Roll No. | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE/IT) (2012 Onwards) (Sem.–4)

DISCRETE STRUCTURES

Subject Code : BTCS-402

Paper ID : [A2305]

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 FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) Define a partial order relation. Give an example.

b) If $A \subset B$ and $B \subset C$ then prove that $A \subset C$ where A, B and C are any sets.

c) State the absorption law of Boolean algebra.

d) Define a commutative ring.

e) Write the generating function corresponding to the numeric function.

$$a_n = 5.2^n,\ n \geq 0$$

f) Give an example of a finite group.

g) Under what condition or conditions, a non empty subset H of a group G is its subgroup.

h) Find the chromatic number of the graph "A cycle on n vertices, $n \geq 3$".

i) Define a Tree.

j) Give an example of a connected graph that has "Neither an Euler circuit nor a Hamilton", cycle.

SECTION-B

2. Determine whether the relation R is a partial order on the set Z where,

   R is defined on Z as, a R b iff a = 2b.

3. Show that the intersection of two left ideals of a ring is again a left ideal of the ring.

4. Solve the recurrence relation, $a_n + 5a_{n-1} + 6a_{n-2} = 3n^2 - 2n + 1$.

5. In a group G, show that $(a\ b)^{-1} = a^{-1}b^{-1}$ for all a , b $\in$ G.

6. Prove that a graph G with e = v – 1 that has no circuit is a tree.

SECTION-C

7. Let a, b be elements of a Boolean algebra then show that, $(a \vee b)' = a' \wedge b'$.

8. Let H be a subgroup of a group G, then prove that the relation

   $$R = \{(x,y): x,y \in G, x^{-1}y \in H\}$$

   is an equivalence relation.

9. Check if the following graphs are isomorphic or not.