Roll No. .....

2011

B. E. 3rd Sem. (I. T.)

Examination – December, 2011

DISCRETE STRUCTURE

Paper : CSE-203-E

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in total.

1. Explain the following terms with suitable examples :

(i) Set,

(ii) Classes of Sets,

(iii) Power Sets,

(iv) Types of Relation,

(v) Partial Ordering Relation. 20

2. Define propositions, tautologies, contradictions and hence prove that the following propositions are tautology :

(i) $pv \sim p$

(ii) $\sim (p \wedge q) \vee q$

(iii) $p \Rightarrow (p \vee q)$ 20

3. (a) Explain permutations and combination and hence find in how many ways a committee of 3 faculty members and two students be selected from 7 faculty members and 8 students. 12

(b) Define AP, GP and AG series with examples. Also write the formula for sum of n terms in AP, GP, AG series. 8

4. (a) Solve the recurrence relation :

$$a_r + 5\, a_{r-1} + 6\, a_{r-2} = 3r^2 - 2r + 1. \quad 10$$

(b) Solve the recurrence relation :

$a_{r+2} - 3\, a_{r+1} + 2\, a_r = 0$ by the method of generating functions with the initial conditions $a_0 = 2,\ a_1 = 3$. 10

5. Discuss about the following terms with examples :

(i) Groups and Rings,

(ii) Homomorphism and Isomorphism in Groups and Rings. 20

6. Write note on the following :

(i) Directed and Undirected Graphs,

(ii) Homomorphic Graphs,

(iii) Cut points and Bridges,

(iv) Paths and Circuit. 20

7. (a) How do we determine whether there is a Hamiltonian circuit in a graph or not ? 8

(b) State and prove Lagrange's Theorem. 12

8. (a) What is a binary search tree ? Give examples. 10

(b) Let $f(x) = x - 1$ and $g(x) = x^2$, find :

(i) $gof(-2)$

(ii) $fog(-2)$ 5

(c) Define Lattice with examples. 5
