created. [Note: define initializer block, static initializer block and the static variable and method. Also demonstrate the sequence of execution of initializer block and static initialize block]
15	Write a java program static block which will be executed before main () method in a Class.
16	Write programs in Java to use Wrapper class of each primitive data types.
17	Write a class “circle” with radius as data member and count the number of instances created using default constructor only. [Constructor Chaining]
18	Create a class “Vehicle” with instance variable vehicle_type. Inherit the class in a class called “Car” with instance model_type, company name etc. display the information of the vehicle by defining the display() in both super and sub class [Method Overriding]
19	Create a class “Account” containing accountNo, and balance as an instance variable. Derive the Account class into two classes named “Savings” and “Current”. The “Savings” class should contain instance variable named interestRate, and the “Current” class should contain instance variable called overdraftLimit. Define appropriate methods for all the classes to enable functionalities to check balance, deposit, and withdraw amount in Savings and Current account. [Ensure that the Account class cannot be instantiated.]
20	Write a program in Java in which a subclass constructor invokes the constructor of the super class and instantiate the values. [refer class Account and sub classes savingAccount and CurrentAccount in Q 19 for this task]
21	Write a program in Java to demonstrate the use of ' final ' keyword in the field declaration. How it is accessed using the objects.
22	Write a java program to illustrate how to access a hidden variable. Class A declares a static variable x . The class B extends A and declares an instance variable x . display() method in B displays both of these variables.
23	Describe abstract class called Shape which has three subclasses say Triangle , Rectangle , and Circle . Define one method area () in the abstract class and override this area () in these three subclasses to calculate for specific object i.e. area () of Triangle subclass should calculate area of triangle etc. Same for Rectangle and Circle
24	Write a java program to implement an interface called Exam with a method Pass (int mark) that returns a boolean. Write another interface called Classify with a method Division (int average) which returns a String. Write a class called Result which implements both Exam and Classify. The Pass method should return true if the mark is greater than or equal to 50 else false. The Division method must return “First” when the parameter average is 60 or more,



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	“Second” when average is 50 or more but below 60, “No division” when average is less than 50.
25	Assume that there are two packages, student and exam. A student package contains Student class and the exam package contains Result class. Write a program that generates mark sheet for students.
26	Define a class A in package apack. In class A, three variables are defined of access modifiers protected, private and public. Define class B in package bpack which extends A and write display method which accesses variables of class A. Define class C in package cpack which has one method display() in that create one object of class A and display its variables. Define class ProtectedDemo in package dpack in which write main () method. Create objects of class B and C and class display method for both these objects.
27	Write a java program to implement Generic class Number_1 for both data type int and float in java.
28	Write a java program to accept string to check whether it is in Upper or Lower case. After checking, case will be reversed.
29	Write a java program to use important methods of String class.
30	Write a program in Java to demonstrate use of final class, final variable and final method
31	Write a program in Java to develop user defined exception for 'Divide by Zero' error
32	Write a program in Java to demonstrate throw, throws, finally, multiple try block and multiple catch exception.
33	Write a small application in Java to develop Banking Application in which user deposits the amount Rs 1000.00 and then start withdrawing of Rs 400.00, Rs 300.00 and it throws exception "Not Sufficient Fund" when user withdraws Rs. 500 thereafter.
34	Write a program to write at least 10 objects of the Circle class in a File and to perform basic operations: adding, retrieving, updating, removing elements.
35	Write a program for Java Generics class for Sorting operations: 1. Sorting a list according to natural ordering of elements 2. Reversing sort order 3. Sorting a list whose elements of a custom type 4. Sorting a list using a Comparator. [desirable]
36	Write a program in Java to create, write, modify, read operations on a Text file.
37	Write a java program to illustrate use of standard input stream to read the user input.
38	Write a java program to checks the existence of a specified file.
39	Write a java program to create a file to the specified location.
40	Write a java program to demonstrate the way contents are read from a file.



