Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 18

M.Sc.(IT)/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

Answer briefly :

1. Perform indicated operation $5\sqrt{3} + 2\sqrt{3} - 8\sqrt{3}$.
2. Simplify $\sqrt{4x}\,\sqrt{5x^3}$.
3. Write the set $\{1, 2, 3, 6, 9, 18\}$ in set builder form.
4. If R is the set of real numbers and Q is the set of rational numbers, then what is R – Q?
5. If A = {–2, –1, 0, 1, 3}, then find the number of subsets of A.
6. Define Conjunction and Disjunction.
7. Show that $a \vee b = b \vee a$.
8. Translate statement into symbolic form ‘‘2, 3 and 6 are factors of 12’’.
9. Define Square and Unit Matrix.
10. Evaluate $\begin{bmatrix} 1 & -3 & 5 \\ 4 & 6 & 0 \\ 8 & -2 & 3 \end{bmatrix} + \begin{bmatrix} 1 \\ 3 \\ 0 \end{bmatrix}$.

SECTION-B

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

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

12. a) Define Rational Numbers, Irrational numbers and Real number with example ?

b) If $x = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$, and find (*i*) $X - Y$, (*ii*) $X \oplus Y$, (*iii*) $X \cap Y$.

13. a) State and prove De-Morgan's Law.

b) Which of the following sets are equal ?

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

14. a) Show that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

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

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

ii) $A \cap P(A) = A$ iv) $\{A\} \cap P(A) = A$

SECTION-C

15. a) Prove distributive law of disjunction over conjunctions.

b) Show that $(p \wedge q) \rightarrow r$ and $(p \rightarrow r) \wedge (q \rightarrow r)$ are not equivalent.

16. a) Show that $\sim (p \rightarrow q) \rightarrow p$ is a tautology.

b) If $\begin{bmatrix} xy & 4 \\ z+6 & x+y \end{bmatrix} = \begin{bmatrix} 8 & w \\ 0 & 6 \end{bmatrix}$, then find values of *x, y, z* and *w*.

17. a) If $A = \begin{bmatrix} 0 & -1 & 2 \\ 4 & 3 & -4 \end{bmatrix}$ and $B = = \begin{bmatrix} 4 & 0 \\ 1 & 3 \\ 2 & 6 \end{bmatrix}$, then verify that $(AB)' = B'A'$

b) Show that Matrix multiplication is not commutative *i.e.* $AB \neq BA$.

18. a) If $A = \begin{bmatrix} 1 & 5 \\ 7 & 12 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 1 \\ 7 & 8 \end{bmatrix}$, verify that $(A + B)' = A' + B'$.

b) Find X and Y if $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

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.