

Roll No.

Total No. of Questions : 07]

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BCA (Sem. - 1st)
MATHEMATICS
(Bridge Course)
SUBJECT CODE : BC-102
Paper ID : [B0202]

[Note: Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.

Section - A

(10 × 2 = 20)

Q1)

- a) Define a Set with an example.
- b) If $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 4, 6, 8\}$ find $A \cup B$ and $A \cap B$.
- c) What is a reflexive relation? Give an example.
- d) Define a function with an example.
- e) State Binomial Theorem for $n \in \mathbb{N}$, set of natural numbers.

f) Find the adjoint of the matrix $A = \begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$

- g) For the matrices A and B where

$$A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}, B = \begin{bmatrix} 4 & 6 \\ 3 & 2 \end{bmatrix}$$

$$\det(A)\det(B) = \det(AB)$$

- h) Verify that $(AB)' = B'A'$

$$A = \begin{bmatrix} 1 & -3 \\ 2 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & 4 \\ 2 & 5 \end{bmatrix}$$

- i) What are the properties of arithmetic mean?
- j) Write the demerits of median.

Section - B

(4 × 10 = 40)

Q2) State and prove De Morgan's Laws.

Q3) If $f, g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by

$$f(x) = x^3 + 1, g(x) = 2x - 3$$

Find (i) $f \circ g$ (ii) $g \circ f$ (iii) $f \circ f$ (iv) $g \circ g$

Q4) Use the principle of mathematical induction to prove that

$$1.2 + 2.3 + 3.4 + \dots + n(n+1) = \frac{1}{3}n(n+1)(n+2)$$

Q5) Using properties of determinants, prove that

$$\begin{vmatrix} a & b-c & c-b \\ a-c & b & c-a \\ a-b & b-a & c \end{vmatrix} = (a+b-c)(b+c-a)(c+a-b)$$

Q6) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$ then $A^3 - 23A - 40I = 0$
Hence find A^{-1}

Q7) Calculate mean and median of the data.

x	15	20	25	30	35	40	45	50	55
f	2	22	19	14	3	4	6	1	1

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