

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)  $A - \{1, 2\}$  (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 
$$\begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & \\ 1 & 1 & 0 \end{pmatrix}$$

- 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  $\frac{n(n-1)}{2}$ .

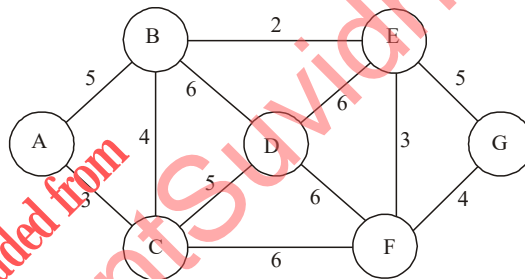
## SECTION-B

2. a) State and prove De Morgan's law for sets.
- b) Let  $m$  be a given fixed positive integer. Let  $R = \{(a, b) : a, b \in \mathbb{Z} \text{ and } a - b \text{ is divisible by } m\}$ , show that  $R$  is an equivalence relation on  $\mathbb{Z}$ .
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  $n \in \mathbb{N} : 1.3 + 3.5 + 5.7 + \dots + (2n - 1)(2n + 1) = \frac{n(4n^2 + 6n + 1)}{3}$
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  $S(K) = 2 \cdot 4^k - 5 \cdot (-3)^k$  of second order.
7. If  $R = \{(a, b) : |a - b| = 1\}$  and  $S = \{(a, b) : a - b \text{ is even}\}$  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.**