UNITED INSTITUTE OF TECHNOLOGY

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Periyanaickenpalayam, Coimbatore – 641020

Learn Research
Innovate

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

II YEAR

EVEN SEMESTER

(FOURTH SEMESTER)

ACADEMIC YEAR 2024 – 2025

INDEX

HEAD OF THE DEPARTMENT

ACOE **PRINCIPAL** **CHAIRMAN**

CS3492

Database Management Systems

UNIT I

RELATIONAL DATABASES

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is a Database Management System? Why do we need a DBMS?	1	1	2
2.	List out some applications of Database Management System.	1	2	2
3.	What is physical data independence?	1	2	2
4.	What are the three levels of data abstraction?	1	1	2
5.	Differentiate between primary key and foreign key.	1	2	2
6.	What are the different types of integrity constraints used in designing relational databases?	1	1	2
7.	Justify the need of embedded SQL.	1	2	2
8.	Differentiate between Static SQL and Dynamic SQL.	1	2	2
	PART B			
1.	Explain the database management system architecture with a neat diagram.	1	5	16
2.	Define relational algebra. Explain various relational algebraic operations with examples.	1	5	16
3.	Create an EMPLOYEE table and write the SQL to create, insert, update, delete, save and join the various attributes of an EMPLOYEE Table**.**	1	6	16
4.	What is a data model? Explain various data models for describing the design of a database at the logical level**.**	1	5	16

UNIT II
DATABASE DESIGN

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define single valued and multi valued attributes.	2	1	2
2.	What is a weak entity? Give an example.	2	1	2
3.	What does the cardinality ratio specify?	2	2	2
4.	Define normalization.	2	1	2
5.	List the anomalies of 1NF.	2	1	2
6.	Define Functional Dependency.	2	1	2
7.	'Boyce-Codd normal form is found to be stricter than the third normal form'. Justify the statement	2	2	2
8.	List out the desirable properties of decomposition.	2	1	2
	PART B			
1.	What is the notation used in the E-R diagram? Construct an E-R diagram for a banking enterprise with almost all components.	2	3	16
2.	What is the need for Normalization? Outline first normal form, second normal form and third normal form with an example.	2	3	16
3.	Discuss briefly about Boyce-Codd normal form, Multi valued dependency and Fourth Normal Form.	2	5	16
4.	Explain the concept of Join Dependencies and Fifth Normal Form with examples.	2	5	16

UNIT III

TRANSACTIONS

Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking-Timestamp – Multiversion – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update – Shadow paging – ARIES Algorithm

	Question	CO	BTL	Marks
	PART A			
1.	Define transaction.	3	1	2
2.	What is a schedule in transaction management?	3	1	2
3.	What is the need for concurrency control?	3	1	2
4.	What is timestamp-based concurrency control?	3	1	2
5.	What is multiple granularity locking?	3	1	2
6.	Distinguish between deferred and immediate updates in recovery.	3	2	2
7.	What is shadow paging in database recovery?	3	1	2
8.	Name the three phases of the ARIES recovery algorithm.	3	1	2
	PART B			
1.	Explain the states of transactions and discuss the ACID properties in detail.	3	5	16
2.	Discuss about conflict and view serializability.	3	5	16
3.	Explain the locking protocols for concurrency control.	3	3	16
4.	Explain Deadlock in detail with an example.	3	3	16

UNIT IV

IMPLEMENTATION TECHNIQUES

RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations – Query optimization using Heuristics - Cost Estimation

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is a data dictionary in a database system?	4	1	2
2.	What is column-oriented storage?	4	1	2
3.	What are ordered indices?	4	1	2
4.	Differentiate BTree and B+Tree Index.	4	2	2
5.	Differentiate between static hashing and dynamic hashing.	4	2	2
6.	Distinguish between sparse and dense indexes.	4	2	2
7.	List three components of the query processor.	4	1	2
8.	What is the need for query optimization?	4	1	2
	PART B			
1.	Explain the structure and working of a B+ tree in database indexing. Discuss its advantages over other indexing techniques and provide examples to demonstrate its efficiency.	4	6	16
2.	The following key values are organized in an extendable hashing technique. 1, 3, 5, 8, 9, 12, 17, 28. Show the extendable hash structure for this file if the hash function is h(x)=x mod 8 and buckets can hold three records. Assess how the extendable hash structure changes as the result of each of the following steps: INSERT 2. INSERT 24. DELETE 5. DELETE 12.	4	6	16
3.	List the different levels in RAID technology and explain its features.	4	5	16
4.	Give a detailed description about Query processing and Optimization. Explain the cost estimation of Query Optimization	4	5	16

UNIT V

ADVANCED TOPICS

Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control – SQL Injection – Statistical Database security – Flow control – Encryption and Public Key infrastructures – Challenges

