DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

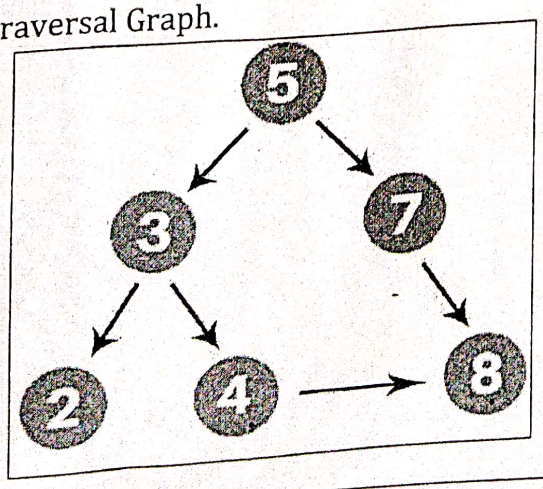
USN No: ENG23AM0085

B. Tech IV Semester End Examinations – June 2025

Course Title: Artificial Intelligence
Duration: 03 Hours
Time: 10:00 AM to 01:00 PM

Course Code: 23AM2405
Date: 19-06-2025
Max Marks: 100

Note:
1. **Answer all Five Full Questions**
2. **Each Full Question carries 20 Marks**
3. **Draw neat sketches wherever necessary**
4. **Missing Data may be suitably assumed**

Q. No.	Question	Marks	BTL	COs
1.a.	List and briefly **Explain** the types of Machine Learning Algorithms.	07	L2	CO1
1.b.	**Outline AI Agents**, Interpret on any two types of the AI Agents.	07	L2	CO1
1.c.	**Assuming** two jugs (4-liter & 3-liter), both the jugs are not having measuring marker. There is a pump which can be used to fill the jugs with water. Construct the suitable production rules to fill 2 liters of water into a 4–liter jug.	06	L3	CO1
2.a.	**Contrast** on Search Algorithms, Mentions its Importance and Properties.	10	L2	CO2
2.b.	**Make use of** BFS & DFS Algorithm and python code to solve the follow Traversal Graph. 	10	L3	CO2
Q. 2.d.				

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DAYANANDA SAGAR UNIVERSITY

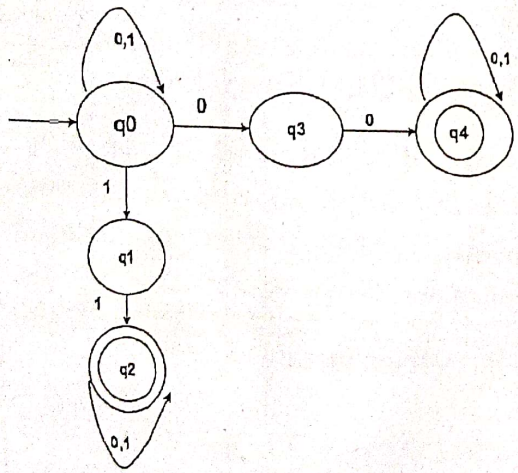
SCHOOL OF ENGINEERING

USN No: ENG23AM0085

B. Tech IV Even Semester End Examinations – June 2025

Course Title: THEORY OF COMPUTATION
Course Code: 23AM2404
Duration: 03 Hours
Date: 17-06-2025
Time: 10:00 AM to 01:00 PM
Max Marks: 100

Note:
1. Answer all Five Full Questions
2. Each Full Question carries 20 Marks
3. Draw neat sketches wherever necessary
4. Missing Data may be suitably assumed

Q. No.	Question	Marks	BTL	COs
1.a.	Construct a NFA accepting string with 0's and 1's such that string contains two consecutive 0's and two consecutive 1's. Verify using δ mapping & Proliferation diagram for 010011. 	10	L3	CO1
1.b.	Construct NFA state diagram with minimum states and edges, for L1={Set of all strings that ends with '1'} L2= {Set of all strings that starts with '10' }	06	L3	CO1
1.c.	Distinguish between DFA (Deterministic Finite Automata) and NFA (Non-deterministic Finite Automata)? (Maximum 4 points)	04	L4	CO1

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0085

B. Tech IV Semester End Examinations – June 2025

Course Title: Database Management System

Course Code: 23AM2403

Duration: 03 Hours

Date: 14-06-2025

Time: 10:00 AM to 01:00 PM

Max Marks: 100

Note:
1. Answer all Five Full Questions
2. Each Full Question carries 20 Marks
3. Draw neat sketches wherever necessary
4. Missing Data may be suitably assumed

Q. No.	Question	Marks	BTL	COs
1.a.	Explain the characteristics of the database approaches.	05	L2	CO1
1.b.	What are the key advantages of using a DBMS over traditional file-based systems?	05	L3	CO1
1.c.	What is the Three-Schema Architecture in DBMS, and how does it help in data abstraction and independence?	05	L1	CO1
1.d.	Draw an Entity-Relationship (ER) Diagram clearly showing entities, relationships, attributes, and cardinalities. A university wants to design a database to manage its academic system. The system should store information about Students, Courses, and Professors. Scenario: Each student has a unique roll number, name, and email. Each course has a course ID, course name, and number of credits. Professors have an employee ID, name, and department. A student can register for multiple courses, and each course can have many students. Each course is taught by exactly one professor, but a professor can teach multiple courses.	05	L6	CO1
2.a.	Explain the following Relational Model Constraints with suitable examples: (i) Domain Constraint (ii) Key Constraint (iii) Entity Integrity Constraint. (iv) Referential Integrity Constraint	05	L2	CO2

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SCHOOL OF ENGINEERING

USN: ENG23EC0081

III Semester B.Tech. Mid-Semester Examination - II
Department of Mathematics

Course Title: Transforms and Numerical Techniques
Course Codes: 23 AS/ME/CY/CT/EC 2301, 23CS2305
Time: 10:45 am - 12:00 noon

Date: 4/12/2024
Duration: 1.25 hrs
Max. Marks: 40

Instructions to Candidates:
1. Answer all the questions.

Q.	Question	Marks	BT	COs	POs
1.	In the following initial value problem approximate $y(0.4)$ using Runge-Kutta 4th-order method with a step size $h = 0.2$. $$y' = x + y, \quad y(0) = 1 \quad .$$	8	L2	CO4	PO1
2.	In the following initial value problem approximate $y(0.4)$ using Euler's method with a step size $h = 0.1$. $$y' = 1 + 2x, \quad y(0) = 0 \quad .$$	6	L2	CO4	PO1
3.	Let $f : (0, \infty) \to \mathbb{R}$ be defined as follows. $$f(x) = \begin{cases} \sin x & \text{if} \quad 0 < x < \pi \\ 0 & \text{if} \quad x \geq \pi \end{cases}$$ Show that the fourier cosine transform of f satisfies, $$\widehat{f}_c(1) = 0 \quad .$$	6	L3	CO3	PO2

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No:

IV Semester B.Tech Mid Semester Examination - II
Computer Science and Engineering (AI & ML)

Course Title: Theory of Computation **Course Code:** 23AM2404

Duration: 75 Mins. **Date:** 12-5-2025

Time: 10: 45 AM-12:00 PM **Max Marks:** 40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1(a)	What is a derivation tree in the context of a context-free grammar (CFG)? **Distinguish** between left-most and right-most derivations	05	L4	CO3	PO2
Q. 1(b)	**Define** a Context Free Grammer also mentioned Tuple for CFG.	05	L1	CO3	PO1
Q2.	**Discover** and demonstrate the ambiguity in the following grammar: S → S + S / S * S / a / b / c. Provide appropriate 1. Leftmost Derivation 2. Rightmost Derivation 3.Parse trees Consider sting: a*b+c	10	L4	CO3	PO2
Q. 3	What is Chomsky Hierarchy? Explain the following grammer in details 5. Type-0 6. Type-1 7. Type-2 8. Type-3	10	L1	CO4	PO1, PO2
Q. 4(a)	**Determine** whether following language is Deterministic Context Free Language (DCFL)? $L = \{a^n b^n : n \geq 1\} U \{a\}$	05	L5	CO4	PO2
Q. 4(b)	**Compare** between Deterministic Pushdown Automata (DPDA) & Non Deterministic Pushdown Automata (NPDA) (5 Points)	05	L2	CO4	PO1

Course Outcomes Being Assessed	
CO3	Demonstrate Understanding of Context-Free Grammars and Pushdown Automata
CO4	Analyze and Prove Properties of Regular and Context-Free Languages

