DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM & MARKING SCHEME

PROGRAM CODE: DPMS07

Scheme of M. Sc. Computer Science Under Semester System

(Based on CBCS)

SESSION: 2025-26

D. P. VIPRA COLLEGE,

(AN AUTONOMOUS INSTITUTION)

OLD HIGH COURT ROAD BILASPUR

(CHHATTISGARH)

RE-ACCREDIATED "A" GRADE BY NAAC Phone No: 07752-424497

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Scheme of M. Sc. Computer Science Under Semester System

Program Code & Name: DPMS07 - M.Sc. (Computer Science)

Session 2025-26

Semester	Course Code	Course Name	Credit			Total Credit	Marks			
							ESE	CIA	Total	
			L	T	P				MAX	MIN
First	MCST101	Computer Architecture	3	1	-	4	70	30	100	40
	MCST102	Advanced Computer Network	3	1	-	4	70	30	100	40
	MCST103	JAVA Programming	3	1	-	4	70	30	100	40
	MCSE104	Operating System Concepts	3	1	-	4	70	30	100	40
	MCSP101	Programming Lab in JAVA	-	-	2	2	35	15	50	20
	MCSP102	Programming Lab in Linux	-	-	2	2	35	15	50	20
						20	**350**	**150**	**500**	**200**
Second	MCST201	RDBMS Using ORACLE	3	1	-	4	70	30	100	40
	MCST202	Data Structure with C++	3	1	-	4	70	30	100	40
	MCST203	Software Engineering	3	1	-	4	70	30	100	40
	MCSE201	Cryptography and Network Security	3	1	-	4	70	30	100	40
	MCSP201	Programming Lab in RDBMS	-	-	2	2	35	15	50	20
	MCSP202	Programming Lab in Data Structure in C++	-	-	2	2	35	15	50	20
					Total	**20**	**350**	**150**	**500**	**200**
Third	MCST301	Theory of Computation	3	1	-	4	70	30	100	40
	MCST302	Data Science using Python	3	1	-	4	70	30	100	40
	MCST303	ASP.NET using C#	3	1	-	4	70	30	100	40
	MCSE304	Mobile Computing	3	1	-	4	70	30	100	40
	MCSE305	Data Mining and Data Warehousing	3	1	-	4	70	30	100	40
	MCSP301	ASP.NET using C# Lab - I	-	-	2	2	35	15	50	20
	MCSP302	Python Programming Lab - II	-	-	2	2	35	15	50	20
					Total	**20**	**350**	**150**	**500**	**200**
Fourth	MCST401	Compiler Design	3	1	-	4	70	30	100	40
	MCST402	Artificial Intelligence & Machine Learning	3	1	-	4	70	30	100	40
	MCST403	IOT based Programming	3	1	-	4	70	30	100	40
	MCSE404	Advanced Neural Network & Deep Learning	3	1	-	4	70	30	100	40
	MCSE405	Cloud Computing	3	1	-	4	70	30	100	40
	MCSP401	Major Project	-	-	4	4	70	30	100	40
					Total	**20**	**350**	**150**	**500**	**200**
					Grand Total	**80**	**1400**	**600**	**2000**	**800**

Program Code and Name	**DPMS07, M.Sc. (COMPUTER SCIENCE)**			Semester	**II**
Exam Code and Name	**2072 - M. Sc. COMPUTER SCIENCE SECOND SEMESTER**			Paper	**I**
Course Code	**MCST201**			Course Type	**T**
Course Title	**RDBMS Using ORACLE**				
Total Credit	**4**				
Total Marks	CIA: 30/15	ESE: 70/35	Max Marks: 100/50	Min. Pass. Marks: 40/20	
Prerequisites (if any)					
Course Outcomes	CO1: Understand and apply relational algebra operations and basic query formulation techniques in database systems. CO2: Construct and execute SQL queries using clauses like SELECT, FROM, WHERE, GROUP BY, and HAVING for data retrieval and manipulation. CO3: Analyze and implement nested queries, correlated queries, and database objects such as views and temporary tables. CO4: Evaluate and enforce integrity constraints and perform data manipulation operations like INSERT, UPDATE, and DELETE in relational databases.				