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is a distributed database management system?	5	1	2
2.	Discriminate the meaning of homogeneous and heterogeneous DDBMS.	5	2	2
3.	What are the advantages of NO SQL?	5	1	2
4.	State CAP theorem.	5	1	2
5.	What is a document-based system in NoSQL databases?	5	1	2
6.	What are the key security issues in databases?	5	1	2
7.	What is encryption in database security?	5	1	2
8.	What are the main challenges in database security?	5	1	2
	PART B			
1.	Explain the architecture of a distributed database system.	5	2	16
2.	Explain in detail about key value stores, Column Based Systems and Graph Databases.	5	2	16
3.	Write short notes on Access control based on privileges and role based access control.	5	5	16
4.	Explain SQL Injection attacks and describe techniques to prevent them and provide examples of vulnerable and secure SQL queries.	5	5	16

CS3451

INTRODUCTION TO OPERATING SYSTEM

UNIT I

INTRODUCTION

Computer System - Elements and organization; Operating System Overview - Objectives and Functions Evolution of Operating System; Operating System Structures – Operating System Services - User Operating Interface - System Calls – System Programs - Design and Implementation - Structuring methods

Q.No	Question	CO	BT L	Marks
	PART A			
1.	What is an operating system?	1	1	2
2.	List the Services of operating system function.	1	1	2
3.	Define system call.	1	1	2
4.	What is System Programs?	1	1	2
5.	What does the CPU do when there are no user programs to run?	1	1	2
6.	Describe the actions taken by a kernel to context-switch between processes.	1	2	2
7.	Mention the circumstances that would a user be better off using a time-sharing system rather than a PC or a single user workstation?	1	1	2
8.	What are the advantages of peer-to-peer systems over client-server systems?	1	2	2
	PART B			
1.	Explain Operating System Services and components.	1	5	16
2.	i)State the basic functions of OS and DMA. ii)Explain system calls, system programs and OS generation.	1 1	4 4	8 8
3.	Discuss the pros and cons of single processor system, multi core system and clustered system and write the importance and need of cache with its working principle.	1	5	16
4.	i)Enumerate the different operating system structure and explain with neat sketch	1	4	8
	ii)How could a system be designed to allow a choice of operating systems from which to boot? What would the bootstrap program need to do?	1	5	8

UNIT II

PROCESS MANAGEMENT

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - MultithreModels – Threading issues; Process Synchronization - The Critical-Section problem Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - MoDeadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detRecovery from deadlock**.**

<table>
<tr><th colspan="2">Q.No</th><th>Question</th><th>CO</th><th>BTL</th><th>Marks</th></tr>
<tr><td></td><td colspan="5">PART A</td></tr>
<tr><td></td><td>1.</td><td>What is process control block? List out the data field associated with PCB.</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td></td><td>2.</td><td>Differentiate a Thread from a Process.</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td></td><td>3.</td><td>What are the difference b/w user level threads and kernel level threads?</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td></td><td>4.</td><td>Define mutual exclusion.</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td></td><td>5.</td><td>What is semaphore? Mention its importance in operating system.</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td></td><td>6.</td><td>What is preemptive and non preemptive scheduling?</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td></td><td>7.</td><td>Define the term ‘dispatch latency’.</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td></td><td>8.</td><td>Define deadlock.</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td></td><td colspan="5">PART B</td></tr>
<tr><td></td><td rowspan="2">1.</td><td>(i)How monitors help in process synchronization.</td><td>2</td><td>2</td><td>8</td></tr>
<tr><td></td><td>(ii)Is it possible to have concurrency but not parallelism? Explain And briefly expalin Inter process communication.</td><td>2</td><td>4</td><td>8</td></tr>
<tr><td></td><td rowspan="2">2.</td><td>i)What do you mean by term synchronization? What is Semaphore? Explain how semaphore can used as synchronization tool.</td><td>2</td><td>2</td><td>8</td></tr>
<tr><td></td><td>ii)Discuss in detail the critical section problem and also write the algorithm for Readers-Writers Problem with semaphores.</td><td>2</td><td>4</td><td>8</td></tr>
<tr><td></td><td>3.</td><td>Explain the FCFS, preemptive and non-preemptive versions of Shortest-Job First and Round Robin (time slice = 2) scheduling algorithms with Gantt charts for the four Processes given. Compare their average turnaround and waiting time.
<table>
<tr><th>Process</th><th>Arrival Time</th><th>Waiting Time</th></tr>
<tr><td>P1</td><td>0</td><td>8</td></tr>
<tr><td>P2</td><td>1</td><td>4</td></tr>
<tr><td>P3</td><td>2</td><td>9</td></tr>
<tr><td>P4</td><td>3</td><td>5</td></tr>
</table></td><td>2</td><td>4</td><td>16</td></tr>
<tr><td></td><td rowspan="2">4.</td><td>(i)Explain the Banker algorithm for deadlock avoidance and in detail with an example and explain the steps involved in deadlock recovery.</td><td>2</td><td>5</td><td>8</td></tr>
<tr><td></td><td>(ii)Discuss the threading issues which are considered with multithread ed programs and discuss about the issues to be considered in the Multi threaded program.</td><td>2</td><td>2</td><td>8</td></tr>
</table>

UNIT III

MEMORY MANAGEMENT

Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table Segmentation, Segmentation with paging; Virtual Memory - Demand Paging – Copy on Write - Replacement - Allocation of Frames –Thrashing.

