

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
MCA I Year I Semester Supplementary Examinations August-2024
DISCRETE MATHEMATICS

Time: 3 Hours**Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Obtain the disjunctive normal form of $\neg(P \vee Q) \Leftrightarrow (P \wedge Q)$. CO1 L3 6M
 b Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises CO1 L1 6M
 $P \vee Q, Q \rightarrow R, P \rightarrow M, \neg M$.

OR

- 2 a Define converse, inverse, contra positive with an example. CO1 L1 6M
 b Prove that $(P \wedge Q) \Leftrightarrow (\neg P \vee \neg Q)$ is a contradiction. CO1 L3 6M

UNIT-II

- 3 a Define Relation? Write the properties of relations. CO2 L1 6M
 b Let $A = \{0, 1, 2, 3, 4\}$. Show that the relation CO2 L4 6M
 $R = \{(0, 0), (0, 4), (1, 1), (1, 3), (2, 2), (3, 1), (3, 3), (4, 0), (4, 4)\}$ is an
 equivalence relation.

OR

- 4 a Find the inverse of the following functions CO2 L3 6M
 (i) $f(x) = \frac{10}{\sqrt[5]{7-3x}}$ (ii) $f(x) = 4e^{(6x+2)}$
 b Let $f(x) = x + 3, g(x) = x - 4$ and $h(x) = 5x$ are functions from $R \rightarrow R$ CO2 L3 6M
 where R is the set of real numbers. Find $fo(goh)$ and $(fog)oh$.

UNIT-III

- 5 a Out of 5 men and 2 women, a committee of 3 is to be formed. In how CO3 L2 6M
 many ways can it to be formed if at least one women is to be included?
 b Find the number of arrangements of the letters in the word CO3 L3 6M
 (i) ACCOUNTANT (ii) CALCULUS (iii) DIFFERENTIATION.

OR

- 6 a Find the number of non-negative integer solutions of the equality CO3 L3 6M
 $x_1 + x_2 + x_3 + x_4 + \dots + x_6 < 10$.
 b Find the number of integer solutions of $x_1 + x_2 + x_3 + x_4 + x_5 = 30$ where CO3 L3 6M
 $x_1 \geq 2, x_2 \geq 3, x_3 \geq 4, x_4 \geq 2, x_5 \geq 0$.

UNIT-IV

- 7 a Find the generating function for the sequence 0, 2, 6, 12, 20, 30, 42, CO4 L3 6M
 b Find the sequence generated by the function $f(x) = (3+x)^3$. CO4 L3 6M

OR

- 8 a Solve the recurrence relation $a_{n+2} + 3a_{n+1} + 2a_n = 3^n$ for $n \geq 0$ given $a_0 = 0, a_1 = 1$. CO4 L3 6M
- b Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0$ for $n \geq 2$ given $a_0 = -1, a_1 = 8$. CO4 L3 6M

UNIT-V

- 9 a Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$. CO5 L4 6M
- b How many vertices will the graph contains 6 edges and all vertices of degree 3. CO5 L2 6M

OR

- 10 a Explain the algorithm for Breadth-First Search (BFS) for finding a spanning tree for the graph. CO5 L2 6M
- b Explain the algorithm for Depth-First Search (DFS) for finding a spanning tree for the graph. CO5 L2 6M

***** END *****

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
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MCA I Year I Semester Supplementary Examinations August-2024

COMPUTER ORGANIZATION

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- | | | | | |
|-----|--|-----|----|----|
| 1 a | Convert the following | CO1 | L3 | 6M |
| | a. $(10110001101011)_2 = (?)_{16}$ b. $(3971)_{10} = (?)_{16}$ c. $(306.D)_{16} = (?)_2$ | | | |
| b | Examine the signed and unsigned numbers for positive numbers with a suitable example. | CO1 | L4 | 6M |

OR

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|-----|--|-----|----|----|
| 2 a | Using K- map simplify the Boolean function | CO1 | L4 | 6M |
| | a) $F(w, x, y, z) = \sum(0, 1, 2, 4, 6, 8, 9, 12, 13, 14)$. | | | |
| b | Illustrate the Decoder in detail with Truth table. | CO1 | L2 | 6M |

