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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:

- 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

l. 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,

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

- 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, $n \ge 3$ ".
- i) Define a Tree.
- j) Give an example of a connected graph that has "Neither an Euler circuit nor a Hamilton", cycle.

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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.

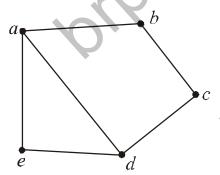
SECTION-C

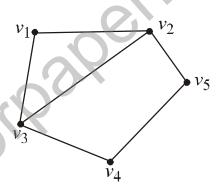
- 7. Let a, b be elements of a Boolean algebra then show that, $(a \lor b)' = a' \land b'$.
- 8. Let H be a subgroup of a group G, then prove that the relation

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

is an equivalence relation.

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





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