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: Enn2 3A0000 85

IV Semester B.Tech Mid Semester Examination - I
Computer Science and Engineering (AI&ML)

Course Title: DESIGN AND ANALYSIS OF ALGORITHMS
Course Code: 23AM2402
Duration: 75 Mins.
Date: 03/04/2025
Time: 02:45 to 04:00 pm
Max Marks: 40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1(a)	Check the uniqueness of the elements 63, 57, 44, 22,33 and 44 using a suitable algorithm and analyse the same.	5	3	CO1	PO1,PO2, PO3
Q. 1(b)	Analyse the Towers of Hanoi puzzle for n=5 (n stands for the number of disks).	5	3	CO1	PO1, PO3
Q. 2(a)	Figuratively explain the process involved in the design and analysis of algorithm	3	3	CO1	PO1, PO3
Q. 2(b)	Let f(n) and g(n) be two functions: f(n)= 2n+3 and g(n) = 1n. Find out which asymptotic notation relates the two functions	3	3	CO1	PO1, PO3
Q. 2(c)	Find out the time complexity of sum of n elements using tabular method	4	3	CO1	PO1, PO3
Q. 3(a)	Write down the algorithm for selection sort under brute force algorithm and analyse the same.	5	2	CO2	PO1
Q. 3(b)	Given the recurrence equation **T(n) = c + T(n/2).** Solve it using iteration method. $\Theta(n^2)$	5	3	CO2	PO1, PO2, PO3
Q. 4(a)	Brief about Master's Theorem	4	2	CO2	PO1
Q. 4(b)	Use Divide and Conquer technique to explain merge sort using an example and analyse the same.	6	3	CO2	PO1, PO3

Course Outcomes Being Assessed	
CO1	**Exemplify** the algorithm design techniques and standard Asymptotic notations. Analyze non-recursive and recursive algorithms to obtain worst- case running times of algorithms using asymptotic analysis
CO2	**Interpret** the brute-force, divide-and-conquer paradigms and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrence describing the performance of divide-and-conquer algorithms.

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENU23AM0085

IV Semester B.Tech Mid Semester Examination - I

Computer Science and Engineering (AI & ML)

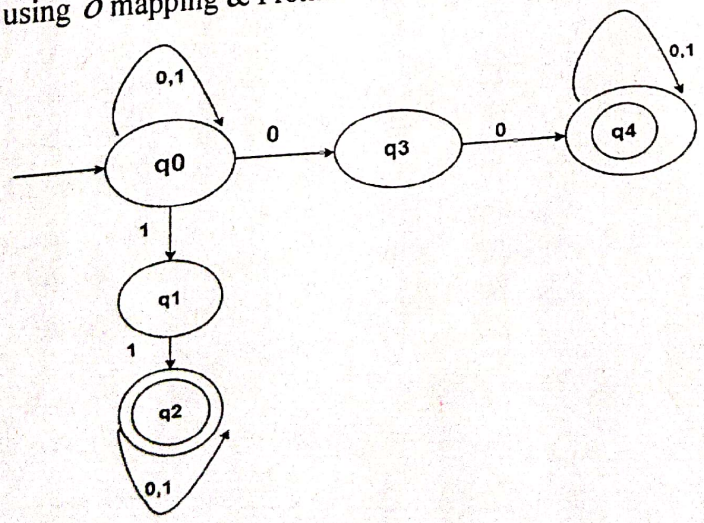
Course Title: Theory of Computation **Course Code:** 23AM2404

Duration: 75 Mins. **Date:** 29-03-2025

Time: 10: 45 AM-12:00 PM **Max Marks:** 40

Instructions to Candidates:

- Answer all the six Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1 (a)	**What** are the differences between Deterministic Finite Automata (DFA) and Non-deterministic Finite Automata (NFA)? (Maximum 5 points)	05	L1	CO1	PO1, PSO1
Q. 1 (b)	**Construct** a DFA to accept strings with an even number of 0's, considering "00" as input. Represent it using a state diagram and 5-tuple notation.	05	L3	CO1	PO2, PSO1
Q. 2	**Develop** a NFA accepting string with 0's and 1's such that string contains two consecutive 0's and two consecutive 1's. Verify using δ mapping & Proliferation diagram for 010011. 	10	L3	CO1	PO3, PSO1

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No:

B. Tech IV Semester End Examinations – June 2025

Course Title: Transforms and Numerical Techniques
Course Code: 23RA2401/23AM2401/23DS2401
Duration: 03 Hours
Time: 10:00AM to 01:00PM

Date: 10-06-2025
Max Marks: 100

Note:
1. Answer all Five Full Questions
2. Each Full Question carries 20 Marks
3. Draw neat sketches wherever necessary
4. Missing Data may be suitably assumed

Q. No.	Question	Marks	BTL	COs
1.a.	Find L (sin t sin 2t sin 3t).	04	L1	CO1
1.b.	Find the Laplace Transform of the square wave given by $f(t) = \begin{cases} E, & 0 < t < \frac{a}{2} \\ -E, & \frac{a}{2} < t < a \end{cases}$ and $f(t+a) = f(t)$	06	L1	CO1
1.c.	Find $L^{-1}\left(\frac{s}{(s+2)^2}\right)$	04	L1	CO1
1.d.	Solve $y'' - 4y' + 8y = e^{2t}; y(0) = 2, y'(0) = -2$ using Laplace transforms.	06	L3	CO1
2.a.	Derive the Fourier series of $f(x) = x + x^2$ in $(-\pi, \pi)$ of periodicity 2π and hence deduce $\sum \frac{1}{n^2} = \frac{\pi^2}{6}$	10	L3	CO2
2.b.	Compute the first two harmonics of the Fourier series of f(x) given by the following table.	10	L2	CO2

x	0	π/3	2π/3	π	4π/3	5π/3	2π
f(x)	1.0	1.4	1.9	1.7	1.5	1.2	1.0

3.a.	Find the Fourier transform of $f(x) = \begin{cases} 1 & if\ \lvert x\rvert \le a \\ 0 & if\ \lvert x\rvert > a \end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin s}{s} ds$	08	L2	CO3
3.b.	Find the Fourier sine transform of $f(x) = e^{-ax}$, a > 0	06	L3	CO3

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0085

B. Tech IV Semester End Examinations – June 2025

Course Title: Design and Analysis of Algorithms

Course Code: 23AM2402

Duration: 03 Hours

Date: 12-06-2025

Time: 10:00 AM to 01:00 PM

Max Marks: 100

Note:

1. Answer all Five Full Questions
2. Each Full Question carries 20 Marks
3. Draw neat sketches wherever necessary
4. Missing Data may be suitably assumed

Q. No.	Question	Marks	BTL	COs
1.a.	Explain Big O, Big Ω, and Big Θ notations with relevant examples.	08	L2	CO1
1.b.	Given the recurrence relation T(n) = 2T(n/2) + n log n, solve it using the Master's Theorem and derive its time complexity.	08	L3	CO1
1.c.	Illustrate the importance of space complexity in algorithm design with suitable examples.	04	L2	CO1
2.a.	Apply Merge Sort algorithm for your own data. Derive and analyze its time complexity for best, average, and worst cases.	10	L3	CO2
2.b.	Solve the recurrence relation T(n) = T(n/2) + n using the substitution method.	06	L3	CO2
2.c.	Compare and contrast Merge Sort and Quick Sort based on algorithm design, time complexity, and space requirements.	04	L2	CO2
3.a.	Describe the working of Breadth-First Search (BFS) and Depth-First Search (DFS) algorithms with suitable examples.	08	L2	CO3
3.b.	Explain the Horspool's string matching algorithm. Compare its performance with Naïve string matching.	04	L4	CO3
3.c.	Identify open hashing and closed hashing techniques with appropriate examples and advantages.	08	L3	CO3
4.a.	Apply Dijkstra's algorithm with an example graph of your own choice.	06	L3	CO4
4.b.	Demonstrate the working of Huffman Trees and their application in data compression.	06	L2	CO4

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USN No:

DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No:

IV Semester

B.Tech Mid Semester Examination - II

Department of CSE(AIML)

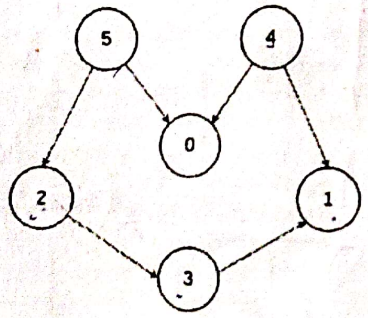
Course Title: DESIGN AND ANALYSIS OF ALGORITHMS **Course Code: 23AM2402**

