Revised NEP Syllabus: B.Sc[PMCs] for 2026-2027

Programme: B.Sc PMCs

Subject: Computer Science

Semester	Course Code	Title	Theory/Practical	Credit L:T:P	Hours / Week	Maximum Marks			Total Marks	Exam Duration in Hours
						CIE		SEE		
						C1	C2	C3		
I	HMA280	Computer Concepts and Problem-Solving using C++	Theory	3:0:0	3	10	10	80	100	3
	HMA280P	Computer Basics and Programming in C++	Practical	0:0:2	4	05	05	40	50	3
II	HMB280	Data Structures	Theory	3:0:0	3	10	10	80	100	3
	HMB280P	Data Structures using C++	Practical	0:0:2	4	05	05	40	50	3

****Total Credits (Theory and Practical): (06+08=14)**

Programme Name: BSc	**Semester:I**
Course Title: Computer Concepts and Problem solving using C++	
Course Code: HMA210	**No of credits: 03(3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1. Understand the basics of computer.
CO2. Understand problem-solving strategies and techniques.
CO3. Describe the Object-Oriented Programming principles and concepts.
CO4. Understand of the syntax and semantics of the C++.

CO-PO Mapping Matrix

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1.	**3**	2	–	–	2	1	–	–	–	2	–	–
CO2.	2	**3**	–	2	2	**3**	2	–	–	2	1	1
CO3.	**3**	2	–	–	2	2	1	1	–	2	2	–
CO4.	**3**	2	–	–	**3**	2	–	1	–	**3**	1	–

Course Contents	Hours
Unit-1 **Introduction To Computers:** Definition And Characteristics Of Computers, Brief History Of Computers, Classification Of Computers Based On Size And Processing Ability. Applications Of Computers. **Computer Architecture:** CPU, ALU, Control Unit, Registers, Cache Memory, RAM, ROM, Input/output Components, Buses, Ports. Hardware And Software: System Software [Operating System, Interpreters], Application Software. Languages Of Computer, ASCII And EBCDIC, Computer Threats And Safety Measurements.	11
Unit-2 **Problem Solving Techniques:** Problem, Definition, Analysis, Design Tools 11 [Algorithm & Flow Chart], Coding, Testing, Maintenance. Basics Of Algorithm Hours Analysis: Time Complexity, Space Complexity, Asymptotic Notations. **Basic Programming Concepts:** Tokens Of Programming Language, Identifier, Constant, Variable, Data Types, And Operators. Introduction To Programming Concepts. Comparison Of POP And OOP.	11
Unit-3 **Introduction To C++:** Overview Of Programming Languages, History and Features of C++, Structure of C++ Program, Data Types In C++. Control Structures: Decision Making: If, If-Else, Nested If, Switch Statement. Looping: While, Do-While, For. Unconditional Statements: Break And Continue Statements. **Access Specifiers:** Public, Private, Protected. Pointers In C++.	11

Unit 4 **Objects, Classes:** Base And Derived Classes, Data Encapsulation, Data Abstraction, Friend Function, Inheritance: Single, Multiple, Multilevel, Hierarchical. **Polymorphism:** Function Overloading, Operator Overloading, Virtual Functions. **Constructors And Destructors:** Exception Handling.	11

Reference:

1. "Programming: Principles and Practice Using C++" by Bjarne Stroustrup.
2. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo.
3. "Object-Oriented Programming with C++" by E. Balagurusamy
4. "Problem Solving and Object-Oriented Programming with C++" by Tanenbaum and Mukherjee:

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: BSc	**Semester: I**
Course Title: Computer Basics and Programming in C++ **Lab**	
Course Code: HMA210P	**No of credits: 02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1. Illustrate the hardware components of Computer.
CO2. Use Open-Source Office tools.
CO3. Demonstrate simple programming skills through C++ programming language.

CO-PO Mapping Matrix

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1.	**3**	2	–	–	2	1	–	1	–	2	–	–
CO2.	2	1	–	–	**3**	1	–	**3**	1	**3**	2	1
CO3.	**3**	**3**	–	1	**3**	2	1	1	–	**3**	2	1

Laboratory Program List

PART -A

1. Demonstration of Desktop computer Hardware components.
2. Demonstration of Word Processor software [Open-Office].
3. Demonstration of Spreadsheet software [Open-Office].
4. Demonstration of Presentation software [Open-Office].
5. C++ program to print user name.
6. C++ program to swap 2 numbers.
7. C++ Program to Find Largest Among 3 Numbers
8. C++ program to perform arithmetic operations.

PART-B

1. C++ Program to Print Multiplication Table of a Number
2. C++ Program to Reverse a Number
3. C++ Program to Check Whether a Number is a Palindrome or Not 4. C++ Program to Create a Class and Object
5. C++ program for single inheritance.
6. C++ program to demonstrate multi-level inheritance.
7. C++ program to demonstrate operator overloading.
8. C++ Program by using Pointers.

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written programs	5
Viva Voce		5
Total		**40**

Programme Name: BSc	**Semester: II**
Course Title: Data Structures	
Course Code: HMB210	**No of credits: 03(3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1. Understand the basics of Data Structures.
CO2. Identify the appropriate data structures and algorithms for solving real world problems.
CO3. Understand the practical applications of Tree and Graph.

CO-PO Mapping Matrix:

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	2	–	–	2	1	–	–	–	2	–	–
CO2	2	**3**	–	2	**3**	**3**	2	1	–	2	2	1
CO3	**3**	**3**	–	2	**3**	2	2	1	–	2	2	1

Course Content	Hours
Unit-1 **Introduction:** Data Structure Definition, Basic Terminology and Concepts, Importance of Data Structures In Programming. Classification of Data Structures. Primitive Data Structures, Non-Primitive Data Structures. **Arrays:** Declaration, Initialization, Accessing Elements, Multidimensional Arrays. C++ Strings, String Handling Functions, Applications of Arrays and Strings. **Stack:** Definition, Memory Representation, Algorithms for Stack Operations (Push, Pop), Applications of Stack. **Queue:** Definition, Memory Representation, Linear Queue, Circular Queue, Enqueue, Dequeue. Applications Of Queue.	11
Unit-2 **Linked Lists**: Definition, Types. **Singly Linked List:** Implementation, Insertion [At the Beginning], Deletion [At the End]. **Doubly Linked List:** Memory Representation of Singly Linked List and Doubly Linked Lists. Applications of Linked List.	11
Unit-3 **Tree**: Definition, Memory Representation Using Array and Linked List. **Binary Tree:** Definition, Traversal Algorithms [Pre-Order, In-Order, Post-Order], Construction of Tree from In-Order and Pre-Order, In-Order and Post-Order. Binary Search Trees: Insertion of a Node, Deletion of A Node. **Advanced Tree Structures AVL And B-Trees:** Definition and Applications.	11

Unit – 4 **Graph:** Definition, Memory Representation of Graph. Adjacency Matrix, Adjacency List. Graph Traversal Algorithms: Breadth-First Search (BFS), Depth-First Search (DFS). **Sorting Techniques:** Bubble Sort, Selection Sort [Algorithm, Time & Space Complexity]. **Searching Techniques:** Linear And Binary Search Sort [Algorithm, Time & Space Complexity]. **Heap:** Heap Operations and Applications.	11

Reference Books:

1. Data Structures through C++ (4th Edition) Yashvant Kanetkar.
2. Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss.
3. Data structure and Algorithms using C++ by Sachi Nandan Mohanty, Pabitra Kumar Tripathy.
4. Data Structures and Algorithms in C++, Second Edition by Adam Drozdek.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: BSc	**Semester: II**
Course Title: Data Structures using C++	
Course Code: HMB210P	**No of credits: 02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1. Implement data structures using C++.
CO2. Demonstrate searching and sorting techniques using ++.
CO3. Demonstrate simple programming skills through C++ programming language.