Q.No	Questions	CO	BTL	Marks
	PART A			
1.	Difference between internal and external fragmentation	3	4	2
2.	What is virtual memory? Mention its advantages.	3	1	2
3.	What do you mean by thrashing?	3	1	2
4.	Define swapping.	3	1	2
5.	Differentiate between Global and Local page replacement algorithms.	3	4	2
6.	Differentiate a page from a segment.	3	4	2
7.	Define demand paging in memory management. What are the steps required to handle a page fault in demand paging.	3	1	2
8.	Name two differences between logical and physical addresses.	3	2	2
	PART B			
1.	Describe the different paging techniques for structuring page tables.	3	5	16
2.	Explain the segmentation with paging implemented in MULTICS system.Explain the segmentation with paging implemented in OS/2 32-bit IBM system.	3	5	16
3.	What is the cause for thrashing? How does the system detect thrashing? Once it detects, what can the system do to eliminate this problem?	3	4	16
4.	Given memory partitions of 100KB, 500KB, 200KB, 300KB and 600KB(in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212KB, 417KB, 12KB and 426 KB(in order)? Which algorithm makes the most efficient use of memory? also describe the following algorithms: a. First fit b. Best Fit c. Worst Fit	3	3	16

UNIT IV

STORAGE MANAGEMENT

	Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File c- Access methods - Directory Structure - Directory organization - File system mounting - File ShariProtection; File System Implementation - File System Structure - Directory implementation - AllMethods - Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kern Subsystem.			
Q.No	**Question**	**CO**	**BTL**	**Marks**
	PART A			
1.	List the various file attributes	4	1	2
2.	What are the different accessing methods of a file?	4	1	2
3.	What are the most common schemes for defining the logical structure of a directory?	4	1	2
4.	What is garbage collection?	4	2	2
5.	What is meant by polling?	4	2	2
6.	Define rotational latency and disk bandwidth.	4	1	2
7.	Give the importance of Swap space Management.	4	1	2
8.	Draw the diagram for interrupt driven I/O cycle.	4	1	2
	PART B			
1.	Explain the different disk scheduling algorithms and briefly explain about file system in Linux with examples.	4	5	16
2.	Explain the services provided by Kernel I/O subsystem and explain the allocation of frames in detail.	4	5	16
3.	Explain about RAID structure in disk management with various RAID levels of organization in detail.	4	5	16
4.	On a disk with 200 cylinders, numbered 0 to 199, compute the number of tracks the disk arm must move to satisfy the entire request in the disk queue. Assume the last request received was at truck 100. The queue in FIFO order contains requests for the following tracks. 55, 58, 39, 18, 90, 160, 150, 38, 184. Perform the computation to find the seek time for the following disk scheduling algorithms. • FCFS • SSTF • SCAN • C-SCAN • LOOK	4	5	16

UNIT V

VIRTUAL MACHINES AND MOBILE OS

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is virtualization?	5	1	2
2.	State the components of a Linux System.	5	1	2
3.	Define the function of Caching-only servers.	5	1	2
4.	What is Linux distribution?	5	1	2
5.	What are the components of kernel mode?	5	1	2
6.	What is paravirtualization?	5	1	2
7.	What is the major design goal for the android platform?	5	1	2
8.	List out any two components that are unique for Mobile OS.	5	1	2
	PART B			
1.	Explain the significance and steps involved in setting up Xen, VMware software‘s on Linux host for successful virtualization in detail.	5	5	16
2.	Write about LINUX architecture and LINUX kernel with neat sketch.	5	5	16
3.	i)Explain Various types of Virtual Machines and their implementations in Detail.	5	5	8
4.	ii)Explain the architecture of Android OS and Compare iOS with Android OS frame work and explain the working function of android operating system architecture. Compare the feature of IoS and android.	5 5	5 4	8 16

GE3451

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

UNIT I

ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is an ecosystem and what are the components of ecosystem?	1	1	2
2.	What are biotic and abiotic components of an ecosystem?	1	1	2
3.	What do you mean natural resources? Give examples.	1	1	2
4.	What are food chains and food webs and give its significance?	1	1	2
5.	Define Ecological succession.	1	1	2
6.	Differentiate between endangered and endemic species.	1	2	2
7.	Define primary succession and secondary succession.	1	1	2
8.	Define key stone species with suitable example.	1	1	2
	PART B			
1.	What is an ecosystem? Describe the structure and function of an ecosystem.	1	2	16
2.	Explain the values and threats to the biodiversity .	1	2	16
3.	"India is a mega diversity nation"–Discuss.(8) Brief biodiversity hotspots in India.(8)	1	2	16
4.	Explain the conservation of biodiversity.	1	2	16

