

II B.Tech I Semester(RR) Supplementary Examinations, May/June 2010

DISCRETE STRUCTURES AND GRAPH THEORY

(Common to Computer Science & Engineering, Information Technology, Computer Science & Systems Engineering and Electronics & Computer Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Show that the following premises are inconsistent. [10+6]
 - (a) if Jack misses many classes through illness, then he fails high school.
 - (b) If Jack fails high school, then he is uneducated.
 - (c) If Jack reads a lot of books, then he is not uneducated.
 - (d) Jack misses many classes through illness and reads a lot of books.
2. (a) Define a poset with an example. Also define glb and lub in a poset. If $A = \{a, b, c\}$ such that $\rho(A)$ is a poset with a partial order $\subseteq$ on M and $B = \{\{a, b\}, \{a, c\}\}$ find the glb and lub of B . [8+8]
 - (b) Let L be a poset under partial ordering $\leq$. Let $a, b \in L$, then show that:
 - i. if a and b have a lub, then this lub is unique.
 - ii. if a and b have a glb, then this glb is unique.
3. (a) Define the term 'lattice', clearly stating the axioms. [6]
 - (b) Let C be a collection of sets which are closed under intersection and union. Verify whether $(C, \cap, \cup)$ is a lattice. [10]
4. Prove that any 2 simple connected graphs with n vertices, all of degree 2, are isomorphic. [16]
5. Prove that a connected graph has a Euler circuit iff it can be decomposed to a set of elementary cycles that have no edge in common. [16]
6. (a) From the adjacency matrix of a simple digraph, how will you determine whether it is a directed tree? If it is a directed tree, how will you determine its root and terminal nodes. [10]
 - (b) What is "tree traversal"? what are the different tree traversal methods? Explain them in brief with suitable examples. [6]
7. (a) Suppose that JNTU has a residence hostel that has 5 single rooms, 5 double rooms, and 3 rooms for 3 students each. In how many ways can 24 students be assigned to the 13 rooms? [6]
 - (b) How many ways are there to distribute 10 balls into 6 boxes with at most 4 balls in the first 2 boxes (that is, if x_i = the number of balls in box i , then $x_1 + x_2 \leq 4$) if
 - i. the balls are indistinguishable?
 - ii. The balls are distinguishable?
8. Solve the recurrence relation $a_n - 7a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n \geq 2$. [16]