Contents of Course

Unit	Contents	No. of Period
I	**Overview of Database Management**: Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file-oriented approach verses database-oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.	15
II	**Relational Model**: Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.	15
III	**Structured Query Language** :Relational Algebra: select, project, cross product different types of joins(inner join, outer joins, self- join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, standalone and embedded query languages, Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING…ORDERBY….), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.	15
IV	**Relational Database** Design: Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. File organization for relational tables, De- normalization. **Introduction to Query Processing and Protecting the Database & Data Organizations:** Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base -Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security& Authorization in SQL.	15
	Total no. of Lectures	**60**

Text books	1. An Introduction to database systems By Bipin Desai, 2011 ed., Galgotia Publication.
Reference books	1. Database system concept By H. Korth and A. Silberschatz, TMH. 2. Data Base Management System By James Matin. 3. Principles of Database System By Ullman. 4. Database Management System By A. K. Majumdar & P.Bhattacharya, TMH

Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

Program Code and Name	**DPMS07, M.Sc. (COMPUTER SCIENCE)**		Semester	**II**
Exam Code and Name	**2072 - M. Sc. COMPUTER SCIENCE SECOND SEMESTER**		Paper	**II**
Course Code	**MCSE202**		Course Type	**T**
Course Title	**Data Structure with C++**			
Total Credit	**4**			
Total Marks	CIA: 30/15	ESE: 70/35	Max Marks: 100/50	Min. Pass. Marks: 40/20
Prerequisites (if any)				
Course Outcomes	CO1: Understand and implement fundamental data structures such as arrays and linked lists along with their memory representation and operations. CO2: Apply stack and queue data structures for solving problems like expression evaluation, conversion, and real-life applications. CO3: Analyze and implement tree-based data structures including binary search trees, AVL trees, and heaps for efficient data organization and searching. CO4: Apply graph algorithms and searching/sorting techniques to solve computational problems efficiently.			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	**Introduction to Data Structures:** Definition of Data structure and Abstract data type. Basics of Algorithm. Classification of Data structures: Linear, Non-linear. Arrays: Definition & types of arrays, Memory representation of one- & two-dimensional array, Operations on DS. Linked List: Singly Linked list- Operation on it; doubly linked list- Operation on it; Circular linked list - Operation on it.	15
II	**Stacks, Queues:** Stacks; Array representation of stack; Linked representation of stack; Various polish notation's-Prefix, Postfix, infix; Evaluation of a postfix & Prefix expression; Conversion from one another; Application of stack; Queues; Linked representation of queues; Dqueues; Circular queue; Priority queue.	15
III	**Trees**: Binary trees; Types of binary tree Representation of binary tree in memory; traversing binary tree; Binary search trees; Searching and inserting in binary search trees; Deleting in a binary search, tree; AVL search trees and operation on it. B trees: searching, insertion, deletion; Heap.	15
IV	**Graphs:** Terminology & representation; Warshall algorithm; Shortest path; Minimum spanning tree; Kruskal & Dijkstara algorithm; Linked representation of graph; Operation on graph; Traversing a graph. **Searching and Sorting:** Searching algorithm: linear search, binary search; sorting algorithms: Bubble sort, Insertion sort, Selection sort, Quick Sort, Merge sort and Heap sort.	15
	Total no. of Lectures	60

Reference books	1.	Let us C++ "Yashwant Kanetkar", BPB Publications, Tenth Edition.
	2.	The C Programming Language "Kemigham and Ritche [Prentice Hall]"
	3.	Data Structure by Lipshutz, McGraw Hill.
	4.	Data Structure by Standish, Addison-Wesley.
	5.	Data structures Through C by G. S. Baluja