UNIT II

ENVIRONMENTAL POLLUTION

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Differentiate between primary and secondary air pollutants.	2	2	2
2.	Define photochemical smog.	2	1	2
3.	What are point and non point sources of water pollution?	2	1	2
4.	Define e-waste management.	2	1	2
5.	Write the objectives of environmental acts.	2	6	2
6.	Define hazardous waste management.	2	1	2
7.	What are the effects of noise pollution?	2	1	2
8.	Write any two causes and sources of soil pollution.	2	6	2
	PART B			
1.	Describe the role of individual in the prevention of pollution. Explain the sources, effect and control methods of noise pollution.	2	2	16
2.	Demonstrate with a flow sheet and explain the steps involved in So waste management.	2	3	16
3.	What is OHASMS? Explain it with any one case study.	2	2	16
4.	Write about one of the industrial waste water treatment techniques, support with a neat schematic diagram.	2	5	16

UNIT III

RENEWABLE SOURCES OF ENERGY

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

PART A				
Q.No	**Question**	**CO**	**BT L**	**Marks**
1.	List the objectives of energy management.	3	1	2
2.	What is the significance of OTE?	3	1	2
3.	What is the important use of Artificial intelligence in energy sector?	3	1	2
4.	What is Bio-mass energy?	3	1	2
5.	Give any five applications of tidal energy conservation.	3	6	2
6.	Give some important applications of GTE.	3	6	2
7.	What is DESS? Mention its components.	3	1	2
8.	Mention the applications of hydrogen energy.	3	1	2
PART B				
1.	Explain the applications of ocean energy and GTE.	3	2	16
2.	Explain the principle and various steps involved in the energy management.	3	2	16
3.	Write detailed notes on new energy sources.	3	6	16
4.	Explain the origin, concept and advantage and disadvantages of Geo thermal energy.	3	2	16

UNIT IV

SUSTAINABILITY AND MANAGEMENT

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols -Sustainable Development Goals-targets, indicators and intervention areas Climate changeGlobal,Regional and local environmental issues and possible solutions-case studies. Concept of CarbonCredit, Carbon Footprint. Environmental management in industry-A case study

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is GDP?	4	1	2
2.	Write any four millennium development goals.	4	6	2
3.	Define carbon credit.	4	1	2
4.	What are the sources of carbon foot print?	4	2	2
5.	Define environmental management.	4	1	2
6.	Mention any five important needs of sustainability.	4	1	2
7.	Write some advantages of carbon credits.	4	6	2
8.	Mention some effects of climate change.	4	1	2
	PART B			
1.	Brief notes on (i) Millennium Development Goals (ii) Sustainability protocols.	4	2	16
2.	What is environmental management? Explain the various steps of environmental management.	4	2	16
3.	Write notes on concept, goal and aim of sustainable development.	4	6	16
4.	What are the causes, effects and possible solutions of climate change? What is carbon credit? Explain the types and merits.	4	1	16

UNIT V

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cyclescarbon cycle, emission and sequestration, Green Engineering: Sustainable urbanizationSocioeconomical and technological change

.No	Questions	CO	BTL	Marks
	PART A			
1.	What is zero waste and R concept?	5	1	2
2.	Define circular economy.	5	1	2
3.	What are the key elements of ISO14000?	5	1	2
4.	Mention the objectives of EIA.	5	1	2
5.	What is green engineering?	5	1	2
6.	What is meant by energy cycles?	5	1	2
7.	What is sustainable urbanization?	5	1	2
8.	Define carbon sequestration.	5	1	2
	PART B			
1.	Explain the various steps to achieve zero waste? Mention advantages and disadvantages of zero waste.	5	2	16
2.	What is 3R concept? Determine the concept and advantages of R concept.	5	3	16
3.	What are green materials? Explain important green building materials. (8) What is sustainable transport? Discuss the key elements of sustainable transport.(8)	5	2	16
4.	What is sustainable urbanization? Explain the rules to develop sustainable urban.	5	3	16

IT3401

WEB ESSENTIALS

UNIT I

WEBSITE BASICS

Internet Overview - Fundamental computer network concepts - Web Protocols - URL – Domain Name- Web Browsers and Web Servers- Working principle of a Website –Creating a Website - Client-side and server-side scripting.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What are the basic types of computer networks, and how do they differ?	1	1	2
2.	What is the primary difference between HTTP and HTTPS?	1	1	2
3.	What components make up a URL?	1	1	2
4.	How does a domain name system (DNS) work to map a domain name to an IP address?	1	2	2
5.	What is the role of a web server in delivering web content?	1	1	2
6.	How does a website function when accessed by a user?	1	2	2
7.	What are the main steps involved in creating a basic website?	1	2	2
8.	What is the difference between client-side and server-side scripting?	1	1	2
	PART B			
1.	Discuss the different types of computer networks (LAN, WAN, MAN) and their respective use cases. Explain the roles of routers and switches in these networks and how they contribute to the interconnectivity of the Internet.	1	3	16
2.	Explain the working of HTTP and HTTPS protocols in web communication. Highlight their differences in terms of security and performance. What role do SSL/TLS certificates play in HTTPS?	1	5	16
3.	Describe the roles of web browsers and web servers in the process of loading a webpage. How do they interact during the request-response cycle? Discuss how the server handles dynamic content and what technologies enable this interaction.	1	5	16
4.	Explain the Domain Name System (DNS) and its function in Internet navigation. Describe the DNS resolution process, and discuss the security implications of DNS and methods to enhance its security.	1	5	16

