



Programme: B.Sc. Honours in Computer Science (Major) 2023-2024

SEMESTER-IV

Course Code: 23CSCM41 Title: Database Management Systems

Hours: 3 hrs/week

Credits: 3

Learning Objectives:

To familiarize with concepts of database design

Learning Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels			
CO1. Differentiate between database systems and	Level-1, Level-2		
file based systems.			
CO2. Design a database using ER model	Level-1, Level-2,		
	Level-3		
CO3. Use relational model in database design	Level-2, Level-3		
CO4. Use SQL commands for creating and	Level-3, Level-4,		
manipulating data stored in databases.	Level-5		
CO5. Write PL/SQL programs to work with	Level-3, Level-4,		
databases	Level-5		

		CO-PO Mapping
1-Low, 2-Moderate,	3- High,	'-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	-	-	-	1	-	3	3	3
CO 2	2	-	-	-	1	-	3	3	3
CO 3	3	-	-	-	1	-	3	3	3
CO 4	3	-	-	-	1	-	3	3	3
CO 5	3	-	-	-	1	-	3	3	3

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		CO-PSO Mapping	
I-Low, 2-Moderate,	3- High,	'-' No Correlation	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT- I

Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base,

UNIT -II

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, **IS A** relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modeling.

UNIT - III

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra,

limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms upto 3rd normal form.





UNIT - IV

Structured Query Language: Introduction, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations,

UNIT - V

PL/SQL: Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

Reference Books

- 1. Database Management Systems by Raghu Ramakrishnan, McGrawhill
- 2. Principles of Database Systems by J. D. Ullman
- 3. Fundamentals of Database Systems by R. Elmasri and S. Navathe
- 4. SQL: The Ultimate Beginners Guide by Steve Tale.





SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Seminar Presentation on Database Management Systems Evaluation Method: Depth of research, clarity of explanations, ability to address questions and engage the audience.

Unit 2: Activity: Case Study on EER model

Evaluation Method: Identification of inheritance relationships, effective use of generalization and specialization, and adherence to constraints.

Unit 3: Activity: Exercise on Normalization: Assign students a set of unnormalized tables and have them normalize the tables to third normal form

Evaluation Method: Normalized table designs, identification of functional dependencies, adherence to normalization rules, and elimination of anomalies.

Unit 4: Activity: Competition on SQL Query Writing

Evaluation Method: Query correctness, efficiency, proper use of SQL commands, ability to handle complex scenarios, and creativity in query formulation.

Unit 5: Activity: Peer Review of PL/SQL code

Evaluation Method: Peer evaluation of code quality, adherence to coding standards, proper use of language elements, and logic.





IV Semester

Course 9: Database Management Systems

Credits -1

List of Experiments:

- 1. SQL Commands (DDL,DML)
- 2. SQL Functions
- 3. Aggregate Functions, Group by and Having clause
- 4. Integrity Constraints
- 5. PL/SQL sample programs
- 6. Control structures in PL/SQL
- 7. Loops in PL/SQL
- 8. Procedures, Functions in PL/SQL
- 9. Triggers in PL/SQL



SEMESTER END EXAMINATIONS MODEL PAPER SEMESTER- II

Programme : B.Sc(Computer Science) – Honours Course title: Database Management Systems Course code: 23CSCM41

Time: 3 hours

Maximum Marks: 60

PART-A

Answer any five of the following questions.

5 X 4 = 20 Marks

Each question carries **Four** marks. 1. – 2. – 3. – 4. ---5. – 6. – 7. ---8. – 9. – 10. --

PART-B

Answer all the following quest	ions.	
Each carries Eight marks		5 X 8 = 40 Marks
11. (A)		
	(Or)	
(B)		
12. (A)		
(B)	(Or)	
(b)		
13. (A).		
	(Or)	
(B)		
14. (A).		
	(Or)	
(B)		
15 (A)		
13. (1)	(Or)	
(B)	()	





Programme: B.Sc. Honours in Computer Science (Major) 2023-2024 SEMESTER-IV

Course Code: 23CSCM42 Title: Object Oriented Software Engineering

Hours: 3 hrs/week

Credits: 3

Course Objective:

To introduce Object-oriented software engineering (OOSE) - which is a popular technical approach to analyzing, designing an application, system, or business by applying the object- oriented paradigm and visual modeling.