Duration: 75 Mins. **Date: 10/05/2025**

Time: 02:45 to 04:00pm **Max Marks: 40**

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1(a)	Write and explain the Insertion Sort algorithm. Analyze its best, average, and worst-case complexities.	5	3	CO3	PO1,PO2, PO3
Q. 1(b)	Describe the Topological Sort algorithm based on Fig 1  Fig 1: Graph	5	3	CO3	PO1, PO3
Q. 2(a)	Differentiate BFS and DFS. Explain the Breadth-First Search (BFS) algorithm with an example.	5	3	CO3	PO1, PO3
Q. 2(b)	Differentiate between Open Hashing and Closed Hashing and explain them with a suitable example.	5	3	CO3	PO1, PO3

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0085

III Semester B.Tech Mid Semester Examination-II

Department of Computer Science and Engineering (AI & ML)

Course Title: Skill Enhancement Course (JAVA PROGRAMMING) **Course Code:** 23AM2306

Duration: 75 Mins. **Date:** 06-12-2024

Time: 2:45pm to 4:00pm **Max Marks:** 40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's/ PSO's
Q. 1(a)	Demonstrate how an instance variable can be accessed within a class and outside a class with proper code snippets?	5	L2	CO3	PO1, PO2, PO3, PO9
Q. 1(b)	**Consider the following code. What will be the output?** **class A {** **int x;** **A() {** **x = 10;** **}** **A(int x) {** **this.x = x;** **}** **}** **public class Main {** **public static void main(String[] args) {** **A obj = new A();** **System.out.println(obj.x);** → 10 **}** **}**	5	L2	CO3	PO1, PO2, PO3, PO9
Q. 2(a)	Build a class called '**Person**' with instance variable name, age and implement constructor overloading for the same?	5	L1	CO3	PO3, PO9
Q. 2(b)	Create a scenario where method overloading can be used in a simple calculator program?	5	L3	CO3	PO3, PO9
Q. 3(a)	**What will be the output of the following code?** **class A {** **void methodA() {** **System.out.println("A");** **}**	5	L3	CO3	PO1, PO2, PO3, PO9

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0134

III Semester B.Tech Mid Semester Examination - I
Computer Science and Engineering (AIML)

Course Title: COMPUTER NETWORKS
Course Code: 23AMXXXX
Duration: 75 Mins.
Date: 21.10.2024
Time: 10:45 – 12:00 PM
Max Marks: 40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1(a)	Summarize the services provided by 7 layers of OSI Model.	07	L2	CO1	PO1
Q. 1(b)	Distinguish between guided and unguided medium.	03	L4	CO1	PO1
Q. 2(a)	Contrast Circuit switching and Packet switching networks.	05	L4	CO1	PO1
Q. 2(b)	Summarize network types along with an example for each.	05	L2	CO1	PO1
Q. 3(a)	Utilize suitable example to analyse Error detection techniques.	08	L3	CO2	PO1, PO2, PO3
Q. 3(b)	Explain Random Access in medium access control.	02	L2	CO2	PO1, PO2, PO3
Q. 4(a)	Host A wants to send 12 frames to host B. The hosts agreed to go with SR ARQ. Solve and find How many numbers of frames are transmitted by Host A if every 5 th frame that is transmitted by host A is either corrupted or lost? Also apply and compare the number of transmissions of SR ARQ with Go-Back-3 ARQ.	07	L4	CO2	PO1, PO2, PO3
Q. 4(b)	Identify the DLC services provided by data link layer.	03	L3	CO2	PO1, PO2, PO3

Course Outcomes Being Assessed	
CO1	Explain the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
CO2	Apply the concept of Hamming distance, the significance of the minimum Hamming distance and its relationship to errors as well as the detection and correction of errors in block codes.

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0134

III Semester B.Tech Mid Semester Examination-I
Computer Science and Engineering
(Artificial Intelligence & machine Learning)

Course Title: Computer Organization & Architecture (COA) **Course Code:** 23AMXXX

Duration: 75 Mins. **Date:** 22-10-2024

Time: 10:45 – 12:00 **Max Marks:**40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

Q. No.	Questions	Marks	BT Level	CO's	PO's/ PSO's
Q. 1(a)	Draw and **Explain** the architecture of the ARM7TDMI processor. How it is different from arm core processors?	6M	L2	CO1	1 /1,2
Q. 1(b)	**Define** RISC and CISC architectures with examples. Discuss how instruction pipelining is more efficiently handled in RISC compared to CISC.	4M	L2	CO1	1 /1,2
Q. 2(a)	**Discuss** the concept of the Thumb instruction set in Assembly Language Programming. How does it differ from the standard ARM instruction set?	5M	L2	CO1	1 /1,2
Q. 2(b)	**Contrast** the stages of the ARM7TDMI pipeline? Draw the ARM7TDMI pipeline diagram. How does pipelining improve the processor's performance?	5M	L3	CO1	1,2,3 / 1,2
Q. 3(a)	**Analyze** the importance of the vector table in ARM7TDMI processors, and where is it typically located in memory?	3M	L3	CO2	1,2,3 / 1,2
Q. 3(b)	**Contrast** the process of macros in ARM assembly language? Write a macro in ARM assembly that calculates the square of a number stored in a register.	4M	L3	CO2	1,2,3 / 1,2
Q. 3(c)	**Analyze** the advantages of endianness in ARM Assembly Language Programming? Explain the difference between little-endian and big-endian formats with examples?	3M	L3	CO2	1,2,3 / 1,2
Q. 4(a)	Write an ARM assembly program that rotates the bits of a number in R1 to the right by 3 positions and stores the result in R0.	4M	L4	CO2	1,2,3 / 1,2
Q. 4(b)	**Examine** the following code and explain its	6M	L4	CO2	1,2,3 / 1,2

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SCHOOL OF ENGINEERING

USN No: EN6223AM1001

V Semester B.Tech Mid Semester Examination-II

Computer Science and Engineering (AI & ML)

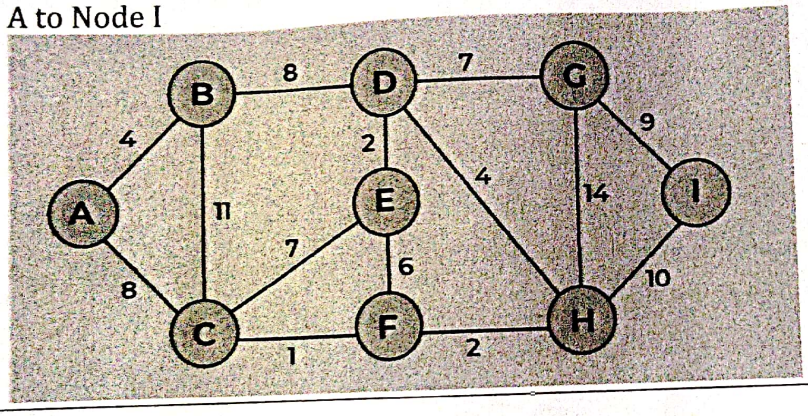
Course Title: Computer Networks **Course Code: 22AM3504**

Duration: 75 Mins. **Date:** 04/12/2024

Time: 2:45-4:00PM **Max Marks:**40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

Q. No.	Question	Marks	BT Level	CO's
Q. 1(a)	**Compare** Virtual-Circuit and Datagram Network issue	4	L2	3
Q. 1(b)	**Make use of** Link state routing algorithm to solve the given graph. Show the step wise process in order to find out the path from Node A to Node I 	6	L3	3
Q. 2(a)	**Outline** on the approaches available for congestion control	6	L2	3
Q. 2(b)	**Distinguish** between two traffic shaping algorithms	4	L4	3
Q. 3(a)	**Contrast** on the available three Transport Service Primitives.	6	L4	4
Q. 3(b)	**Compare** between User Datagram Protocol & Transfer Control Protocol	4	L4	4
Q. 4(a)	Solve for given subnet problem ➢ Suppose you have an IP address **192.168.1.0/24.** This is a **Class C network**, and it has 256 possible addresses (from 192.168.1.0 to 192.168.1.255). ➢ Now, you need to divide this network into smaller subnets, each with 60 hosts.	5	L3	4
Q. 4(b)	**Survey** on connection less Protocol (user datagram protocol- UDP) with a neat diagram explain the position of RTP in the protocol stack.	5	L4	4

Course Outcomes Being Assessed	
CO3	**Solve** the problems related to various Routing Algorithms and also perform the Interpretation of routers, Internet Protocol IPv4, and IPv6.
CO4	**Recognize** transport layer services and infer UDP and TCP protocols and **Distinguish** between UDP and TCP Protocols.

