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M.Sc.(IT) / MCA / PGDCA (Sem.–1)

MATHEMATICS

Subject Code : PGCA-1901

M.Code : 76971

Date of Examination : 10-01-2023

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

(Complusory Section)

1. Solve the following :

a) Find the cube root of 8000.

b) Define contradiction / Fallacy in algebra of logic.

c) Define Transpose of a matrix.

d) Define symmetric and skew-symmetric matrices with an example.

e) Evaluate $\sqrt{53824}$.

f) If $x * y = x + y + \sqrt{xy}$ then find the value of 6 * 24.

g) Find the truth table for $\sim (p \vee q) = (\sim p \wedge \sim)$

h) If A is any set, then $A \cap A = A$.

i) State De-Morgan's Law for difference of sets.

j) Define tautology with an example.

SECTION-B

2. a) Find the value of $\sqrt{0.01} + \sqrt{0.81} + \sqrt{1.21} + \sqrt{0.0009}$.

   b) Find the smallest number by which 128 must be divided to obtain a perfect square.

3. a) Which of the given numbers is not a perfect cube ; 1000, 1728 and 100

   b) Find the cube root of 110592 by prime factorization method.

4. a) In a hostel 15 members take tea, 8 members take coffee and 6 members take milk. If 5 members take tea and coffee both, 4 members take tea and milk both and none of them take coffee and milk both or all the three beverages. Find the number of members in the hostel assuming that every member takes at least one or the other beverages.

   b) State and Prove Distribution Law of sets where $\cup$ is distributive over $\cap$.

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

   b) State and Prove De Morgan's law for Difference of sets.

SECTION-C

6. a) Find the Transpose of the matrix and prove that $AA' = 1$ where A' denotes transpose of a matrix. $A = \begin{pmatrix} 2 & -3 & 0 \\ 3 & 1 & -2 \\ -1 & 0 & 4 \end{pmatrix}$.

   b) If $\begin{pmatrix} 4 \\ 1 \\ 3 \end{pmatrix} X = \begin{pmatrix} -4 & 8 & 4 \\ -1 & 2 & 1 \\ -3 & 6 & 3 \end{pmatrix}$ find the matrix A

7. a) Test the validity of the argument.

   If a man is a bachelor, then he is unhappy.

   If a man is unhappy, then he dies young.

   Therefore bachelors die young.

b) Show that $p \rightarrow (p \vee q)$ is a tautology.

8. a) If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ verify that $A^2 - 5A + 7I = 0$

b) Find the value of x which makes the following product equals to 1

$$\begin{pmatrix} 2 & 0 & 7 \\ 0 & 1 & 0 \\ 1 & 2 & 1 \end{pmatrix} \begin{pmatrix} -x & -14x & 7x \\ 0 & 1 & 0 \\ x & 4x & -2x \end{pmatrix}$$

9. a) Test the validity of the argument :

If my brother stands first in the class, I will give him a scooter. Either he stood first in the class or I was out of station. I did not give my brother a scooter this time. Therefore I was out of station.

b) Prove that $\sim (\sim p) = p$.

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.