UNIT II

WEB DESIGNING

HTML – Form Elements - Input types and Media elements - CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	How to facilitate the collection and submission of user input on a web page?	2	2	2
2.	Write the syntax for creating a number list.	2	2	2
3.	List two forms of style rules with an example.	2	1	2
4.	List and explain any two HTML elements.	2	1	2
5.	What is CSS Padding?	2	1	2
6.	Write the syntax of CSS rule.	2	2	2
7.	How will you create a password field in a HTML form?	2	2	2
8.	Write HTML code to display an image.	2	2	2
	PART B			
1.	Create a web page for displaying your profile using HTML and apply an external style sheet for different HTML elements.	2	3	16
2.	Create a web page using HTML for a college event using backgrounds, text effects, and animations.	2	3	16
3.	Explain FRAME and IFRAME tags and attributes. Write down HTML tags to explain frame within a frame.	2	5	16
4.	Explain any eight CSS text properties. Explain on Box Model.	2	5	16

UNIT III

CLIENT-SIDE PROCESSING AND SCRIPTING

JavaScript Introduction – Variables and Data Types-Statements – Operators - Literals-Functions Objects-Arrays-Built-in Objects- Regular Expression, Exceptions, Event handling, Validation - JavaScript Debuggers.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Write a JavaScript code snippet for Exception handling.	3	1	2
2.	What are the basic data types in JavaScript? Provide an example for each.	3	1	2
3.	What is the difference between a statement and an expression in JavaScript?	3	1	2
4.	What is a literal in JavaScript? Provide an example of each type of literal.	3	1	2
5.	What is event handling in JavaScript? How would you han button click event in JavaScript?	3	1	2
6.	List the different built- in objects available in Java Script.	3	1	2
7.	What is the benefit of using JavaScript code in an H document?	3	1	2
8.	How exceptions are handled in JavaScript.	3	2	2
	PART B			
1.	Develop a simple online shopping application using Java Script.	3	4	16
2.	Explain with a simple example illustrate how the elements of the HTML document tree structure can be accessed using JavaScript.	3	5	16
3.	Describe the different types of statements used in JavaScript with suitable example.	3	2	16
4.	Describe how arrays are handled in JavaScript, including various array methods and discuss the techniques used for debugging JavaScript code.	3	2	16

UNIT IV

SERVER SIDE PROCESSING AND SCRIPTING – PHP

PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - File Uploading – Email Basics - Email with attachments - PHP and HTML - Simple PHP scripts - Databases with PHP.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	List out advantages of PHP.	4	1	2
2.	State the primitive data types that can be used in PHP?	4	1	2
3.	Write the different types of mouse events.	4	1	2
4.	What is the purpose of JavaScript Debugger.	4	1	2
5.	What are cookies? Give its uses.	4	1	2
6.	What is an array in PHP?	4	1	2
7.	Name any four built in functions in PHP.	4	1	2
8.	How can you embed PHP code into an HTML file? Provide an example of a simple PHP script embedded in HTML.	4	1	2
	PART B			
1.	Write a PHP program to access any associative array and display the same.	4	2	16
2.	Discuss the various types of operators in PHP and their functionalities.	4	2	16
3.	Create an HTML form to enter one number. Write PHP code to display the message about is odd or even. Explain data type in PHP.	4	4	16
4.	Explain various types of arrays used in PHP. Explain how to perform read and write operations in PHP.	4	5	16

UNIT V

SERVLETS AND DATABASE CONNECTIVITY

Servlets: Java Servlet Architecture – Servlet Life cycle- Form GET and POST actions -Sessions – Cookies – Database connectivity - JDBC Creation of simple interactive applications - Simple applications

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What are Servlets?	5	1	2
2.	Define JDBC?	5	1	2
3.	Compare GET and POST methods.	5	2	2
4.	What is a driver manager?	5	1	2
5.	What is the primary purpose of an HTTP get request ?	5	1	2
6.	What are the servlet API life cycle method ?	5	1	2
7.	What is ServletContext object ?	5	1	2
8.	Write the applications of servlets .	5	2	2
	PART B			
1.	Write a Java Servlet to display the net salary of employee, use JDBC connectivity to get employee details from the database.	5	5	16
2.	Describe the servlet architecture and various information invoked by the servlet container.	5	5	16
3.	How to create cookies and retrieve its value? Draw and explain Servlet life cycle with suitable example.	5	5	16
4.	Explain the purpose of session handling in Servlet with an example. Discuss advantages and disadvantages of servlet.	5	5	16

CS3452

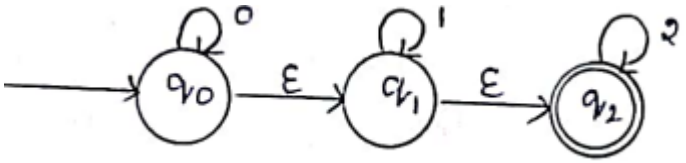
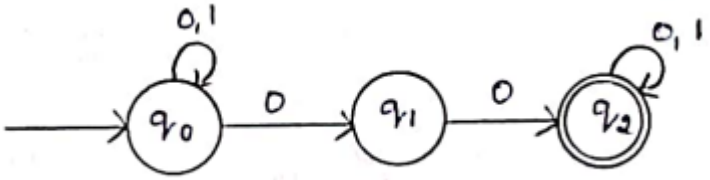
THEORY OF COMPUTATION

