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

Total No. of Questions : 07

BCA (Sem.–1st)

MATHEMATICS-I

Subject Code : BSBC-103 (2011 & 2012 Batch)

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 briefly :

(a) Describe the set builder form of {1,2,3,6,9,18}.

(b) Let A = {1, 2, 4, 5}, B = {2, 3, 5, 6} and C = {4, 5, 6, 7}. Verify $(A \cup B) \cup C = A \cup (B \cup C)$.

(c) If R is the relation 'is less than' from A = {1,2,3,4,5} to B = {1,4,5}. Write down the cartesian product corresponding to R. Also find R^{-1}.

(d) Write down the truth set of $p(x) : x + 6 < 9, x \in N$.

(e) For any statement p, Prove that $\sim(\sim p) \equiv p$.

(f) Define simple graph and connected graph.

(g) Show that k_5 is non planer.

(h) Check whether 1,3,5,6,8,8 is a degree sequence of a graph.

(i) Give Krushal's algorithm.

(j) Define the order of a recurrence relation.

SECTION-B

2. (a) Draw the Venn diagram and verify the identity $(A \cap B)' = A' \cup B'$.

   (b) Show that $(A \cup B)' = A' \cap B'$.

3. (a) Prove that $(p \wedge q) \Rightarrow p$ is a tautology.

   (b) Show that the relation, '*is a multiple of* ' on the set N of all natural numbers is reflexive and transitive but not symmetric.

4. (a) Prove by the principle of induction that :

   $n(n+1)(2n+1)$ is divisible by 6 for all $n \in N$.

   (b) Using the principle of mathematical induction, Prove that :

   $(2^{3n} - 1)$ is divisible by 7 for all $n \in N$.

5. (a) If the number of vertices of a connected graph a is n and the number of edges m and the region r, then show that $r + n - m = 2$.

   (b) Draw 8 regular graphs with 6 vertices. How many of them are connected?

6. (a) Draw a complete binary tree with 19 vertices.

   (b) Find the coefficient of x^5y^7 in the expansion of $(x + 3y)^{12}$.

7. (a) Solve the recurrence relation $u_n = 3u_{n-1} + 2$, $n \geq 1$, $u_0 = 1$.

   (b) Solve the recurrence relation $2u_{n+1} - u_n = 2$.