Answer Sheet # ________________

Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] **Total No. of Pages : 03**

Total No. of Questions : 07

BCA (2011 & Onward) (Sem.–1)

MATHEMATICS-I

Subject Code : BSBC-103

Paper ID : [B1110]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION 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 has to attempt any FOUR questions.**

SECTION-A

1. **Write brief :**

(a) Prove that $(A \cap B)^C = A^C \cup B^C$ where A^C denotes complement of A.

(b) Find the truth table for $(\sim p) \vee (\sim q)$.

(c) Let $P(n)$ be the statement $(4^n > n)$, if $P(n)$ is true, prove that $P(n + 1)$ is also true.

(d) Draw the 2-regular graph.

(e) Define simple and non-simple graph.

(f) Define : (i) Euler path (ii) Euler Circuit

(g) Define recurrence relation and order of recurrence relation.

(h) Find the characteristic equation of

$S(n) - 5 \, . \, S_{n-1} + 6/S_{n-2} = 0.$

(i) Let R be relation 'greater than' from set A = {1, 4,5} to set B = {1, 2, 3, 4, 5}. Write down the Cartesian product corresponding to R.

(j) Define recurrence relation and order of recurrence relation.

SECTION-B

2. (a) In a survey of 60 people, it was found that 25 read Newsweek magazine, 26 read Times, 34 read Fortune, 9 read both Newsweek and Fortune, 11 read both Times and Newsweek, 8 read both Times and Fortune, 3 read all three magazines. Find : (i) the no. of people who read at least one of the three magazines ? (ii) The number of people who read exactly one magazine.

   (b) Let R be the relation defined on the set of of natural numbers N as $R = \{(x, y) \mid x, y \in N, 2x + y = 41\}$. Find the domain and range of R. also verify whether.

   R is (*i*) reflexive (*ii*) symmetric (*ii*) transitive.

3. (a) Show that $(p \wedge q) \rightarrow (\sim p \vee q)$ is a tautology.

   (b) Write down :

   (i) Contrapositive of $p \rightarrow \sim q$.

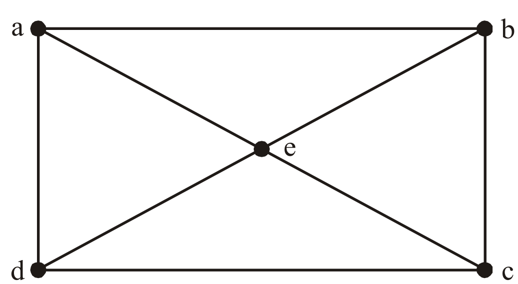
   (ii) Contrapositive of converse of $p \rightarrow \sim q$.

   (iii) Inverse of Converse of $p \rightarrow q$.

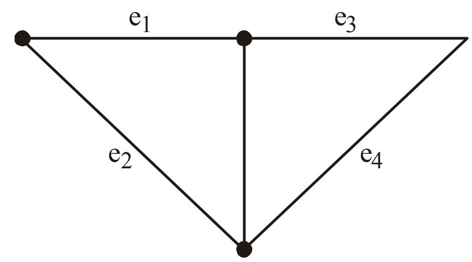
4. (a) In graph theory prove that the sum of the degrees of all the vertices in a graph G is equal to twice the number of edges in G.

   (b) Is it possible to construct a graph with 12 edges such that two of its vertices have degree 3 and remaining vertices have degree 4.

5. (a) Does the graph G given below have Hamiltonian Circuit ? Justify your answer.



(b) How many spanning trees the following graph have ? Draw its all spanning trees.



6. Solve $S_n - 7S_{n-2} + 6S_{n-3} = 0$, when $S_0 = 8$, $S_1 = 6$, $S_2 = 22$.

7. If $A = \begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$, prove that $A^3 - 6A^2 + 11A - I = 0$ and hence find A^{-1}.