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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June/July 2024
Discrete Mathematics
(CSE & IT)

Roll No										

Time: 3 hours   **Max. Marks: 70**
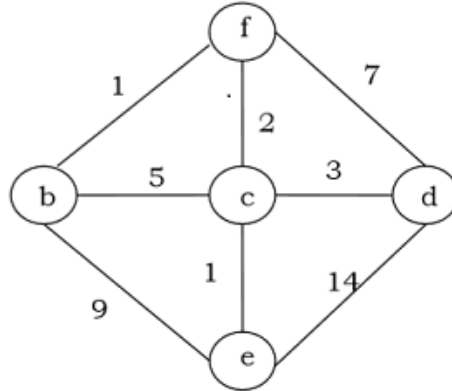
Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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1	**A**	Show that $(\neg p \wedge (p \vee q)) \to q$ is a tautology	**[7M]**
	B	Show that $S \vee R$ is a valid conclusion from the premises $P \vee Q, P \to R, Q \to S$ using rules of inferences	**[7M]**
		(OR)	
2	**A**	Find the principal Disjunctive normal form of $(\neg P \to R) \wedge (P \leftrightarrow Q)$	**[7M]**
	B	Symbolize the statements (i) " All men are giants " (ii)" Any integer is either positive or negative "	**[7M]**
3	**A**	Define Reflexive ,Symmetric and Transitive relations with an example	**[7M]**
	B	Draw the Hasse diagram for representing the partial ordering {(a,b) / a divides b } on the set {2,3,6,12,24,36}	**[7M]**
		(OR)	
4	**A**	Let $f: z \to z \; and \; g: z \to z$ defined as $f(x) = x^2 + 2, g(x) = x + 1$ find i) $fog(x)$ ii) $gof(x)$	**[7M]**
	B	Define Lattice , show that the poset represented by the Hasse diagram of the divisors of 16 (D_{16}) is a Lattice	**[7M]**
5	**A**	Prove that the set $\{1, -1, i, -i\}$ forms a group under multiplication	**[7M]**
	B	How many different words can be formed with the letters of the word 'MISSISSIPPI'?	**[7M]**
		(OR)	
6	**A**	Define Homomorphism ,Prove that $f: Z \to Z$ where $f(x) = 2x$ is a homomorphism where (Z, +) is a group	**[7M]**
	B	Find the coefficient of $x^4 y^3 z^3$ in $(x + y + z)^{10}$ using multinomial theorem	**[7M]**
7		Solve the homogeneous recurrence relation $a_n - 9a_{n-1} + 20a_{n-2} = 0, \; a_0 = -3, a_1 = -10$ by using generating function method	**[14M]**
		(OR)	
8		Solve the recurrence relation $a_n + 6a_{n-1} + 9a_{n-2} = 0, n \geq 2$ with the initial conditions $a_0 = 3, a_1 = -3$ by Characteristics roots method	**[14M]**

9   Define graph coloring , chromatic number and hence find the   **[14M]**
chromatic number of the graphs
 i) complete graph K_4 ii) complete bipartite graph $K_{2,3}$

(OR)

10   Define Spanning tree and minimal spanning tree , Use Prim's   **[14M]**
algorithm to find a minimal spanning tree in the weighted graph
shown in figure below

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June/July 2024
Data Structures
(CSE)

Roll No										

Time: 3 hours   **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	*A*	Write applications of single linked list to represent polynomial expressions	**[7M]**
	B	Discuss the role of abstract data types in organizing and structuring data. Provide examples to illustrate your points.	**[7M]**

OR

2	*A*	Explain the processes of searching, insertion, and deletion in a circular linked list. Provide examples to demonstrate each operation.	**[7M]**
	B	Explain the process of deleting a node from a singly linked list. Provide examples for deletion at the beginning and end.	**[7M]**

SECTION-II

3	*A*	Explain the linked list implementation of a queue. Discuss the advantages and limitations of this approach compared to the array-based implementation.	**[9M]**
	B	Define the Stack Abstract Data Type (ADT) and discuss its key characteristics.	**[5M]**

OR

4	*A*	Discuss the role of stacks in the conversion of infix expressions to postfix expressions. Provide a step-by-step example.	**[9M]**
	B	Discuss the role of a priority queue and its significance in various applications.	**[5M]**

