Exam.Code:0917
Sub. Code: 6405

2122

B.E. (Computer Science and Engineering)
Fifth Semester
CS-505: Theory of Computation

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I. Attempt the following:-

a) State the pumping lemma definition for regular set.

b) Write the steps to eliminate useless symbols.

c) Show that L= $\{a^p/p$ is prime$\}$ is not context free.

d) Differentiate between P and NP complete problems.

e) What is the reasons for minimizing number of states of automata. (5x2)

UNIT - I

II. a) Prove that "A language L is accepted by DFA if and only if L is accepted by some NFA"

b) Differentiate between NFA and DFA. (2x5)

III. a) Write Regular Expression over the alphabets {a, b} consisting of strings whose

i) Second last character is 'a' and starts with 'bb'

ii) Starting with 'a' and ending with 'b' with alternate repetition of 'b'.

b) List the closure properties of regular languages. (6,4)

IV. a) Define context free grammar. How we can write a CFG from finite automata. Compare the powers of both.

b) Describe the Chomsky Hierarchy of Languages. (2x5)

UNIT - II

V. a) Construct Pushdown automata for L = $\{0^n1^m2^m3^n \mid m,n \geq 0\}$.

b) Compare and contrast Pushdown automata and Turing machine. (6,4)

P.T.O.

VI. a) Design a Turing machine to accept L= $\{0^n1^n | n \geq 1\}$. Draw the transition diagram. Also specify instantaneous description to trace the string 000111.

b) List the various advantages and limitation of Turing machine. (8,2)

VII. a) When is a Recursively Enumerable language said to be Recursive?

b) Identify whether "Tower of Hanoi" problem is tractable or intractable. Justify your answer.

c) If L1 and L2 are recursive language then L1 $\underline{U}$ L2 is a recursive language. (4,3,3)

x-x-x