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

Total No. of Questions : 07

B.Sc. (Data Analytic) (Sem.–1)

MATHEMATICS

Subject Code : UGCA1901

M.Code : 91479

Date of Examination : 14-01-23

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) Prove that, if A $\subset$ B, B $\subset$ C then prove that A $\subset$ C where A, B and C are sets.

b) If A = {X : 0 < X < 3} and B = $\{x : 1 \leq x \leq 5\}$. Draw the Venn diagram of A $\cap$ B.

c) Define the terms: Conjunction, Disjunction, Negation and Conditional Operator with examples.

d) Write the following statement in symbolic form and give their negation also. If Mahatma Gandhi was a saint then Sardar Patel was an iron man.

e) Find the values of a, b, c and d from the equation

$$\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$$

f) If A is a square matrix such that A^2 = A, then write the value of $(1 + A)^2 - 3A$

g) Which term in the A.P. 5, 2, –1 …….. is –22?

h) If a^2, b^2, c^2 are in A.P. then prove that $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in A.P.

i) Sum the series upto the infinity

$$\frac{1}{5} + \frac{3}{5^2} + \frac{2}{5^3} + \frac{3}{5^4} + ... \infty$$

j) If a, b, c are in A.P. then what is the relationship between a, b and c.

SECTION-B

2. a) If A, B and C are any three sets then prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cap C)$

   b) In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% buy newspaper B and 10% families buy newspaper C, 5% of families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the newspaper, Find the number of families which (i) buy A and B newspaper only ii) none of A, B and C

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

4. a) If $A = \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$ and $f(x) = x^2 - 4x + 2$ then find the value of $f(A)$.

   b) If $A = \begin{bmatrix} 2 & -1 \\ -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ -1 & 1 \end{bmatrix}$ Does $(A + B)^2 = A^2 + B^2 + 2AB$ hold.

5. If $A = \begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$. Prove that $A^3 - 6A^2 + 11A + 1 = 0$

6. a) If m times the m^{th} term is equal to n times the n^{th} term of an A.P. Prove that $(m + n)^{th}$ term of the A.P. is zero.

   b) If an A.P. the p^{th} term is $\frac{1}{q}$, q^{th}, term is $\frac{1}{p}$. Prove that the sum of the first pq terms must be $\frac{1}{2}(pq + 1)$.

7. a) If the 4th, 10th and 16th term of a G.P. are x, y and z respectively, then prove that x, y, z are in G.P.

   b) Find the sum to n terms of the sequence

   8, 88, 888, 8888 ……

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.