

V Semester

DEPARTMENT	Computer Science and Engineering							
Course Code	22CS510	Total Credits	4	Course Type	Professional Core Course			
Course Title	Database Management Systems							
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks				
	Lecture	52	4		CIE	SEE	Total	
	Tutorial	0	0	Weightage	40 %	60 %	100 %	
	Practical	0	0	Maximum Marks	40 Marks	60 Marks	100 Marks	
	Total	52	4	Minimum Marks	20 marks	25 marks	45 Marks	

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Data structures and algorithms

COURSE OBJECTIVES:

Sl.No.	Course Objectives
1	Introduce the basic concepts of database systems.
2	Learn to design entity relationship and relational models for given user requirements.
3	Formulate the relational algebraic equations and SQL statements.
4	Apply database design theory and normalization techniques.
5	Learn transaction processing techniques.

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Describe the fundamental concepts of database system environment.	L2
CO2	Design a database schema for a given problem specifications and user-requirements.	L3
CO3	Use SQL language to create, populate, maintain, and query a database.	L3
CO4	Design a simple database system applying normal forms.	L3
CO5	Design and build a simple database system in line with transaction properties.	L3

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

UNIT No.	Content	Hours
		Lecture
1	Introduction to Database Concepts and Architecture: Introduction; An example; Characteristics of Database approach; Database users, Advantages of using DBMS approach, Data models, schema and instances, Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of DBMS.	10
2	Data Modeling Using the Entity-Relationship (ER) Model: Using High-Level Conceptual Data Models for Database Design, A Sample	10

	<p>Database Application, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database, ER Diagrams, Naming Conventions, and Design Issues, Relationship Types of Degree Higher than Two, Relational Database Design Using ER-to-Relational Mapping</p> <p>The Relational Data Model and Relational Database Constraints: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions, and Dealing with Constraint Violations,</p>	
3	<p>The Relational Algebra: Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations: Generalized Projection, Aggregate Functions and Grouping, OUTER JOIN Operations, Examples of Queries in Relational Algebra</p> <p>Basic SQL: SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, More Complex SQL retrieval Queries, Specifying Constraints as Assertions and Actions as Triggers, Views (Virtual Tables) in SQL.</p>	12
4	<p>Database Design Theory and Normalization: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form, Further Topics in Functional Dependencies: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions.</p>	10
5	<p>Transaction Processing, Concurrency Control, and Recovery: Introduction to Transaction Processing, Transactions, Database Items, Read and Write Operations and DBMS Buffers, Why Concurrency Control is Needed, Why Recovery Is Needed, Desirable Properties of Transactions, Two-Phase Locking Techniques for Concurrency Control.</p>	10

Text Books:

Sl.No.	Author/s	Title	Publisher Details
1	Elmasri and Navathe	Fundamentals of Database Systems	7 th Edition, Pearson Education, 2016.
2	Raghu Ramakrishnan and Johannes Gehrke	Database Management Systems	3 rd Edition, McGraw-Hill, 2015.

Reference Books:

Sl.No.	Author/s	Title	Publisher Details
1	Silberschatz, Korth and Sudharshan	Data base System Concepts	6 th Edition, Mc-GrawHill, 2016.
2	C.J. Date, A. Kannan, S. Swamynathan	An Introduction to Database Systems	8 th Edition, Pearson Education, 2016.
3	Carlos Coronel, Steven Morris and Peter Rob	Database Systems design, Implementation, and Management	9 th Edition, Cengage Learning, 2016
4	Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom	The Database Systems – The Complete Book	Pearson Prentice Hall, 2017

Web Resources:

Sl.No.	Web link
1	http://nptel.ac.in/courses/106106093/
2	https://nptel.ac.in/courses/106/104/106104135/

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	3
CO4	3	3	-	3	3	-	-	-	-	-	-	-	3	-	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-

High – 3, Medium – 2, Low – 1

DEPARTMENT	Computer Science and Engineering							
Course Code	22CS520	Total Credits	4	Course Type	Professional Core Course			
Course Title	Computer Networks							
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks				
	Lecture	52	4		CIE	SEE	Total	
	Tutorial	0	0	Weightage	40 %	60 %	100 %	
	Practical	0	0	Maximum Marks	40 Marks	60 Marks	100 Marks	
Total		52	4	Minimum Marks	20 marks	25 marks	45 Marks	

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Data Communication.