CO-PO Mapping Matrix:

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	–	2	3	2	2	1	–	3	2	1
CO2	2	3	–	2	3	3	2	1	–	2	2	1
CO3	3	3	–	1	3	2	1	1	–	3	2	1

Laboratory Program List

Part A:

1. C++ program to find GCD of two numbers.
2. C++ program to implement Tower of Hanoi.
3. C++ program to print Fibonacci series.
4. C++ program to find largest and smallest element in an array.
5. C++ program to perform stack operations.
6. C++ program to perform Linear queue operations
7. C++ program to insert a node at the beginning of a singly linked list.
8. C++ program to delete a node at the end of a singly linked list.

Part B:

1. C++ program to construct a binary search tree
2. C++ program for Binary Tree traversal.
3. C++ program to implement DFS
4. C++ program to implement BFS
5. C++ Program to Sort an Array (Selection Sort)
6. C++ Program to Sort an Array (Bubble Sort)
7. C++ Program to perform Linear Search of an Element in an Array.
8. C++ Program to perform Binary Search of an Element in an Array.

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written programs	5
Viva Voce		5
Total		**40**

Question paper pattern:

Part-A

Answer any 10 out of 12 Questions (3 Questions drawn from each unit). Each question carries 2 Marks.

(10 X 2 =20)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

Part-B

Answer all the Questions. Each question carries 15 Marks. (4 X 15 =60)
(Each question with internal choice and with maximum of 3 sub questions)

13. a)

OR

13. b)

14. a)

OR

14. b)

15. a)

OR

15. b)

16. a)

OR

16. b)

Revised NEP Syllabus: B.Sc[PMCs] for 2026-2027

Programme: B.Sc PMCs

Subject: Computer Science

Semester	Course Code	Title	Theory/Practical	Credit L:T:P	Hours / Week	Maximum Marks			Total Marks	Exam Duration in Hours
						CIE		SEE		
						C1	C2	C3		
III	HMC280	Data Base Management System	Theory	3-0-0	03	10	10	80	100	3
	HMC280P	DBMS Lab	Practical	0-0-2	04	05	05	40	50	3
	HMC282	Software Engineering	Theory (Elective 1)	3-0-0	03	10	10	80	100	3
	HMC284	E-Commerce and E- Governance	Theory (Elective 2)	0-0-2	02	05	05	40	50	3
IV	HMD280	Object Oriented Programming with Java	Theory	3-0-0	03	10	10	80	100	3
	HMD280P	Java Lab	Practical	0-0-2	04	05	05	40	50	3
	HMD284	Software Testing	Theory (Elective 1)	3-0-0	03	10	10	80	100	3
	HMD256	Digital Marketing	Theory (Compulsory Paper)	0-0-2	02	05	05	40	50	3

****Total Credits (Theory and Practical): (06+06=12)**

Programme Name: BSc	**Semester: III**
Course Title: Title: Data Base Management System	
Course Code: HMC280	**No of credits: 03(3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1: Understand basic concepts of databases, data models, and ER diagrams.
CO2: Apply relational algebra and SQL to query and manipulate data.
CO3: Analyze database normalization to improve design and remove anomalies.
CO4: Evaluate transaction management and database security features.

CO-PO Mapping Matrix

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	–	**3**	1	–	1	–	**3**	1	–
CO2	**3**	**3**	–	2	**3**	**3**	2	1	–	**3**	2	1
CO3	**3**	**3**	–	**3**	**3**	**3**	2	1	–	**3**	2	1
CO4	2	**3**	–	**3**	**3**	**3**	2	2	**3**	**3**	2	2

Content	**Hours**
Unit-1 **Introduction to Databases**: Definition of Data, Database, and DBMS, Overview of Database, Applications, Advantages and Disadvantages of DBMS, Roles of Database Users and Administrators. **Data Models:** Introduction to Data Models, Types of Data Models (Hierarchical, Network, Relational, Object-oriented), Importance of Data Models in DBMS. **Database Design**: Keys: Primary Key, Candidate Key, Super Key, Foreign Key, Composite Key, Alternate Key, Unique Key, Surrogate Key, Constraints in a table: Primary Key, Foreign Key, Unique Key, NOT NULL, CHECK, Entity-Relationship (ER) Model, Entities and Entity Sets, Attributes and Relationships, ER Diagrams, Key Constraints and Weak Entity Sets, Extended ER Features, Introduction to the Relational Model and Relational Schema.	11

Unit-2 **Relational Algebra**: Introduction to Relational Algebra, **Operations:** Selection, Projection, Set Operations, Join Operations and Division. **Structured Query Language (SQL):** SQL Basics: DDL and DML, Aggregate Functions (Min(), Max(), Sum(), Avg(), Count ()), Logical operators (AND, OR, NOT), Predicates (Like, Between, Alias, Distinct), Clauses (Group By, Having, Order by, top/limit).	11
Unit-3 **SQL Joins and Views:** Inner Join, Natural Join, Full Outer Join, Left Outer Join, right outer Join, Equi Join, Definition of View, creating a View, Managing Views (Listing, Updating, Deleting). **Normalization**: Anomalies in relational database design. Functional dependencies - Axioms. Decomposition, Transitive Dependency. **Data Normalization:** First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	11
Unit-4 **Query Processing Transaction Management:** Introduction Transaction Processing, Single user & multiuser systems. **Transactions**: read & write operations. **Need of concurrency control:** The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of Transactions. Storage of Database, File Operations Database Security. **Stored Procedure:** definition, create procedure, stored procedure with one parameter, stored procedure with multiple parameters	11

Text Books:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7thEdition, Pearson.

Reference Books:

1. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
2. Introduction to Database System, C J Date, Pearson, 1999.
3. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill,
4. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: BSc	**Semester: III**
Course Title: Title: Data Base Management System LAb	
Course Code: HMC280P	**No of credits: 02 (0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1: Execute single-line SQL queries and apply group functions effectively.
CO2: Perform database operations using DDL, DML, DCL, and TCL commands.
CO3: Implement advanced SQL concepts like nested queries and join operations.
CO4: Create views and apply table-level locking mechanisms for data control.

CO-PO Mapping Matrix:

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	–	2	**3**	2	1	1	–	**3**	2	1
CO2	**3**	**3**	–	2	**3**	**3**	2	1	1	**3**	2	1
CO3	**3**	**3**	–	**3**	**3**	**3**	2	1	–	**3**	2	1
CO4	2	**3**	–	**3**	**3**	**3**	2	2	**3**	**3**	2	2

Laboratory Program List

Part A:

Activity 1: Database: Student (DDL, DML Statements)

Table: Student

Name	**Reg. No**	**Class**	**Major**
Smith	17	1	CS
Brown	8	2	CS

Table: Course

Course Name	**Course Number**	**Credit Hours**	**Department**
Introduction to Computer Science	CS1310	4	CS
Data Structure	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database Management System	CS3380	3	CS

Table: Section

Section Identifier	Course Number	Year	Instructor
85	MATH2410	98	King
92	CS1310	98	Andreson
102	CS3320	99	Knuth
112	MATH2410	99	Chang
119	CS1310	99	Andreson
135	CS3380	99	Stone

Table: Grade_Report

Reg. No	Section Identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

Queries

1. Create Table Using create statement.
2. Insert rows into individual Tables using insert statement.
3. Alter table section add new field section and update the records
4. Delete brown's grade report.
5. Drop the table section.

Activity 2: (Select clause, Arithmetic Operators)

Database: Employee

Create the following tables and insert tuples with suitable constraints.

Table: EMPLOYEE

EMPID	FIRSTNAME	LASTNAME	Hire Date	ADDRESS	CITY
1001	George	Smith	11-May-06	83 First Street	Paris
1002	Mary	Jones	25-Feb-08	842 Vine Ave	Losantiville
1012	Sam	Tones	12-Sep-05	33 Elm St.	Paris
1015	Peter	Thompson	19-Dec-06	11 Red Road	Paris
1016	Sarath	Sharma	22-Aug-07	440 MG Road	New Delhi
1020	Monika	Gupta	07-Jun-08	9 Bandra	Mumbai

Table: EMPSALARY

EMPID	SALARY	BENEFITS	DESIGNATION
1001	10000	3000	Manager
002	8000	1200	Salesman
1012	20000	5000	Director
1015	6500	1300	Clerk
1016	6000	1000	Clerk
1020	8000	1200	Salesman

Queries

1. Display FIRSTNAME, LASTNAME, ADDRESS, and CITY of all employees living in PARIS
2. Display the content of the employee table in descending order of FIRSTNAME
3. Select FIRSTNAME and SALARY of salesmen
4. Display the FIRSTNAME, LASTNAME, and TOTAL SALARY of all employees where TOTAL SALARY = SALARY + BENEFITS
5. Count the number of distinct DESIGNATIONs from EMPSALARY
6. List the employees whose names have exactly 6 characters
7. Add a new column PHONE_NO to the EMPLOYEE table and update the records
8. List employee names who have joined before 15-Jun-08 and after 16-Jun-07
9. Generate salary slip with Name, Salary, Benefits, HRA=50%, DA=30%, PF=12%, and calculate gross salary. Order by gross salary in descending order.

