Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 09

M.Sc.(IT)/MCA/PGDCA (2019 Batch) (Sem.–1)

MATHEMATICS

Subject Code : PGCA-1901

M.Code : 76971

Time : 3 Hrs. **Max. Marks: 70**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying TEN marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

1. Solve the following :

a) Perform indicated operation $\frac{3-2/3}{5+5/6}$.

b) Solve $\frac{3\sqrt{2}-4\sqrt{3}}{4\sqrt{2}+3\sqrt{3}}$

c) Write the solution set of the equation $2x^2 + 3x - 2 = 0$ in roster form.

d) If R is the set of real numbers and Q is the set of rational numbers, then what is R – Q?

e) Write the subsets of the set $\{a, b\}$.

f) Find negation of ''At least 10 inches of rain fell today in Mumbai''

g) Show that $a \wedge b = b \wedge a$.

h) Find components of the statement ''The number 100 is divisible by 3, 11 and 5''.

i) Define Transpose and Scalar matrices

j) Evaluate $\begin{vmatrix} 1 & -3 & 5 & 1 \\ 4 & 6 & 0 & 3 \\ 8 & -2 & 3 & 0 \end{vmatrix}$

SECTION-B

2. a) Expand $(1+\sqrt{2})(3-\sqrt{2})$.

   b) Simplify $\sqrt[3]{12}.\sqrt[3]{36}+\frac{4-\sqrt{3}}{5\sqrt{3}}$.

3. a) Define Natural number, Real numbers and Irrational numbers with examples.

   b) If $X = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$, find (i) X – Y, (ii) Y – X, (iii) X $\triangledown$ Y.

4. a) Show that $(A \triangledown B)^c = A^c \cup B^c$.

   b) Which of the following sets are equal ?

   $A = \{x : x^2 - 4x + 3 = 0\}$, $B = \{x : x \in N, x < 3\}$, $C = \{x : x \in N, x \text{ is odd} < 5\}$

5. a) Show that $(A \cup B) - (A \triangledown B) = (A - B) \cup (B - A)$.

   b) Determine which of the following statement is true or false.

   i) $A \cup P(A) = A$

   ii) $A - P(A) = A$

   iii) $A \triangledown P(A) = A$

   iv) $\{A\} \triangledown P(A) = A$

SECTION-C

6. a) Show that $\sim (p \vee q)$ and $\sim p \wedge \sim q$ are equivalent.

   b) Use truth table to prove $\sim (p \vee q) \equiv (\sim p \wedge \sim q)$.

7. a) Show that $(p \wedge q) \downarrow r$ and $(p \downarrow r) \wedge (q \downarrow r)$ are not equivalent.

   b) Determine whether $(\sim q \wedge (p \downarrow q)) \downarrow \sim p$ is a tautology.

8. a) If $A = \begin{vmatrix} 1 & 5 \\ 7 & 12 \end{vmatrix}$ and $B = \begin{vmatrix} 9 & 1 \\ 7 & 8 \end{vmatrix}$, find matrix C such that 3A + 5B + 2C is null matrix.

b) Show that matrix addition is commutative *i.e.* A + B = B + A, where A and B and *mxn* matrices.

9. a) Find value of *x* such that $[1 \quad x \quad 1] \begin{bmatrix} 1 & 3 & 2 & 1 \\ 2 & 5 & 1 & 2 \\ 15 & 3 & 2 & x \end{bmatrix} = 0$.

b) Show that if $A = \begin{vmatrix} 1 & 0 \\ -1 & 7 \end{vmatrix}$, and $I = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$ $^2 = 8A + kI$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.