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42	Write a java program to count the availability of text lines in the particular file. A file is read before counting lines of a particular file.
43	Write a generic method to count the number of elements in a collection that have a specific property (for example, odd integers, prime numbers, palindromes).
44	Write a generic method to exchange the positions of two different elements in an array.
Thread Programming	
1	Write a program to implement the concept of threading by extending “Thread” Class.
2	Write a program to implement the concept of threading by implementing “Runnable” Interface.
3.	Write a program that executes two threads. One thread displays “Thread1” every 2,000 milliseconds, and the other displays “Thread2” every 4,000 milliseconds.
4.	Write a program that executes two threads. One thread will print the even numbers and another thread will print odd numbers from 1 to 50.
5.	Write java program that create and runs following threads: a) print "A" 20 times b) print "B" 30 times c) print "C" 15 times
6.	Write a program in Java to demonstrate use of synchronization of threads when multiple threads are trying to update common variable for “Account” class.
The collection Framework	
1.	Develop a program to create Linked List for “Student” class objects references. “Student” class has std_id, std_name, Array of marks, total_marks. Calculate total_marks for all students of Linked List. Display Linked List and also display a particular student based on student name as a command line argument.
2.	Develop a program to create Array List for “Employee” class objects references. Employee class has emp_code, emp_name, basic_sal, gross_sal. Calculate gross_sal for all employees of Array List. Display Array List and also insert an employee object reference in a particular position (input) in Array List. Gross_sal=basic_sal+20% of basic_sal (MA)+30% of basic_sal(HRA)
3.	Develop a program to create Hash Map for “Customer” class objects references. Customer class has Bill_no, cust_mobile_no, Array of item_name, Array of item_unit_price, Array of item_count, total_price. Calculate total_price for all customers of Hash Map. Display Hash Map and also search particular customer’s bill based on customer mobile no. Key is mobile no.
4.	Sort “Student” Linked List (mentioned in Q:1) based on std_name using “Comparator” interface.



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Course / Subject Code :

Course / Subject Name : Object Oriented Programming using JAVA

Active Learning Assignment:

Consider any small application e.g. Library Management System having few transactions like Issue, Return, Renew and Report. Develop Java object oriented application programs and Present the application developed

CO- PO Mapping:

Semester - 1	Course Name : Object Oriented Programming using JAVA							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-
CO5	3	3	3	-	-	-	-	-
	3	3	3	-	-	-	-	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Web Technology Project

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Core Course

Prerequisite:	Basic computer knowledge.
Rationale:	<ul style="list-style-type: none">• The aim of the course is to provide knowledge of web as a tool in presenting information.• Understand basic web languages and its components.• Students can develop a dynamic webpage by the use of HTML, JavaScript and DHTML.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
CO1	Develop web pages using HTML and HTML5 tags and validators.	AP
CO2	Implement client side scripting using Javascript and apply styling using CSS in web pages.	CR
CO3	Develop navigation, events and controlling elements of Angular JS in web pages.	CR
CO4	Design dynamic web applications using PHP.	CR
CO5	Configure Laravel framework and develop database driven PHP web applications	CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Web Technology Project

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1	HTML, XHTML, HTML5 & DHTML Introduction: HTML, Tags and Attributes, HTML File Structure, Meta, Title, Body Common HTML Tags: Headings, Anchor, Links, Lists, Table, Frames, Forms XHTML: HTML Validator, Block and Inline Elements Introduction to HTML5 DHTML: Introduction to Dynamic Html	6	15
2.	CSS & JavaScript Page Designing with CSS: CSS Declarations, Using CSS, Sample CSS File, Selectors, Box Model Concept, Padding, Float and Clear, Z-Index, Websites Benefits of CSS Client-side Scripting: Introduction to JavaScript, Basic Syntax, Variables, Identifiers, DataTypes and Values, Scope, Literals, Reserved Words, Operators and Statements, Functions, Objects (Math, String, Date) Regular Expressions, DOM Event Handling	12	30
3.	Angular JS: Single page application: Single page application using AngularJS, Create a module, Define Simple controller Embedding AngularJS script in HTML, AngularJS's routine capability, \$routeProvider service from ngRoute, Navigating different pages, HTML DOM directives, ng-disabled, ng-show, ng-hide, ng-click, Modules (Application, Controller), Forms (Events, Data validation, ng-click)	8	10
	Introduction to PHP Introduction: Basic HTML syntax, Basic PHP Syntax, using SFTP, Testing your script, Sending text to browser, Using the PHP Manual, Sending HTML to the browser, Adding comments to Scripts, Basic debugging steps		



GUJARAT TECHNOLOGICAL UNIVERSITY

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Course / Subject Name: Web Technology Project