Activity 3: (Logical, Relational Operators)

Database: Library

Create the following tables and insert tuples with suitable constraints.

Table: Books

Book_Id	Book_Name	Author_Name	Publishers	Price	Type	Quantity
C0001	The Klone and I	Lata Kappor	EPP	355	Novel	5
F0001	The Tears	William Hopkins	First Publ	650	Fiction	20
T0001	My First C++	Brain & Brooke	First Publ	350	Text	10
T0002	C++ Brainwork's	A.W. Rossaine	TDH	350	Text	15
F0002	Thunderbolts	Ana Roberts	First Publ	750	Fiction	50

Table: Issued

Book_Id	Quantity_Issued
T0001	4
C0001	5
F0001	2
T0002	5
F0002	8

Queries

1. To show Book name, Author name and price of books of First Publ. publisher.
2. Display Book id, Book name and publisher of books having quantity more than 8 and price less than 500.
3. Select Book id, book name, author name of books which is published by other than ERP publishers and price between 300 to 700.
4. Generate a Bill with Book_id, Book_name, Publisher, Price, Quantity, 4% of VAT "Total".
5. Display book details with book id"s C0001, F0001, T0002, F0002 (Hint: use IN operator).
6. Display Book list other than, type Novel and Fiction.
7. Display book details with author name starts with letter "A".
8. Display book details with author name starts with letter "T" and ends with "S".
9. Select Book_Id, Book_Name, Author Name , Quantity Issued where Books.Books_Id = Issued.Book_Id.
10. List the book_name, Author_name, Price. In ascending order of Book_name and then on descending order of price.

Activity 4: (Date Functions)

Database: Lab

Create Following table and insert tuples with suitable constraints.

Table: Equipment Details

No.	Item Name	Cost Per Item	Quantity	Date of Purchase	Warranty	Operational
1	Computer	30000	9	21/5/07	2	7
2	Printer	5000	3	21/5/06	4	2
3	Scanner	8000	1	29/8/08	3	1
4	Camera	7000	2	13/6/05	1	2
5	UPS	15000	5	21/5/08	1	4
6	Hub	8000	1	31/10/08	2	1
7	Plotter	25000	2	11/1/09	2	2

Queries

1. To select the ItemName purchase before 31/10/07.
2. Extend the warranty of each item by 6 months.
3. Display ItemName, Dateof purchase and number of months between purchase date and present date.
4. To list the ItemName in ascending order of the date of purchase where quantity is more than 3.
5. To count the number, average of costperitem of items purchased before 1/1/08.
6. To display the minimum warranty, maximum warranty period.
7. To Display the day of the date, month, year of purchase in characters.
8. To round of the warranty period to month and year format.
9. To display the next Sunday from the date "07-JUN-96".
10. To list the ItemName, which are within the warranty period till present date.

Activity 5: Database: Games

Create the following tables and insert tuples with suitable constraints.

Table: GAMES

GCode	GameName	Number	PrizeMoney	Date
101	CaromBoard	2	5000	23-jan-2021
102	Badminton	2	12000	12-dec-2023
103	TableTennis	4	8000	14-feb-2024
104	Chess	2	9000	01-jan-2024
105	LawnTennis	4	25000	19-mar-2024

Table: PLAYER

PCode	Name	GCode
1	Arjun	101
2	Ravi	105
3	Jignesh	104
4	Nihir	103
5	Sohil	104
6	Bharat	104

- To display the details of those games whose name starts from character ‘c’
- To display details of those game which are having Prize Money more than 8000.
- To display the details of the game which is played in the month of January
- To display the name of players who plays Carom Board.
- To display the name of the player in ascending order who play the games chess.
- To display the details of the game which has maximum prize money

Activity 6:

Database: Employee

Create the following tables and insert tuples with suitable constraints.

Table: EMPLOYEE

W_ID	FIRSTNAME	LASTNAME	CITY
102	SAM	TONES	PARIS
105	SARAH	ACKERMAN	NEW YORK
144	MANILA	SENGUPTA	NEW DELHI
210	GEORGE	SMITH	HOWARD
255	MARY	JONES	HUSTON
300	ROBERT	SAMUEL	WASHINGTON
335	HENRY	WILLIAMS	BOSTON
400	RONNY	LEE	NEW YORK
451	PAT	THOMPSON	PARIS

Table: DESIG

W_ID	SALARY	BENEFITS	DESIGNATION
102	75000	15000	MANAGER
105	85000	25000	DIRECTOR
144	70000	15000	MANAGER
210	75000	12500	MANAGER
255	50000	12000	CLERK
300	45000	10000	CLERK
335	40000	10000	CLERK
400	32000	7500	SALESMAN
451	28000	7500	SALESMAN

- Display FirstName and City of Employee having salary between 50,000 and 90,000
- Display details of Employees who are from “PARIS” city.
- Increase the benefits of employee having W_ID = 210 by 500.
- Count number of employees whose name starts from character ‘S’.
- Display maximum salary of desig
- Display first name having designation as manager and employee w_id=design w_id
- Display the number of distinct designation

Part B:

Activity 7: (Numeric, character functions).
Use Functions for the following.

1. Find the mod of 165,16.
2. Find Square Root of 5000.
3. Truncate the value 128.3285 to 2 and -1 decimal places
4. Round the value 92.7683 to 2 and -1 decimal places.
5. Convert the string ‘Department’ to uppercase and lowercase.
6. Display your address convert the first character of each word to uppercase and rest are in lowercase.
7. Combine your first name and last name under the title Full name.
8. A) Take a string length maximum of 15 displays your name to the left. The remaining space should be filled with '*'.
9. Take a string length maximum of 20 displays your name to the right. The remaining space should be filled with '#'.
10. Find the length of the string ‘JSS College, Mysore’.
11. Display substring ‘BASE’ from ‘DATABASE’.
12. Display the position of the first occurrence of character ‘o’ in Position and Length.
13. Replace string Database with Data type.
14. Display the ASCII value of ‘ ’ (Space).
15. Display the Character equivalent of 42.

Activity 8: Database: subject

Create the following table and insert tuples with suitable constraints.

Table: Physics

Regno	Name	Year	Combination
AJ00325	Ashwin	First	PCM
AJ00225	Swaroop	Second	PMCs
AJ00385	Sarika	Third	PME
AJ00388	Hamsa	First	PMCs

Table: Computer Science

Regno	Name	Year	Combination
AJ00225	Swaroop	Second	PMCs
AJ00296	Tejas	Second	BCA
AJ00112	Geetha	First	BCA
AJ00388	Hamsa	First	PMCs

Queries

1. Select all students from Physics and Computer Science.
2. Select student common in Physics and Computer Science.
3. Display all student details who are studying in the second year.
4. Display students who are studying both Physics and Computer Science in the second year.
5. Display the students studying only Physics.
6. Display the students studying only Computer Science.
7. Select all students having PMCs combination.
8. Select all students having BCA combination.
9. Select all students studying in the third year.
10. Rename table Computer Science to CS.

Activity 9: (group by, having clause)

Database: Bank system

Create the following table and insert tuples with suitable constraints.

