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

Total No. of Questions : 07

BCA (2014 to 2018)/B.Tech. (CSE) (Sem.–1)

B.Sc.(IT) (2015 to 2018)

MATHEMATICS – I

Subject Code : BSIT/BSBC-103

M.Code : 10045

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) If A = {1, 2, *a*, *b*}, determine the following sets (*i*) A – [illegible] (*ii*) A – {1, 2}.

b) Given an example of a relation which is reflexive and symmetric but not transitive.

c) Find relation R if matrix representation of R is $\begin{vmatrix} 1 & 0 & 0 \\ & 1 & 1 \\ 1 & 1 & 0 \end{vmatrix}$.

d) Prove that $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$

e) Use quantifiers to show that $\sqrt{3}$ is not a rational number.

f) Define Planer and Complete Graph.

g) List two difference between Tree and Graph.

h) Find order of the recurrence Relation $T(K) = 2T(k-1) - kT(K-3)$.

i) Define recurrence relation with examples.

j) Prove that the maximum number of edges of simple graph is $\frac{n(n \,\square 1)}{2}$.

SECTION-B

2. a) State and prove De Morgan's law for sets.

   b) Let m be a given fixed positive integer. Let R = $\{(a, b) : a, b \in Z$ and $a - b$ is divisible by $m\}$, show that R is an equivalence relation on Z.

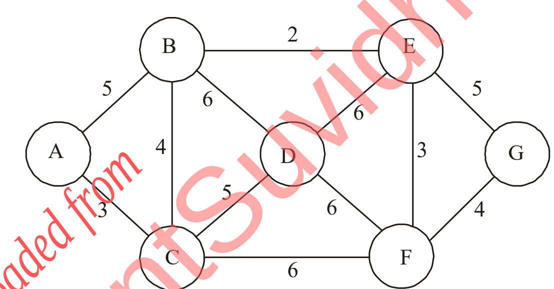
3. a) Prove validity of argument :

   If man is bachelor, he is happy.

   Therefore Bachelor dies young.

   b) By the principle of mathematical induction, prove the following for each $n \in N$: $1.3 + 3.5 + 5.7 + \ldots + (2n - 1)(2n + 1) = \frac{n(4n^2 + 6n - 1)}{3}$

4. a) Find minimal spanning tree of weighted graph



   b) State and prove five colour theorem.

5. Solve recurrence relation S (K + 2) – 4S (K) = $K^2 + K - 1$.

6. a) Prove that simple graph with k-components and n vertices can have at the most of $\frac{(n-k)(n-k+1)}{2}$ edges.

   b) Obtain recurrence relation of S (K) = $2.4^k - 5.(-3)^k$ of second order.

7. If R = $\{(a, b) : |a - b| = 1\}$ and S = $\{(a, b) : a - b$ is even$\}$ are two relation on A = {1, 2, 3, 4}. Then draw digraph of R and S. And show that $R^2 = S^2$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.