UNIT I

AUTOMATA AND REGULAR EXPRESSIONS

Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFA'S

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Finite Automata?	1	1	2
2.	Distinguish between DFA and NFA.	1	2	2
3	List any four types of proofs	1	1	2

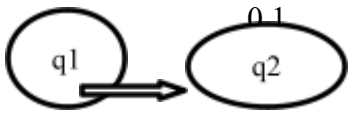
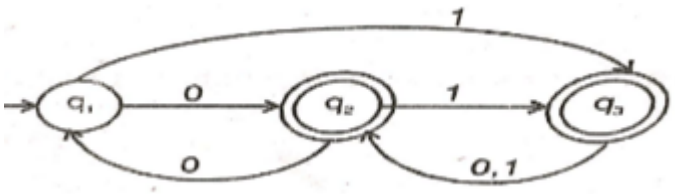
3.	Construct a NFA given below and find the **δ**(q0,01).  	1	6	16
4.	Consider the NFA to check whether ω=01001 is valid or not.  		4	16
5.	Prove If L is accepted by NFA with **ε** transitions that L is accepted by an NFA without **ε** transitions.		2	16

UNIT II

REGULAR EXPRESSIONS AND LANGUAGES

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Illustrate regular expression to recognize the set of strings over {a,b} having odd number of a's and b's and that starts with 'a'.	2	2	2
2.	When two states are said to be distinguished? Give an example.	2	2	2

3.	Demonstrate a regular expression that recognize the set of all stringds (0+1)* that do not contain the substring 00 and 11 over the alphabet ∑={0,1}.	2	2	2
4.	Explain that reversal of any regular language is also regular .	2	2	2
5.	Recall the term Regular expression .Give a regular expression for any language containing symbols (0,1) and strictky ends with '1'. Illusttrate the following two languages : $L_1 = \{a^n b a^n \mid n > 0\}$ $L_2 = \{a^n b a^n b^{n+1} \mid n > 0\}$ Check whether the above languages are context free or not .	2	2	2
6.	Define Pumping Lemma for regular languages.	2	1	2
7.	Outline an NFA equivalent to (0+1)* (00+11).	2	2	2
8.	What are the various methods for conversion of DFA to RE?	2	1	2
	PART B			
1.	What are the types of closure properties ? Explain them.	2	5	16
2.	Find R and A where the L(A)={X,Y,X€{1} * and y€{0,1}* 0 	2	5	16
3.	Find R for finite automata given below ? 	2	6	16
4.	i). State and prove pumping lemma? ii). Show that the set L ={a(i2)|i≥|}is not regular .	2	6	16

5.	Construct a DFA with reduce state equation to the regular expression RE = 10 +(0+11) 0*1	2	5	16

UNIT III

CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA

Types of Grammar - Chomsky‘s hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees –Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG – Deterministic Pushdown Automata.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Outline CFG to accept the language defined by, L={a(i)b(j)c(k)|i,j,k>=0 and i=j+k}.	3	2	2
2.	List out the steps for performing LL parsing .	3	1	2
3.	Illustrate a regular expression that recognize the set of all strings (0+1)* that do not contain the substrings 00 and 11 over the alphabet ∑={0,}.	3	2	2
4.	Define Pumping lemma for context free language .	3	1	2
5.	Mention a few points regarding the Chomsky hierarchy with illustration.	3	2	2
6.	Explain the context free grammar representing the set of palindromes over(0+1)*.	3	2	2
7.	Define Chomsky's hierarchy .	3	1	2
8.	What is Deterministic pushdown automata?	3	2	2
	PART B			
1.	For the grammer given below give the parse tree for leftmost and rightmost derivation of the string 1001.	3	6	16
2.	Let L = { a (n) b(n) c (m) d(m) | n,m ≥ 1} find a PDA for L?	3	6	16
3.	Let L = { a(i) b(j) c (k) | i, j, k ≥ 0 i + j = k} Prove the transition function. i) . Accepted by final state. ii). Accepted by empty state (LN).	3	6	16
4.	Construct PDA to CFG M={p,q},{0,1},{x,z},{q,z,ø}	3	6	16
5.	**Construct CFG to PDA** M=({q0,q1},{0,1},{z0,x},**δ**,q0,z0,Ø}) **δ**(q0,1,z0)={q0,xz0} **δ**(q0,1,x)={q0,xx} **δ**(q0,0,x)={q1,x} **δ**(q0,**ϵ**,z0)=(q0,**ϵ**) **δ**(q1,1,x)=(q1,**ϵ**) **δ**(q1,0,z0)=(q0,z0)	3	3	16