Table: Account

Account_No	Cust_Name	Branch_ID
AE0012856	Reena	SB002
AE1185698	Akhil	SB001
AE1203996	Daniel	SB004
AE1225889	Roy	SB002
AE8532166	Sowparnika	SB003
AE8552266	Anil	SB003
AE1003996	Saathwik	SB004
AE1100996	Swarna	SB002

Table: Branch

Branch_ID	Branch_Name	Branch_City
SB001	Malleshwaram	Bangalore
SB002	MG Road	Bangalore
SB003	MG Road	Mysore
SB004	Jayanagar	Mysore

Table: Depositor

Account_No	Branch_ID	Balance
AE0012856	SB002	12000
AE1203996	SB004	58900
AE8532166	SB003	40000
AE1225889	SB002	150000

Table: Loan

Account_No	Branch_ID	Balance
AE1185698	SB001	102000
AE8552266	SB003	40000
AE1003996	SB004	15000
AE1100996	SB002	100000

Queries

1. Display the total number of accounts present in each branch.
2. Display the total loan amount in each branch.
3. Display the total deposited amount in each branch in descending order.
4. Display the maximum and minimum loan amount present in each city.
5. Display the average amount deposited in each branch for each city.
6. Display the maximum loan amount in each branch where the balance is more than 25000.
7. Display the total number of accounts present in each city.
8. Display all customer details in ascending order of branch ID.
9. Update the balance to 26000 where Account_No = AE1003996.
10. Display customer names with their branch name.

Activity 10:

Database: Books

Create the following tables and insert tuples with suitable constraints.

Table: BOOKS

Book_Id	Book_Name	Author_Name	Publishers	Price	Type	Quantity
C01	Fast Cook	Lata Kapoor	EPB	355	Cookery	5
F01	The Tears	William Hopkins	First	650	Fiction	20
T01	My C++	Brain & Brooke	FPB	350	Text	10
T02	C++ Brain	A.W.Rossaine	TDH	350	Text	15
F02	Thuderbolts	Anna Roberts	First	750	Fiction	50

Table: ISSUED

Book_Id	Quantity_Issued
T01	4
C01	5
F01	2
C01	6
T02	3

1. To list the names from books of Text type.
2. To display the names and price from books in ascending order of their price.
3. To increase the price of all books of EPB publishers by 50.
4. To display the Book Name, Quantity_Issued and Price for all books of EPB publishers.

5. To display maximum price from books.
6. To display the count of distinct publishers from books where price is greater than or equal to 400
7. To display book_name, author_name from books where publishers is first
8. To display minimum price from books where type is text

Activity 11:

Database: LAb

Create the following tables and insert tuples with suitable constraints.

Table: L**AB**

ItemNo	ItemName	CostPerItem	Quantity	Dateofpurchase	Warranty	Operational
1	Computer	60000	9	21/5/2016	2	7
2	Printer	15000	3	21/5/2017	4	2
3	Scanner	18000	4	29/8/2016	3	1
4	Camera	21000	2	13/10/2017	1	1
5	Switch	8000	1	31/10/2018	2	1
6	UPS	5000	5	21/5/2017	1	4
7	Router	25000	2	11/1/2018	2	5

(i) To display all the itemName whose name starts with "C".
(ii) To select the ItemName,which are within the Warranty period till present date.
(iii)To list the ItemName in ascending order of the date of purchase where quantity is more than 3.
(iv)To display minimum of distinct quantity
(v) To display maximum of warranty
(vi) To display sum of costperitem
(vii) To display sum of costperitem whose name starts with 'S' and Quantity >2
Update costperitem to 500 of the item which is purchased in the year 2017 and warranty>2

Activity 12: (views)

Database: Railway Reservation System.

Create the following table and insert tuples with suitable constraints.

Table: Train Details

Train_No	Train_Name	Start_Place	Destination
RJD16	Rajdhani Express	Bangalore	Mumbai
UDE04	Udhyan Express	Chennai	Hyderabad
KKE55	Karnataka Express	Bangalore	Chennai
CSE3	Shivaji Express	Coimbatore	Bangalore
JNS8	Janashatabdi	Bangalore	Salem

Table: Availability

Train_No	Class	Start_Place	Destination	No_of_seats
RJD16	Sleeper Class	Bangalore	Mumbai	15
UDE04	First Class	Chennai	Hyderabad	22
KKE55	First Class AC	Bangalore	Chennai	15
CSE3	Second Class	Coimbatore	Bangalore	8
JNS8	Sleeper Class	Bangalore	Salem	18

Queries

1. Create a view **sleeper** to display train number, start place, destination which have sleeper class and perform the following:
   a. Insert new record.
   b. Update destination='Manglore' where train no='RJD16'.
   c. Delete a record which has train no='KKE55'
2. Create a view **detail** to display train number, train name, and class.
3. Create a view **total_seats** to display train number, start place, use COUNT function on No_of_seats, group by start place and perform the following:
   a. Insert new record.
   b. Update start place='Hubli' where train no='JNS8'.
   c. Delete the last row of the view.
4. Rename view **sleeper** to **class**.
5. Delete view **details**.

Evaluation Scheme for Lab Examination

Assessment Criteria Marks		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written Program	5
Viva Voce based on Data Base Management System		5
Total		**40**

Semester: III

Programme Name: BSc	**Semester: III**
Course Title: Title: Software Engineering	
Course Code: HMC282 (Elective 1)	**No of credits: 03 (3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs):
CO1 Explain software engineering concepts, process models, and agile practices.
CO2 Apply techniques to gather and manage software requirements.
CO3 Model systems using UML diagrams and system modeling techniques.
CO4 Design software architecture using patterns and UML notations.

CO-PO Mapping Matrix:

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	1	2	2	2	1	1	**3**	2	1
CO2	**3**	**3**	–	**3**	2	**3**	2	**3**	2	**3**	**3**	2
CO3	**3**	**3**	–	**3**	**3**	2	2	**3**	–	**3**	**3**	1
CO4	**3**	**3**	–	**3**	**3**	**3**	**3**	2	1	**3**	**3**	2

Course Content	**Hours**
Unit 1 **Overview:** Introduction; Software engineering diversity, Software engineering and the Web, Software Engineering Ethics; Software Process Models; Process Activities; Coping with Change; Agile Software Development: Agile Methods; Plan- Driven and Agile Development.	11
Unit 2 **Requirements Engineering:** Functional and Non-Functional Requirements; Software Requirements Document; Requirement's Specification; Requirements Engineering Processes; Requirement's Elicitation and Analysis; Requirement's Validation; Requirements Management.	11
Unit 3 **System Modeling:** Context Models; Interaction Models- Use Case Modelling, Sequence Diagrams; Structural Models- Class Diagrams, Generalization, Aggregation, Behavioral Models- Data-Driven Modelling, Event-Driven Modelling; Model-Driven Engineering.	11
Unit 4 **Architectural Design:** Architectural Design Decisions; Architectural Views; Architectural Patterns- Layered Architecture, Repository Architecture, Client–Server Architecture Pipe and Filter Architecture. **Design And Implementation:** Object-Oriented Design Using The UML- System Context and Interactions, Architectural Design, Object Class Identification, Design Models, Interface Specification; Design Patterns; Implementation Issues, Open source development.	11

Text Books:

1. Software Engineering by Ian Sommerville, Pearson publications;10th Edition, 2015.
2. A Concise Introduction to Software Engineering, Pankaj Jalote, 2nd Edition, Springer Cham, 2025.

Reference:

1. Software Engineering, N.S. Gill, Khanna Publishing House, 2023.
2. Software Engineering A Practitioner's Approach, 8th edition, Roger S Pressman, Bruce R. Maxim. McGraw Hill Education, 2015.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Semester: III

Programme Name: BSc	**Semester: III**
Course Title: Title: E-Commerce and E- Governance	
Course Code: HMC284 (Elective 1)	**No of credits: 02 (0:0:2)**
Total Contact Hours: 30	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 02	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs):
CO1 Understand the fundamentals, models and infrastructure of E-Commerce.
CO2 Analyze E-Commerce strategies, marketing and real-world applications.
CO3 Explain E-Governance models, technologies and service.
CO4 Evaluate challenges, innovations, and future trends in E-Governance.