Course Outcomes:

Course outcomes Mapping with Bloom's Taxonomy Levels				
CO1. Understand and apply the fundamental principles of Object-Oriented Programming (OOP)	Level-1, Level-2			
concepts and Unified Modeling Language (UML) basics, in the development of software solutions.				
CO2. Analyze and specify software requirements, develop use cases and scenarios, apply object- oriented analysis and design (OOAD) principles	Level-1, Level-2, Level-3			
CO3. Familiar with the concept of test-driven development (TDD) and its practical implementation	Level-2, Level-3			
CO4. Analyze and Evaluate Software Maintenance Level-3, Level-4, Level-5				
CO5. Apply Advanced Object-Oriented Software Engineering Concepts	Level-3, Level-4, Level-5			





		CO-PO Mapping
1-Low, 2-Moderate,	3- High,	'-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	-	-	-	1	-	3	3	3
CO 2	2	-	-	-	1	-	3	3	3
CO 3	3	-	-	-	1	-	3	3	3
CO 4	3	-	-	-	1	-	3	3	3
CO 5	3	-	-	-	1	-	3	3	3

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CO-PSO Mapping
1-Low, 2-Moderate, 3-High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT-I

Introduction to Object-Oriented Programming: Overview of software engineering, Introduction to Object-Oriented Programming (OOP) concepts (classes, objects, inheritance, polymorphism), Unified Modelling Language (UML) basics, Introduction to software development process and software development life cycle (SDLC).

UNIT-II

Requirements Analysis and Design: Requirements analysis and specification, Use cases and scenarios, Object-oriented analysis and design (OOAD), Design patterns, UML modelling techniques (class diagrams, sequence diagrams, state machine diagrams, activity diagrams)

UNIT-III

Software Construction and Testing: Software construction basics, Objectoriented design principles, Object-oriented programming languages (Java, C++, Python), Software testing basics (unit testing, integration testing, system testing), Test-driven development (TDD)





UNIT-IV

Software Maintenance and Evolution: Software maintenance basics, refactoring techniques Software version control, Code review and inspection, Software evolution and reengineering.

UNIT-V

Advanced Topics in Object-Oriented Software Engineering: Model-driven engineering (MDE), Aspect-oriented programming (AOP), Component-based software engineering (CBSE), Service- oriented architecture (SOA).

Text Book(s)

1. An Introduction to Object-Oriented Analysis and Design and the Unified Process, 3rd Edition, Craig Larman, Prentice-Hall.

2. Programming in Java by Sachin Malhotra, Oxford University Press

Reference Books

1. Requirements engineering: processes and techniques, G.Kotonya and, I.Sommerville, 1998, Wiley

2. Design Patterns, E.Gamma, R. Helm, R. Johnson, and J. Vlissides

3. The Unified Modeling Language Reference Manual, J. Rumbaugh, I.Jacobson and G. Booch, Addison Wesley





SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Group Activity: Design and implement a small OOP project **Evaluation Method:** Presentation evaluation rubric, Project evaluation based on OOP principles.

Unit 2: Activity: Use Case Scenario Presentation & Peer Activity: Review and provide feedback

on each other's use case diagrams

Evaluation Method: Presentation evaluation rubric, Peer feedback assessment.

Unit 3: Activity: Poster Presentation: Illustrate TDD principles and benefits

Evaluation Method: Poster presentation evaluation

Unit 4: Activity: Peer Activity: Analyze and discuss different maintenance strategies

Evaluation Method: Peer discussion participation evaluation

Unit 5: Activity: Seminar on Design Patterns

Evaluation Method: Depth of research, clarity of explanations, ability to address questions and engage the audience.





IV Semester Course Code: 23CSCM42 Title: Object Oriented Software Engineering Lab Credits -1

Suggested Software Tools:

StarUML/UMLGraph/Topcased/Umberollo/ArgoUML/ Eclipse IDE, Visual Paradigm for UML/Rational Software Architect/Any other Open Source Tool List of Experiments:

Select domain of interest (e.g. College Management System) and identify multi-tier software application to work on (e.g. Online Fee Collection). Analyze, design and develop this application using OOSE approach:

Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).

2. Understanding of System modeling: Data model i.e. ER – Diagram and draw the ER Diagram with generalization, specialization and aggregation of specified problem statement

3. Understanding of System modeling: Functional modeling: DFD level 0 i.e. Context Diagram and draw it

4. Understanding of System modeling: Functional modeling: DFD level 1 and DFD level 2 and draw it.

5. Identify use cases and develop the use case model.

6. Identify the business activities and develop an UML Activity diagram.

7. Identity the conceptual classes and develop a domain model with UML Class diagram.

8. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.

9. Draw the state chart diagram.





10. Identify the user interface, domain objects, and technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.

- 11. Implement the technical services layer.
- 12. Implement the domain objects layer.
- 13. Implement the user interface layer.
- 14. Draw component and deployment diagrams.



SEMESTER END EXAMINATIONS MODEL PAPER SEMESTER- II

Programme : B.Sc(Computer Science) – Honours Course title: Object Oriented Software Engineering Course code: 23CSCM42

Time: 3 hours

Maximum Marks: 60

PART- A

Answer any **five** of the following questions.

