Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. .....

CS–505

B. E. (Fifth Semester) EXAMINATION, Dec., 2011

(Computer Science & Engg. Branch)

THEORY OF COMPUTATION

(CS – 505)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. All questions carry equal marks. Attempt *one* question from each Unit.

Unit – I

1. (a) Design FA which accepts even no. of 0's and even no. of 1's. 10

   (b) Find the regular expression accepted by following deterministic finite automation. 10

Or

2. (a) Prove that $a^n \subset b^n \mid n \geq 1$ is not regular. 10

   (b) Check whether the given grammar is ambiguous or not : 10

$$S \rightarrow iC + S$$

$$S \rightarrow iC + ScS$$

$$S \rightarrow a$$

$$C \rightarrow b$$

P. T. O.

Unit – II

3. (a) Reduce the grammar into CNF and GNF : 10

$G = (\{S, A, B\}, \{0, 1\}, \{S \rightarrow 1A|0B, A \rightarrow 0S \mid 0, B \rightarrow 1S \mid 1, S\})$.

(b) How many types of Grammar are there ? Explain each of them. 10

Or

4. (a) Define the following : 10

(i) Chomsky Normal form

(ii) Greibach Normal form

(b) Convert the following grammar to CNF : 10

$S \rightarrow bA \mid aB$

$A \rightarrow bAA \mid aS \mid a$

$B \rightarrow aBB \mid bSbb$

Unit – III

5. (a) Design PDA for the language : 10

$L = \{w \mid w \in (a + b)^* \text{ and } n_a(w) > n_b(w)\}$

(b) Derive the string "aabbabba" for leftmost derivation and rightmost derivation using a CFG given by : 10

$S \rightarrow aB \mid bA$

$A \rightarrow a \mid aS \mid bAA$

$B \rightarrow b \mid bS \mid aBB$

And also draw the derivation tree.

Or

6. (a) Construct PDA for the following grammar : 10

$S \rightarrow AB$

$A \rightarrow CD$

$B \rightarrow b$

$C \rightarrow a$

$D \rightarrow a$

(b) Explain three closer properties of CFL. 10

Unit – IV

7. (a) Construct a TM for language of even no. of 1's and even no. of 0's over $\Sigma = \{0, 1\}$. 10

(b) Explain the properties of Recursive and Recursive Enumerable language. 10

Or

8. (a) Explain multitape and multi-head turing machine. 10

(b) Design a TM for language $\{L = a^n b^n \mid n \geq 1\}$. 10

Unit – V

9. (a) Explain Relation between P, NP, NP hard and NP complete problem with diagram. 10

(b) Explain Cook's theorem. 10

Or

10. (a) Prove that vertex cover is NP complete problem. 10

(b) Discuss Travelling Salesman problem. 10