Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

BMCI (2014 & Onwards) (Sem.–1)

MATHEMATICS – I

Subject Code : BMCI-101

Paper ID : [A3271]

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 FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Answer briefly :

a) Find all partitions of S= {a, b, c}.

b) Find $(A \cap B)^{c,}$ where

U={1,2,3,4,5,6,7,8,9,}, A={2,3,4,}, B={2,4,6,8}.

c) Define a transitive relation by giving suitable example.

d) Define the composition of relations R and S, where R be a relation from set A to set B and S be a relation from set B to set C.

e) Find the truth set for prepositional function $p(x)$ defined on the set **N** of positive integers. Where p(x) be "x + 2 > 7".

f) Define a '*contradiction*' proposition.

g) Define and draw a multi graph.

h) Define and draw a directed graph.

i) Define a recurrence relation.

j) If $A = \begin{bmatrix} 4 & 0 \\ 3 & 6 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 7 \\ 2 & 6 \\ 3 & 4 \end{bmatrix}$ find the $3A + 5B$

SECTION-B

2. Prove the Distributive Law: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

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

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

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

   Determine whether or not each of the above relations on A is : (a) reflexive; (b) symmetric; (c) transitive; (d) Antisymmetric.

4. Determine whether the proposition : $p \vee \neg(p \wedge q)$ is a tautology or not ?

5. Find the product matrix AB where A = $\begin{bmatrix} 2 & 2 & 1 \\ 2 & 0 & 2 \\ 1 & 2 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} 3 & 2 & 1 \\ 0 & 1 & 3 \\ 1 & 2 & 1 \end{bmatrix}$

6. Define the following graphs by drawing suitable examples :

   a) Eulerian Graph.

   b) Hamiltonian graph.

SECTION-C

7. a) Determine whether the sequence <3n> is solution of recurrence relation $a_n = 2a_{n-1} - a_{n-2}$?

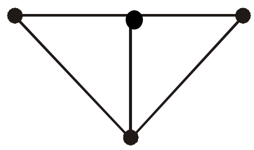
   b) Consider the relation R = {(1, 3), (1, 4), (3, 2), (3, 3), (3,4)} on A = {1, 2, 3, 4}.

   i) Find the matrix M of relation R.

   ii) Find the domain and range of R.

   iii) Find inverse of relation R. [5+5]

Q8. a) Define a spanning tree. Find three spanning trees of the graph G shown below :



Graph (G)

b) How many colors are required for coloring of above graph G. [7+3]

Q9. Prove the following by the principle of mathematical induction:

$1 + 3 + 5 + 8 + \ldots + (2n - 1) = n^2$ [10]