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0100

III Semester B.Tech Internal Assessment -I

Department of Computer Science and Engineering (AI & ML)

Course Title: Skill Enhancement Course (JAVA PROGRAMMING) **Course Code:** 23AM230X

Duration: 75 Mins. **Date:** 22-10-2024

Time: 2:45pm to 4:00pm **Max Marks:** 40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's/ PSO's
Q. 1(a)	Explain all the Java Buzzwords?	6	L1	CO1	PO1,PSO1

Q. 1(b)	Predict the output for below snippets
	(i) `boolean flag = true;`
	`if (!flag) {`
	`System.out.println("False");`
	`} else {`
	`System.out.println("True");`
	`}`
	(ii) `char c = 'A';`
	`int i = c + 2;`
	`System.out.println(i);`
		4	L1	CO2	PO2,PO3,PSO1

Q. 2(a)	Describe the architecture of the **Java Virtual Machine (JVM)**, Additionally, explain the role of each component in the process of executing a Java application and how they contribute to Java's platform independence.	6	L1	CO1	PO1,PO2,PSO1

Q. 2(b)	**What will be the result of this code execution?**
	(i)`int[] arr = {10, 20, 30};`
	`for (int x : arr) {`
	`x = x + 5;`
	`System.out.println(arr[1]);`
	`}`
	`System.out.println(arr[2]);`
	(ii) `int[][] arr = {{1, 2}, {3, 4}, {5, 6}};`
	`System.out.println(arr[2][1]);`
		4	L2	CO2	PO2,PO3,PSO2

Q. 3(a)	Summarize the concept of Jagged Arrays with code snippet. Give one advantage of using Jagged Arrays	5	L1	CO2	PO2,PO3,PSO2

Q. 3(b)	Given the following Java code snippet:
	`int x = 130;`
	`byte b = (byte) x;`
	`System.out.println(b);`
		5	L3	CO1	PO1,PO2

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0085

B. Tech III Semester End Examinations – January 2025

Course Title: Computer Networks
Course Code: 23AM2303
Duration: 03 Hours
Date: 21-01-2025
Time: 10:00 AM to 01:00 PM
Max Marks: 100

Note:
1. **Answer all Five Full Questions**
2. **Each Full Question carries 20 Marks**
3. **Draw neat sketches wherever necessary**
4. **Missing Data may be suitably assumed**

Q. No.	Question	Marks	BTL	COs
1.a.	**Explain** in detail about TCP/IP protocol suite with neat diagram?	07	L2	CO1
1.b.	**Illustrate** the different criteria used to evaluate the performance of a network.	05	L2	CO1
1.c.	**List** different switching techniques? With a neat diagram, **Explain** about datagram network.	08	L2	CO1
2.a.	A bit stream 1101011011 is transmitted from user A to user B **apply and analyze**, using the standard CRC method. The generator polynomial is x^4+x+1. What is the actual bit string transmitted? 10011	07	L4	CO2
2.b.	Host A want to send 10 packets to Host B. The Host agreed to go with Go-Back-4. All packets are ready and immediately available for transmission. **Analyze** how many numbers of packets are transmitted by Host A, if every 7th packet that Host A transmits get lost (But no ACK's from Host B ever get lost).	05	L4	CO2
2.c.	With a neat diagram, **summarize** on: (i) Pure ALOHA (ii) Slotted ALOHA	08	L2	CO2
3.a.	**Identify** a suitable example for Link state routing and explain in detail.	08	L3	CO3
3.b.	**Compare** and **analyze** the working mechanisms of the Token Bucket and Leaky Bucket algorithms in traffic shaping.	07	L4	CO3

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0088

B. Tech III Semester End Examinations – January 2025

Course Title: Data Structures
Course Code: 23CT/23CS/23CY/23EC/23DS/23AM/23RA2302
Duration: 03 Hours
Time: 10:00 AM to 01:00 PM

Date: 17-01-2025
Max Marks: 100

Note:

1. **Answer all Five Full Questions**
2. **Each Full Question carries 20 Marks**
3. **Draw neat sketches wherever necessary**
4. **Missing Data may be suitably assumed**

Q. No.	Question	Marks	BTL	COs
1.a.	What are different types of sparse matrix? **Discuss** a method to reduce significant memory requirement for storing the elements of sparse matrices.	05	L2	CO1
1.b.	**Implement** a C program that defines an employee structure consisting of three attributes: name, employee ID, Date-of-joining and department. Define array of structure variables and perform following operations: (i) Take input from user at run time, and (ii) Display the Employee name and his/her duration of the employment.	05	L3	CO1
1.c.	**Write** a C program for insertion and deletion of an element in a given array.	05	L3	CO1

1.d.	What will be the output of the following program. Show every iterations. (assume header files are included)
	int main()
	{
	int v=1;
	do{
	v++; ++v;
	} while(v++>25);
	printf("%d\n", val);
	return 0;
	}
		05	L3	CO1

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SCHOOL OF ENGINEERING

USN No: EPU23AM0085

III Semester B. Tech Mid Semester Examination – II
Department of Computer Science and Engineering

Course Title: Data Structures
Course Code: 23CS2302
Duration: 75 Mins.
Date: 04/12/2024
Start Time: 2:45pm
Max Marks: 40

Instructions to Candidates:

1. Answer all the four full questions.
2. Each full question carries 10 marks.

Q No.		Question Description	Marks	BT Level	COs	POs
1)	a.	**Develop** a solution in C for Insertion of a node in Circular linked list at any position.	5	3	3	1,3
	b.	**Implement** a C function for Deletion operation of any node in singly linked list.	5	3	3	1,3
2)	a.	**Discuss** a C function for Insertion of a node in doubly linked list at any position.	5	3	3	1,3
	b.	**Illustrate** Push and Pop operation for implementation of stack using linked list.	5	3	3	1,3
3)	a.	**Define** extended binary tree, full binary tree, and complete binary tree. Suppose number of nodes in complete binary tree is 1000, **Calculate** its depth.	4	2	4	1,3
	b.	Following are the in-order and post-order traversal of a binary tree T. **Construct** the binary tree T. In-order: D B F E A G C L J H K Post-order: D F E B G L J K H C A	6	3	4	1,3
4)	a.	Write short notes on Threaded Binary Tree.	4	2	4	1
	b.	Define Binary search Tree (BST). **Demonstrate** following operations into an initially empty BST: (i) Insert: 8,5,1,19,16,4,25,12,23 (ii) Delete: 5, 19	6	3	4	1,2,3

COs being assessed

CO3 **Implement** and manipulate singly linked lists, doubly linked lists, and circular linked lists, executing operations such as insertion, deletion, and traversal.

CO4 **Understand** the concepts of binary trees, binary search trees, and threaded binary trees, and their associated operations.

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No:

III Semester B.Tech Additional Mid Semester Examination-I

Department of Computer Science and Engineering (AI & ML)

Course Code: 23AM2306

Course Title: Skill Enhancement Course (JAVA PROGRAMMING)

Date: 15-12-2024

Duration:75 Mins.

