Roll No. □□□□□□□□□□□□ **Total No. of Pages : 03**

Total No. of Questions : 07

BCA (2013 & Onward)

B.Sc.(IT) (2015 & Onward) (Sem.–1)

MATHEMATICS – I

Subject Code : BSIT/BSBC-103

Paper ID : [B1110]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. Write briefly:

a) Let A = {3, 6, 12, 15, 18, 21}, B = {4, 8, 12, 16, 20}. Find (A – B) ∪ (B – A).

b) Let A = [{1, 2, 3}, {4, 5}, {6, 7, 8}]. Find the number of elements of A.

c) Define an antisymmetric relation by giving suitable example.

d) A = (1, 2, 3) and B = {x, y, z}, and let R be a relation from A to B defined by R = {(1, y), (1, z), (3, y)}. Determine the domain and range of R.

e) Write down the truth table of : $\neg p \vee \neg q$.

f) Write down the contrapositive of the conditional proposition: $p \to q$

g) Define a multi graph.

h) Define a simple path and cycle in a graph.

i) Determine whether the sequence <2n> is solution of recurrence relation

$$a_n = 3a_{n-1} - a_{n-2} ?$$

j) Find the values of a, b, c, d from the equation : $\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$.

SECTION-B

2. If A and B are any two sets, then prove that $A - B = A \cap B^c$. (10)

3. Prove the following by the principle of mathematical induction

$$1.3 + 2.4 + 3.5 + \ldots + n\,.\,(n+2) = \frac{1}{6}n(n+1)(2n+7).$$ (10)

4. a) Define the following graphs by taking suitable examples. (5+5)

   (i) Eulerian Graph

   (ii) Hamiltonian graph.

   b) Find the minimum number n of colors required to paint the following graph.

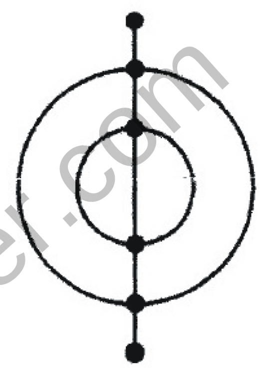


Fig.1

5. Find the inverse of the following matrix.

$$\begin{bmatrix} 3 & 1 & 2 \\ 2 & -3 & -1 \\ 1 & 2 & 1 \end{bmatrix}$$ (10)

6. a) Consider the following three relations on the set A = {1, 2, 3, 4}:

   R = {(1, 1), (1, 4), (1, 3), (3, 3)}

   S = {(1, l), (1, 2), (3, 2), (2, 2), (3, 3)}

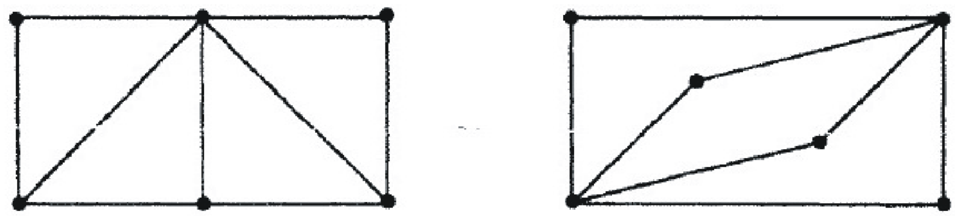
   T = {(1,1), (1,4), (2, 2), (2,3), (3,3), (4,4)}

   Determine whether or not each of the above relations on A is : (6+4)

   (i) reflexive; (ii) symmetric; (iii) transitive;

b) Verify that the proposition $(p \wedge q) \wedge \neg (p \vee q)$ is a contradiction.

7. a) Determine which of the following are Eulerian or Hamiltonian or both?` (5)



(a) (b)

Fig.2

b) In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find : (5)

(i) How many drink tea and coffee both? (ii) How many drink coffee but not tea?