# (Sem. II) Examination

## April / May - 2015

## BCA-203 : Discrete Mathematics

Time : 3 Hours] [Total Marks : 70

1 (a) Define the following terms with example : 6

(i) Power set

(ii) Universal set

(iii) Partitions set

(b) Attempt the followings : (any two) 12

(i) Proov the De'Morgan's law for Union.

(ii) If $A = \{{}^{2x}/_{x}$ is prime number $<8\}$

$$B = \left\{ {}^{x}/_{x^2} \leq 4, x \in z \right\}$$

$C = \{-1, 1, 2, 3, 4\}$

then find $A\Delta B$, $B\Delta C$, $C\Delta A$

$A-(B\Delta C)$ and $B-(C\Delta A)$

(iii) If $A = \{x^2/x = 4,\ x \in N\}$

$B = \{x/x$ is prime number $< 10,\ x \in N\}$

$C = \{x/3x - 12,\ x \in N\}$

then verify $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

2 (a) Define the following terms with example. 5

(1) One-to-one function

(2) Inverse function

(b) Attempt the followings (any two) 12

(i) Let $f: R - \{1\} \to R$, $f(x) = \frac{1-x}{1+x}$ then find

$fof$

(ii) Let $a$ and $b$ be a positive integer and suppose $Q$ is defined recursively as follows

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

then find

(1) $Q(2,7)$

(2) $Q(5,3)$

(3) $Q(15,2)$

(iii) Find $ABS(-21.15)$, $INT(-5.97)$, $\lfloor -4.31 \rfloor$,

$\lceil -16.7 \rceil$, $-33 \pmod 7$, $\log_{10} 0.001$

3 (a) Explain the following terms with example 6

(i) Symmetric matrix

(ii) Scalar matrix

(ii) Transpose of a matrix

(b) Attempt the following (any two) 12

(i) Find inverse of $A$

where $A=\begin{bmatrix} 4 & 3 & 2 \\ 1 & -2 & 5 \\ -3 & -1 & 7 \end{bmatrix}$

(ii) If $A=\begin{bmatrix} 1 & 4 \\ 3 & -2 \end{bmatrix}$ and $B=\begin{bmatrix} 2 & -2 \\ 1 & -1 \end{bmatrix}$ then show that $(A+B)^T=A^T+B^T$.

(iii) Evaluate $A^2-2A+2I$ where $A=\begin{bmatrix} -2 & 1 & 4 \\ 3 & 5 & 0 \\ -1 & 0 & 6 \end{bmatrix}$

4 (a) Explain following terms 5

(i) Sequence

(ii) Permutation

[Contd...

(b) Attempt the following (any two) 12

(i) The $5^{th}$ term of an A.P. is 20 and its $15^{th}$ term is 50. Then find its $21^{st}$ term.

(ii) 5, 15, 45, ..... ($7^{th}$ term)

(iii) (a) Find the values of

$8^P 3,\ 7^P 5,\ 9^C 4$

(b) How many different words can be formed by using all letters of the Word COMMON.

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