CO-PO Mapping Matrix:

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	1	**3**	2	1	1	1	**3**	1	1
CO2	2	**3**	–	**3**	**3**	**3**	2	2	2	**3**	2	**3**
CO3	**3**	2	–	2	**3**	2	2	2	**3**	**3**	2	**3**
CO4	2	**3**	–	**3**	**3**	**3**	**3**	2	**3**	**3**	2	**3**

Course Contents	**Hours**
Unit-1 **Introduction to E-commerce:** Fundamentals of E-commerce, E-commerce Business Models, E-commerce Infrastructure, E-commerce Security and Payment Systems	11
Unit-2 **E-commerce Strategies and Applications:** E-commerce Marketing and Advertising, Supply Chain Management in E-commerce, Emerging Trends in E-commerce **AI and Machine learning in E- Commerce:** Personalized recommendations, Chatbots, predictive analytics in customer service and sales, Case Studies and Practical Applications.	11
Unit-3 **Introduction to E-Governance**: Fundamentals of E-Governance, E-Governance Models and Frameworks, Technology and Infrastructure for E-Governance, E-Governance Services and Applications.	11
Unit-4 **Challenges and Future Trends in E-Governance:** Challenges in E-Governance, E-Governance in Developing Countries, Emerging Technologies in E-Governance, Future Directions and Innovations.	11

Textbooks:

1. "E-Commerce 2020: Business, Technology, and Society" by Kenneth C. Laudon and Carol Guercio Traver, Pearson.
2. "Electronic Commerce 2018: A Managerial and Social Networks Perspective" by Efraim

Turban, Jon Outland, David King, Jae Lee, Ting-Peng Liang, and Deborrah C. Turban, Springer.

Reference Books:

1. "E-Government: Information, Technology, and Transformation" by Hans J. Scholl, Routledge.
2. "E-Governance: Managing or Governing?" by Jeremy Millard, Routledge.
3. "Public Information Technology and E-Governance: Managing the Virtual State" by G. David Garson, Jones & Bartlett Learning.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Semester: IV

Programme Name: BSc	**Semester: III**
Course Title: Object Oriented Programming with Java	
Course Code: HMD280	**No of credits: 03(3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1. Understand the Java programming fundamentals.
CO2. Describe with examples of basic Java OOP concepts.
CO3. Understand the Java Interfaces and Packages.
CO4. Deliberate the Details of Multithreading, Exception Handling & File Handling
CO5. Design GUI applications using tools like AWT.

CO-PO Mapping Matrix:

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	–	**3**	1	–	1	–	**3**	1	–
CO2	**3**	**3**	–	2	**3**	**3**	2	2	–	**3**	2	1
CO3	**3**	**3**	–	2	**3**	2	2	1	–	**3**	2	1
CO4	**3**	**3**	–	**3**	**3**	**3**	2	2	1	**3**	2	1
CO5	**3**	**3**	–	2	**3**	2	2	**3**	–	**3**	**3**	2

Course Contents:	**Hours**
Unit-1 **Fundamentals of Object-oriented Programming:** Object-oriented Paradigm, Basic Principles of Object-oriented Programming, Advantages of Object-Oriented Programming, Applications of Object-Oriented Programming. **Introduction to Java Language:** Java History, Features, Overview, Difference between C, C+ + and Java, Java Environment- JDK, JVM, JRE and API, Java Program Structure, Java Tokens, Implementing a Java Program, Command Line Arguments. **Java Programming Fundamentals:** Data types, Variables & Constants, Keywords & Naming Conventions, Type Casting, Operators and Expressions, Control Structures, Jumping Statements.	11
Unit-2 **Classes & Objects** Basics of Objects and Classes, Constructors, Access Modifiers, Method Overloading, Overloading Constructors, Static members, this keyword. **Inheritance**: Types of inheritance, method overriding in inheritance, Interface, abstract class and methods, final keyword in inheritance	11

Arrays: One dimensional Arrays, Two dimensional Arrays, Array of Objects. **Strings**: String Handling functions. **Multithreading in Java** Concepts of Thread, Thread Life Cycle, Creating Threads & Implementing Runnable Interface, Thread Synchronization & Thread Priority.	
Unit-3 **Exception Handling** Concepts of Exception, Different Types of Exceptions, Creating User-Defined Exceptions Using Try-Catch-Finally-Throw Blocks, Nested Try, Catch, Throw, and Throws Blocks. **File Handling** I/O Handling, I/O Streams, Types of Files, Byte Stream, Binary I/O Classes & Its Hierarchy, FileInputStream & FileOutputStream Classes, Object I/O Classes. **Event Handling & GUI programming** Event Handling, Event Types, Event Handling Mechanism, Keyboard & Mouse Handling, Introduction to AWT & GUI basics, AWT hierarchy of classes, AWT controls – Frames, Panels, Layout managers & other controls of AWT.	11

Reference Books:

1. D.S. Guru, M.T. Somashekara, & K.S. Manjunatha, Object Oriented Programming with Java, PHI Learning, 2017.
2. E Balagurusamy , Programming with JAVA, TMH, 2007
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Semester: IV

Program Name: BSc	**Semester: IV**
Course Title: Programming with Java Lab	
Course Code: HMD280P	**No of credits :02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assess Marks: 40**

Course Outcomes (COs): On successful completion of this course, students will be able to:
CO1. Implement simple programs using Java Fundamental concepts.
CO2. Identify classes, objects, members of class and the relationships among them needed for finding the solution to specific problems using Objected Oriented Programming concepts of Java.
CO3. Design & Develop simple GUI programs using AWT GUI tool.

CO-PO Mapping Matrix:

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	–	2	**3**	2	1	1	–	**3**	2	1
CO2	**3**	**3**	–	**3**	**3**	**3**	2	2	–	**3**	**3**	1
CO3	**3**	**3**	–	2	**3**	2	2	**3**	–	**3**	**3**	2

Laboratory Program List

Part A:

1. Program to find whether the given number is Positive, Negative or Zero.
2. Program to list the factorial of the numbers 1 to 10.
3. Program to demonstrate classes & objects.
4. Program to demonstrate method overloading.
5. Program to demonstrate single inheritance (simple calculator – base class, Advanced Calculator – derived class).
6. Program to demonstrate Interface.
7. Program to demonstrate abstract class and methods
8. Program to find Maximum & Minimum element in one dimensional array of numbers.
9. Program to check whether the given string is palindrome or not.
10. Program to create a 'Student' class with Reg.no. Name and marks of 3 subjects. Calculate the total marks of 3 subjects and create an array of 3 student objects & display the results.

Part B:

1. Program to generate negative array size exception
2. Program to generate Null Pointer Exception.
3. Program that reads two integer numbers for the variables a and b. The program should catch Number Format Exception & display the error message.
4. Program to implement arithmetic operations using AWT components
5. Program to display three colours using Radio Button

6. Program to create AWT window with 4 buttons M/A/E/Close. Display M for Good Morning, A for Afternoon, E for evening and Close button to exit the window.
7. Program to demonstrate the various mouse handling events.
8. Program to read and write Binary I/O file.
9. Program to create window with three buttons father, mother and close. Display the respective details of father and mother as name, age and designation using AWT controls.
10. Program to create menu bar and pull-down menus.

Evaluation Scheme for Lab Examination

Assessment Criteria Marks		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written Program	5
Viva Voce based on Object Oriented Programming with Java		5
Total		**40**

Programme Name: BSc	**Semester: IV**
Course Title: Software Testing	
Course Code: HMD284 **(Elective 1)**	**No of credits: 03(3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs):
CO1. Understand basics of software testing and test case design.
CO2. Apply decision table and data flow testing methods.
CO3 Analyze integration and system testing techniques.
CO4. Evaluate object-oriented and GUI testing approaches.