COURSE OBJECTIVES:

Sl.No.	Course Objectives
1	Introduce the various routing and congestion control algorithms.
2	Understand the various Internet protocols such as [IPV4, IPV6].
3	Analyze the different application protocols and streaming services.

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Implement various Routing algorithm on Datagram and Virtual Circuit Network.	L3
CO2	Design of different packet scheduling and congestion control policies.	L4
CO3	Compare and contrast various protocols of Transport layer and Network layer	L2
CO4	Use of TCP service primitives for creation and connection management of applications.	L3
CO5	Illustrate Multimedia Streaming and the need of Network security.	L3

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

UNIT No.	Content	Hours
		Lecture
1	Network layer: Network layer design issues: Store-and-Forward Packet Switching, Services provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit and Datagram Subnets. Routing algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, <u>Routing for Mobile Hosts</u> , Routing in Ad Hoc Networks.	10
2	Congestion control algorithms: Approaches to congestion control, Traffic Aware Routing, Admission Control, Traffic Throttling, Load	12

	Shedding, and Quality of Service: Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control, Integrated Services, and Differentiated Services. Internetworking: How networks differ, How Networks can be connected, Tunneling, Internetwork Routing, Packet fragmentation.	
3	The Network Layer in the Internet: The IP Version 4 Protocol, IP Addresses, IP Version 6, Internet Control Protocols, Label Switching and MPLS, OSPF, BGP, Internet Multicasting, Mobile IP. Transport Layer: The Transport Service: Services provided to the upper layers, Transport Service Primitives, Berkeley Sockets, and Elements of Transport Protocols: Addressing, Connection establishment, Connection release, Error Control & Flow control Multiplexing and Crash recovery. Simple transport protocol, UDP, Remote Procedure Call, Real Time Transport Protocol.	10
4	The Internet Transport Protocols: TCP, TCP service Model, TCP Protocol, TCP segment Header, TCP connection establishment, TCP connection release, TCP connection management, Transmission policy, Sliding window, Timer management, TCP congestion control, The Application Layer: DNS: The DNS Name Space, Resource Records, Name Servers. Electronic Mail: Architecture and Services, The User agent, message formats, and message transfer, final delivery, WWW: Architectural overview, static web documents, dynamic web documents, HTTP.	10
5	Streaming Audio and Video: Digital Audio, Digital Video, Streaming Stored Media, Streaming Live Media, Real Time Conferencing. Network Security: Cryptography: Introduction to cryptography, Public Key Algorithm: RSA Communication Security: IPsec, Firewalls, Virtual Private Networks, Wireless Security.	10

Text Book:

Sl.No.	Author/s	Title	Publisher Detail
1	Andrew S Tanenbaum, David J Wetherall,	Computer Networks	6 th Edition, PHI/Pearson Publication, 2021

Reference Books:

Sl.No.	Author/s	Title	Publisher Detail
1	Alberto Leon-Garcia and Indra Widjaja	Communication Networks – Fundamental Concepts and Key architectures	2 nd Edition Tata McGraw-Hill, 2004.
2	William Stallings	Data and Computer Communication	8 th Edition, PHI, 2007
3	Behrouz A Forouzan	Data Communications and Networking	5 th Edition, Tata McGraw Hill, 2013
4	James F. Kurose and Keith W. Ross	Computer Networking	7 th Edition, Pearson, 2017

Web Resources:

Sl.No.	Web Link
1	https://nptel.ac.in/courses/106/105/106105081/
2	https://onlinecourses.swayam2.ac.in/cec19_cs07/preview

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

High – 3, Medium – 2, Low – 1

DEPARTMENT		Computer Science and Engineering				
Course Code	22CS530	Total Credits	4	Course Type	Professional Core Course	
Course Title	Principles of Compilers					
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks		
	Lecture	52	4		CIE	SEE
	Tutorial	0	0	Weightage	40 %	60 %
	Practical	0	0	Maximum Marks	40 Marks	100 Marks
	Total	52	4	Minimum Marks	20 marks	25 marks

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Knowledge of automata theory, Context free languages, Computer organization, Data structures, Theory of computation

COURSE OBJECTIVES:

Sl No.	Course Objectives
1	Introduce the concepts of compiler design.
2	Recognize the underlying formal models such as finite state automata, push-down automata and their connection to language definition through regular expressions and grammars.
3	Extend the knowledge of parsers by top down and bottom-up parsing algorithms
4	Generate the intermediate code for a programming language construct.

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Explain the basic concepts of compilers and lexical analyzer.	L2
CO2	Construct parsing table for the given grammar.	L3
CO3	Design parsing table for the given grammar and Syntax Directed Definitions various language construct.	L3
CO4	Design various forms of intermediate code for the given language constructs.	L3
CO5	Apply the concepts of intermediate code for assembly language.	L3

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

UNIT No.	Content	Hours
		Lecture
1	Introduction, Lexical Analysis: Language processors, The structure of Compilers, Lexical analysis: The role of Lexical Analyzer, Input Buffering, Specifications of Tokens, recognition of Tokens.	10
2	Syntax analysis-I: Introduction, Writing a Grammar, Top-down Parsing, Bottom-up Parsing, Introduction to LR Parsing: Simple LR	11

	parser.	
3	Syntax analysis-II: More powerful LR Parsers: Canonical parser, LALR parser. Syntax-Directed Definitions: Evaluation order for SDDs, Applications of Syntax-directed translation, Syntax-directed translation schemes.	11
4	Intermediate Code Generation: Variants of syntax trees, Three-address code, Types and declarations, Translation of expressions, Type checking, Control flow, Back patching, and Switch statements.	10
5	Code Generation: Issues in the design of Code Generator, The Target language, Addresses in the target code, Basic blocks and Flow graphs, Optimization of basic blocks, A Simple Code Generator.	10

Text Books:

Sl.No.	Author/s	Title	Publisher Details
1	Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman	Compilers-Principles, Techniques and Tools	2 nd Edition, Pearson education, 2014.

Reference Books:

Sl.No.	Author/s	Title	Publisher Details
1	Kenneth C Louden	Compiler Construction - Principles & Practice,	1 st Edition, Brooks/Cole, CENGAGE learning, 1997
2	Andrew W Appel	Modern Compiler Implementation in C	1 st Edition, Cambridge University Press, 2010

Web Resources:

Sl.No.	Web Link
1	http://nptel.iitm.ac.in
2	http://nptel.ac.in/courses/106104123/

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-

High – 3, Medium – 2, Low – 1

DEPARTMENT	Computer Science and Engineering							
Course Code	22CS540	Total Credits	4	Course Type	Professional Core Course			
Course Title	Artificial Intelligence							
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks				
	Lecture	52	4	CIE	SEE	Total		
	Tutorial	0	0	Weightage	40 %	100 %		
	Practical	0	0	Maximum Marks	40 Marks	100 Marks		
	Total	52	4	Minimum Marks	20 marks	45 Marks		

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Design and analysis of Algorithms

COURSE OBJECTIVES:

Sl.No.	Course Objectives
1	State space search representation for the problem and tracing the solution path.
2	Able to differentiate between informed and uninformed search.
3	Knowledge representation and pruning the search space.

