I/BCA /102

2012

(OCTOBER)

BACHELOR OF COMPUTER APPLICATION

(MATHEMATICS - I)

Paper No. 102

Full Mark: 75

Time: 3 hours

PART -A : OBJECTIVE

(Marks : 25)

The figures in the margin indicate full marks for the questions.

1. **Tick (✓) the correct answer from the following: (10X1=10)**

i) $A - (A \cap B)$ is equal to

a)	$A \cap B$	( )
b)	A - B	( )
c)	$A \cup B$	( )
d)	$(A \cap B)'$	( )

ii) The number of subsets of the set A={x,y,z} is

a)	2	( )
b)	4	( )
c)	8	( )
d)	12	( )

iii) If $A=\begin{pmatrix}1 & 3\\ 5 & 2\end{pmatrix}$, $B=\begin{pmatrix}1 & 2 & 5\\ 3 & 1 & 2\end{pmatrix}$

then

a) AB is 2X2 matrix ( )
b) AB is 2X3 matrix ( )
c) AB is 3X2 matrix ( )
d) AB does not exist ( )

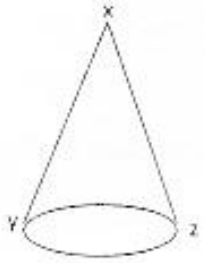
iv) If A is a square matrix of order n and k is a non-zero contant, then

a) $|kA| = k|A|$ ( )
b) $|kA| = k^n |A|$ ( )
c) $|kA| = nk|A|$ ( )
d) $|kA| = k^{n^2}|A|$ ( )

v) A graph consists of a set of elements called vertices and a set of elements called-

a) points ( )
b) joints ( )
c) edges ( )
d) none of these ( )

vi) Consider the graph below:



then the vertex degree of Z is

a)	1	( )
b)	2	( )
c)	3	( )
d)	4	( )

vii) Three officers enter in a room where there are five chairs in a line; then the number of ways they can take their seats is

a)	60	( )
b)	80	( )
c)	$\overline{100}$	( )
d)	None of these	( )

viii) The value of $\lim_{x \to 0} \frac{\sin x}{x}$ is

a) 0 ( )
b) -1 ( )
c) 2 ( )
d) 1 ( )

ix) Which of the following is incorrect regarding properties of definite integral:

a) $\int_a^b f(x)dx = \int_a^b f(z)dz$ ( )

b) $\int_a^b f(x)dx = -\int_a^b f(x)dx$ ( )

c) $\int_{-a}^{a} f(x)dx = 0 \text{ if } f(-x) = -f(x)$ ( )

d) $\int_0^{2a} f(x)dx = 0 \text{ if } f(2a - x) = f(x)$ ( )

x) The differential co-efficient of 10^x is

a) $10^x \log_e 10$ ( )
d) 10^x ( )
c) $\log 10^x$ ( )
d) $10^x \log^x$ ( )

II. State whether the following statement is true or false. **(5X1=5)**

i) Let $f : x \to y$ be a function and I_x is the identity function on the set X, then $f \circ I_x = f$. ( )

ii) AB=BA for all 2X2 matrices A and B. ( )

iii) The graph of the cube is planar. ( )

iv) The value of ${}^{10}C_2$ is 80. ( )

v) The value of $\int_3^5 \frac{dx}{x}$ is $\log \frac{5}{3}$. ( )

SECTION II

III. Answer the following questions: **(5X2=10)**

i) Let A={1,2,3}

B={3,7,11}

C={3,7,13}

Then show that

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

ii) If $\begin{bmatrix} 7 & x^2 \\ y^3 & 18 \end{bmatrix} = \begin{bmatrix} a & 16 \\ -64 & 18 \end{bmatrix}$

Then find the value of x and y

(5X2=10)

iii) Differentiate : $x \sin^{-1} x$

(iv) Evaluate: $\int \frac{1}{\sqrt{x}} \cos \sqrt{x} dx$

v) Evaluate: $\int_0^{\frac{\pi}{2}} e^{\sin x} dx$

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BACHELOR OF COMPUTER APPLICATIONS

(MATHAMETICS - I)

Paper No. 102

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PART -B : DESCRIPTIVE

(Marks : 50)

Answer the following questions.

a) If A and B are two finite sets, then prove that (5)

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

b) Prove that for any two sets A and B,

$(A \cup B)' = A' \cap B'$ Where A' stands for the complement of the set A. (5)

OR

a) On the set of positive integers, define a binary operation '*' by $a*b=2^{ab}$. Examine whether * is commutative and associative. (5)

b) Is the function $f: Z \to Z$, where Z is set of integer, defined by $f(x) = x^2$ one-one? Is it onto? Justify your answer. (5)

3. a) If A and B be two matrices conformable to form the product AB, then show that (5)
$(AB)^t = B^tA^t$ where A^t denotes the transpose of A.

OR

b) Show that (5)

$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

OR

4. a) Find the Adj A and A^{-1} of the matrix (5)

$$\begin{pmatrix} 9 & 7 & 6 \\ 7 & -1 & 8 \\ 3 & 4 & 2 \end{pmatrix}$$

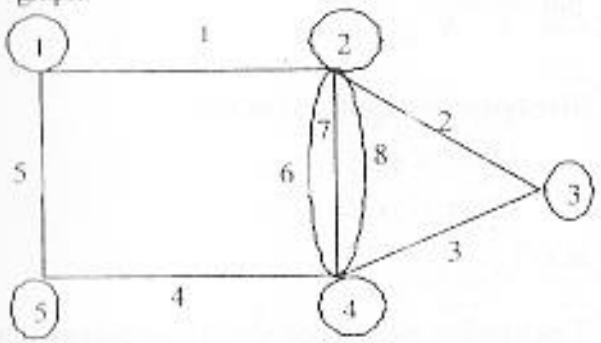
b) If A is an n x n matrix, prove that the determinant of adjoint A is $|A|^{n-1}$. (5

5. a) Define the following terms with example: (5X2=10)

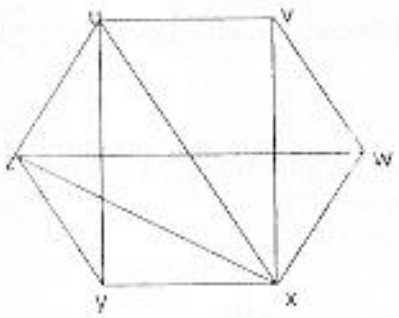
i) graph
ii) sub-graph
iii) connected graph
iv) vertex degree
v) tree

OR

6. a) Write down the incidence matrix of the following graph: (5)



b) Show that the following graph is planar, by finding a plane drawing of it. (5)



10. a) Evaluate: $\int \frac{dy}{2+5x}$ (2)

b) Evaluate: $\int \frac{sin^{-1}x}{\sqrt{1-x^2}}dx$ (3)

c) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{sin^3 x\, dx}{sin^3 x + cos^3 x}$ (5)