CO-PO Mapping Matrix:

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	2	**3**	2	1	1	1	**3**	1	1
CO2	**3**	**3**	–	**3**	**3**	**3**	2	1	1	**3**	2	1
CO3	**3**	**3**	–	**3**	**3**	**3**	2	2	1	**3**	2	2
CO4	**3**	**3**	–	**3**	**3**	**3**	2	2	2	**3**	**3**	2

Course Content	**Hours**
Unit 1 **Basics of Software Testing and Examples:** Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing, Generalized pseudo code, The triangle problem, The Next Date function, The commission problem, The SATM (Simple Automatic Teller Machine) problem. **Decision Table-Based Testing:** Decision tables, Test cases for the triangle problem, Test cases for the Next Date function, Test cases for the commission problem.	11
Unit 2 **Data Flow Testing:** Definition-Use testing, Slice-based testing, Guidelines and observations. **Life Cycle–Based Testing:** Traditional Waterfall Testing**,** Testing in Iterative Life Cycles**,** Agile Testing, **Model-Based Testing:** Testing Based on Models**,** Peterson's Lattice**,** Expressive Capabilities of Mainline Models**,** Modeling Issues**,** Making Appropriate Choices. **Integration Testing:** Introduction, Decomposition- based, call graph- based, Path-based integrations.	11
Unit 3 **System Testing:** Definition, Possibilities, Basic concepts for requirements specification, Model-Based Threads, Use Case–Based Threads, ASF (Atomic System Functions). **Object-Oriented Testing:** Units for object-oriented testing, Implications of composition and encapsulation, inheritance, and polymorphism, Levels of object-oriented testing, GUI testing, Dataflow testing for object-oriented software **Class Testing:** Methods as units, Classes as units. **Automated Testing Tools:** Introduction to Selenium, Junit, TestNG.	11

Applications of Automated Testing Tools.	
Unit 4 **Object-Oriented Integration Testing:** UML support for integration testing, MM- paths for object-oriented software, A framework for object-oriented dataflow integration testing. **Object-Oriented System Testing:** Currency converter UML description, UML-based system testing, State chart-based system testing. **GUI Testing:** The currency conversion program, Unit testing, Integration Testing and System testing for the currency conversion program, case study of windshield wiper.	11

Text Books:

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications.

Reference Books:

1. Aditya P Mathur: Foundations of Software Testing, Pearson.
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, 1st edition, John Wiley & Sons.
3. Srinivasan Desikan, Gopalaswamy Ramesh: Software testing Principles and Practices.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: BSc	**Semester: IV**
Course Title: Digital Marketing	
Course Code: HMD256	**No of credits: 02(0:0:2)**
Total Contact Hours: 30	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 02	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs):
CO1 Describe the basics, evolution, and channels of digital marketing.
CO2 Apply social media and email marketing strategies effectively.
CO3 Create content and mobile marketing plans with analytics.

Course Content	**Hours**
Unit 1 **Introduction to Digital Marketing:** Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms **Digital Marketing Strategy and Planning:** Developing a digital marketing strategy, Setting goals and objectives, Budgeting, and resource allocation. Campaign planning and execution, Monitoring and adjusting digital marketing campaigns.	10
Unit 2 **Social Media Marketing:** Overview of social media marketing, social media platforms and their features, Creating and optimizing social media profiles, social media content strategy, social media advertising and analytics **Email Marketing:** Introduction to email marketing, building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics. **Tools and Platforms:** Introduction to tools like Buffer, Hootsuite, Canva for digital media planning and automation	10
Unit 3 **Content Marketing:** Understanding content marketing, Content strategy and planning, Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics. **Mobile Marketing:** Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics. **Search Engine Optimization(SEO):** On page and off page SEO, keyword research, google algorithm basics	10

Text Books:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth.
2. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by

Chad S. White.

References:

1. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi.
2. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles.
3. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**05**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**05**
Total	**10**

Question paper pattern:

Time: 3 Hours Max Marks:80

Part-A

Answer any 10 out of 12 Questions (3 Questions drawn from each unit). Each question carries 2 Marks.

(10 X 2 =20)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

Part-B

Answer all the Questions. Each question carries 15 Marks.

(4 X 15 =60)

(Each question with internal choice and with maximum of 3 sub questions)

13. A

OR

13. B

14. A

OR

14. B

15. A

OR

15. B

16. A

OR

16. B

Question paper pattern for Theory Courses (2 Credits):

Time: 2 Hours Max Marks: 40

Instructions: Answer Part-A and Part-B

Part-A

I. **Answer any 5 questions out of 6 Questions:** **5x2=10**

1.

2.

3.

4.

5.

6.

Part B

II Answer the following questions: **10x3=30**

7.a)
7. b)
OR
7. c)
7. d)
8.a)
8. b)
OR
8. c)
8. d)
9.a)
9. b)
OR
9. c)
9. d)

Revised NEP Syllabus: B.Sc[PMCs] for 2026-2027

Programme: B. Sc PMCs

Subject: Computer Science

Semester	Course Code	Title	Theory/Practical	Credit L: T:P	Hours / Week	Maximum Marks			Total Marks	Exam Duration in Hours
						CIE		SEE		
						C1	C2	C3		
V	HME280	Operating Systems	Theory	3:0:0	3	10	10	80	100	3
	HME282	Web Technology	Theory	3:0:0	3	10	10	80	100	3
	HME280P	Web Technology Lab	Practical	0:0:2	4	05	05	40	50	3
	HME256	AI Tools and its applications	Practical (Compulsory Paper)	0:0:2	4	05	05	40	50	3
VI	HMF280	Computer Networks	Theory	3:0:0	3	10	10	80	100	3
	HMF282	Python Programming	Theory	2:0:0	2	05	05	40	50	2
	HMF282P	Python Programming Lab	Practical	0:0:2	4	05	05	40	50	3
	HMF256	Power BI	Practical (Compulsory Paper)	0:0:2	4	05	05	40	50	3

****Total Credits (Theory and Practical): (06+08=14)**

Semester: V

Programme Name: B.Sc	**Semester: V**
Course Title: Operating Systems (Theory)	
Course Code:HME280	**No of credits: 03 (3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:
CO1: Gain knowledge of the basic concepts of Operating System, its functions and services.
CO2: Apply the various concepts related to Process Management and threads
CO3: Evaluate the performance of various algorithms used for CPU scheduling
CO4: Understand the concepts of Deadlocks
CO5: Understand the concepts of memory management in main memory and virtual memory.

CO-PO Mapping Matrix

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	2	–	–	2	1	–	–	–	2	–	–
CO2	2	**3**	–	2	**3**	**3**	2	1	–	2	2	1
CO3	2	**3**	–	**3**	2	**3**	2	1	–	2	1	1
CO4	**3**	2	–	2	2	**3**	1	–	–	2	1	–
CO5	**3**	**3**	–	2	**3**	2	1	–	–	**3**	1	–

Course Contents	**Hours**
Unit:1: Introduction to Operating Systems, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Kernel Data Structures, Computing Environments, Open-Source Operating Systems.	11
Unit 2: Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication, Examples of IPC Systems, Communication in Client Server Systems. Threads: Overview, Multicore Programming, Multithreading Models, Thread Libraries.	11
Unit:3: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling System Model, Deadlock Characterization, and Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.	11
Unit:4:	

Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. Virtual Memory: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.	11

Text Book:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 10th Edition,Wiley, 2018.

Reference Books:

1. Operating System Principles, Per Brinch Hansen, Prentice Hall of India (PHI).
2. Operating Systems, Milan Milenkovic, McGraw-Hill.
3. Modern Operating Systems, Andrew S. Tanenbaum, 4th Edition, Prentice Hall of India (PHI).

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: B.Sc	**Semester: V**
Course Title: Web Technology (Theory)	
Course Code: HME282	**No of credits: 03 (3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1:	Understand Web Fundamentals
CO2:	Explore the concepts of HTML/XHTML
CO3:	Apply Styling to Web Pages Using CSS
CO4:	Implement Basic Interactivity with JavaScript
CO5:	Demonstrate JavaScript with XHTML for Dynamic Web Pages

CO-PO Mapping Matrix

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	2	–	–	2	1	–	–	–	2	–	–
CO2	**3**	2	–	–	**3**	1	–	2	–	**3**	1	–
CO3	2	2	–	1	**3**	2	1	**3**	–	**3**	2	1
CO4	**3**	**3**	–	2	**3**	**3**	2	2	–	**3**	2	1
CO5	**3**	**3**	–	2	**3**	2	2	2	–	**3**	2	1

Course Contents	**Hours**
Unit 1: Fundamentals: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol, the Web Programmer's Toolbox. Introduction to HTML/XHTML: Origins and Evolution of HTML and XHTML, Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML, Syntactic Differences between HTML and XHTML.	11
Unit 2: Cascading Style Sheets: Introduction, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color, The Box Model, Background Images, The and Tags	11
Unit 3: The Basics of JavaScript: Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching	11

Using Regular Expressions, Errors in Scripts.	
Unit 4: JavaScript and XHTML Documents: The JavaScript Execution Environment, The Document Object Model, Element Access in JavaScript, Events and Event Handling, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Text Box and Password Elements, The DOM 2 Event Model, The navigator Object, DOM Tree Traversal and Modification.	11

Text Book:

1. Programming the World Wide Web, Robert W. Sebesta, 10th Edition, Pearson Education, 2018.

Reference Books:

1. Internet and World Wide Web – How to Program, Harvey M. Deitel, Paul J. Deitel, 5th Edition, Pearson Education, 2019.
2. Web Programming: Building Internet Applications, Chris Bates, 3rd Edition, Wiley India, 2020.
3. Introduction to JavaScript Object Notation, Lindsay Bassett, O'Reilly Media, Inc., 2015.