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Apply the knowledge of Artificial Intelligence to write simple algorithm for agents.	L3
CO2	Apply the AI knowledge to solve problem on search algorithm.	L3
CO3	Analyze different game-playing algorithms and apply minimization and maximization techniques to enhance machine capability to win the game.	L4
CO4	Develop knowledge base sentences using propositional logic and first order logic.	L3
CO5	Analyze different Planning techniques for solving the advanced problem solving technique. Design a mini expert system.	L4

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

UNIT No.	Content	Hours
		Lecture
1	Introduction to AI: Introduction, History, Intelligent systems, Foundation of AI, Sub area of AI , Applications, Tic-Tac-Toe Game Playing, development of AI, current trend in AI.	10
2	Problem solving: state space search and control strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques.	10
3	Problem reduction and Game playing: Introduction, Problem reduction,	10

	game playing, Bounded look-ahead strategy, alpha-beta pruning, Two player perfect information games.	
4	Logic concepts: Introduction, Propositional calculus, Propositional logic, Natural Deduction system, Semantic Tableau System in Propositional Logic, resolution refutation in Propositional Logic, Predicate logic.	12
5	Advanced problem solving paradigm: Planning: types of planning system, block world problem, logic based planning, Linear planning using a goal stack. Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System architecture, Expert System verses Traditional Systems.	10

Text Books:

Sl.No.	Author/s	Title	Publisher Details
1	Saroj Kaushik	Artificial intelligence	Cengage learning, 2014

Reference Books:

Sl.No.	Author/s	Title	Publisher Details
1	Ellaine Rich, Kelvin Knight	Artificial intelligence	3 rd edition, Tata McGraw Hill publications
2	Stuart J Russel, Peter Norvig	Artificial intelligence, A modern Approach	3 rd edition, Pearson publications
3	Charu C. Aggarwal	Artificial intelligence	Springer publications, June 2021
4	Winston Patrick Henry	Artificial intelligence	3 rd edition, Pearson Education

Web Resources:

Sl.No	Web Link
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1	https://nptel.ac.in/courses/106105077/
2	https://www.youtube.com/watch?v=TjZBTDzGeGg&list=PLUl4u3cNGP63gFHB6xb-kVBiQHYe_4hSi

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-

High – 3, Medium – 2, Low – 1

DEPARTMENT	Computer Science and Engineering							
Course Code	22CS552	Total Credits	3	Course Type	Professional Elective Course			
Course Title	Cryptography and Network Security							
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks				
	Lecture	39	3		CIE	SEE		
	Tutorial	0	0	Weightage	40 %	60 %		
	Practical	0	0	Maximum Marks	40 Marks	100 Marks		
	Total	39	3	Minimum Marks	20 marks	45 Marks		

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Computer Networks.

COURSE OBJECTIVES:

Sl.No.	Course Objectives
1	Understand the key concepts of cryptography
2	Comprehend various applications of cryptography
3	Analyze the different cryptographic algorithms to provide better security

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Explain basic cryptographic principles, and mathematics involved.	L2
CO2	Illustrate algorithms related to the Secret Key cryptography.	L3
CO3	Illustrate algorithms related to the Public Key cryptography.	L3
CO4	Explain the authentication and Key management activities.	L2
CO5	Analyse issues related to security in Network, Transport and Application Layer.	L4

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

UNIT No.	Content	Hours Lecture
1	Cryptography: Introduction: Security Goals, Cryptographic Attacks, Services and Mechanism, Techniques for Security Goals Implementation. Mathematics of Cryptography: Integer Arithmetic, The extended Euclidean algorithm, Modular Arithmetic, Matrices, Linear Congruence.	07
2	Traditional Symmetric Key Ciphers: Symmetric Key Ciphers, Categories of Traditional Ciphers. Stream and Block Ciphers. Data Encryption Standard: DES Structure, DES Analysis, Security of DES, Advanced Encryption Standard: The AES Cipher	08
3	Asymmetric Key Cryptography: RSA Cryptosystem, Elgamal Cryptosystem. Elliptic Curve Cryptosystems.	08
4	Message Integrity, Authentication, Key Management: Message Integrity, Random Oracle Model, Message Authentication Cryptographic Hash Functions: Iterated Hash Function, Description of	08