4.	<p>Variables: What Are Variables?, Variable Syntax, Types of Variables, Variable Values, Understanding Quotation Marks</p> <p>Form: Creating a Simple Form, Choosing a Form Method, Receiving Form Data in PHP, Displaying Errors, Error Reporting, Manually Sending Data to a Page</p> <p>Numbers: Creating the Form, Performing Arithmetic, Formatting Numbers, Understanding Precedence, Incrementing and Decrementing a Number, Creating Random Numbers</p> <p>Strings: Creating the HTML Form, Concatenating Strings, Handling Newlines, HTML and PHP, Encoding and Decoding Strings, Finding Substrings, Replacing Parts of a String</p> <p>Control Structures: Creating the HTML Form, The if Conditional, Validation Functions, Using else, More Operators, Using elseif The Switch Conditional, The for Loop</p>	6	15
5.	<p>Introduction to LARAVEL: Why Use a Framework? Why Laravel? Setting Up a Laravel Development Environment, An Introduction to Artisan, Basic Artisan commands, Writing custom artisan commands, calling artisan commands in Normal code, Tinker.</p> <p>Router and Controllers: Route Definitions, Route Groups, Views, Controllers, Route Model Binding, Route Caching, Form Method Spoofing, CSRF Protection, Redirects, Aborting the Request, Custom Responses</p> <p>Blade Template : Echoing Data, Control Structures (Conditionals, Loops, Or), Template Inheritance, View Composers and Service Injection, Custom Blade Directives Front End Components: Elixir, Pagination, Message Bags, String Helpers, Pluralization and localization</p> <p>Collecting and Validating User Data: Injecting a Request Object, Route Data, Uploaded Files, Validation, Form Requests, Eloquent Model Mass Assignment, {{versus {!! Auth Controller Database Eloquent: configuration, Migration, Seeding, Query Builder, Introduction to Eloquent, Eloquent Events User Authentication and Authorization : The User Model and Migration, Using the auth() Global Helper and the Auth Facade</p>	13	30
	Total	45	100



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Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Web Technology Project

References/Suggested Learning Resources:

Textbook:

1. M. Srinivasan, Web Technology: Theory and Practice, Pearson India
2. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP - BPB Publications
3. Jeremy McPeak, Paul Wilton, Beginning JavaScript Wrox Publication
4. Angular From Theory To Practice, Asim Hussain, Version 1.2.0, 2017-11-24
5. Larry Ullman, PHP for Web, fifth Edition, Pearson
6. Matt Stauffer, "LARAVEL Up and Running, A framework for building modern PHP Apps", O'REILLY , 3rd Indian Reprint (ISBN: 978-93-5213-485-4)

Reference Books:

1. Murach's HTML5 & CSS3", Zak Ruvalcaba & Anne Boehm
2. "JavaScript: The Definitive Guide", 6th Edition, David Flanagan, O'Reilly Media
3. "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, & Web Graphics", Jennifer Niederst Robbins, O'Rielly
4. "HTML5 Programming with JavaScript", John Paul Mueller, Wiley
5. "HTML5 & CSS3 for the Real World", Estelle Weyl, Louis Lazaris, Alexis Goldstein, Sitepoint
6. Julie C Meloni, "Sams Teach Yourself PHP, MySQL and Apache All in One" 4th edition, Pearson Education
7. Luke Welling, Laura Thomson , PHP and MySQL Web Development — Pearson
8. Mastering Web Application Development with AngularJS, Pawel Kozlowski Peter and Bacon Darwin, Packt Publishing
9. Martin Bean, "Laravel 5 Essentials", Packet Publishing, ISBN 978-1-78528-301-7
10. Fernando Monteiro, "Hands-On Full-Stack Web Development with Angular 6 and Laravel 5 ", Packt Publishing, ISBN 9781788833912

Suggested Course Practical List:

1. HTML Basics: Create a simple HTML document with headings, paragraphs, lists, links, images, and tables.
2. HTML Forms: Design a form with various input types and validate it using HTML5 attributes.
3. CSS Styling: Apply CSS to an HTML document to style text, borders, backgrounds, and layouts using the Box Model.
4. Responsive Design: Create a responsive webpage using CSS media queries.
5. JavaScript Basics: Write a JavaScript script to perform basic arithmetic operations and manipulate the DOM.
6. JavaScript Events: Implement event handling to create interactive elements on a webpage.