Max Marks: 40

Time: 10:30am to 11.45am

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's/ PSO's
Q. 1(a)	Write a java program to introduce all Primitive data types with proper output	5	L1	CO1	PO1,PSO1
Q. 1(b)	Illustrate all the arithmetic operators with appropriate code.	5	L1	CO2	PO2,PO3,PSO1
Q. 2(a)	Illustrate the types of control statements with proper examples.	5	L1	CO1	PO1,PO2,PSO1
Q. 2(b)	Write a java program for type casting. Design the type casting with proper definition.	5	L2	CO2	PO2,PO3,PSO2
Q. 3(a)	Define unary operators and illustrate them with proper examples.	5	L1	CO2	PO2,PO3,PSO2
Q. 3(b)	Write a java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.	5	L3	CO1	PO1,PO2
Q. 4(a)	Write a java program to find the sum of array elements in a single dimensional array using for each loop.	5	L3	CO2	PO2,PO3,PSO2
Q. 4(b)	Write a program for matrix multiplication in java.	5	L3	CO2	PO2,PO3,PSO2

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SCHOOL OF ENGINEERING

USN No:

III Semester B. Tech Additional Mid Semester Examination – I
Department of Computer Science and Engineering

Course Title: Data Structures
Course Code: 23CS2302
Duration: 75 Mins.
Date: 20/12/2024
Start Time: 1:45PM
Max Marks: 40

Instructions to Candidates:

1. Answer all the five full questions.
2. Each full question carries 10 marks.

Q No.		Question Description	Marks	BT Level	COs	POs
1)	a.	Write a C program to get a string (array of characters) from the user and count the number of vowels (a, e, i, o, u) present in the string.	5M	L3	CO1	PO1
	b.	Create a C program that uses an appropriate data structure to represent information about cricket players. The data structure should include the following: Player Name Player ID Batting Average Bowling Average Store and display the above information for at least 2 payers.	5M	L3	CO1	PO1
2)	a.	Differentiate between structure and union with a valid programming example.	5M	L2	CO1	PO1
	b.	For a given matrix as input from the user, write a C program to find if the matrix is Sparse or not.	5M	L3	CO1	PO1
3)	a.	Give step-by-step implementation of infix to postfix algorithm for the following expression: A+B*C+D/E+F^G	5M	L3	CO2	PO3
	b.	Devise a C program to implement the operations of a stack using arrays.	5M	L3	CO2	PO3
4)	a.	Differentiate between stack and queue	5M	L2	CO2	PO3
	b.	Devise a C program to implement the queue using arrays.	5M	L3	CO2	PO3

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No: ENG23AM0100

III Semester B. Tech Mid Semester Examination – I
Department of Computer Science and Engineering

Course Title: Data Structures
Duration: 75 Mins.
Time: 2.45 – 4.00PM

Date: 18/10/2024
Max Marks: 40

Instructions to Candidates:
1. Answer all the four full questions.
2. Each full question carries 10 marks.

Q No.		Question Description	Marks	BT Level	COs	POs
1)	a.	Why do we need data structure? **Describe** types of data structures with suitable example.	5	1	1	1,2
	b.	What are different ways of representing sparse matrix? **Develop** a method to reduce significant memory requirement for storing the elements of sparse matrices.	5	3	1	1,2,3
2)	a.	**Compare** Structure and Union with suitable C programs.	5	4	1	1,2,3
	b.	**Implement** a C program that defines a student structure consisting of three members: name, branch, and percentage. Define array of structure variables and perform following operations: (i) Take input from user at run time, and (ii) Display the entered information.	5	5	1	1,2,3, 12
3)	a.	**Design** an algorithm to solve Tower of Hanoi problem. Show steps for n=3. Note: n is no. of disks 7 step	4	3	2	1,2,3
	b.	**Demonstrate** the details of Stack at each step of conversion of the following Infix expression to Postfix expression **using Stack.** **(a * b + c ^ d) * f + (e + g)** ab+c*d^feg+*+ (Note: ^ indicates exponent operator)	6	3	2	1,2,3
4)	a.	**Discuss** advantages and disadvantages of recursive solutions with examples.	4	2	2	1,2,3, 12
	b.	**Implement** Enqueue and Dequeue operation on Queue considering array representation.	6	3	2	1,2,3, 12

COs being assessed

CO1 **Apply** the concepts of pointers, arrays, structures, and unions to address real-world problems and implement the concept in C programming language.

CO2 **Utilize** stacks and queue data structures to solve problems such as infix to postfix, infix to prefix conversions, the Towers of Hanoi puzzle, job scheduling and maze navigation.

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SCHOOL OF ENGINEERING

USN No:

III Semester B.Tech Mid Semester Examination-I
Computer Science and Engineering
(Artificial Intelligence & machine Learning)

Course Title: Computer Networks **Course Code: 23AM2303**

Duration: 75 Mins. **Date:** 18.12.2024

Time: 10:00 -11:15 AM **Max Marks:**40

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's/ PSO's
Q. 1(a)	**Explain** different network types based on geographical scale with example?	5M	L2	CO1	1 / 1,2
Q. 1(b)	**Explain** TCP/IP reference model with diagram?	5M	L2	CO1	1 / 1,2
Q. 2(a)	What is transmission media, and how are they **categorized** in telecommunications?	3M	L4	CO1	1/ 1,2
Q. 2(b)	**List** different switching techniques? With a neat diagram, **Explain** about datagram network.	7M	L2	CO1	1 / 1,2
Q. 3(a)	A bit stream 1101011011 is transmitted from user A to user B **apply and analyze**, using the standard CRC method. The generator polynomial is x^4+x+1. What is the actual bit string transmitted?	5M	L4	CO2	1,2/ 1,2
Q. 3(b)	**Make use of** suitable diagram to explain the working of GO-BACK-N ARQ protocol.	5M	L3	CO2	1,2 / 1,2
Q. 4(a)	Host A want to send 10 packets to Host B. The Host agreed to go with Go-Back-4. All packets are ready and immediately available for transmission. **Analyse** how many numbers of packets are transmitted by Host A, if every 7th packet that Host A transmits get lost (But no ACK's from Host B ever get lost).	5M	L4	CO2	1,2 / 1,2
Q. 4(b)	With neat diagram, **Summarize** on 1) Pure ALOHA 2) Slotted ALOHA	5M	L2	CO2	1 / 1,2

Course Outcomes Being Assessed	
CO1	**Explain** the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
CO2	**Apply** the concept of Hamming distance, the significance of the minimum Hamming distance and its relationship to errors as well as the detection and correction of errors in block codes.

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No:

III Semester B.Tech Mid Semester Examination - II
Computer Science and Engineering (AI & ML)

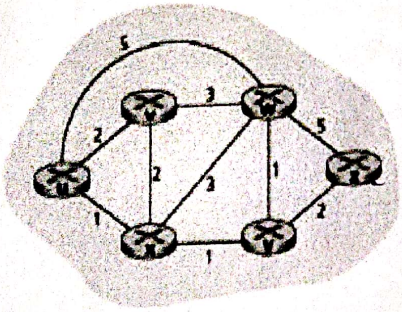
Course Title: COMPUTER NETWORKS **Course Code: 23AM2303**

Duration: 75 Mins. **Date: 05.12.2024**

Time: 10:45 – 12:00 PM **Max Marks: 40**

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1(a)	**Distinguish** between IPv4 and IPv6.	05	L4	CO3	PO1, PO2, PO3
Q. 1(b)	Consider the following network with the indicated link costs. **Apply** Dijkstra's shortest-path algorithm to compute the shortest path from U to all other nodes in the network. Write the corresponding spanning tree and routing table. 	05	L3	CO3	PO1, PO2, PO3
Q. 2(a)	**Make use of suitable diagram** to explain congestion control algorithm (leaky bucket and token bucket algorithm).	07	L3	CO3	PO1, PO2, PO3
Q. 2(b)	**Compare** the following: 1) uncontrolled flooding 2) Controlled Flooding 3) Spanning tree Flooding.	03	L4	CO3	PO1, PO2, PO3
Q. 3(a)	**Compare and contrast** the concept of transport layer Multiplexing and De-multiplexing.	05	L4	CO4	PO1, PO2, PO3

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DAYANANDA SAGAR UNIVERSITY

SCHOOL OF ENGINEERING

USN No:

IV Semester B.Tech Mid Semester Examination - I
Computer Science and Engineering (AI & ML)

Course Title: FULL STACK DEVELOPMENT **Course Code:** 23AM2406

Duration: 75Mins. **Date: 02.04.2025**

Time: 2:45–4:00PM **Max Marks: 40**

Instructions to Candidates:

- Answer all the four Questions
- Each question carries 10 marks

		Marks	BT Level	CO's	PO's
Q. 1(a)	Explain the structure of an HTML document. Include details about the purpose of the <html>, <head> and <body> tags. Provide an example of a basic HTML webpage.	5	2	1	1,2,3,5
Q. 1(b)	What is the importance of using CSS alongside HTML in web development? Discuss the main differences between HTML and CSS and explain how they work together to create styled, structured web pages. Provide an example to show how CSS can be applied to an HTML document.	5	2	1	1,2,3,5
Q. 2(a)	What is the role of CSS in web development? Discuss the different ways of incorporating CSS into an HTML document, explaining inline, internal, and external CSS with examples.	5	3	1	1,2,3,5
Q. 2(b)	What is a CSS reset, and why is it important in web development? Provide examples of how to apply a CSS reset in an HTML document and explain how it improves consistency across different browsers.	5	3	1	1,2,3,5
Q. 3(a)	Analyze the CSS Box Model and its components. Explain the significance of margin, padding, border, and content area in the box model. Provide a practical example of styling an element using the box model.	5	4	2	1,2,3,5
Q. 3(b)	Discuss the concept of specificity in CSS. How does CSS specificity determine which style is applied to an element when multiple styles target the same element? Provide	5	4	2	1,2,3,5