	MD Hash Family. Key Management: Key Distribution Centre (KDC), Session Keys: Needham Schroeder Protocol, Kerberos: Servers, Operations.	
5	Network Security: Security at the Application Layer: Email System, Pretty Good Privacy, Secure/Multipurpose Internet Mail Extension. Security at the Transport Layer: SSL Architecture, Four Protocols Security at the Network Layer: IP Security, Modes of IP Security, Two Security Protocols.	08

Text Book:

Sl.No.	Author/s	Title	Publisher Details
1	Behrouz A Forouzan, Debdeep Mukhopadhyay	Cryptography and Network Security	3 rd Edition , Mc-Graw Hill, 2015

Reference Books:

Sl.No.	Author/s	Title	Publisher Details
1	William Stallings	Cryptography and Network Security - Principles and Practices	4 th Edition, Prentice Hall, 2016. Reprint 2019
2	Jonathan Katz, Yehuda Lindell	Introduction to Modern Cryptography	CRC press publications. 2007
3	Atul Kahate	Cryptography and Network Security	3 rd Edition, McGraw Hill Education private Limited, 2013
4	Douglas R. Stinson	Cryptography: Theory and Practice	3 rd Edition, Chapman and Hall/CRC, 2006

Web Resources:

Sl.No.	Web Link
1	https://onlinecourses.nptel.ac.in/noc21_cs16/preview
2	https://onlinecourses.nptel.ac.in/noc21_cs43/preview

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3	3
CO4	3	3		-	-	-	-	-	-	-	-	-	3	-	3	-
CO5	3	3		-	-	-	-	-	-	-	-	-	3	-	3	-

High – 3, Medium – 2, Low – 1

DEPARTMENT	Computer Science and Engineering							
Course Code	22CS57L	Total Credits	1.5	Course Type	Professional Core Course			
Course Title	Database Management Systems Lab							
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks				
	Lecture	0	0		CIE	SEE		
	Tutorial	0	0	Weightage	40 %	60 %		
	Practical	39	1.5	Maximum Marks	40 Marks	60 Marks		
Total		39	1.5	Minimum Marks	20 marks	45 Marks		

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Data Structures.

COURSE OBJECTIVES:

Sl.No.	Course Objectives
1	Learn to design entity relationship and relational models for given user requirements.
2	Formulate SQL statements.
3	Apply database design theory and normalization techniques.

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Implement a database schema for a given problem specifications and user-requirements.	L4
CO2	Use SQL language to create, populate, maintain, and query a database.	L4
CO3	Apply normalization theory to validate and revise the logical database design.	L3

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

Weeks	List of Programs	No. of Hours
1	Consider a structure named Student with attributes as SID, NAME, BRANCH, SEMESTER, ADDRESS. Write a program in C/C++/ and perform the following operations using the concept of files. <ul style="list-style-type: none"> a. Insert a new student b. Modify the address of the student based on SID c. Delete a student d. List all the students e. List all the students of CSE branch. f. List all the students of CSE branch and reside in Kuvempunagar. 	03
2	Create a table for the structure Student with attributes as SID, NAME, BRANCH, SEMESTER, ADDRESS, PHONE, EMAIL, Insert atleast 10 tuples and perform the following operations using SQL. <ul style="list-style-type: none"> a. Insert a new student 	03