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

Program Code and Name	**DPMS07, M.Sc. (COMPUTER SCIENCE)**		Semester	**II**
Exam Code and Name	**2072 - M. Sc. COMPUTER SCIENCE SECOND SEMESTER**		Paper	**III**
Course Code	**MCST203**		Course Type	**T**
Course Title	**Software Engineering**			
Total Credit	**4**			
Total Marks	CIA: 30/15	ESE: 70/35	Max Marks: 100/50	Min. Pass. Marks: 40/20
Prerequisites (if any)				
Course Outcomes	CO1: Understand software engineering fundamentals, SDLC models, and Agile methodologies for effective software development. CO2: Analyze and document software requirements using appropriate elicitation techniques and prepare a standard SRS document. CO3: Design software systems using appropriate design principles, models, and architectural approaches. CO4: Apply software testing techniques and quality assurance practices to ensure reliable and high-quality software systems.			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	**Software:** Software Characteristics Components and Applications Software Engineering a Layered Technology Software Development Life Cycle Software Process Models- Linear Sequential Model Prototype & RAD Model Incremental and Evolutionary Process Models. Introduction of Agile Software Development.	15
II	**Analysis Concept and Principles:** Requirement Analysis, Analysis Principles Requirement Elicitation, Information Gathering Techniques Requirements Specification Requirements, Verification and Validation Requirements Management. Documenting, Software Requirement Specification (SRS) Characteristics of SRS Format of SRS Software Project Planning: Objectives Decomposition Techniques and Empirical Estimation Models. Project Metrics: Software Measurement–Size Oriented Function Oriented Metrics.	15
III	**Design Concepts and Principles:** Design Process Design Concepts Design Principles Effective Modular Design Human Computer Interface Design Interface Design Guidelines. System Design: Design Models for Architecture Component Data and User Interfaces; Problem Partitioning Abstraction Cohesiveness Coupling Top Down and Bottom-Up Design Approaches; Functional Versus Object Oriented Approach Design Specification. Coding: Top-Down and Bottom-Up Structure Programming Information Hiding Programming Style and Internal Documentation Verification.	15
IV	**Software Testing:** White and Black Box Testing Levels of Testing UNIT Integration System Testing Functional Testing, Structural Testing, Test Plan Software Testing Strategies, Verification & Validation Incremental & Non-Incremental Testing Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, White Box and Black Box Testing Techniques, Debugging Techniques. Software Quality: Quality Models, Quality Control and Quality Assurance, ISO, SEI, Capability Maturity Model (CMM). Software Maintenance Need and Categories of Maintenance Software Configuration Management Software Reverse and Reengineering Models.	15
	Total no. of Lectures	60

Reference books	1. Roger S. Pressman Software Engineering-a Practitioner's Approach McGraw Hill International Edition 2. K. K. Aggarwal Yogesh Singh Software Engineering 3. Ian Sommerville- Software Engineering Addison-Wesley Publishing Company 4. James F. Peter Software Engineering - an Engineering Approach John Wiley 5. Fairley Richard Software Engineering Concepts Tata McGraw Hill