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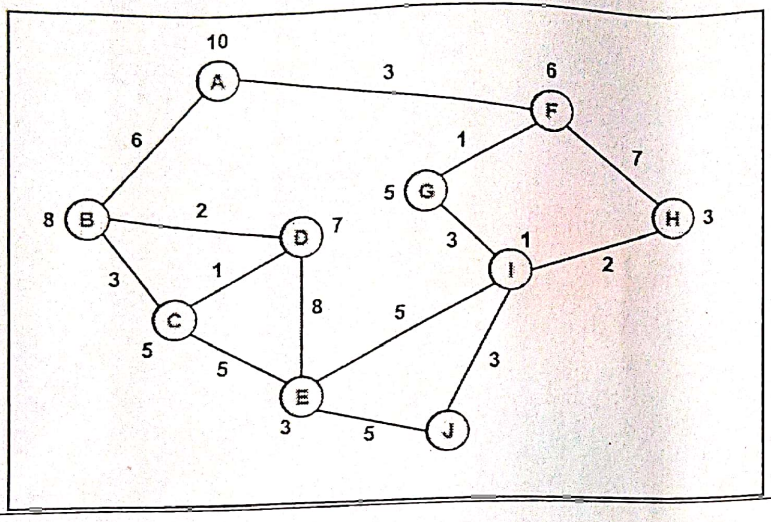
3.a.	**Identify** the problems in the hill climbing algorithms and find the solutions.	06	L3	CO2
3.b.	**Explain** Adversarial Search used in game Tree.	04	L2	CO2
3.c.	**Solve** the graph to find the most cost-effective path to reach from start state ***A to final state J*** using **A* Algorithm.** Q. 3.c. 	10	L3	CO2
4.a.	**Explain** Reasoning and its types in Artificial Intelligence. **Contrast** monotonic & non-Monotonic Reasoning.	06	L2	CO3
4.b.	**Explain** Certainty Factors used in bayes Theorem.	06	L2	CO3
4.c.	**Demonstrate** Quantifiers with suitable examples.	08	L2	CO3
5.a.	**Summarize** the required components of Expert System? **List** characteristics of expert system.	04	L2	CO5
5.b.	**Contrast** on the following Expert System (i) Rule -Based Expert System. (ii) Model – Based Expert System.	10	L4	CO5
5.c.	**Justify** the use of expert system shell in development and deployment of intelligent systems in artificial intelligence. **Identify** the Advantages and Disadvantages of Expert Systems?	06	L5	CO5

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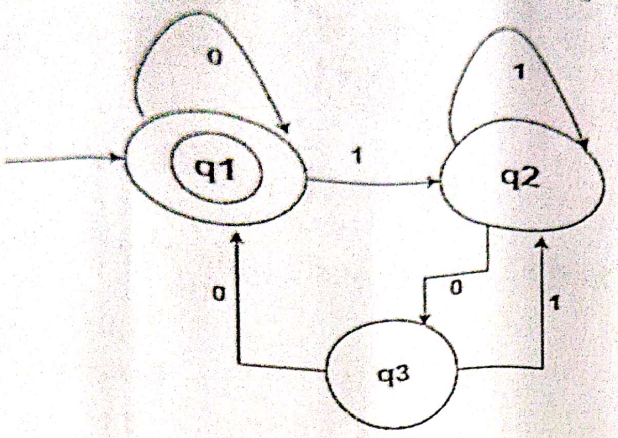
2.a.	Solve the Regular Expression corresponding to state diagram. 	10	L3	CO2
2.b.	Build the Regular Expression (1+01)* equivalent NFA with $\in$ moves	06	L3	CO2
2.c.	List any five identities of the regular expressions.	04	L1	CO2
3.a.	Construct a push down Automata (PDA) for $L=(0^n1^n \mid n>1)$, consider the string 000111 for verification.	10	L3	CO3
3.b.	Define and explain with example of Derivation Tree and their types.	06	L1	CO3
3.c.	Define a Context Free Grammer also mention Tuple for CFG.	04	L1	CO3
4.a.	What is Chomsky Hierarchy? Explain the following grammer in details. (i) Type-0 (ii) Type-1 (iii) Type-2 (iv) Type-3	10	L1	CO4
4.b.	Determine whether the following language is Deterministic Context Free Language (DCFL) or not. $L=\{a^nb^n : n\geq 1\}U\{a\}$	06	L5	CO4
4.c.	Compare between Deterministic Pushdown Automata (DPDA) & Non-Deterministic Pushdown Automata (NPDA) (4 Points)	04	L2	CO4
5.a.	List & Illustrate the Various Properties of Recursive & Recursively Enumerable Language.	10	L2	CO5
5.b.	Construct a Turing Machine for L={aba*b}, verify for the string "abaab".	06	L3	CO5
5.c.	Prove that PCP with two list X= (01, 1, 1) & Y= (01^2, 10, 1^2) has no solution.	04	L5	CO5

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2.b.	What are constraint violations in a relational database? Explain with examples how constraint violations can occur for: (a) Primary Key (b) Foreign Key. (c) Check Constraint	05	L2	CO2
2.c.	How does a DBMS handle the violations? Explain the possible actions a database can take.	05	L2	CO2
2.d.	What is Data Manipulation Language (DML) in SQL? List and explain any three common DML commands.	05	L2	CO2
3.a.	What is a View in SQL? Create a view showing only the names and salaries of employees from an employees table where the salary is above 1,50,000.	05	L6	CO3
3.b.	What are some common issues encountered in database programming, especially when integrating databases with application software?	05	L1	CO3
3.c.	What is a Trigger in SQL and its types? Create a trigger that prevents the deletion of a record from the Employees table if the employee's status is "Active."	05	L6	CO3
3.d.	What are the main differences between SQL and NoSQL databases?	05	L4	CO3
4.a.	What are CRUD operations? Construct SQL queries for the following: (i) Create a new record in the Students table with fields StudentID, Name, and Age. (ii) Read all records from the Students table where Age is greater than 48. (iii) Update the Age of a student with StudentID = 100 to 22. (iv) Delete a student record with StudentID = 102.	05	L3	CO4
4.b.	What are Normal Forms in database design? Explain the First Normal Form, Second Normal Form in terms of primary keys and functional dependencies.	05	L2	CO4
4.c.	What is Third Normal Form in database design? Explain how it eliminates transitive dependencies?	05	L2	CO4
4.d.	What is Boyce-Codd Normal Form (BCNF)? How does BCNF improve upon 3NF? Discuss with an example.	05	L6	CO4
5.a.	Summarize are the ACID properties in database systems? Provide examples for each.	05	L3	CO5
5.b.	What is a schedule in database management? Differentiate between serial and non-serial schedules.	05	L4	CO5
5.c.	What is Concurrency Control in a DBMS? Explain why it is necessary for ensuring correctness and efficiency in transaction processing.	05	L2	CO5
5.d.	What is error recovery and discuss the three primary error recovery methods.	05	L6	CO5

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4.	Let $f : \mathbb{R} \to \mathbb{R}$ be defined as follows. $$f(x) = \begin{cases} \pi & \text{if } -1 < x < 1 \\ 0 & \text{if } \quad \lvert x \rvert \geq 1 \end{cases}$$ Show that each of the following are true. (a) $A(w) = \frac{2 \sin w}{w}$ wherein, $$A(w) = \frac{1}{\pi} \int_{-\infty}^{\infty} f(v) \cos(wv) dv \quad .$$ (b) $B(w) = 0$ for all w, wherein, $$B(w) = \frac{1}{\pi} \int_{-\infty}^{\infty} f(v) \sin(wv) dv \quad .$$ (c) $2 \int_{0}^{\infty} \frac{\cos(wx) \sin(w)}{w} dw = \begin{cases} \pi & \text{if } -1 < x < 1 \\ 0 & \text{if } \quad \lvert x \rvert > 1 \end{cases}$ (d) The fourier transform of f satisfies $\widehat{f}(w) = \frac{\sqrt{2\pi} \sin w}{w}$.	3+3+4+4	L3	CO3	PO2
5.	Let $f : \mathbb{R} \to \mathbb{R}$ be a π-periodic function whose values at 5 equidistant points are indicated below. x-values: $0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi$ $f(x)$-values: 0, -1, 0, 1, 0 Determine (an approximation to the amplitude of the first harmonic of the fourier series of f, i.e.,) $\sqrt{a_1^2 + b_1^2}$ wherein, $$a_1 = 2[f(x) \cos(2x)] \quad \text{and} \quad b_1 = 2[f(x) \sin(2x)]$$	6	L2	CO3	PO1

