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Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI and ML) (Sem.–1) MATHEMATICS Subject Code : UGCA-1901 M.Code : 79003 Date of Examination : 12-01-2023

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

- 1. Write briefly :
 - a) Define A.P. and G.P.
 - 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) Which term in the A.P. 5,2,-1, is -22?
 - f) If a, b, c are in A.P. Show that b + c, c + a, a + b are in A.P.
 - g) In a G.P. the third term is 24 and sixth term in 192. Find the tenth term.
 - h) If A is any set, then $A \cap A = A$.
 - i) State De-Morgan's Law for sets.
 - j) Define tautology with an example.

SECTION-B

2. a) Find the Transpose of the matrix and Prove that AA' = 1 where A' denotes transpose of a matrix.

$$\mathbf{A} = \begin{pmatrix} 2 & -3 & 0 \\ 3 & 1 & -2 \\ -1 & 0 & 4 \end{pmatrix}$$

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.

3. a) Test the validity of the argument

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

If a man is unhappy, the he dies young.

Therefore bachelors die young.

- b) Show that $p \rightarrow (p \lor q)$ is a tautology.
- 4. 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 beverage.

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

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

- 6. If $a = 1 + a + a^2 + a^3 + \dots \infty x = 1 + b + b^2 + b^3 + \dots \infty m$ then prove that $\frac{xy}{x+y-1} = 1 + ab + a^2b^2 + a^3b^3 + \dots$
 - b) Prove that AM > GM.
- 7. a) Find the common difference of an A.P. whose first term is 100 and the sum of whose first six terms is five times the sum of next six terms.
 - b) Sum of the following series :

 $0.9 + 0.91 + 0.92 + \dots 100$ terms.

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