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

Program Code and Name	**DPMS07, M.Sc. (COMPUTER SCIENCE)**		Semester	**II**
Exam Code and Name	**2072 - M. Sc. COMPUTER SCIENCE SECOND SEMESTER**		Paper	**IV**
Course Code	**MCSE201**		Course Type	**T**
Course Title	**Cryptography and Network Security**			
Total Credit	**4**			
Total Marks	CIA: 30/15	ESE: 70/35	Max Marks: 100/50	Min. Pass. Marks: 40/20
Prerequisites (if any)				
Course Outcomes	CO1: Understand the fundamental concepts of cryptography, security services, and basic mathematical tools used in encryption techniques. CO2: Analyze and apply symmetric key encryption algorithms such as DES and AES along with their design principles and modes of operation. CO3: Evaluate public key cryptographic techniques including RSA, Diffie-Hellman, and hash functions for secure communication and authentication. CO4: Explain and implement network and web security protocols such as SSL/TLS, Kerberos, and intrusion detection systems for secure data transmission.			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	**Foundations of Cryptography and security**: Security trends, The OSI Security architecture Security attack, services and mechanism, Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.	15
II	**Symmetric Cipher**: Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block, Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DES, Triple DES, Modes of operation. Advance encryption Standard (AES)- Evaluation criteria of AES, AES cipher, key distribution.	15
III	**Public Key cryptography and Hash function**: Prime numbers and testing for primarily, factoring large, numbers, Principles of public key cryptosystem, RSA algorithm. Key management: Diffie-Helman, Key exchange, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digital, signature.	15
IV	**IP and Web security protocols**: Authentication application: Kerberos, Public key infrastructure. E-mail: Pretty Good Privacy (PGP), S/MIME. IP security, Web Security: Secure Socket layer (SSL) and Transport layer security, Secure Electronic Transaction (SET). **System Security**: Firewall, and Intrusion Detection system (IDS), Malicious Software.	15
	Total no. of Lectures	60

Reference books	1. Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication 2. Applied cryptography - protocols and algorithm By BuceSchneier, Springer Verlag 2003 3. Cryptography and Network Security By Atul Kahate , TMH Publication. 4. Cryptography and Network Security By Behrouz A. Forouzan, First Edition, TMH Publication. 5. Network Security: Private Communication in Public World By Charlie Kaufman, Radia Perlman and Mike Speciner , PHI Publication.

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

Program Code and Name	**DPMS07, M.Sc. (COMPUTER SCIENCE)**		Semester	**II**
Exam Code and Name	**2072 - M. Sc. COMPUTER SCIENCE SECOND SEMESTER**		Paper	**I**
Course Code	**MCSP201**		Course Type	**P**
Course Title	**Programming Lab in RDBMS**			
Total Credit	**4/3/2/1**			
Total Marks	CIA: 15	ESE: 35	Max Marks: 50	Min. Pass. Marks: 20
Prerequisites (if any)				
Course Outcomes	CO1: To understand the fundamentals of relational database systems CO2: To develop skills in SQL and PL/SQL programming. CO3: To perform database operations using Oracle tools. CO4: To design and manage relational databases efficiently.			

Contents of Course	
List of Experiments	**No. of Period**
1. **Creation and Manipulation of Tables** Create database tables using SQL commands and perform data insertion, updating, deletion, and retrieval operations. 2. **Implementation of Integrity Constraints** Define and apply constraints such as Primary Key, Foreign Key, Unique, Not Null, and Check constraints on tables. 3. **Data Retrieval using SQL Queries** Execute SELECT queries with conditions, sorting, grouping, and filtering using WHERE, ORDER BY, GROUP BY, and HAVING clauses. 4. **Use of Aggregate Functions** Perform operations using aggregate functions like COUNT, SUM, AVG, MIN, and MAX on database tables. 5. **Working with Joins** Implement different types of joins (INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN) to retrieve data from multiple tables. 6. **Subqueries and Nested Queries** Write and execute subqueries in SELECT, WHERE, and FROM clauses for complex data retrieval. 7. **Creation and Management of Views** Create, modify, and drop views; perform operations on views to simplify complex queries. 8. **Indexing and Performance Optimization** Create and manage indexes to improve query performance and analyze their impact. 9. **PL/SQL Programming Basics** Write simple PL/SQL programs using variables, control structures, and exception handling. 10. **Database Security and User Management** Create users, assign roles, and grant/revoke privileges to ensure database security.	15
Total no. of Lectures	60