	<p>b. Modify the address of the student based on SID c. Delete a student d. List all the students e. List all the students of CSE branch. f. List all the students of CSE branch and reside in Kuvempunagar.</p>	
3, 4,5,6	<p>Data Definition Language (DDL) commands in RDBMS Consider the database schemas given below. Write ER diagram and schema diagram. The primary keys are underlined and the data types are specified. Create tables for the following schema listed below by properly specifying the primary keys and foreign keys. Enter at least five tuples for each relation. Altering tables, Adding and Dropping different types of constraints. Also adding and dropping fields in to the relational schemas of the listed problems. Delete, Update operations</p> <p>A. Sailors database</p> <p>SAILORS (sid, sname, rating, age) BOAT(bid, bname, color) RSERVERS (sid, bid, date)</p> <p>B. Insurance database</p> <p>PERSON (driver id#: string, name: string, address: string) CAR (regno: string, model: string, year: int) ACCIDENT (report_ number: int, acc_date: date, location: string) OWNS (driver id#: string, regno: string) PARTICIPATED(driver id#:string, regno:string, report_ number: int,damage_amount: int)</p> <p>C. Order processing database</p> <p>Customer (Cust#:int, cname: string, city: string) Order (order#:int, odate: date, cust#: int, order-amt: int) Order-item (order#:int, Item#: int, qty: int) Item (item#:int, unitprice: int) Shipment (order#:int, warehouse#: int, ship-date: date) Warehouse (warehouse#:int, city: string)</p> <p>D. Student enrollment in courses and books adopted for each course</p> <p>STUDENT (regno: string, name: string, major: string, bdate: date) COURSE (course#:int, cname: string, dept: string) ENROLL(regno:string, course#: int,sem: int,marks: int) BOOK-ADOPTION (course#:int, sem: int, book-ISBN: int) TEXT (book-ISBN: int, book-title: string, publisher: string, author: string)</p> <p>E. Company Database:</p> <p>EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo, DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours)</p>	03
7,8,9,10	Data Manipulation Language (DML) and Data Control Language (DCL)	03

	<p>Write valid DML statements to retrieve tuples from the databases. The query may contain appropriate DML and DCL commands such as:</p> <p>Select with</p> <ul style="list-style-type: none"> - %like, between, where clause - Order by - Set Operations - Exists and not exists - Join operations - Aggregate functions - Group by - Group by having - Nested and correlated nested Queries <p>Grant and revoke permission</p>	
11,12	<p>Views and Triggers</p> <ul style="list-style-type: none"> i. Views: creation and manipulating content. ii. Triggers: creation and execution of database triggers on every insert, delete and update operation. 	03
13	Laboratory Test: Note (question no. 1 and 2 only for practice)	03

Text Books:

Sl.No.	Author/s	Title	Publisher Details
1	Elmasri and Navathe	Fundamentals of Database Systems	7 th Edition, Pearson Education, 2016.
2	Raghuramakrishnan and Johannes Gehrke	Database Management Systems	3 rd Edition, McGraw-Hill, 2015.

Reference Books:

Sl. No	Author/s	Title	Publisher Details
1	Silberschatz, Korth and Sudharshan	Data base System Concepts	6 th Edition, Mc-GrawHill, 2016.
2	C.J. Date, A. Kannan, S. Swamynathan	An Introduction to Database Systems	8 th Edition, Pearson Education, 2016.
3	Carlos Coronel, Steven Morris and Peter Rob	Database Systems design, Implementation, and Management	9 th Edition, Cengage Learning, 2016
4	Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom	The Database Systems – The Complete Book	Pearson Prentice Hall, 2017

Web Resources:

Sl.No.	Web Link
1	http://nptel.ac.in/courses/106106093/
2	https://nptel.ac.in/courses/106/104/106104135/

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	-	-	-	-	-	3	3	-	-	3	-	3	-	-
CO2	3	3	-	-	3	-	-	3	3	-	-	3	-	3	-	-
CO3	3	3	2	-	3	-	-	3	3	-	-	3	-	3	-	-