SECTION-III

5	*A*	Compare and contrast the time complexities of Selection Sort, Bubble Sort, and Insertion Sort. Provide a rationale for choosing one over the other based on time complexity.	**[7M]**
	B	Explain the breadth-first search (BFS) algorithm for graph traversal. Compare it with DFS in terms of applications and efficiency.	**[7M]**

OR

6	*A*	Explain the binary search algorithm. Compare and contrast it with linear search, highlighting scenarios where each is more efficient.	**[7M]**
	B	Discuss how to sort elements using merge sort with suitable example.	**[7M]**

SECTION-IV

7	*A*	What are different methods of collision resolution in hashing? Explain in brief.	**[7M]**
	B	Discuss the insertion operation in a dictionary implemented using a linear list. Provide step-by-step details and analyze its time complexity.	**[7M]**

OR

8	A	Explain open addressing as a collision resolution technique, specifically linear probing. Discuss how linear probing handles collisions and its impact on the efficiency of the hash table.	**[7M]**
	B	Explain the double hashing technique in open addressing. Discuss its advantages and provide examples of situations where double hashing is beneficial.	**[7M]**

SECTION-V

9	A	Develop a binary search tree resulting after inserting the following integer keys 49, 27, 12, 11, 33, 77, 26, 56, 23, 6.	**[7M]**
	B	Discuss the searching operation in an AVL Tree. Provide examples and analyze the time complexity of the search operation.	**[7M]**

OR

10	A	Explain the steps involved in deleting a key from a B-Tree. Discuss the redistribution and merging operations used and analyze the time complexity of the deletion operation.	**[7M]**
	B	Explain the concept of threaded binary trees. Discuss the advantages of threaded binary trees over regular binary trees.	**[7M]**

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SECTION-I

1 *A* Explore the generations of operating systems, highlighting the key advancements and changes in each generation. **[7M]**

   B Explain the concept of context switching in the context of process execution. Discuss how context switching occurs and its impact on system performance. **[7M]**

OR

2 *A* Discuss the architecture and design principles of UNIX. Highlight its contributions to the field of operating systems. **[7M]**

   B Discuss the benefits of using threads in operating systems. Provide examples to illustrate these benefits. **[7M]**

SECTION-II

3 *A* Discuss the key criteria used for evaluating process scheduling algorithms **[7M]**

   B Explain the Round Robin (RR) scheduling algorithm. Discuss its implementation, advantages, and limitations. **[7M]**

OR

4 *A* Explain semaphores as a synchronization mechanism in IPC. Discuss their implementation and usage. **[7M]**

   B Define monitors as a synchronization construct. Discuss their advantages over traditional synchronization mechanisms and provide examples of their usage. **[7M]**

SECTION-III

5 *A* Discuss the principles of contiguous memory allocation. Explain the differences between fixed and variable partitioning and the implications for memory management. **[7M]**

   B Discuss the process of page allocation in detail, including how the operating system assigns pages to processes. **[7M]**

OR

6 *A* Discuss the challenges and potential issues associated with demand paging. Propose strategies to address these challenges **[7M]**

   B Discuss the Second Chance (SC), Not Recently Used (NRU), and Least Recently Used (LRU) page replacement algorithms. Compare and contrast their efficiency and complexity **[7M]**

SECTION-IV

7 *A* Explore different access methods for files and discuss their suitability for various applications **[7M]**

	B	Compare and contrast different file allocation methods and discuss their advantages and limitations	**[7M]**

<p style="text-align:center">OR</p>

8	*A*	Explain the principles of Direct Memory Access (DMA). Discuss how DMA enhances data transfer between devices and memory.	**[7M]**
	B	Explain how the operating system interacts with I/O devices through software. Discuss the layers of abstraction involved in managing I/O operations	**[7M]**

SECTION-V

9	*A*	Explain the SCAN disk scheduling algorithm. Compare it with the C-SCAN algorithm. Discuss their strengths and weaknesses.	**[7M]**
	B	Explain the principles of deadlock detection. Discuss algorithms and techniques used for detecting the occurrence of deadlocks in a system.	**[7M]**

<p style="text-align:center">OR</p>

10	*A*	Discuss factors contributing to disk reliability. Explain strategies for improving the reliability of disk storage.	**[7M]**
	B	Discuss strategies for handling bad blocks on a disk. Explain how the operating system manages and avoids bad blocks.	**[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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II B.Tech I Semester Supplementary Examinations, June/July 2024
Computer Organization
(CSE)

