

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-2 EXAMINATION 2024

B.Tech-IV Semester (CSE/IT)

COURSE CODE (CREDITS): 18B11CI414 (3)

MAX. MARKS: 25

COURSE NAME: Discrete Computational Mathematics

COURSE INSTRUCTORS: Dr. Amol Vasudeva, Dr. Rakesh Bajaj, and Dr. Neelkanth

MAX. TIME: 1 Hour 30 Minutes

Note:

(a) All questions are compulsory. (b) Marks are indicated against each question in square brackets. (c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

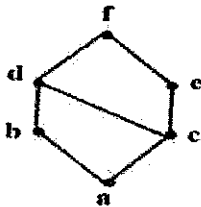
1. Using the concept of generating function, solve the following recurrence relation:
 $a_k = 2a_{k-1} + 3a_{k-2} + 4^k + 6$ with initial conditions $a_0 = 20$ and $a_1 = 60$. CO-7 [4 marks]

2. (a) Suppose $A_n = \left(-\frac{1}{n}, \frac{1}{n}\right)$; $n \in N$ (set of natural numbers) is an interval. CO-2 [3 marks]
 Find (i) $A_3 \cup A_5$ (ii) $A_4 \cap A_{10}$ (iii) $A_1 \cap A_2 \cap A_3 \cap \dots \cap A_k \cap A_{k+1} \dots$; $k \in N$

(b) Among 18 students, 7 study mathematics, 10 study physics and 10 study computer programming. Also, 3 study mathematics and physics, 4 study mathematics and computer programming, and 5 study physics and computer programming. Given that 1 student studies all three subjects. How many of these students study none of the three subjects? CO-2 [2 marks]

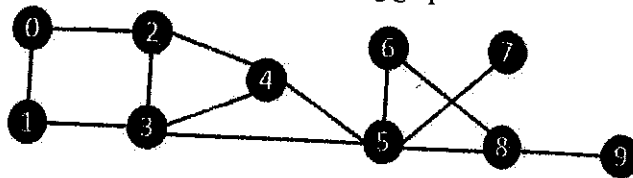
3. Let A be the set {1, 2, 3} and R be the relation $R = \{(1, 2), (2, 3), (3, 1)\}$.
 (a) Draw the diagram for this relation CO-3 [1 mark]
 (b) Determine the transitive closure of R? CO-3 [3 marks]

4. Verify whether the lattice given in the following figure is distributive or not. CO-3 [3 marks]



5. Draw the Hasse diagram of the lattice D_{42} and show that it is bounded and complemented. CO-3 [3 marks]

6. (a) What will be the complement of the complete graph K_n
 (b) Draw the planar representation of the complete bipartite graph $K_{2,4}$
 (c) Show that K_5 is an Eulerian graph and find an Eulerian circuit in it.
 (d) Find the distance $d(1,6)$ and diameter for the following graph



- (e) Find the cut points in the above graph.
 (f) A graph has 26 vertices and 58 edges. There are five vertices of degree 4, six vertices of degree 5 and seven vertices of degree 6. If the remaining vertices all have the same degree, what is this degree? (CO-4) [1×6 = 6 marks]