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Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Web Technology Project

7. Form Validation: Create a JavaScript-based form validation system.
8. AngularJS Application: Develop a single-page application (SPA) using AngularJS that includes a module, controller, and view.
9. AngularJS Directives: Use AngularJS directives such as ng-show, ng-hide, and ng-click in a sample application.
10. PHP Basics: Write a simple PHP script to process form data and display it on a webpage.
11. PHP Control Structures: Create a PHP script that uses if-else and switch-case statements for decision-making.
12. Database Connection with PHP: Connect a PHP script to a MySQL database and perform CRUD operations.
13. Laravel Setup: Set up a Laravel development environment and create a simple application using Artisan commands.
14. Laravel Routing and Controllers: Define routes and create controllers in a Laravel application.
15. Laravel Blade Templates: Develop a Laravel application using Blade templates to display dynamic content.

CO- PO Mapping:

Semester	Course Name : Web Technology Project							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	-	-	-	-	-
CO2	3	3	3	-	-	-	-	1
CO3	3	3	3	2	-	-	-	-
CO4	3	3	3	2	-	-	-	-
CO5	1	3	3	3	-	-	-	1
	2.6	2.8	2.8	2.3	-	-	-	1

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Basic Mathematics

w. e. f. Academic Year:	2024-25
Semester:	1
Category of the Course:	Non-Credit Compulsory Subject for the students who did not have mathematics at undergraduate level.

Prerequisite:	High school mathematics, Basic understanding of algebra and proficiency in problem-solving skills.
Rationale:	This course is designed to equip students with foundational knowledge across various disciplines. Starting with Set Theory & Fundamentals, students learn to manipulate sets and matrices, crucial for applications in database management and algorithms. Mathematical Logic builds on this by teaching rigorous reasoning and logical argument construction, skills vital for software development and formal verification. Integers and Counting deepen students' understanding of concepts like prime numbers and counting techniques, which are essential for cryptography and data science. Relations and Functions introduce students to modeling relationships and mappings applicable to network analysis and machine learning. Lastly, Graphs and Trees provide tools to analyze complex systems, preparing students to solve social network and data structure problems. This structured approach ensures students develop theoretical understanding and practical skills necessary for future academic and professional success in technology-driven fields.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Apply set theory concepts to solve problems involving set operations, describe sets using roster and set-builder notation, and manipulate matrices through various operations.	AP
02	Construct truth tables for logical expressions, apply DeMorgan's laws to simplify logical statements, and use mathematical induction to prove statements about integers.	AP
03	Calculate greatest common divisors (GCD) and least common multiples (LCM), convert between different numeral systems, and solve counting problems using permutations, combinations, and recurrence relations.	AP
04	Define and classify relations based on their properties, analyze functions for injectivity, surjectivity, and bijectivity, and apply composition and inverse operations to functions.	AP



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Basic Mathematics

05	Interpret and construct different types of graphs, analyze paths and cycles within graphs, identify and apply properties of trees, and perform tree traversals using various methods.	AP
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Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	P	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
0	2	2	0	0	50	50	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Unit 1: Set Theory & Fundamentals Set Theory Basic Concepts of Set Theory: Definition, Two Methods to Describe (Represent) Sets; Sets and Subsets, Operations on Sets, Algebraic Properties of Set Operations, The Addition Principle, Sequences: Introduction, Characteristic Functions, Strings and Regular Expressions Matrices: Representation of a Matrix; Equality of Matrices; Special Matrices: Rectangular / Square Matrices, Null (Zero) Matrix, Unit Matrix, Diagonal Matrices, Sum and Difference of 2 Matrices; Multiplication of 2 matrices; Transpose of a Matrix, Symmetric Matrices, Boolean Matrix Operations	5	15
2.	Unit 2: Mathematical Logic Introduction, Propositions and Logical Operations, Truth Tables; DeMorgans' Laws; Conditional Statements, Methods of Proof, Mathematical Induction, Mathematical Statements	7	25
3.	Unit 3: Integers and Counting Integers: Properties of Integers; Prime Number; Greatest Common Divisor (GCD); Relative Prime; Least Common Multiple (LCM); Representation of Integers in Computer; Decimal, Binary, Octal, and Hexadecimal Representation Counting: Permutations, Combinations, Pigeonhole Principle, Elements of Probability, Recurrence Relations	6	20
4.	Unit 4: Relations and Functions Relations: Definition, Binary Relation, Representation, Domain, Range, Universal Relation, Void Relation, Union, Intersection, and	8	25



