SET-3

INDIRA UNIVERSITY, PUNE

SCHOOL OF INFORMATION TECHNOLOGY-BSC AIML

Backlog Examination (2025 Pattern) April/ May – 2026 - Semester – I

Subject Name: Discrete Structures for Computer Science **Max. Marks: 25**
Subject Code: 25AML109T **Time: 1:30 Hrs.**

Instructions

- All questions are compulsory.
- Use of single memory non programmable calculator is allowed.

CO #	Cognitive Ability	Course Outcome
CO2	**Understand**	Understand and explain the properties of relations, including equivalence relations, partial orderings, and their applications in the context of functions and binary relations
CO3	**Apply**	Apply operations on sets, such as union, intersection, set difference, and complement, as well as use De-Morgan's Laws in various mathematical and practical contexts
CO5	**Evaluate**	Evaluate combinatorial problems using basic counting principles, including the addition and multiplication principles, as well as permutations and combinations

Q.1.	**Attempt any 5 out of 7. (1 mark each)** **(5 Marks)** a) For sets $A = \{1, 2, 3\}$ and $B = \{2, 3, 4\}$, find $A \cap B$. b) Find AXB where $A = \{a, b\}$ and $B = \{1,2,3\}$. c) If $f(x) = 2x + 1$, Find $f(3)$. d) State Pigeonhole Principle. e) If you can choose any of 5 shirts and any of 3 trousers, how many outfits can you make? Explain. f) Classify the following recurrence relation as homogeneous or non-homogeneous. $a_n = 4a_{n-1} - 4a_{n-2} + n$. g) For the recurrence relation $a_n = 2a_{n-1} + 3a_{n-2}$ $with$ $a_0 = 1, a_1 = 3$, Find a_2.	**CO2**

Q.2.	**Attempt any 2 out of 4. (5 marks each)** **(10 Marks)** **a)** For three sets A, B, C where n(A) = 20, n(B) = 30, n(C) = 25, n(A ∩ B) = 10, n(B ∩ C) = 8, n(A ∩ C) = 5, n(A ∩ B ∩ C) = 3, Apply the inclusion–exclusion principle to find n(A ∪ B ∪ C). **b)** Draw Hasse Diagram for the poset D45 with divisibility relation. **c)** Apply the concept of permutations to determine in how many ways can 5 different Physics books**,** 4 different Mathematics books, and 3 different English books be arranged on a shelf? **d)** Formulate the recurrence relation for the number of regions obtained by drawing 'n' straight lines in a plane such that no two lines are parallel and no three meet at a point.	**CO3**
Q.3.	**Attempt all questions. (5 marks each)** **(10 Marks)** **a)** Let List the members of the following sets: i. {x | x is a real number such that $x^2 = 4$} ii. {x |x is a negative integer greater than -7} iii. {x |x is the square of an integer and x < 100} iv. {x |x is an integer such that $x^2 = 7$} **b)** Let $R = \{(a,a),(a,b),(b,c),(c,b),(c,d),(d,a),(d,b)\}$. Defined on $A = \{a,b,c,d\}$. Find M_R and draw digraph of R.	**CO5**
Q.3.	**OR** Consider the relation R on a set $A = \{1,2,3,4,5\}$ given by **(10 Marks)** $R = \{(1,2),(2,3),(3,4),(4,5)\}$ Use Warshall's algorithm to find its transitive closure R^*. Also draw the digraph of R^*.	**CO5**

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