High – 3, Medium – 2, Low – 1

DEPARTMENT	Computer Science and Engineering							
Course Code	22CS58L	Total Credits	1.5	Course Type	Professional Core Course			
Course Title	Computer Networks Lab							
Teaching Learning Process		Contact Hours	Credits	Assessment in Weightage and marks				
	Lecture	0	0	CIE	SEE	Total		
	Tutorial	0	0	Weightage	40 %	60 %		
	Practical	39	1.5	Maximum Marks	40 Marks	100 Marks		
	Total	39	1.5	Minimum Marks	20 marks	45 Marks		

Note: *For passing the student has to score a minimum of 45 Marks (CIE+SEE: 20 + 25 or 21 + 24)

COURSE PREREQUISITE: Data Communication, Computer Networks.

COURSE OBJECTIVES:

Sl.No.	Course Objectives
1	Introduction to different commands commonly used in networking.
2	Provide hands on experience related to error detection, routing and congestion control algorithms.
3	Simulate the working of different networks using simulation software (NS2/ NS3).

COURSE OUTCOMES (COs)

CO#	Course Outcomes	Highest Level of Cognitive Domain
CO1	Develop of error detection and congestion control algorithms using JAVA/Python Programming	L3
CO2	Design of Client - Server programming using TCP and UDP protocols using JAVA/Python Programming and explore system configuration using tool.	L3
CO3	Implement and evaluate networking protocols using simulation in NS2 / NS3	L3

L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate, L6 - Create

Course Content / Syllabus:

Weeks	List of Programs	No. of Hours
PART-A: Implement the following using C++/Java/Python		
1	A. Use appropriate tool to find Host name, IP address, physical address, subnet mask, default gateway etc [hint: Ipconfig]. Explore different options available with the tool. B. On the host system, identify the TCP connections, ports on which the computer is listening, Ethernet statistics, the IP routing table, IPV4statistics, and IPV4 statistics etc. using appropriate tool [hint: netstat]. Explore different options available with the tool.	03
2	Write a program to sort frames using appropriate sorting techniques	03
3	Write a program for error detecting code using CRC-CCITT (16- bits).	03
4	Write a program to find the shortest path between vertices using bellman-	03

	ford algorithm.	
5	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present	03
6	Write a program on datagram socket for client/server to display the messages on client side, typed at the server side.	03
7	Write a program for simple RSA algorithm to encrypt and decrypt the data.	03
8	Write a program for congestion control using leaky bucket algorithm and token bucket algorithm.	03
9	Write a program to implement random early detection (RED) congestion control algorithm.	03
PART-B: Simulation Experiments using NS2/ NS3/ NetSim or any other suitable simulation software		
10	Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.	03
11	Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion	03
12	Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.	03
13	Implement simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets	03
14	Lab Test/Event	

Text Book:

Sl.No.	Author/s	Title	Publisher Detail
1	Andrew S Tanenbaum, David J Wetherall,	Computer Networks	6 th Edition, PHI/Pearson Publication, 2021

Reference Books:

Sl.No.	Author/s	Title	Publisher Detail
1	Alberto Leon-Garcia and Indra Widjaja	Communication Networks – Fundamental Concepts and Key architectures	2 nd Edition Tata McGraw-Hill, 2004.
2	William Stallings	Data and Computer Communication	8 th Edition, PHI,2007
3	Behrouz A Forouzan	Data Communications and Networking	5 th Edition, Tata McGraw Hill, 2013
4	James F. Kurose and Keith W. Ross	Computer Networking	7 th Edition, Pearson, 2017

Web Resources:

Sl.No.	Web Link
1	https://nptel.ac.in/courses/106/105/106105081/
2	https://www.isi.edu/nsnam/ns/

Course Articulation:

COURSE OUTCOMES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	-	-	-	-	3	3	-	-	3	3	3	-
CO2	3	3	3	3	-	-	-	-	3	3	-	-	-	3	3	-
CO3	3	3	3	3	2	-	-	-	3	3	-	-	3	3	3	3

High – 3, Medium – 2, Low – 1