

Roll No.

Acc. No.
DATE

P-2102

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B. E./B. Tech. (Fifth Semester)
EXAMINATION, 2006-07
(Computer Science & Engg.)
DISCRETE STRUCTURE
(CS-504)

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt any five questions.

1. (a) Define relation and function with a suitable example.
Explain the properties of a relation. 10
(b) Define composition, identity and inverse functions.
Also give the definitions of Injections, Surjections and
Bijections functions. 10
2. (a) Define Mathematical Induction. Use Induction to
show that : 10
$$\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

for all $n \geq 1$.

(b) Write the postulate on binary operations. Also define
the condition for a set to be semigroup, monoid and
group. 10
3. (a) Define Homomorphism and Isomorphism of groups
with a suitable example. 10

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- (b) Minimize the following expression using truth table or map technique : 10
- (i) $f = A B \bar{C} + \bar{A} B \bar{C} + A \bar{B} \bar{C} + \bar{A} \bar{B} \bar{C}$
- (ii) $\Sigma m (0, 2, 8, 12, 13)$
4. (a) Define Automata. What are the tuples (parts) of Finite State Automata ? Draw the automata for $a(ba)^*bc$. 10
- (b) Define Lattices. Differentiate between bounded, complemented and distributive lattice with examples. 10
5. (a) Define Tautologies and Truth tables. Write the most basic logical laws. 10
- (b) Define all the rules of Inferences and their Tautological forms. 10
6. (a) Explain Poly's Counting theorem with an example. 10
- (b) Define recurrence relation. Solve the following recurrence relations by substitution : 10
- (i) $a_n = a_{n-1} + f(n)$ for $n \geq 1$
- (ii) $a_n = a_{n-1} + \frac{1}{n(n+1)}$ where $a_0 = 1$.
7. Write short notes on any four of the following : 20
- (a) Rings and fields
- (b) Logic gates
- (c) Pigeonhole principle
- (d) Posets
- (e) Fallacy with example