Reference books	1. Database system concept By H. Korth and A. Silberschatz, TMH. 2. Data Base Management System ByAlexies&Mathews,Vikas publication. 3. Data Base Management System By C. J. Date, Narosha Pub. 4. Data Base Management System By James Matin. 5. Principles of Database System By Ullman. 6. An Introduction to database systems By Bipin Desai, 2011 ed., Galgotia Publication. 7. Database Management System By A. K. Majumdar & P.Bhattacharya, TMH

Assessment and Evaluation			
Suggested Continuous Evaluation Methods:			
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30/15 Marks	End Semester Exam (ESE) : 70/35 Marks	
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 / 10 & 10 Assignment / Seminar + Attendance: 10 / 5 Total Marks: 30 / 15	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30 / 15** Marks	
End Semester Exam (ESE)	**Laboratory / Field Skill Performance:** On spot Assessment A: Performed the Task based on lab - 20 Marks /40 Marks B: Spotting based on tools & technology (written) - 10 Marks / 20 Marks Viva-voce (based on principle/technology) - 5 Marks / 10 Marks		Managed by Course teacher as per lab. status

Program Code and Name	**DPMS07, M.Sc. (COMPUTER SCIENCE)**		Semester	**II**
Exam Code and Name	**2072 - M. Sc. COMPUTER SCIENCE SECOND SEMESTER**		Paper	**II**
Course Code	**MCSP202**		Course Type	**P**
Course Title	**Programming Lab in Data Structure in C++**			
Total Credit	**4/3/2/1**			
Total Marks	CIA: 15	ESE: 35	Max Marks: 50	Min. Pass. Marks: 20
Prerequisites (if any)				
Course Outcomes	CO1: Apply fundamental concepts of data structures to implement arrays, stacks, and queues using C++. CO2: Design and implement linked data structures such as singly and doubly linked lists. CO3: Develop programs for searching and sorting techniques to solve computational problems efficiently. CO4: Implement tree-based data structures and perform basic operations such as traversal using C++.			

Contents of Course	
List of Experiments	**No. of Period**
1. **Array Operations** Write a C++ program to perform insertion, deletion, and traversal operations on an array. 2. **Stack Implementation (Array)** Implement a stack using an array and perform PUSH, POP, and DISPLAY operations. 3. **Stack Implementation (Linked List)** Implement a stack using a linked list and demonstrate all basic operations. 4. **Queue Implementation (Array)** Implement a queue using an array and perform ENQUEUE and DEQUEUE operations. 5. **Circular Queue** Write a C++ program to implement a circular queue and demonstrate its operations. 6. **Singly Linked List** Create a singly linked list and perform insertion, deletion, and traversal operations. 7. **Doubly Linked List** Implement a doubly linked list with operations such as insertion and deletion at different positions. 8. **Searching Algorithms** Implement Linear Search and Binary Search algorithms and compare their performance. 9. **Sorting Algorithms** Write C++ programs for Bubble Sort, Selection Sort, and Insertion Sort. 10. **Binary Tree Traversal** Implement a binary tree and perform inorder, preorder, and postorder traversals.	15
Total no. of Lectures	60

Reference books	1. Let us C++ "Yashwant Kanetkar", BPB Publications, Tenth Edition. 2. The C Programming Language "Kemigham and Ritche [Prentice Hall]" 3. Data Structure by Lipshutz, McGraw Hill. 4. Data Structure by Standish, Addison-Wesley. 5. Data structures Through C by G. S. Baluja

Assessment and Evaluation			
Suggested Continuous Evaluation Methods:			
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30/15 Marks	End Semester Exam (ESE) : 70/35 Marks	
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 / 10 & 10 Assignment / Seminar + Attendance: 10 / 5 Total Marks: 30 / 15	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30 / 15** Marks	
End Semester Exam (ESE)	**Laboratory / Field Skill Performance:** On spot Assessment A: Performed the Task based on lab - 20 Marks /40 Marks B: Spotting based on tools & technology (written) - 10 Marks / 20 Marks Viva-voce (based on principle/technology) - 5 Marks / 10 Marks		Managed by Course teacher as per lab. status