



**B.C.A. II Semester Degree Examination, Sept./Oct. - 2024**

**COMPUTER SCIENCE**

**DSC 5 : Discrete Mathematical Structures**

**(NEP)**

Time : 2 Hours

Maximum Marks : 60

**SECTION - A**

Answer the following sub-questions. Each sub-question carries **one** mark. **10x1=10**

1. (a) Define conjunction.
- (b) If  $f(x) = x^2$  and  $g(x) = 2x$  find  $f \circ g(2)$ .
- (c) State Demorgan's law of set theory.
- (d) Define Recurrence Relation.
- (e) Find  ${}^6C_2$ .
- (f) Define symmetric relation.
- (g) Define relation.
- (h) Draw (5, 4) graph.
- (i) What is chromatic number ?
- (j) Define simple graph.

**SECTION - B**

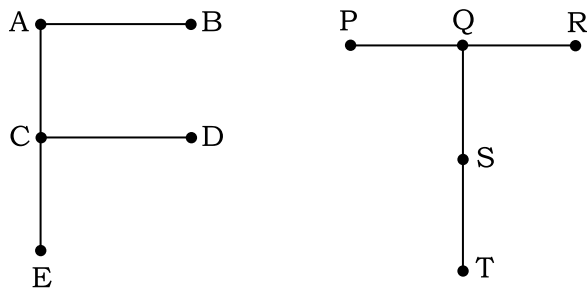
Answer **any four** from the following questions.

**4x5=20**

2. Write the converse, inverse and contrapositive for the following compound proposition.  
If it is hot then I will take cold drinks.
3. If  $U = \{a, b, c, d, e, f, g\}$   
 $A = \{a, b\}$   $B = \{c, d, e\}$   $C = \{e, f, g\}$   
Find (i)  $A \cap B$   
(ii)  $B' \cup C'$   
(iii)  $\overline{A \cup B}$   
(iv)  $(A \cap B) \cap C$   
(v)  $|A|$



4. A team of four has to be selected from 6 boys and 4 girls. How many different ways a team can be selected if at least one boy must be there in the team ?
5. A Relation R in set {1, 2, 3} is defined as  
 $R = \{(1, 1) (2, 2) (3, 3) (1, 2) (2, 3) (1, 3)\}$   
 Check R is reflexive, symmetric, transitive.
6. Show that the following two graphs are isomorphic.



7. Define graph. Explain different types of graph.

**SECTION - C**

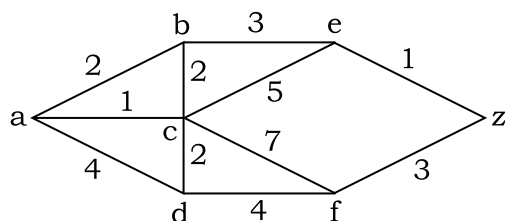
Answer **any three** from the following questions.

**3x10=30**

8. (a) Prove that  $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$   
 (b) Define quantifiers. List and explain its types.
9. Find the co-efficient of  $x^6y^3$  in the expansion of  $(x+2y)^9$ .
10. Prove that

$$1.3 + 2.4 + \dots + n(n+2) = \frac{1}{6} n(n+1)(2n+7)$$

11. Find the shortest distance and shortest path from 'a' to 'z' in the given weighted graph.



12. (a) Out of 250 candidates who failed in examination, it was revealed that 128 failed in Maths, 87 in Physics and 134 in Chemistry, 31 failed in Maths and Physics, 54 failed in Chemistry and Maths, 30 failed in Chemistry and Physics. Find how many candidates failed.
- (i) In all the three subjects.
  - (ii) In Maths but not in Physics.
- (b) If  $A = \{1, 2, 3, 4\}$ , R and S are two relations defined on a set A. defined by  
 $R = \{(1, 2) (3, 4) (2, 2)\}$   
 $S = \{(4, 2) (2, 5) (3, 1) (1, 3)\}$   
Find ROS, SOR, RO(SOR), ROR and SOS.

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