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BCA (Sem. - 1st)

MATHEMATICS (BRIDGE COURSE)

SUBJECT CODE : BC - 102 (N2)

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

Q1) *(10 x 2 = 20)*

a) Write the set $\{x : x \text{ is a positive integer and } x^2 < 30\}$ in the roster form.

b) Explain power set with an example.

c) Let $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{2, 4, 6, 8\}$ then show that $A - B \neq B - A$.

d) Explain the concept of duality with an example.

e) Expand, using Binomial theorem, $(1 + x + x^2)^3$.

f) Let $P(n) : 2^n \geq n$, using mathematical induction prove that $P(n)$ is true.

g) Construct a 2 x 2 matrix A = [aij], where $aij = \frac{(i+2j)^2}{2}$.

h) If $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$; show that $|2A| = 4|A|$.

i) Give few disadvantages of statistics.

j) Write a note on tabulation of data.

Section - B

(4 x 10 = 40)

Q2) (a) If $A \cap B^C = \phi$, show that $A \subset B$.

(b) For any two sets A and B, prove that $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$.

Q3) (a) Let $A=\left\{\frac{1}{2},2\right\}$, $B = \{2, 3, 5\}$ and $C = \{-1, -2\}$, verify that $A\times(B\cup C)=(A\times B)\cup(A\times C)$.

(b) The coefficients of $(r-1)^{th}$, r^{th} and $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1 : 3 : 5. Find n and r.

Q4) (a) Using Binomial theorem, evaluate $(99)^5$.

(b) Using principle of induction, prove that $n(n+1)(2n+1)$ is divisible by 6 for all $n\in N$.

Q5) (a) Verify (AB)C = A(BC), for $A=\begin{bmatrix}1 & 2\\ -2 & 3\end{bmatrix}$, $B=\begin{bmatrix}2 & 1\\ 2 & 3\end{bmatrix}$ & $C=\begin{bmatrix}-3 & 1\\ 2 & 0\end{bmatrix}$.

(b) If $A=\begin{bmatrix}0 & 0\\ 4 & 0\end{bmatrix}$, find A^{16}.

Q6) (a) Prove that $\begin{vmatrix}x+a & b & c\\ a & x+b & c\\ a & b & x+c\end{vmatrix}=x^2(x+a+b+c)$.

(b) Draw histogram and frequency polygon for the following data :

0 - 10	2
10 - 20	4
20 - 30	6
30 - 40	8
40 - 50	4

Q7) (a) Find the median for the following data :

Wage (in Rs.)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of workers	22	38	46	35	20

(b) Find mode of the following frequency distribution :

Height (in cm)	52 - 55	55 - 58	58 - 61	61 - 64
Frequency	15	20	25	10