5 X 4 = 20 Marks

Each question carries Four marks. 1. – 2. – 3. – 4. ---5. – 6. – 7. ---8. – 9. – 10. --

PART-B

Answer all the following ques	stions.	
Each carries Eight marks		5 X 8 = 40 Marks
11. (A)		
	(Or)	
(B)		
12. (A)		
	(Or)	
(B)		
13. (A).		
	(Or)	
(B)		
14. (A).		
	(Or)	
(B)		
15. (A)	(-)	
(-)	(Or)	
(B)		





Programme: B.Sc. Honours in Computer Science (Major) 2023-2024

SEMESTER-IV

Course Code: 23CSCM43

Tite: Data Communication and Computer Networks

Hours: 3 hrs/week

Credits: 3

Course Objectives

To provide students with a comprehensive understanding of networking principles, protocols, and technologies, enabling them to design, analyze, and evaluate efficient and reliable network solutions.

Course Outcomes

Course outcomes Mapping with Bloom's Taxonomy Levels				
CO1. Understand and apply network applications,	Level-1, Level-2			
hardware, software, and reference models for				
network communication.				
CO2. Design and analyze data link layer protocols,	Level-1, Level-2,			
multiple access protocols, and wireless LAN	Level-3			
technologies.				
CO3. Design routing algorithms, congestion control	Level-2, Level-3			
algorithms, and evaluate network layer protocols for				
internetworking.				
CO4. Analyze transport service, transport protocols,	Level-3, Level-4,			
and evaluate UDP and TCP in the internet.	Level-5			
CO5. Understand and evaluate application layer	Level-3, Level-4,			
protocols, including DNS, email, WWW, and	Level-5			
network management protocols.				

CO-PO Mapping 1-Low, 2- Moderate, 3- High, '-' No Correlation





	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	-	-	-	1	-	3	3	3
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CO 3	3	-	-	-	1	-	3	3	3
CO 4	3	-	-	-	1	-	3	3	3
CO 5	3	-	-	-	1	-	3	3	3

CO-PSO Mapping	
1-Low, 2- Moderate, 3- High, '-' No Correlation	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	2	3
CO 2	3	3	2	2	2
CO 3	2	2	2	3	2
CO 4	2	2	2	3	2
CO 5	2	2	3	3	2

UNIT-I

INTRODUCTION: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet.

THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission.

UNIT-II

THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Wireless LAN, Bluetooth.

UNIT-III

THE NETWORK LAYER: Network layer design issues, routing algorithms, the network layer in the internet (IPv4 and IPv6), Quality of Service.





UNIT-IV

THE TRANSPORT LAYER: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V

THE APPLICATION LAYER: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.

APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

Text Book(s)

1. S. Tanenbaum (2003), Computer Networks, 4th edition, Pearson Education/ PHI, New Delhi, India

Reference Books

 Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.

2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.





SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:

Unit 1: Activity: Hands-on exercises to configure network applications Evaluation Method: Practical skills in configuring network applications, hardware, and software.

Unit 2: Activity: Protocol Design and Simulation using simulation tools like NS-3 or Cisco Packet

Tracer.

Evaluation Method: Students' ability to design and simulate data link layer protocols and multiple access protocols

Unit 3: Activity: Guest Lectures and Workshops on routing algorithms, congestion control, and network layer protocols.

Evaluation Method: Students' participation and understanding demonstrated in guest lectures and workshop

Unit 4: Activity: Network Monitoring and Traffic Analysis using tools like Wireshark

Evaluation Method: Understanding of transport protocols through their analysis of network traffic and identification of UDP and TCP behavior **Unit 5: Activity:** Group Projects on Network Application Development **Evaluation Method:** Group Project Presentations





IV Semester

Course Code: 23CSCM43P

Title : Data Communication and Computer Networks Lab

Credits -1

List of Experiments:

- 1. Understanding various network tools in Windows and Linux
- 2. Study different types of Network devices and Cables
- 3. Building a Local Area Network
- 4. Concept of Network IP Address
- 5. Introduction to Network Simulator Packet Tracer (PT)
- 6. Configuration of a Router using Packet Tracer
- 7. Implementation of a Network using Packet Tracer
- 8. Implementation of Static Routing using Packet Tracer
- 9. Implementation of RIP using Packet Tracer
- 10. Implementation of OSPF using Packet Tracer
- 11. Implement DNS using packet tracer
- 12. Implementation of a VLAN using Packet Tracer



SEMESTER END EXAMINATIONS MODEL PAPER **SEMESTER-II**

Programme : B.Sc(Computer Science) – Honours Course title: Data Communications and Computer Networks Course code: 23CSCM43

Time: 3 hours

Maximum Marks: 60

PART-A

Answer any **five** of the following questions.

5 X 4 = 20 Marks

Each question carries Four marks. 1. – 2. – 3. – 4. ----5. – 6. – 7. ----8. – 9. – 10. --

PART-B

Answer all the following ques	tions.	
Each carries Eight marks		5 X 8 = 40 Marks
11. (A)		
	(Or)	
(B)		
12. (A)		
	(Or)	
(B)		
13. (A).		
	(Or)	
(B)		
14. (A).		
	(Or)	
(B)		
15. (A)		
	(Or)	
(B)		