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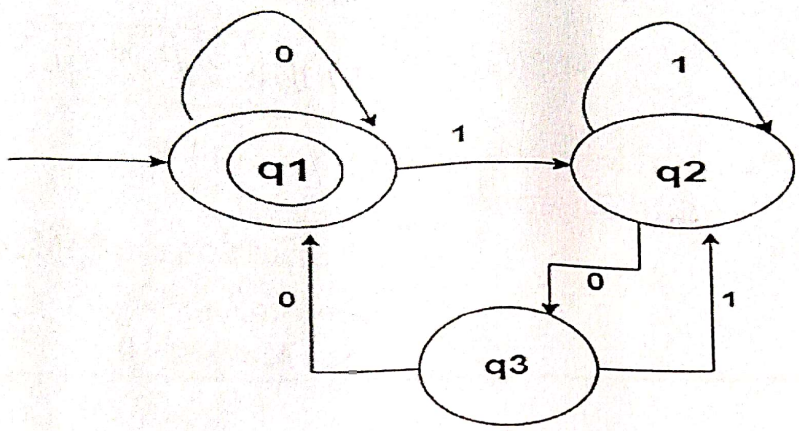
Q. 3	**Solve** the Regular Expression corresponding to state diagram. 	10	L3	CO2	PO1, PO2, PSO1
Q. 4 (a)	Convert and **build** the following Regular Expression into equivalent NFA with ∈ moves (1+01)*.	05	L2	CO2	PO1, PO2, PSO1
Q. 4 (b)	**Recall** Arden's Theorem and prove it with a suitable explanation	05	L1	CO2	PO1, PSO1

Course Outcomes Being Assessed	
CO1	Analyze and Differentiate Automata Types.
CO2	Formulate and Apply Regular Expressions for Text Processing.

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3.c.	Find the Fourier cosine transform of f(x) defined as $f(x) = \begin{cases} x & if\ 0 < x < 1 \\ 2 - x & if\ 1 < x < 2 \\ 0 & if\ x > 2 \end{cases}$		06	L4	CO3
4.a.	Find the value of y at x =0.2 given that $y' = x^2 + y$; $y(0) = 1$ using fourth order Runge-Kutta method.		08	L2	CO4
4.b.	Solve the logistic population model $y' = y - y^2$ using Euler's method given $y(0) = 0.2, h = 0.1$. Compute 5 steps		06	L3	CO4
4.c.	Solve the initial value problem for a damped mass spring system $+ 2y' + 0.75y = 0; y(0) = 3, y'(0) = -2.5$ By Euler's method for systems with step-size $h = 0.2$ from $x = 0\ to\ 0.6$.		06	L3	CO4
5.a.	Solve by using finite difference to the Laplace Equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ within the square region delimited by the coordinate axis and the line $x = 4,\ y = 4$. Utilize the following boundary conditions presented in analytical form: (i) $u(0, y) = 0, 0 \le y \le 4$ (ii) $u(4, y) = y + 12, 0 \le y \le 4$ (iii) $u(x, 0) = 3x, 0 \le x \le 4$ (iv) $u(x, 4) = x^2, 0 \le x \le 4$		10	L3	CO5
5.b.	Solve the Poisson equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = -81xy$; $0 < x < 1,\ 0 < y < 1$ given that $u(0, y) = 0,\ u(x, 0) = 0,$ $u(1, y) = 100,\ u(x, 1) = 100$ and $h = \frac{1}{3}$.		10	L3	CO5

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4.c.	Compare Prim's and Kruskal's algorithms for finding the Minimum Spanning Tree with an example graph.		08	L4	CO4
5.a.	Solve the N-Queen's problem for N = 4 using backtracking.		08	L3	CO5
5.b.	Explain the subset sum problem with an example.		04	L2	CO5
5.c.	Explain the approximation algorithm for Traveling Salesman Problem and discuss its significance.		08	L2	CO5

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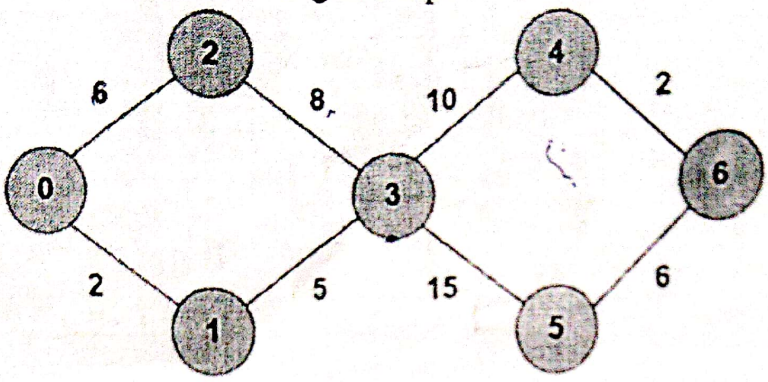
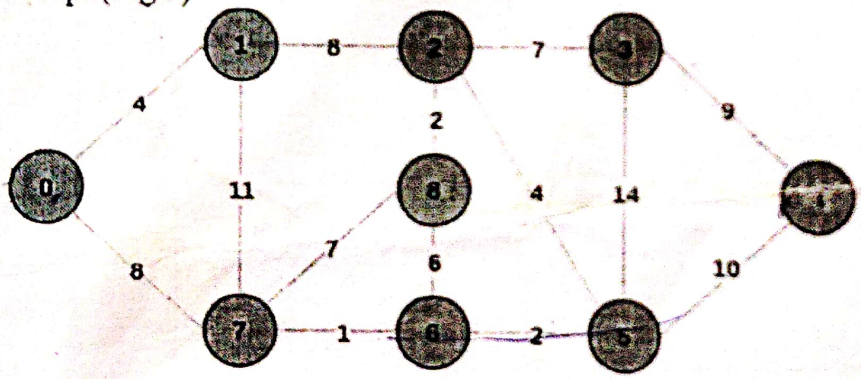
Q. 3(a)	Solve single-source shortest path problem with the help of Dijkstra's algorithm using Fig 2 Fig 2: Graph  	5	2	CO4	PO1
Q. 3(b)	Discuss the working of Huffman Trees and generate the respective codes using the following example. Character: a, b, c, d, e, f Frequency: 5, 9, 12, 13, 16, 45	5	3	CO4	PO1, PO2, PO3
Q. 4(a)	Find out the Minimum spanning Tree using the following Graph(Fig 3)  Fig 3: Graph	6	2	CO4	PO1, PO2, PO3
Q. 4(b)	Define String Matching and elaborate Horspool's string matching with a suitable example.	4	3	CO3	PO1, PO3

Course Outcomes Being Assessed	
CO3	**Demonstrate** the Decrease and Conquer, Transform and Conquer algorithm design techniques and analyze the performance of these algorithms.
CO4	**Identify and interpret** the greedy technique, dynamic-programming paradigm as to when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms and analyze them

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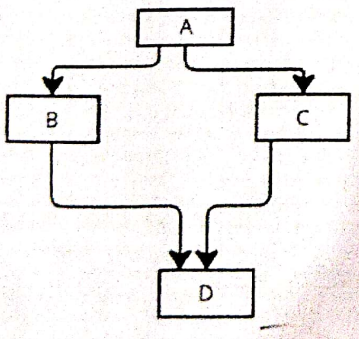
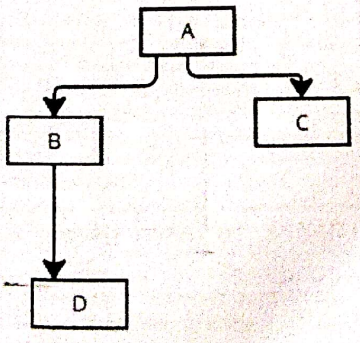
```
}
class B extends A {
void methodA(int x) {
System.out.println("B");
}
}
public class Main {
public static void main(String[] args) {
B b = new B();
b.methodA();
}
}
```

→ B A

Q. 3(b)	**Consider the following code. What will be the output?** **public class Main {** **public static void main(String[] args) {** **Main m = null;** **m.print();** **}** **static void print() {** **System.out.println("Hello");** **}** **}** Hello	5	L3	CO4	PO4,PO5,PO6
Q. 4(a)	Why does Java not support multiple inheritance with classes directly? Explain how multiple inheritance can be achieved in Java using interfaces. Provide an example to demonstrate this concept.	5	L2	CO4	PO4,PO5,PO6
Q. 4(b)	Examine the two figures provided below: **Task:** 1.Identify which figure (Figure 1 or Figure 2) can represent hybrid inheritance. 2.After making your prediction, write a complete Java program that demonstrates hybrid inheritance based on the selected figure.  Figure-1  Figure-2	5	L2	CO4	PO4,PO5,PO6

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functionality:

```
LDR R1, =num1
  LDR R2, =num2
  LDR R3, [R1]
  LDR R4, [R2]

  CMP R3, R4
  MOVGT R5, R3
  MOVLE R5, R4
```

i) What does the code compare, and what is stored in R5?

ii) If num1 is 15 and num2 is 20, what is the final value in R5?

