

Roll No

CS - 505**B.E. V Semester**

Examination, June 2015

Theory of Computation**Time : Three Hours****Maximum Marks : 70**

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
- ii) All parts of each questions are to be attempted at one place.
- iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
- iv) Except numericals, Derivation, Design and Drawing etc.

Unit-I

1. a) Differentiate between transition graph and transition matrix.
- b) Explain the term alphabet and string.
- c) What do you understand by DFA (Deterministic Finite Automata) and how is it represented.
- d) What is Moore Machine? How Finite Automates can be converted into Moore Machine? Explain with the help of example.

OR

State the Myhill Nerode theorem and its applications.

[2]

Unit-II

2. a) Show that the grammar $s \rightarrow a|sa|bss|ssb|sbs|$ is ambiguous.
 b) How can we construct regular grammar from regular expression.
 c) Describe context free and context sensitive Grammar.
 d) Convert the following CFG to CNF :

$$S \rightarrow ABA$$

$$A \rightarrow aA / \epsilon$$

$$B \rightarrow bB / \epsilon$$

OR

Convert the grammar $S \rightarrow AB, A \rightarrow BS/b, B \rightarrow SA/a$ into Greibach normal form.

Unit-III

3. a) What is the additional feature PDA has when compared with NFA?
 b) Is it true that deterministic PDA and non-deterministic PDA are equivalent in the sense of language of acceptances? Justify your answer.
 c) Prove that CFLs are not closed under intersection.
 d) Construct a PDA for the following language :

$$L = \{a^m b^n c^{m+n} \mid m, n \geq 1\}$$

OR

Show that the language $\{a^n \mid n \geq 1\}$ is not context free.

[3]

Unit-IV

4. a) Explain the concept of Turing Machine Model?
 b) Construct TM accepting language
 $L = \{w/w \text{ has even no. of } 2\}$
 c) Discuss the properties of recursive and recursively enumerable languages.
 d) Construct a Turing machine for checking the palindrome of a string of odd palindrome for $\Sigma = \{0, 1\}$

OR

Find the languages obtained from the following operations:

- i) Union of two recursive languages
 ii) Union of two recursively enumerable languages
 iii) L if L and complement of L are recursively enumerable.

Unit-V

5. a) What is tractable and untractable problem?
 b) Explain P- class problems with suitable example.
 c) Explain what is NP- hard problem?
 d) Explain vertex cover problem with suitable example.

OR

Write short notes:

- i) Satisfiability problem.
 ii) Hamiltonian path problem.