UNIT-II

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|-----|--------------------------------------|-----|----|----|
| 3 a | What is memory hierarchy? Explain. | CO2 | L1 | 6M |
| b | Differentiate the types of mappings. | CO2 | L3 | 6M |

OR

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|---|--|-----|----|-----|
| 4 | List and discuss the types of Shift Register Operations. | CO2 | L4 | 12M |
|---|--|-----|----|-----|

UNIT-III

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|-----|--|-----|----|----|
| 5 a | List and explain Program Control Instructions. | CO3 | L4 | 6M |
| b | What is input-output instructions | CO3 | L1 | 6M |

OR

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|-----|---|-----|----|----|
| 6 a | Explain about rotate instructions and its types in detail. | CO3 | L5 | 6M |
| b | Discuss about conditional transfer instructions with example. | CO3 | L6 | 6M |

UNIT-IV

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|-----|---|-----|----|----|
| 7 a | Compare I/O and Memory bus. | CO4 | L4 | 6M |
| b | Explain about Daisy chaining in detail. | CO4 | L5 | 6M |

OR

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|-----|--|-----|----|----|
| 8 a | Briefly explain about Priority interrupts and its types. | CO4 | L5 | 6M |
| b | Clearly explain about modes of transfer and its types. | CO4 | L4 | 6M |

UNIT-V

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|-----|---|-----|----|----|
| 9 a | Design the concept of Pipelining with clear example with neat sketch. | CO5 | L5 | 6M |
| b | Explain about the Shared Memory Multiprocessors in detail. | CO5 | L4 | 6M |

OR

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|------|--|-----|----|----|
| 10 a | Explain about inter processor arbitration. | CO5 | L4 | 6M |
| b | Explain about vector processing in detail. | CO5 | L2 | 6M |

*** END ***

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
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DATA STRUCTURES

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

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|---|-----|----|----|
| 1 a What is a Data Structure? Explain its advantages. | CO1 | L1 | 6M |
| b Explain various types of Data Structures. | CO1 | L2 | 6M |

OR

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|---|-----|----|----|
| 2 a Identify the steps to print the product of two numbers. | CO1 | L3 | 6M |
| b Differentiate linear and non-linear data structure. | CO1 | L4 | 6M |

UNIT-II

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|---|-----|----|-----|
| 3 Explain different ways for inserting an element into a Single Linked List with example. | CO2 | L1 | 12M |
|---|-----|----|-----|

OR

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|--|-----|----|----|
| 4 a Convert the expression $(5 + 6) * (6 - 5)$ from infix to postfix | CO2 | L2 | 6M |
| b Evaluate the postfix expression $25*423-*+$. | CO2 | L5 | 6M |

UNIT-III

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|---|-----|----|----|
| 5 a What are the different ways to define a tree? | CO3 | L1 | 6M |
| b Find various terminologies used in a tree. Explain any six terminologies. | CO3 | L3 | 6M |

OR

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|--|-----|----|----|
| 6 a Explain BFS Tree Traversal with an example. | CO3 | L1 | 6M |
| b Analyze the steps to search element in Binary Search Tree. | CO3 | L2 | 6M |

UNIT-IV

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|--|-----|----|----|
| 7 a Explain Binary Search with an algorithm and example. | CO4 | L2 | 6M |
| b Develop a program to demonstrate Binary Search. | CO4 | L6 | 6M |

OR

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|---|-----|----|----|
| 8 a Explain selection sort with an algorithm and example. | CO4 | L2 | 6M |
| b Explain insertion sort with an algorithm and example. | CO4 | L2 | 6M |

UNIT-V

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|--|-----|----|----|
| 9 a Discuss how to represent Graph storage using Adjacency matrix. | CO5 | L2 | 6M |
| b Prepare an algorithm for Prim's with example. | CO5 | L3 | 6M |

OR

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|--|-----|----|-----|
| 10 What is a Graph? Explain various Graph terminologies. | CO5 | L2 | 12M |
|--|-----|----|-----|

*** END ***

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
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OPERATING SYSTEM

Time: 3 Hours

(Answer all Five Units 5 x 12 = 60 Marks)

Max. Marks: 60**UNIT-I**

- 1 a Illustrate different services provided by operating systems.
 b Write a short note on Computer System Architecture.