Course Pedagogy

1. Interactive lecture sessions using ppts and chalkboard.
2. Step-by-step Demonstrations and Coding Walkthroughs.
3. Assignments and Seminars.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: B.Sc	**Semester: V**
Course Title: Web Technology Lab	
Course Code: HME282P	**No of credits :02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1	Understand the basic concepts of HTML and explore Hyperlinks, Lists and Images
CO2	Demonstrate practical skills, workflows and methods used to create websites usingStyle sheets
CO3	Explore JavaScript and its basic functions and operations
CO4	Understand the concepts of Objects and Dynamic HTML

CO-PO Mapping Matrix

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	2	–	–	**3**	1	–	2	–	**3**	1	–
CO2	2	2	–	1	**3**	2	1	**3**	–	**3**	2	1
CO3	**3**	**3**	–	2	**3**	**3**	2	2	–	**3**	2	1
CO4	**3**	**3**	–	2	**3**	2	2	2	–	**3**	2	1

List of Practical Experiments:

Part -A

1. Personal Portfolio Website:
   - Create a personal portfolio showcasing your skills, projects, and resume.
   - Use HTML5 semantic elements and CSS for styling.
2. Responsive Web Design:
   Develop a multi-page website with responsive design using media queries and Bootstrap or another CSS framework.
3. CSS Grid and Flexbox Layout:
   Design a layout using CSS Grid and Flexbox to create complex and responsive web layouts.
4. Interactive Form with CSS Validation:
   Build a form with custom styling and CSS-based validation (e.g., required fields, pattern matching).
5. Custom Navigation Menu:
   Create a navigation menu with dropdowns, responsive behavior, and hover effects using CSS.
6. Personal Blog Design:
   Design a personal blog layout with custom styling for posts, comments, and sidebars.
7. Portfolio Website:

Create a portfolio website with sections for projects, skills, and contact information, utilizing advanced CSS layout and styling techniques.

Part -B

8. Restaurant Menu: Develop a stylish restaurant menu with categories, item descriptions, and prices, using CSS for layout and design.
9. Event Page:Design a web page for an event with sections for the event schedule, speakers, and registration, using CSS to style different elements.
10. Write a JavaScript program to
    - Find the square root
    - Calculate the area of triangle
11. Write a simple JavaScript that adds some numbers together, concatenates a couple of strings, and then shows the result in an alert () dialog and on the page.
12. To-Do List Application:
    Build a JavaScript application to add, remove, and mark tasks as completed.
13. Write a JavaScript program to create a registration form.
14. Dynamic Content Loading.

Course Pedagogy

1. Practice-oriented Lab Sessions and Guided Implementation.
2. Step-by-step Demonstrations and Coding Walkthroughs.
3. Experiment-based Learning Approach.
4. Application-focused Assignments and Mini Projects.
5. Continuous Evaluation through Lab Performance and Viva Voce.

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written programs	5
Viva Voce		5
Total		**40**

Programme Name: B.Sc	**Semester: V**
Course Title: AI Tools and its applications Lab	
Course Code: HME280P	**No of credits :02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1	Use AI tools to generate text, images, presentations and reports effectively.
CO2	Apply AI tools for solving basic computational and programming problems.
CO3	Analyze data and generate meaningful insights using AI assistance
CO4	Compare different AI tools and select appropriate tools for specific tasks
CO5	Demonstrate the use of AI tools in academic work such as resume creation, translation and documentation.

CO-PO Mapping Matrix

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	–	–	**3**	2	2	**3**	1	**3**	2	1
CO2	**3**	**3**	–	2	**3**	**3**	2	2	–	**3**	2	1
CO3	2	**3**	1	**3**	**3**	**3**	2	2	1	**3**	2	2
CO4	2	**3**	–	2	**3**	**3**	2	1	1	**3**	2	1
CO5	2	2	–	–	**3**	2	1	**3**	**3**	**3**	2	2

List of Practical Experiments

PART A

1. Create an account and explore features of ChatGPT (text generation, summarization).
2. Use ChatGPT to generate a technical literature review on one of topic (IoT / AI in Healthcare / Smart Grid) and refine it into IEEE abstract format
3. Use Google Gemini to generate a short essay on “AI past and future”.
4. Generate an image of future smart class and analyze
5. Design a project poster using Canva AI tools including smart layout, AI background removal, and presentation enhancement.
6. Create a technical presentation using AI presentation generator on “Future of Edge AI in Engineering Applications”- Gamma.
7. Write a paragraph with mistakes, Upload in Grammarly, Note corrections and Rewrite corrected paragraph
8. Create invitation and flyer for Science day celebration function in your college

9. Develop a no-code, student grievance management prototype using Google AI.

Part B

10. Create AI-generated diagrams for system architecture of a smart campus project using AI diagram tools.

11. Generate an MCQ with 25 questions on Data structure , DBMS and Computer networks with appropriate headings

12. Build a workflow automation using no-code tools for attendance management or report approval system.

13. Compare outputs of two AI chatbots for solving one numerical problem and evaluate response accuracy**.**

14. Interact with AI Chatbot. Ask 5 academic questions, Note responses, Evaluate correctness

15. Use AI tool to record the answers and observation on Operating system

16. Upload erroneous Python/C++ code into AI tool, debug it, optimize it, and explain performance improvements.Create a resume using Gemini

17. Use Microsoft Excel AI functions to clean a raw dataset, detect anomalies, and generate trend analysis with formulas and charts.

Course Pedagogy

1. Demonstrates the usage of AI tools (e.g., ChatGPT, Canva, Gamma).
2. Hands-On Practical Learning by conducting experiments individually or in small groups.

1. Problem-Based Learning (PBL) - solve real-world or academic problems using AI tools.

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written programs	5
Viva Voce		5
Total		**40**

Programme Name: B.Sc	**Semester: VI**
Course Title: Computer Networks (Theory)	
Course Code:HMF280	**No of credits: 03 (3:0:0)**
Total Contact Hours: 44	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 03	
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1:	Understand the fundamentals of computer networking
CO2:	Describe the layered architecture of networks
CO3:	Analyze data communication techniques
CO4:	Focus on routing and congestion control mechanisms

CO-PO Mapping Matrix

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	–	–	2	1	–	–	–	2	–	–
CO2	3	2	–	1	3	2	1	1	–	3	1	–
CO3	2	3	–	3	3	3	2	1	–	2	2	1
CO4	3	3	–	3	3	3	2	1	–	3	2	1

Course Contents	**Hours**
Unit 1:	
Introduction to Computer Network: Introduction, Characteristics, Components, Topology- Star, Mesh, Tree, Bus, Ring and Hybrid topology. Transmission Mode- Simplex, Half Duplex, Full Duplex. Categories of Network-LAN, WAN, MAN. The OSI reference model, The TCP/IP reference model. Digital to Analog Conversion- ASK, FSK, PSK.	11
Unit 2:	
Data Transmission and Analog to Analog conversion: Data Transmission serial and parallel transmission, Analog to Digital transmission, Analog to Analog Conversion- AM, FM, PM. The Physical Layer- Transmission media- Twisted pair, coaxial cable, Optical fiber, Radio, Microwaves and Infrared transmission. Switching- Message Switching, circuit Switching and packet Switching Multiplexing.	11
Unit 3:	
The Data link layer: Data link layer design issues, Error detection- Single Parity checking, Checksum, Polynomial Codes- CRC, error Correction- Hamming Code. The Network layer: Design issues, Routing Algorithm- Dijkstra's Shortest path Routing, Flooding, distance vector routing, Congestion Control Algorithm- Leaky Bucket, Token Bucket.	11
Unit 4:	