Course Outcomes Being Assessed	
CO1	**Explain** the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
CO2	**Apply** the concept of Hamming distance, the significance of the minimum Hamming distance and its relationship to errors as well as the detection and correction of errors in block codes.

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	explain their importance in managing the schema of a database.				

Course Outcomes Being Assessed	
CO1: **Use** the basic concepts of database management system in the design and creating database blueprint using E-R model and relational model.	BT 3
CO2: **Formulate** SQL and NoSQL queries for building structure and unstructured databases	BT 4

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2.c.	Compare and contrast the difference between relation and function with an example.	05	L2	CO1
2.d.	Apply the concept of properties of relations to solve the problem: If A= {1,2,3,4,6,12}. On A, define the relation R by aRb if and only if a divides prove that R is a partial order on A.	05	L3	CO2
3.a.	Apply the concept of mathematical Induction to solve: 1+2+3+.....n=n(n+1)/2	04	L3	CO2
3.b.	Apply the concept of recurrence relation to solve and general term of the sequence 0, 2,6,12,20,30,42.	06	L3	CO2
3.c.	Analyze the problem and solve it: (The tower of Hanoi problem) There are 3 pegs fixed vertically on a table top and n circular disks having holes at their centers and having increasing diameters are slipped onto one of these pegs with the largest disk at the bottom, The disks are to be transferred, one at a time, onto another peg with the condition that at no time a larger disk is put on a smaller disk. Determine the number of moves for the transfer of all desks, so that at the end the disks are there in the original order.	05	L4	CO3
3.d.	Analyze the problem and solve it: The number of virus affected files in a system is 1000(to start with) and this increases 250 % every two hours. Use a recurrence relation to determine the number of virus affected files after one day.	05	L4	CO3
4.a.	Define the following with an example: (i) Bipartite graph (ii) complete bipartite graph with an example for each.	04	L1	CO1
4.b.	Apply the concept of graph theory to show that two graphs need not be isomorphic even if they have the same number of vertices, the same number of edges and equal number of vertices with the same degree.	06	L3	CO2
4.c.	Apply the concept of graph theory to differentiate between adjacency matrix and incidence matrix with an example.	04	L3	CO2
4.d.	Apply the concept of graph theory to define vertex connectivity and edge connectivity with an example and Show that vertex connectivity cannot exceed the edge connectivity and the edge connectivity cannot exceed the degree of a graph.	06	L3	CO2
5.a.	Apply the concept of graph theory to discuss Hamilton path and Euler's path with an example.	05	L3	CO2
5.b.	Apply the concept of graph theory to explain Konigsberg Bridge problem.	05	L3	CO2
5.c.	Apply the concept of planar graph to prove that **Kuratwoski's** first graph is a non-planar graph.	05	L3	CO2
5.d.	Apply the concept of graph coloring to discuss five color theorem.	05	L3	CO2

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	Why does the output of the program display -126? Provide a detailed explanation of the conversion process, including binary representation and how two's complement works in this context.				
Q. 4(a)	Illustrate any **five Bit-wise** operators with code snippet and proper output.	5	L3	CO2	PO2,PO3,PSO2

Q. 4(b)	**Predict the output for below snippets**
	i)
	`int a = 10;`
	`int b = a << 2;`
	`int c = b >> 1;`
	`int d = c >>> 2;`
	`int result = a & b | c ^ d;`
	`System.out.println(result);`
	`System.out.println(a);`
	`System.out.println((b);`
	`System.out.println((c);`
	`System.out.println((d);`
	
	(ii)
	`int[] numbers = {1, 2, 3, 4, 5};`
	`int sum = 0;`
	
	`for (int number : numbers) {`
	`if (number % 2 == 0) {`
	`sum += number;`
	`}`
	`}`
	`System.out.println("Sum of even numbers: " + sum);`
	`}`
		5	L3	CO2	PO2,PO3,PSO2

Course Outcomes Being Assessed	
CO1	Demonstrate an understanding of object-oriented programming concepts in Java.
CO2	Apply different operators and control statements in Java to solve programming problems.

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3.c.	A block of addresses is granted to a small organization. We know that one of the addresses is 167.199.170.82/27 What is the first address and last address?		05	L2	CO3
4.a.	**Explain** about: (i) Transmission control Protocol (TCP) (ii) User datagram protocol (UDP)		10	L2	CO4
4.b.	**Describe** the process of establishing and closing a connection in TCP.		10	L2	CO4
5.a.	**Construct** the process of establishing an SMTP connection.		05	L3	CO5
5.b.	**Compare** and **contrast** persistent and nonpersistent HTTP connections.		08	L4	CO5
5.c.	**Explain** the working of FTP along with its command.		07	L2	CO5

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2.a.	Explain algorithm for conversion of infix expression into postfix expression using stack. **Demonstrate** the details of Stack at each step of conversion of the following Infix expression to Postfix expression. (a * b + c ^ d) * f * (e + g) (Note: ^ indicates exponent operator)	10	L3	CO2
2.b.	**Design** a recursive solution for Tower of Hanoi problem. Show each move for n=4. where n is number of disks.	06	L3	CO2
2.c.	**Describe** Advantages and disadvantages of recursion.	04	L2	CO2
3.a.	**Illustrate** a solution in C for Deletion operation of any node in Circular linked list.	07	L3	CO3
3.b.	**Write** a function in C to create a singly linked list using alternate node of a given singly liked list.	05	L3	CO3
3.c.	**Implement** Enqueue and Dequeue operation on Queue considering linked list representation.	08	L3	CO3
4.a.	**Discuss** all traversal method of a binary tree. Suppose following are the in-order and post-order traversal of a binary tree T. **Construct** the binary tree T. In-order: D K I B A E G H J F C Post-order: K D I E A G B F C J H	10	L3	CO4
4.b.	**Demonstrate** following operations into an initially empty BST: (i) Insert: 7,5,1,18,16,14,25,12,23 (ii) Delete: 16, 18	05	L3	CO4
4.c.	**Compare** array and linked list implementation of binary tree.	05	L2	CO4
5.a.	**Illustrate** the rotation techniques used in AVL tree. **Demonstrate** insertion of the following elements into an initially empty AVL Search Tree: 18,1,19,16,4,45,12,23,21,17,45,3	10	L3	CO5
5.b.	**Compare** AVL search tree and B tree	05	L2	CO5
5.c.	Write short note on: (i) Red Black Tree (ii) Splay tree	05	L2	CO5

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Q. 3(b)	**Outline** and explain the design of the TCP segment header briefly.	05	L2	CO4	PO1, PO2, PO3
Q. 4(a)	**Distinguish** TCP and UDP protocol.	05	L4	CO4	PO1, PO2, PO3
Q. 4(b)	**Explain** how TCP controls the congestion (Slow start, congestion avoidance, fast retransmit)	05	L2	CO4	PO1, PO2, PO3

Course Outcomes Being Assessed	
CO3	**Solve** the problems related to various Routing Algorithms and also perform the Interpretation of routers, Internet Protocol IPv4, and IPv6.
CO4	**Recognize** transport layer services and infer UDP and TCP protocols and **Distinguish** between UDP and TCP Protocols.

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	examples with different levels of specificity and explain how the browser decides which style rule to apply.				
Q. 4(a)	Evaluate the use of CSS positioning properties (static, relative, absolute, fixed, sticky). Discuss their differences and when to use each one. Include real-world use cases where each positioning type would be applied.	10	5	2	1,2,3,5

Course Outcomes Being Assessed	
CO1	To demonstrate the ability to design basic web pages using HTML and CSS
CO2	To utilize advanced CSS methods to design the web page, background and components

**** ALL THE BEST ****

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