Roll No										

Time: 3 hours   **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1   **A**   Explain various functional units of a computer in detail.   **[7M]**

      B   What are the different performance measures used to represent a computer system performance?   **[7M]**

OR

2   **A**   What is system software? What are the various functions performed by system software?   **[7M]**

      B   Explain arithmetic, logical and shift operations with examples.   **[7M]**

SECTION-II

3   **A**   An 8-bit register contains the binary value 10011100. What is the register value after an arithmetic shift right? Starting from the initial number 10011 100, determine the register value after an arithmetic shift left, and state whether there is an overflow.   **[7M]**

      B   Illustrate the Computer instructions with example.   **[7M]**

OR

4   **A**   Explain register transfer language with control function and block diagram   **[7M]**

      B   Describe the Memory Reference Instructions with example.   **[7M]**

SECTION-III

5   **A**   Define the term micro programmed control? Draw the basic organization of a micro programmed control unit and explain it.   **[7M]**

      B   Compare and contrast the CISC and RISC processors.   **[7M]**

OR

6   **A**   Discuss about the different Addressing modes.   **[7M]**

      B   Explain the role of stack in computers and explain stack organization in detail.   **[7M]**

SECTION-IV

7   **A**   Illustrate the Direct and Set Associative mapping.   **[7M]**

      B   Explain the following secondary storage devices
           a) Magnetic disk.
           b) Magnetic tape   **[7M]**

OR

8   **A**   Draw and Explain the memory hierarchy.   **[7M]**

      B   Define and discuss the types of replacement algorithms.   **[7M]**

SECTION-V

9 **A** Describe the various modes of data transfer between the CPU and I/O **[7M]** devices. How does programmed I/O differ from interrupt-driven I/O, and what are the advantages and disadvantages of each approach?

   B Define DMA and draw the two-channel DMA controller and explain it. **[7M]**

OR

10 **A** Discuss about the basic concepts of Pipelining. **[7M]**

   B Explain the process of handling interrupts in a computer system. What are **[7M]** the various types of interrupts, and how does the CPU prioritize and respond to them?

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June 2024
Probability and Statistics
(CSE & IT)

Roll No									

Time: 3 hours   **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1   A random variable x has the following probability distribution.   **[14M]**

x	0	1	2	3	4	5	6
P(X)	k	3k	5k	7k	9k	11k	13k

i) Determine K (ii) Evaluate $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$ (iii) what will be the minimum value of K so that $P(X \leq 2) > 0.3$

OR

2   **A**   Two dice are thrown. Let X assign to each point (a, b) in S the maximum of   **[7M]**
its numbers i.e., X(a, b) = max(a, b). Find the probability distribution. X is a
random variable with X(S) = {1, 2, 3, 4, 5, 6}. Also find the mean and
variance of the distribution.

B   If f(x) is the distribution function x given by   **[7M]**

$$F(x) = \begin{cases} 0 & if\ x \leq 1, \\ k(x-1)^4 & if\ 1 < x \leq 3, \\ 1 & if\ x > 1 \end{cases}$$

Determine (i) f(x)   (ii) k   (iii) mean

SECTION-II

3   **A**   The mean of B.D is 3 and variance is $\frac{9}{4}$. Find the value of n (ii) $P(X \geq 7)$ **[7M]**
(iii) $P(1 \leq X \leq 6)$.

B   In a sample of 1000 cases, the mean of a certain test is 14 & standard   **[7M]**
deviation is 2·5 Assuming the distribution to be normal. Find (i) How many
students' score between 12 & 15. (ii) How many score above 18? (iii) How
many score below 18?

OR

4   **A**   **[7M]**
If X is a Poisson Variate such that $3P(X = 4) = \frac{1}{2}P(X = 2) + P(X = 0)$, find

(i) The mean of X (ii) $P(X \leq 2)$

B   Derive mean and variance of a Normal distribution.   **[7M]**

SECTION-III

5   **A**   Ten participants in a contest are ranked by two judges as follows   **[7M]**

X	1	6	5	10	3	2	4	9	7	8
y	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient?

