Roll No. [ ] **Total No. of Pages : 02**

**Total No. of Questions : 07**

**BCA (2011 & Onward)**
**B.Sc.(IT) (2015 Batch) (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) Find $(A \cap B) \cup C$ where :

$A = \{1, 2, 3, 4,\}$, $B = \{2, 4, 6, 8\}$, $C = \{7, 9, 6, 8\}$

b) List the elements of the set B where $N = \{1, 2, 3, ...\}$and $B = \{x \in N| \ x \text{ is even}, x<11\}$

c) Define a reflexive relation by giving suitable example.

d) Find the number of relations from $A = \{3, 4, 6\}$ to $B = \{1, 2\}$.

e) Find the truth table of $p \wedge \neg q$.

f) Define the tautology proposition.

g) Define and draw directed graph.

h) Define and draw a tree.

i) Define a recurrence relation.

j) If $A = \begin{bmatrix} 8 & 0 \\ 3 & 5 \\ 3 & 2 \end{bmatrix}$ *and* $B = \begin{bmatrix} 1 & 7 \\ -2 & 6 \\ 3 & 4 \end{bmatrix}$ find a matrix $X$ such that $A - 5x = 2B$

## SECTION -B

2. Suppose a list A contains the 30 students in a mathematics class, and a list B contains the 35 students in an English class, and suppose there are 20 names on both lists. Find the number of students : (i) only on list A (ii) only on list B (iii) on exactly one list.

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

$$1 + 2 + 3 + ... + n = \frac{n(n+1)}{2}$$

4. Define a Hamiltonian graph. Find a Hamiltonian path or a Hamiltonian circuit, if it exists in the following graph **(Fig. 1)**

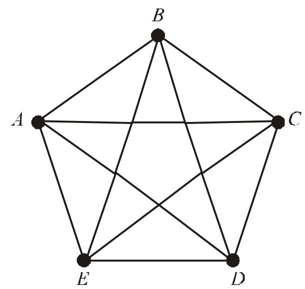


**Fig. 1**

5. Find the Product matrix $BA$ where $A = \begin{bmatrix} -2 & 2 & 1 \\ 2 & 1 & 2 \\ 1 & 2 & 6 \end{bmatrix}$ $and\ B = \begin{bmatrix} 3 & 2 & 1 \\ 5 & 1 & 2 \\ 1 & -2 & 1 \end{bmatrix}$

6. a) Given A = {2, 3, 4 ,6} and B = {x, y, z }. Let R be the following relation from A to B :

   R = {(2, y), (2, z), (4, y), (6, x), (6, z)}

   i) Draw the arrow diagram of R. (ii) Find the inverse relation of R.

   b) Consider the second-order homogeneous recurrence relation $a_n = 2a_{n-1} + a_{n-2}$ with initial conditions

   $a_0 = 1$, $a_1 = 2$. Find the next three terms of the sequence.

7 a) Determine whether the proposition $(p \wedge q)\ \Lambda \neg (p \vee q)$ is a contradiction or not?

   b) Consider the multigraphs 1, 2 and 3 in **Fig. 2**

   1) Which of them are connected?

   2) Which are cycle-free (without cycles)?

   3) Which are loop-free (without loops?

   4) Which are (simple) graphs?

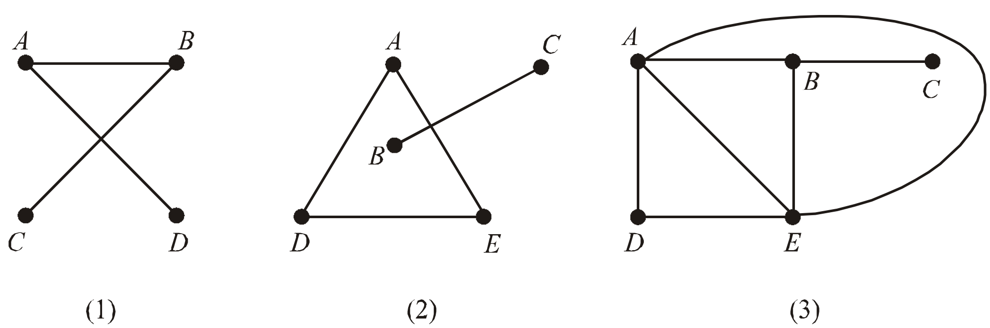


**Fig. 2**