CO1 L3 6M
 CO1 L6 6M

OR

- 2 a Explain about system program and design component of OS.
 b With a neat diagram Explain the Layered Structure of OS.

CO1 L1 6M
 CO1 L6 6M

UNIT-II

- 3 a Discuss the following.
 i) FCFS CPU scheduling algorithm in detail.
 ii) SJF CPU scheduling algorithm in detail
 b Discuss in detail about classic problems of synchronization.

CO2 L2 6M

OR

- 4 a What is a thread? Discuss about thread scheduling.
 b Discuss the Bounded Buffer problem.

CO4 L1 6M
 CO2 L2 6M

UNIT-III

- 5 a What is a page fault ? Explain the steps involved in handling a page fault with a neat sketch.
 b Discuss the hardware support Required to support demand paging.

CO4 L1 6M

CO2 L2 6M

OR

- 6 a What are the disadvantages of single contiguous memory allocation?
 b Consider page reference
 String: 1,2,3,2,1,5,2,1,6,2,5,6,3,1,3,6,1,2,4,3. Compare the number of page faults for LRU and Optimal page replacement Algorithm.

CO1 L1 6M

CO4 L5 6M

UNIT-IV

- 7 a What is File System? and Explain about File Sharing with Examples.
 b Explain in Detailed about Free space management in File System.

CO4 L1 6M

CO1 L1 6M

OR

- 8 a How to Access the file system using Directory Structure?
 b i) How do you use stable storage?
 ii) Explain tertiary storage structure in detail.

CO5 L2 6M

CO1 L1 6M

UNIT-V

- 9 a How can you explain the cryptography as a security tool?
 b Discuss various techniques to recover from the dead lock.

CO1 L1 6M

CO2 L2 6M

OR

- 10 a Explain the indexed allocation of disk space.
 b How can you identify the program threats? Explain briefly.

CO1 L1 6M

CO5 L2 6M

***** END *****

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OBJECT ORIENTED PROGRAMMING THROUGH C++

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- | | | | | | |
|---|---|--|-----|----|----|
| 1 | a | Demonstrate structure of program in C++. | CO1 | L1 | 6M |
| | b | Demonstrate Data types in C++. | CO1 | L3 | 6M |

OR

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|---|---|---|-----|----|-----|
| 2 | a | Explain Array with suitable example. | CO1 | L1 | 6 M |
| | b | Demonstrate control flow statements in C++. | CO1 | L5 | 6M |

UNIT-II

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|---|---|---|-----|----|----|
| 3 | a | Explain Types of Constructor with an example. | CO2 | L2 | 6M |
| | b | Define object and class with suitable examples. | CO2 | L1 | 6M |

OR

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|---|--|--|-----|----|-----|
| 4 | | Analyze and explain Preprocessor directives and name spaces with an example. | CO1 | L4 | 12M |
|---|--|--|-----|----|-----|

UNIT-III

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|---|--|---|-----|----|-----|
| 5 | | Explain Inheritance with suitable examples. | CO6 | L1 | 12M |
|---|--|---|-----|----|-----|

OR

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|---|--|--|-----|----|-----|
| 6 | | Explain Operator overloading with suitable examples. | CO2 | L3 | 12M |
|---|--|--|-----|----|-----|

UNIT-IV

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|---|---|-------------------------------------|-----|----|----|
| 7 | a | Define Abstract class with example. | CO2 | L1 | 6M |
| | b | Define polymorphism in C++. | CO2 | L2 | 6M |

OR

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|---|--|---|-----|----|-----|
| 8 | | Differentiate Base and Derived class virtual function with an example | CO6 | L6 | 12M |
|---|--|---|-----|----|-----|

UNIT-V

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|---|---|---|-----|----|----|
| 9 | a | Define File Streams and String Streams. | CO5 | L1 | 6M |
| | b | Write program Exeption Handling in C++. | CO6 | L1 | 6M |

OR

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|----|--|---|-----|----|-----|
| 10 | | Exaplain Exception Handling with suitable examples. | CO6 | L6 | 12M |
|----|--|---|-----|----|-----|

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