The Transport Layer and Application layer: Elements of Transport Service- Internet transport Protocols (TCP and UDP), Application Layer, DNS, Electronic Mailing-Introduction, SMTP, POP3, SNMP, FTP, TELNET and WWW.	11

Text Books:

1. Computer Networks – by Andrew S. Tanenbaum, David J. Wetherall, and Nick Feamster Publisher: Pearson
2. Computer Networking: A Top-Down Approach – by James F. Kurose and Keith W. Ross
3. Data Communications and Networking – by Behrouz A. Forouzan

Reference books:

1. 1Computer Networks – by Larry L. Peterson and Bruce S. Davie
2. TCP/IP Illustrated Volume 1 – by W. Richard Stevens
3. Internetworking with TCP/IP – by Douglas E. Comer

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**10**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**10**
Total	**20**

Programme Name: B.Sc	**Semester: VI**
Course Title: Python Programming (Theory)	
Course Code: HMF282	**No of credits: 02 (2:0:0)**
Total Contact Hours: 30	**Duration of SEA/Exam: 02 Hours**
Hours/Week: 03	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1:	Understand the basic concepts of Python Programming.
CO2:	Apply proficiency in the handling of loops and the creation of functions
CO3:	Identify the methods to create and store strings
CO4:	Analyze the data using visualization tools

CO-PO Mapping Matrix

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	–	**3**	1	–	1	–	**3**	1	–
CO2	**3**	**3**	–	2	**3**	**3**	2	1	–	**3**	2	1
CO3	2	**3**	–	1	**3**	2	1	1	–	2	1	–
CO4	2	**3**	2	**3**	**3**	**3**	2	2	1	**3**	2	2

Course Contents	**Hours**
Unit 1: Python Basics: - Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions, Python Libraries; Importing Libraries with Examples; Illustrative programs.	10
Unit 2: Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range() and exit () functions; Illustrative programs. Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Illustrative programs.	10
Unit 3: Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods, Lists, Tuples, Dictionaries and sets. Introduction to	10

NumPy. Data Visualization : Introduction to data visualization Matplotlib library, different types of charts using PYplot,	

Text Books:

1. Introduction to Machine Learning with Python – Andreas Müller
2. Python Programming: An Introduction to Computer Science – John M. Zelle.

Reference Books:

1. Python Cookbook – David Beazley & Brian K. Jones
2. Python Crash Course – Eric Matthes.
3. A Byte of Python – C.H. Swaroop.

Formative Assessment for Theory	
Internal Assessment C1 (Test)	**05**
Internal Assessment C2 (Seminar/Assignment/Quiz/ Small Project etc.	**05**
Total	**10**

Programme Name: B. Sc	**Semester: V**
Course Title: Python Programming Lab	
Course Code:HMF282P	**No of credits :02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1	Understand the basic concepts of Python programming
CO2	Apply control structures such as conditional statements and loops to solve programming problems.
CO3	Develop modular programs using functions and modules to improve code organization and reusability.
CO4	Use Python data structures such as lists, tuples, sets, and dictionaries to store and manipulate data

CO-PO Mapping Matrix

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	2	–	–	**3**	1	–	1	–	**3**	1	–
CO2	**3**	**3**	–	2	**3**	**3**	2	1	–	**3**	2	1
CO3	**3**	**3**	–	2	**3**	2	2	1	–	**3**	2	1
CO4	**3**	**3**	–	2	**3**	**3**	2	1	–	**3**	2	1

List of Practical Experiments

Part –A

1. Python script for checking the given year is leap year or not.
2. Python script to check if a number belongs to the Fibonacci sequence
3. Python script to solve Quadratic Equations
4. Python script to display all numbers which are divisible by 7 but are not a multiple of 5, between given range X and Y.
5. Python script to display Multiplication Tables
6. Python script to create a calculator program
7. Explore string functions
8. Implementation of python script that takes a list of words and returns the length of the longest one.
9. Python script handles multiple errors with one except statement.
10. Python script to check whether password is valid or not. Conditions for a valid password are:
    - Should have at least one number.
    - Should have at least one uppercase and one lowercase character.
    - Should have at least one special symbol.

Part –B

1. Implement python script to remove duplicates from a list.
2. Implement python script to find the repeated items of a tuple.
3. Implement python script to check whether a given key already exists or not in a dictionary.
4. Write a python script to implement method overloading.
5. Drawing Line chart and Bar chart using Matplotlib.
6. Drawing Histogram and Pie chart using Matplotlib.
7. Create Array using NumPy and Perform Operations on Array.

Course pedagogy:

1. Demonstrates Python programs and explains syntax, logic, and program execution.
2. Hands-on Programming Practice: Students write and execute Python programs during lab sessions to understand programming concepts.
3. Problem-Based Learning: Students solve computational problems using Python to improve logical thinking and programming ability.
4. Use of Programming Tools: Students practice coding using tools such as IDLE, PyCharm, or Jupyter Notebook

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written programs	5
Viva Voce		5
Total		**40**

Programme Name: B. Sc	**Semester: V**
Course Title: Power BI	
Course Code:HMF256	**No of credits :02(0:0:2)**
Total Contact Hours: 60	**Duration of SEA/Exam: 03 Hours**
Hours/Week: 04	
Formative Assessment Marks: 10	**Summative Assessment Marks: 40**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO1	Import, clean, and transform datasets using tools such as Power Query Editor for effective data preparation
CO2	Create meaningful data visualizations including bar charts, line charts, pie charts, and donut charts to represent business data.
CO3	Develop interactive reports and dashboards to analyze key performance indicators (KPIs) and business performance
CO4	Apply data modelling techniques and DAX expressions to establish relationships between tables and generate calculated fields for advanced analysis

CO-PO Mapping Matrix

COs / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	**3**	2	**3**	**3**	**3**	2	1	1	**3**	2	2
CO2	2	**3**	2	2	**3**	2	2	**3**	1	**3**	2	2
CO3	2	**3**	2	**3**	**3**	**3**	2	**3**	1	**3**	2	2
CO4	**3**	**3**	2	**3**	**3**	**3**	2	2	1	**3**	2	2

List of Practical Experiments

Part -A

1. Import a dataset from an Excel file and clean the data by removing duplicates and handling missing values.
2. Use Power Query Editor to transform a dataset, such as splitting columns, merging tables, or changing data types.
3. Create a bar chart to show the total sales by region.
4. Create a line chart to display the trend of sales over time.
5. Build a report that includes various visualizations, such as pie charts, bar charts, and tables, to analyze sales data.

Part -B

6. Create a dashboard that combines several key performance indicators (KPIs) to give an overview of business performance.
7. Create a relationship between tables manually through Power BI.
8. Use the DAX expression to add a new column in the data source.
9. Use the Donut Chart for Profit Analysis.
10. Analyze the more profitable day from the sales analysis table using Bar Chart in Power BI.

Course Pedagogy

1. Hands-on Laboratory Sessions using Power BI for data import, transformation, visualization, and dashboard creation.
2. Demonstration-based teaching where the instructor explains Power BI tools such as Power Query Editor, data modelling, and DAX functions.
3. Practical Assignments and Exercises requiring students to analyze datasets and build visual reports and dashboards.

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Writing	One Program from Part A	15
	One Program from Part B	15
Execution	Any one of the Written programs	5
Viva Voce		5
Total		**40**

Question paper pattern:

Part-A

Answer any 10 out of 12 Questions (3 Questions drawn from each unit). Each question carries 2 Marks.

(10 X 2 =20)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

Part-B

Answer all the Questions. Each question carries 15 Marks.

(4 X 15 =60)

(Each question with internal choice and with maximum of 3 sub questions)

13. A

OR

13. B

14. A

OR

14. B

15. A

OR

15. B

16. A

OR

16. B