

II B.Tech I Semester Supplementary Examinations, November 2005
DISCRETE STRUCTURES & GRAPH THEORY
 (Common to Computer Science & Engineering, Information Technology
 and Electronics & Computer Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Without constructing the truth table find whether $A \leftrightarrow E$ is valid or not for the following. [8+8]
 $A \leftrightarrow B, B \leftrightarrow (C \wedge D) C \leftrightarrow (A \vee E) \text{ and } A \vee E .$
- (b) Establish the validity of $A \vee C$ from $A \leftrightarrow (B \rightarrow C), B \leftrightarrow (\neg A \vee \neg C), C \leftrightarrow (A \vee \neg B)$ and B.
2. (a) Let S denote the set of all the partial ordering relations on a set P. Define a partial ordering relation on S and interpret this relation in terms of the elements of P. [8+8]
- (b) Draw the Hasse diagram of $\{\rho(A), \subseteq\}$ where A is any set. What are the greatest and least elements? Explain how to find lub and gub using Hasse diagram.
3. (a) Let L be a lattice. Then prove that the relation $a \leq b$ defined by either $a \wedge b = a$ or $a \vee b = b$ is a partial ordering on L. [8+8]
- (b) Let $X = \{1, 2, 3, 4\}$. Define a function $f: X \rightarrow X$ such that $f \neq I_x$ and is one to one. Find $f^2, f^3, f^{-1}, f \bullet f^{-1}$. Can you find another one to one function $g: X \rightarrow X$ such that $g \neq I_x$ but $g \bullet g = I_x$.
4. Prove that any 2 simple connected graphs with n vertices, all of degree 2, are isomorphic. [16]
5. $K_{m,n}$ represents a complete bi partite graph. [5+5+6]
 - (a) Is there a Hamiltonian circuit in $K_{4,6}$?
 - (b) Is there a Hamiltonian path in $K_{4,5}$?
 - (c) State a necessary and sufficient condition for the existence of Hamiltonian circuit in $K_{m,n}$.
6. (a) Describe the rules to convert a general tree to a binary tree. Illustrate with an example situation. [8+8]
- (b) Draw the binary tree for the following expression.
 $((x + 2) \uparrow 3) * (4 - (3 + x)) - 5$
 Find the infix, postfix, Prefix expressions.
7. (a) In how many ways can 30 distinguishable books be distributed among 3 people A, B and C so that. [10]

- i. A and B together receive exactly twice as many books as “C” ?
 - ii. C receives atleast 2 books, B receives at least twice as many books as C, and A receives at least 3 times as many books as B ?
- (b) How many different outcomes are possible by tossing 10 similar coins ? [6]
8. Solve the recurrence relation [16]
 $S(k) - 0.25 S(k-1) = 0, S(0) = 6.$
