



KY-1403

Seat No. _____

B. C. A. (Sem. II) Examination

April/May – 2013

Discrete Mathematics

(BCA - 203)

(New Course)

Time : 3 Hours]

[Total Marks : 70

1 (a) Define following terms with example. **6**

(1) Symmetric difference.

(2) Infinite set.

(3) Power set.

(b) Attempt the following. (any two) **12**

(1) What is Venn diagram ? State and prove distributive law.

(2) $U = \{a, b, c, d, e, f, g, h, i, j, k\}$ and

$A = \{a, e, i\}$ $B = \{d, e, f, g, i\}$ then verify

(1) $(A \cup B)' = A' \cap B'$

(2) $(A \cap B)' = A' \cup B'$

(3) $A = \{-4, -3, -2, -1, 0\}$, $B = \{-2, -1, 0, 1, 2\}$ and

$C = \{-4, -2, 2, 4, 6\}$ then find

$A \Delta B, A - (B \Delta C), A - (B \cup C).$

2 (a) Define following terms with example : **5**

(1) One to one.

(2) Floor function.

(b) Attempt the following : (any two) **12**

- (1) Let a and b positive integers and suppose Q is defined recursively as follows :

$$Q(a, b) = \begin{cases} 5 & \text{if } (a < b) \\ Q((a-b), b+2) + a & \text{if } (a > b) \end{cases}.$$

Find (1) $Q(2, 7)$ (2) $Q(15, 2)$ (3) $Q(5, 3)$

- (2) Let $f: R \rightarrow R$ be a function define as $f(x) = 2x+3$. Find the formula for the inverse function if exists ?

- (3) Find

$$ABS(-0.09), INT(18.3), \lfloor 9.3 \rfloor, \lceil 5.25 \rceil, 23(\text{mod } 3), \log_2 64.$$

3 (a) Explain following terms with example. **6**

- (1) Transpose matrix.
(2) Scalar matrix.
(3) Unit matrix.

(b) Attempt the following : (any two) **12**

(1) Find inverse of matrix $A = \begin{bmatrix} 2 & 5 & 0 \\ 1 & -2 & 3 \\ 0 & -1 & 1 \end{bmatrix}$

(2) If $A = \begin{bmatrix} 3 & 2 \\ 6 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 4 \\ 7 & 1 \end{bmatrix}$, then show

$$(AB)^T = B^T \cdot A^T$$

(3) $A = \begin{bmatrix} 4 & -2 \\ 1 & -6 \end{bmatrix}$ find $g(A)$ where

$$g(x) = x^2 - 3x - 6.$$

- 4 (a) Explain following terms : 5
- (1) Sequence.
 - (2) Permutation.
- (b) Attempt the following : (any two) 12
- (1) 115, 100, 85, 70,..... (6th term)
 - (2) 5, 15, 45,.....(7th term)
 - (3) (a) Find the value :
(1) ${}_8P_3$ (2) ${}_{12}C_6$ (3) ${}_8C_4 + {}_8C_3$
 - (b) Find the number of permutation of all letters of the word 'MISSISSIPPI'.
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