

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:

- If $A = \{1, 2, a, b\}$, determine the following sets (i) $A - \phi$ (ii) $A - \{1, 2\}$.
- Given an example of a relation which is reflexive and symmetric but not transitive.
- Find relation R if matrix representation of R is
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$
.
- Prove that $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$
- Use quantifiers to show that $\sqrt{3}$ is not a rational number.
- Define Planer and Complete Graph.
- List two difference between Tree and Graph.
- Find order of the recurrence Relation $T(K) = 2T(k-1) - kT(K-3)$.
- Define recurrence relation with examples.
- 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} .

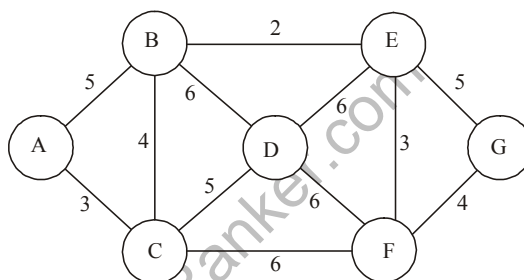
3. a) Prove validity of argument :

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 $S(K) = 2.4^k - 5.(-3)^k$ 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.