Unit - V

5. a) Formally define context sensitive, grammar. 2

   b) Define the recursively enumerable set. 2

   c) Write brief note on complexity theory. 3

   d) State post correspondence problem. Explain it with the help of an example. 7

OR

Find a linear bounded automation that accepts the following language.

$L = \{a^{n!} : n \geq 0\}$ 7

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Total No. of Questions :5] *[Total No. of Printed Pages :4*

Roll No .....

MCA - 304

MCA III Semester

Examination, June 2014

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 question 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) Define finite automata 2

   b) When would you say that the two finite acceptors are equivalent? 2

   c) State Myhill-Nerode theorem. 3

   d) Give a step-by-step method of constructing minimum automata. 7

OR

Construct DFA from the given NFA. 7

Present stage	Next stage 0	Next stage 1
q_0	q_0, q_1	q_0
q_1	q_2	q_1
q_2	q_3	q_3
(q3)	–	q_2

Unit - II

2. a) State Arden's theorem. 2

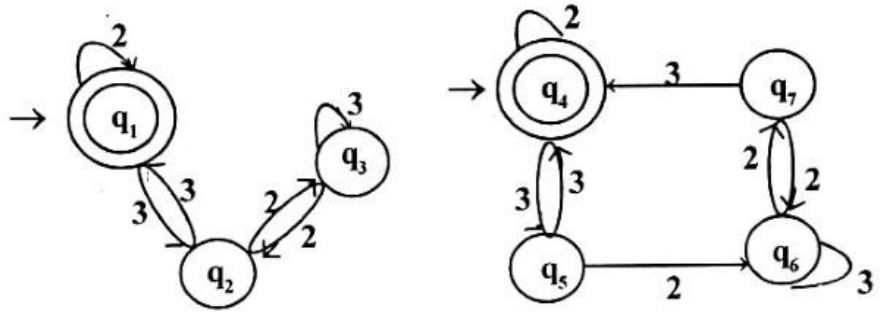
   b) Define Kleene's closure with example. 2

   c) What do you understand by a regular grammar? 3

   d) Show that $L = \{a^n b^n \text{ where } n \geq 1\}$ is not regular. 7

OR

Consider the following two DFAs M and m' over {a, b}:



Find out whether M and M' are equivalent. 7

Unit - III

3. a) Define left most and right most derivations. Explain it with example. 2

   b) Construct a CFG for the regular expression(011 + 1)* (01)* 2

   c) How to construct an equivalent PDA of a context free grammar? 3

   d) Construct a PDA that accept the language generated by the following grammar. 7

   $S \rightarrow aB$

   $B \rightarrow bA/b$

   $A \rightarrow aB$

OR

Convert the following grammar into GNF. 7

$S \rightarrow AA/a$

$A \rightarrow ss/b$

Unit - IV

4. a) Define Turing machine with multiple tracks. 2

   b) What is an off-line Turing machine? 2

   c) Explain the Turing machine halting problem. 3

   d) Design a Turing machine that multiplies two positive integers in unary notation. 7

OR

Design a Turing machine to accept the language $L = \{WW^R, \text{ where } W \in (a, b)^*\}$ 7