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Course / Subject Code:

Course / Subject Name: Basic Mathematics

	<p>Complement Operations on Relations, Properties of Binary Relations in a Set: Reflexive, Symmetric, Transitive, Antisymmetric Relations, Relation Matrix and Graph of a Relation; Partition and Covering of a Set, Equivalence Relation, Equivalence Classes, Compatibility Relation, Maximum Compatibility Block, Composite Relation, Converse of a Relation, Transitive Closure of a Relation R in Set X</p> <p>Functions: Introduction & Definition, Argument, Co-domain, Range, Image, Value of a Function; Examples, Peano's Successor Function; Onto (surjective), Into, One-to-one (injective), Many- to-one, Bijective (one-to-one and onto); examples; Composition of Functions, examples; Inverse Function, Identity Map, Condition of a Function to be Invertible, examples; Inverse of Composite Functions, Properties of Composition of Functions; Binary and n-ary Operations as Mappings (functions), Properties of Binary Operations; Characteristic Function of a Set; Properties, examples; Hashing Functions: Division Method, and Mid-square Method, examples;</p> <p><i>Note: Proofs of Theorems are not required</i></p>		
5.	<p>Unit 5: Graphs and Trees</p> <p>Graphs: Introduction, Definition; Initial & Terminal Nodes, Adjacent Nodes; Directed Edge, Undirected Edge, Directed Graph (Digraph), Undirected Graph, Mixed Graph; Loop (Sling); Distinct Edges, Parallel Edges; Multi-graph, Simple Graph; Weighted Graph; Isolated Nodes, Null Graph; Isomorphic Graphs; In-degree, Out-degree, Total-degree; Subgraphs; Reflexive, Symmetric, Transitive Digraphs; Paths, Length of Path of a Graph; Simple Path (Edge Simple), Elementary Path (Node Simple), Cycle (Circuit), Simple Cycle, Elementary Cycle; Path of Minimum Length (Geodesic), Distance between Two Nodes, Triangle Inequality; Reachability, Reachable Set of a Node, Connected Graphs: Strongly, Unilaterally, Weakly Connected Graphs & Components;</p> <p>Trees: Introduction, Definition, Root, Branch Nodes, Leaf (Terminal Node); Different Representations of Trees; Forests, Subtrees; M-ary Tree, Full or Complete M-ary Tree; Binary Tree, Full (Complete) Binary Tree; Conversion of M-ary Tree to Binary Tree; Traversal of Binary Tree: Pre-order, In-order, and Post-order Traversal</p> <p><i>Note: Proofs of Theorems are not required</i></p>	4	15
	Total	30	100



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code:

Course / Subject Name: Basic Mathematics

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
5	10	85	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. J. P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill (2010) – only for Unit-5 (Graphs & Trees).
2. Bernard Kolmann & others, "Discrete Mathematical Structure", Pearson Education, Sixth Edition
3. K. H. Rosen, "Discrete Mathematics and its applications", Tata McGraw-Hill, 6th edition
4. D. S. Malik & M. K. Sen, "Discrete Mathematics", Cengage Learning (2004)
5. Edgar G. Goodaire, Michael M. Parmenter. "Discrete Mathematics with Graph Theory", PHI
6. Ralph P Grimaldi & B V Ramana, "Discrete and Combinatorial mathematics: An Applied Introduction", Pearson Education, 5th Edition (2018)
7. J. P. Tremblay and W. K. Grassman. "Logic and Discrete Mathematics", Pearson Education

(b) Open-source software and website:

1. <https://www.scilab.org/> (This is an opensource numerical and mathematical simulation tool, students may be given some exercise on using this tool to solve the problems)

Suggested Course Tutorial List:

Following tutorial assignments in each unit should be planned

Unit 1: Set Theory & Fundamentals

1.1 Basic Concepts of Set Theory

- Tutorial Assignments: Solve problems on set operations and properties

1.2 Sequences

- Tutorial Assignments: Analyze given sequences and regular expressions

1.3 Matrices

- Tutorial Assignments: Homework: Solve problems involving matrix operations

Unit 2: Mathematical Logic

2.1 Introduction to Mathematical Logic

- Tutorial Assignments: Solve logic problems using truth tables and proofs

Unit 3: Integers and Counting



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3.1 Integers

- Tutorial Assignments: Solve problems on prime numbers and integer representations

