

**MCA I Semester Degree Examination, July - 2024****Mathematics for Computer Applications**

Time : 3 Hours

Maximum Marks : 70

**Note :** Answer **any five** of the following questions with question No. **1 (Q.1) Compulsory**. Each question carries **equal** marks.

1. (A) Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{1, 2, 4, 6, 8, 9\}$ ,  $B = \{2, 4, 5, 9, 10\}$ ,  $C = \{X | X \text{ is a positive integer and } x^2 \leq 16\}$ ,  $D = \{7, 8\}$ .  
Compute : i.  $A \cap (B \cup C)$  ii.  $(A \cup B) \cap D$  iii.  $(A \cup B)'$  iv.  $(A \cap B)'$  v.  $A \cup A'$  vi.  $A \cap (C' \cup D)$  **7**
- (B) Find Eigen values and Eigen vectors of matrix **7**

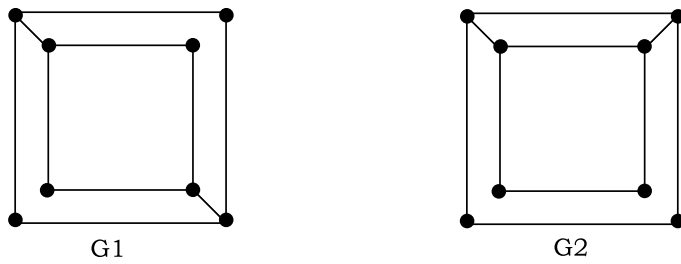
$$A = \begin{bmatrix} 4 & 1 & 2 \\ 1 & 5 & 3 \\ 2 & 3 & 6 \end{bmatrix}$$

2. (A) Consider the following compound propositional statement : **7**  
 $p \wedge (\neg p \vee q)$   
Determine whether the given compound statement is a tautology, a contradiction, or neither.
- (B) What are Quantifiers ? Explain the types of Quantifiers with respective examples. **7**
3. (A) Solve  $a_n - 6a_{n-1} + 9a_{n-2} = 0$  using characteristics equation methods. **7**
- (B) Solve the recurrence relation using characteristic rules and methods **7**  
 $F_n = 3F_{n-1} + 10F_{n-2} + 7.5^n$  where  $F_0 = 4$  and  $F_1 = 3$ .
4. (A) A die is tossed thrice. A success is getting 1 on a toss. Find the mean and variance of number of success. **7**
- (B) If X is a random variable with Probability density function given by **7**

$$f(x) = \begin{cases} cx^2, & |x| \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Find the constant c
- (b) Find  $E(X)$  and Variance (X)
- (c) Find  $P\left(x \geq \frac{1}{2}\right)$

5. (A) Show that the following graphs G1 and G2 are Isomorphic. 7



- (B) Explain the term : Graph, Simple Graph, Finite Graph, Complete Graph, Degree of Vertex, Order and Size of a Graph with neat diagram. 7

6. (A) Check whether  $\neg(A \vee B)$  and  $[(\neg A) \wedge (\neg B)]$  are Logically Equivalent. 7

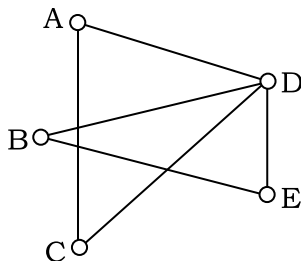
- (B) Solve the following recurrence relation using substitution method. 7

I.  $a_n = a_{n-1} + n^2$  where  $a_0 = 7$

II.  $a_n = a_{n-1} + 3^n$  where  $a_0 = 1$

7. (A) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10, use Poisson distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10,000 packets. 7

- (B) Define Euler line and Euler Graph. Verify whether the given graph is Euler Graph. 7



8. (A) State and explain Poisson Distribution. 7

- (B) Define Planar and Non-Planar Graph with diagrams. List the steps to find the Planarity. 7

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