* P P F - 1 7 4 3 *

PPF-1743

Seat No. 1239

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

April / May – 2016

BCA-203 : Discrete Mathematics

Time : 3 Hours] [Total Marks : 70

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

(i) Partitions sets

(ii) Proper subset

(iii) Universal set

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

(1) If X=set of letters of word YASHVI.

Y=set of letters of word PANKTY.

Z=set of letters of word VATSAL.

then verify

(i) $X-(Y\cap Z)=(X-Y)\cup(X-Z)$

(ii) $X-(Y\cup Z)=(X-Y)\cap(X-Z)$

(2) Find the power set of

(i) $I = \{2x / -2 \leq x < 2, x \in z\}$

(ii) $J = \{x / x^2 - 3x + 2 = 0, x \in R\}$

(3) If $U = \{0,1,2,3,4,5,6,7\}$

$A = \{x / x^3 - 3x^2 + 2x = 0\}$

$B = \{x / x \text{ is prime no.}, x \in U\}$

then verify De'Morgan's law of intersection and union.

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

(i) Constant function

(ii) Composite function

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

(1) $f : R - \{0,1\} \to R - \{0,1\}$, $f(x) = 1 - \frac{1}{x}$ then find

$fofof(x)$.

(2) If $f(x) = x + 2, g(x) = 3x, h(x) = 5x^2$ then find

$fogoh(x)$ and $gohof(x)$.

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

$$Q(a,b)=\begin{cases}0 & \text{if} \quad (a<b)\\ Q(a-b,b)+1 & \text{if} \quad (a\geq b)\end{cases}$$

then find

(i) $Q(3,5)$

(ii) $Q(12,5)$

(ii) $Q(17,5)$

(4) Find $ABS(-0.008), -373(\text{mod}\,8), (49)^{3/2}$ and $\log_{10} 0.0001$.

3 (a) Define the terms with examples. **6**

(i) Skew symmetric matrix.

(ii) Diagonal matrix.

(iii) Lower triangular matrix.

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

(1) If $A=\begin{bmatrix}2 & 3 & 1\\ 4 & 5 & 6\\ -1 & 1 & -2\end{bmatrix}$ then prove that $A\cdot A^{-1}=I$.

(2) If $A=\begin{bmatrix}1 & 3 & 4\\ -2 & 0 & -1\\ 2 & 5 & 2\end{bmatrix}$ then prove that

$$\left(A^{-1}\right)^{T}=\left(A^{T}\right)^{-1}.$$

(3) If $A=\begin{bmatrix} 6 & 1 & 2 \\ -3 & 2 & 4 \\ 5 & 1 & -4 \end{bmatrix}$ and $B=\begin{bmatrix} 1 & 1 & 2 \\ 3 & 4 & 5 \\ -2 & 0 & 1 \end{bmatrix}$ then

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

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

4 (a) Define the terms with examples. **5**

(i) Finite sequence

(ii) Permutation

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

(1) The 3rd term of an A.P. is 9 and its 9th term is 21 then find S_{40}.

(2) The 5th term of an A.P. is 20 and its 15th term is 50 then find 21st term.

(3) Find the value :

(i) ${}^8P_3$, ${}^{10}C_3$, ${}^8C_4 + {}^8C_3$.

(ii) Find the number of permutations of all letters of the word 'STATISTICS'.