3.2 Counting

- Tutorial Assignments: Solve problems involving permutations, combinations, and probability

Unit 4: Relations and Functions

4.1 Relations

- Tutorial Assignments: Solve problems involving binary relations and their properties

4.2 Functions

- Tutorial Assignments: Solve problems on function composition and inversion

Unit 5: Graphs and Trees

5.1 Graphs

- Tutorial Assignments: Solve problems involving graph properties and paths

5.2 Trees

Tutorial Assignments: Solve problems involving tree traversal and representation

Tips for Effective Tutorials

- **Use multimedia:** Incorporate videos, animations, and interactive tools to explain complex concepts.
- **Encourage participation:** Use discussion forums, peer reviews, and group projects to engage students.
- **Provide feedback:** Offer constructive feedback on assignments and activities to help students improve.

Suggested Project List:

Form groups of students. Each group consists of two students. Ask them to write C/C++ program on any two projects from the list given below –

Unit 1: Set Theory & Fundamentals

Project 1: Set Operations

- **Description:** Create a program to perform various set operations (union, intersection, difference, complement) on sets represented as arrays.
- **Key Concepts:** Arrays, functions, set operations.

Project 2: Matrix Operations

- **Description:** Develop a matrix calculator that can perform operations such as addition, subtraction, multiplication, and transpose on matrices.
- **Key Concepts:** 2D arrays, nested loops, functions for matrix operations.



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Course / Subject Code:

Course / Subject Name: Basic Mathematics

Unit 2: Mathematical Logic

Project 3: Truth Table Generator

- **Description:** Write a program that generates the truth table for given logical expressions.
- **Key Concepts:** Logical operators, loops, conditionals.

Project 4: Proof Verification using Logical Operations

- **Description:** Implement a program to verify simple logical proofs and conditional statements.
- **Key Concepts:** Logical operators, functions, conditionals.

Unit 3: Integers and Counting

Project 5: Number Conversion Tool

- **Description:** Create a tool that converts numbers between different bases (decimal, binary, octal, hexadecimal).
- **Key Concepts:** Loops, conditionals, arrays, string manipulation.

Project 6: Prime Number Finder

- **Description:** Write a program to find all prime numbers up to a given number using the Sieve of Eratosthenes algorithm.
- **Key Concepts:** Arrays, loops, functions.

Project 7: Permutations and Combinations Calculator

- **Description:** Develop a program to calculate permutations and combinations for given values of n and r.
- **Key Concepts:** Recursion, loops, functions, factorial calculation.

Unit 4: Relations and Functions

Project 8: Binary Relation Representation

- **Description:** Implement a program to represent and manipulate binary relations using matrices and graphs.
- **Key Concepts:** 2D arrays, graph representation, matrix operations.

Project 9: Function Composition and Inversion

- **Description:** Create a program to perform composition and inversion of mathematical functions represented as arrays or mappings.
- **Key Concepts:** Arrays, functions, recursion.

Unit 5: Graphs and Trees

Project 10: Graph Traversal Algorithms

- **Description:** Write a program to perform depth-first search (DFS) and breadth-first search (BFS) on a graph.



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Course / Subject Name: Basic Mathematics

- **Key Concepts:** Graph representation using adjacency matrix/list, recursion, queues, and stacks.

Project 11: Binary Tree Operations

- **Description:** Implement a binary tree with functionalities such as insertion, deletion, and traversal (in-order, pre-order, post-order).
- **Key Concepts:** Structures, pointers, recursion.

Project 12: Shortest Path Finder

- **Description:** Create a program to find the shortest path in a weighted graph using Dijkstra's algorithm.
- **Key Concepts:** Graph representation, priority queues, algorithms.

CO- PO Mapping:

Semester ____	Course Name : Basic Mathematics							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	-	-	1	-	-	-	-
CO2	2	-	-	1	-	-	-	-
CO3	2	-	-	1	-	-	-	-
CO4	3	-	-	1	-	-	-	-
CO5	1	-	-	1	-	-	-	-
	1.8	-	-	1	-	-	-	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.