UNIT IV

NORMAL FORMS AND TURING MACHINE

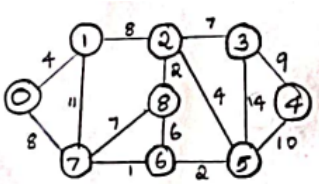
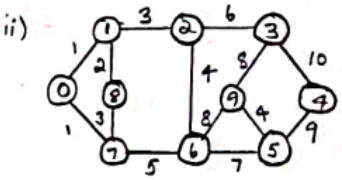
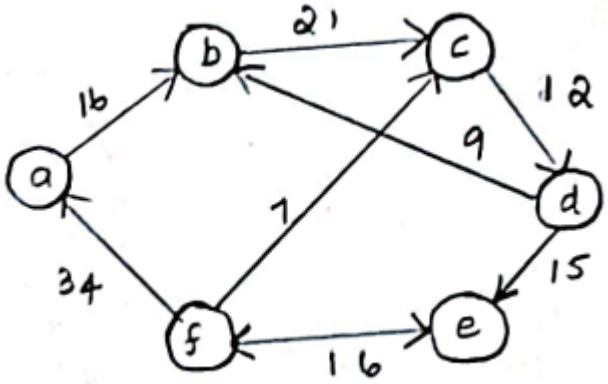
Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Grei bach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages – Turing Machine : Basic model – definition and representation –Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions – Programming techniques for Turing machines (subroutines).

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Tabulate the difference between CNF and GNF.	4	2	2
2.	Illustrate the philosophy behind Pumping lemma for CFLs.	4	2	2
3.	List the different types of mouse events.	4	1	2
4.	What is the role of checking off symbols in a Turing Machine?	4	1	2
5.	Define a Turing Machine.	4	1	2
6.	What is meant by a Turing Machine with two way infinite tape?	4	1	2
7.	Explain the multi tape Turing Machine mode. Is it more power than the basic turing machine ? justify your answer.	4	2	2
8.	Define instantaneous description of a Turing Machine?	4	2	2
	PART B			
1.	Find GNF for the following Grammar. S→AB; A→Bs|b; B→SA|a |b; B→SA|a	4	6	16
2.	Write Programming Techniques for Turning Machines construction.	4	6	16
3.	Design a Turning Machine that accepts all the strings of the form a (n) b(n)for n≥1 and reject all the strings.	4	6	16
4.	Find a grammar in Chomsky Normal Form (CNF) equivalent to S→aAbB ; A→aA|a ; B→bB|b	4	6	16
5.	Let G be the grammar S→OB| 1 A| A→O|OS|1AA ; B→1|1S|OBB. For the string 00110101 Find i)Leftmost derivation ii)Right most derivation iii)Derivation Tree iv)For the string 0110 Find a righmost derivation	4	5	16

UNIT V

UNDECIDABILITY

Unsolvable Problems and Computable Functions –PCP-MPCP-Recursive and recursively enumerable languages – Properties -Universal Turing machine -Tractable and Intractable problems – P and NP completeness – Kruskal's algorithm – Travelling Salesman Problem-3-CNFSAT problems.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What are tractable problems?	5	1	2
2.	Define class P and NP problems.	5	1	2
3.	When is a language L recursively enumerable?	5	1	2
4.	Explain that the union of recursive language is recursive language.	5	2	2
5.	What is un decidability problem? Give an example for an undecidable problem .	5	1	2
6.	Differentiate between recursive and recursively enumerable languages.	5	2	2
7.	Define Diagonal languages.	5	1	2
8.	Mention any two un decidability properties for recursively enumerable language.	5	1	2
	PART B			
1.	Solve the given problem using kruskals algorithm? i)  ii) 	5	6	16
2.	State recursive and non recursive enumerable languages and Explain it.	5	6	16
3.	State rice theorem ?.	5	6	16
4.	State halting problem is undecidable?	5	6	16
5.	Discuss travelling salesman problem in terms of P and NP completeness? 	5	6	16

CS3491

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

UNIT I

PROBLEM SOLVING

Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP)

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is Artificial Intelligence?	1	1	2
2.	What are various applications of AI? or What can AI do today?	1	1	2
3.	What are the advantages of heuristic function?	1	1	2
4.	Is AI a science, or is it engineering? Or neither or both? Explain.	1	2	2
5.	How will you measure the problem-solving performance?	1	1	2
6.	State on which basis search algorithms are chosen?	1	1	2
7.	List some of the uninformed search techniques.	1	2	2
8.	What do you mean by local maxima with respect to search technique?	1	1	2
	PART B			
1.	Define the following problems. What types of control. strategy is used in the following problem. i. The Tower of Hanoi ii. Crypto-arithmetic iii. The Missionaries and cannibals problems iv. 8-puzzle problem	1	4	16
2.	i)Explain the A* search and give the proof of optimality of A* ii)Explain AO* algorithm with a suitable example. State the limitations in the algorithm?	1 1	4 4	8 8
3.	Explain the nature of heuristics with example. What is the effect of heuristics accuracy?	1	2	16
4.	Discuss about constraint satisfaction problem with a algorithm for solving a crypt arithmetic Problem. CROSS +ROADS ---------- DANGER ----------	1	2	16

