



**B.C.A. II Semester Degree Examination, September/October - 2023**

**COMPUTER SCIENCE**

**Discrete Mathematical Structures**

**(NEP)**

Time : 2 Hours

Maximum Marks : 60

**Note :** Answer *all* sections.

**SECTION - A**

1. Answer the following sub-questions. Each carries **one** mark. **10x1=10**
- (a) Define Disjunction.
  - (b) What is power set ?
  - (c) Define Recurrence relation.
  - (d) What is equivalence relation ?
  - (e) Define symmetric relation.
  - (f) Give one example of Divide and Conquer technique.
  - (g) Draw (4, 3) Graph.
  - (h) Define Regular Graph.
  - (i) What is chromatic number ?
  - (j) Define Square Matrix.

**SECTION - B**

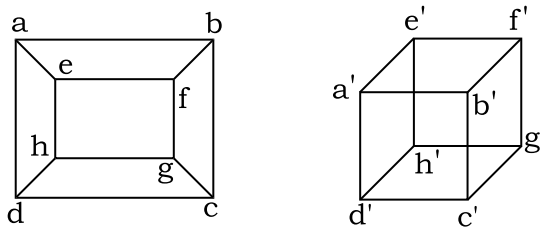
Answer **any four** from the following questions :

**4x5=20**

2. Write the converse, inverse and contrapositive for the following compound proposition.  
"If  $x \in A \cup B$  then  $x \in A$  or  $x \in B$ "
3. Find the value of 'n', such that
- $$\frac{{}^n P_4}{{}^{n-1} P_4} = \frac{5}{3}, n > 4$$
4. Let  $A = \{ 1, 2, 3, 4 \}$  and relation R is defined on A. Where  $R = \{(1,1) (1, 2) (2, 1) (2, 2) (3, 4) (4, 3) (3, 3) (4, 4)\}$ . Verify that 'R' is a equivalence relation.



5. Define isomorphism. Show that the following two graphs are isomorphic.



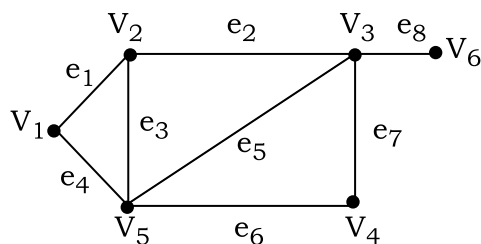
6. Determine the number of possible integers such that  $1 \leq n \leq 100$ . Where 'n' is not divisible by 2, 3 or 5.
7. Define complete Graph. Show that a complete graph with 'n' vertices  $K_n$  has  $\frac{1}{2} n(n-1)$  edges.

**SECTION - C**

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

**3x10=30**

8. (a) What are Quantifiers ? List and explain its types.  
 (b) Let  $A = \{a, b\}$ ,  $B = \{p, q\}$ ,  $C = \{q, r\}$  find  $A \times (B \cup C)$  and  $A \times (B \cap C)$ .
9. In how many ways can 26 letters of English alphabets be permuted such that the patterns CAR, DOG, PUN, BYTE don't appear ?
10. Prove that  $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{1}{6} n(n+1)(2n+1)$  using mathematical induction.
11. For the following graphs find any two possible Open walk, Closed walk, Trial, Circuit (for open walk from  $V_1$  to  $V_6$  and for closed walk from  $V_1$  to  $V_1$ )



12. Find the coefficient of  $x^{15}$  in  $(x-x^2)^{10}$  by using binomial expansion.

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