     B   The equation of two regression lines are 7x-16y+9=0 and 5y-4x-3=0. Find the coefficient of correlation and the means of x and y ?   **[7M]**

OR

6   Find Karl Pearson's coefficient of correlation from the following data   **[14M]**

Wages	100	101	102	102	100	99	97	98	96	95
Cost of	98	99	99	97	95	92	95	94	90	91

SECTION-IV

7   **A**   Sample of size 2 are taken from the population 4,8,12,16,20,24 without replacement. Find (a) Mean of the population (b) Standard deviation of the population (c) The mean of the sampling distribution of the means (d) The standard deviation of the sampling distributions of means.   **[7M]**

     B   Define statistical hypothesis and explain briefly type I error and type II error.   **[7M]**

OR

8   **A**   Samples of size 2 are taken from the population 3, 6, 9, 15, 27 with replacement. Find (a) Mean of the population (b) Standard deviation of the population (c) The mean of the sampling distribution of the means (d) The standard deviation of the sampling distributions of means.   **[7M]**

     B   A random sample of 400 items is found to have mean 82 and S.D. of 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if the sample mean is 82.   **[7M]**

SECTION-V

9   **A**   Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level.   **[7M]**

     B   A random sample of 10 boys had the following I.Q's: 70, 120, 110, 101, 88, 83, 95, 98, 107 and 100.   **[7M]**
         (a) Do these data support the assumption of a population mean I.Q of 100?
         (b) Find a reasonable range in which most of the mean I.Q values of sample of 10 boys lie.

OR

10   **A**   A sample of 900 members has a mean of 3.4 cm and S.D 2.61 cm. Is this sample has been taken from a large population of mean 3.25 cm and S.D 2.61cm. If the population is normal and its mean is unknown find 95% confidence limits of true mean.   **[7M]**

     B   The number of automobile accidents per week in a certain community are as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accident conditions were the same during 10 week period?   **[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, June/July 2024

Analog and Digital Electronics

(CSE & IT)

Roll No										

Time: 3 hours   **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 **A** Explain V-I characteristics and Temperature dependence characteristics of PN junction diode. **[7M]**

   B Explain Zener diode characteristics with neat diagram. **[7M]**

OR

2 **A** Explain diode equation .A Silicon diode has a saturation current of 0.1 pA at 20^0 C. Find the forward bias voltage when the current is 0.1 ma **[7M]**

   B Explain Qualitative Theory of P-N Junction **[7M]**

SECTION-II

3 **A** Explain the operation of CE Configuration of BJT and its input and output characteristics briefly . **[10M]**

   B If a transistor, with $\alpha=0.96$ calculate the values of β and γ **[4M]**

OR

4 **A** *Explain* Transistor as an amplifier **[7M]**

   B Explain α and β Parameters of transistor and the relation between them **[7M]**

SECTION-III

5 **A** Convert a)$(10110.001)_2$ into decimal **b)** $(111110101011.0011)_2$ to octal **c)** $(011110101011.0011)_2$ to Hexa decimal **[6M]**

   B What is Standard form? Express the Boolean function $F = A + B'C$ as standard sum of min terms. **[8M]**

OR

6 **A** Find the complement of the following Boolean functions and reduce them to   minimum number of literals:
   i. (bc'+ a'd) (ab' + cd')
   ii. b'd + a'bc' + acd + a'bc **[8M]**

   B What are the advantages of 2's complement method.?Perform the subtraction of $11011_2 – 10010_2$ using 2's complement method. **[6M]**

SECTION-IV

7 **A** Simplify the following Boolean expression using K-map and implement them using NOR gates:

F (W, X, Y, Z) = W'X'Y'Z' + WXY'Z' + W'X'YZ + WXYZ **[7M]**

	B	Prove that A'B+AC+BC=A'B+AC and implement using NAND gates	**[7M]**

<div align="center">OR</div>

8	**A**	Represent the function – F (A, B, C, D) = (1, 2, 3, 6, 7, 8, 9, 10, 13) on a - Kaurnaugh map. Indicate all prime implicants and write a minimum cost sum of products expression.	**[7M]**
	B	Implement AND, OR and NOR by using NAND gates only.	**[7M]**

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<u>SECTION-V</u>

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9	**A**	Implement the following Boolean function using 8:1 Mux: F(A,B,C,D)=Σm(0,1,3,4,8,9,15)	**[7M]**
	B	How can you Convert An SR Flip-flop to a JK Flip-flop?	**[7M]**

<div align="center">OR</div>

10	**A**	Explain the operation of full adder with neat diagram	**[7M]**
	B	Explain the operation of encoder and decoder with neat diagrams	**[7M]**

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