UNIT II

PROBABILISTIC REASONING

Acting under uncertainty – Bayesian inference – naïve bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN –causal networks.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define principle of maximum expected utility (MEU) .	2	1	2
2.	Mention the needs of probabilistic reasoning in AI.	2	1	2
3.	State Bayes' Theorem in Artificial Intelligence.	2	1	2
4.	What is Bayesian Belief Network?	2	1	2
5.	Given that P(A)=0.3,P(A|B)=0.4 and P(B)=0.5, Compute P(B|A).	2	2	2
6.	Differentiate uncertainty with ignorance .	2	2	2
7.	What is the need for utility theory in uncertainty?	2	1	2
8.	Why does uncertainty arise?	2	2	2
	PART B			
1.	Explain variable elimination algorithm for answering queries on Bayesian networks?	2	4	16
2.	(i)Construct a Bayesian Network and define the necessary (ii)CPTs for the given scenario. We have a bag of three biased coins a,b and c with probabilities of coming up heads of 20%, 60% and 80% respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins) and then the coin is flipped three times to generate the outcomes X1, X2 and X3. a. Draw a Bayesian network corresponding to this setup and define the relevant CPTs. b. Calculate which coin is most likely to have been drawn if the flips come up HHT .	2 2	4 4	8 8
3.	Discuss about Bayesian Theory and Bayesian network.	2	2	16
4.	Explain how does Bayesian statistics provide reasoning under various kinds of uncertainty?	2	2	16

UNIT III

SUPERVISED LEARNING

Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear ClassificationModels: Discriminant function – Probabilistic discriminative model - Logistic regression,Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vectormachine, Decision Tree, Random forests.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is Machine Learning?	3	1	2
2.	What is 'Over fitting' in Machine learning?	3	1	2
3.	What are the different Algorithm techniques in Machine Learning?	3	1	2
4.	What is the main key difference between supervised and unsupervised machine learning?	3	2	2
5.	What is 'Training set' and 'Test set'?	3	1	2
6.	What is a Linear Regression?	3	1	2
7.	Why is random forest better than SVM?	3	2	2
8.	What is the difference between stochastic gradient descent (SGD) and gradient descent (GD)?	3	1	2
	PART B			
1.	Explain Naïve Bayes Classifier with an Example.	3	4	16
2.	Explain the following a) Linear regression . b) Logistic Regression.	 3 3	 4 4	 8 8
3.	Explain SVM Algorithm in Detail. Explain Decision Tree Classification.	3 3	2 2	8 8
4.	Explain the principle of the gradient descent algorithm. Accompany your explanation with a diagram. Explain the use of all the terms and constants that you introduce and comment on the range of values that they can take.	3	2	16

UNIT IV

ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

Q.No	Question	CO	BT L	Marks
	PART A			
1.	What is bagging and boosting in ensemble learning?	4	1	2
2.	What type of classifiers are used in weighted voting method?	4	1	2
3.	What are examples of unsupervised learning?	4	1	2
4.	What are Gaussian mixture models How is expectation maximization used in it?	4	2	2
5.	What is the principle of maximum likelihood?	4	1	2
6.	What is expectation maximization algorithm used for?	4	1	2
7.	How do you implement expectation maximization algorithm?	4	2	2
8.	What is the advantage of Gaussian process?	4	1	2
	PART B			
1.	List the applications of clustering and identify advantages and disadvantages of clustering algorithm.	4	4	16
2.	Explain various learning techniques involved in unsupervised learning?	4	4	16
3.	What is Gaussian process? And explain in detail of Gaussian parameter estimates with suitable examples.	4	2	16
4.	List non-parametric techniques and Explain K-nearest neighbour estimation.	4	2	16

UNIT V

NEURAL NETWORKS

Perceptron - Multilayer perceptron, activation functions, network training – gradientdescent opti – stochastic gradient descent, error backpropagation, from shallownetworks to deep networ saturation (aka the vanishing gradient problem) – ReLU,hyperparameter tuning, batch norma regularization, dropout.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is perceptron and its types?	5	1	2
2.	What are the advantages of Multilayer Perceptron?	5	1	2
3.	What are the three main types gradient descent algorithm?	5	1	2
4.	Does stochastic gradient descent lead to faster training?	5	2	2
5.	What are the types of activation function?	5	1	2
6.	Why is ReLU used in deep learning?	5	2	2
7.	Is stochastic gradient descent same as gradient descent?	5	2	2
8.	What are the activation functions of MLP?	5	1	2
	PART B			
1.	i)List the factors that affect the performance of multilayer feed-forward neural network. ii)Difference between a Shallow Net & Deep Learning Net .	5 5	4 4	8 8
2.	Develop a Back propagation algorithm for Multilayer Feed forward neural network consisting of one input layer, one hidden layer and output layer from first principles.	5	4	16
3.	Draw the architecture of a Multilayer perceptron (MLP) and explain its operation. Mention its advantages and disadvantages.	5	5	16
4.	Write the flowchart of error back-propagation training algorithm.	5	5	16