**Roll No ..**

CS-505

B.E. V Semester
Examination, June 2016
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) Design DFA that accepts all strings with at most 3 a's.

    b) Design a NFA for $\{cbab^n / n >= 0\}$.

    c) Construct Moore machine for the following Mealy machine.
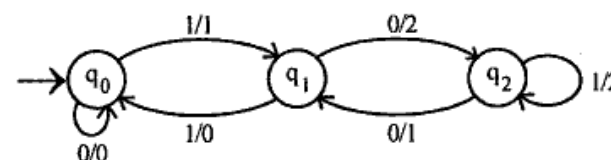
    d) Write and explain Myhill-Nerode theorem.

OR

Construct NFA for the following grammar

$S \rightarrow Ab \mid ab, A \rightarrow Ab \mid Bb, B \rightarrow Ba \mid a$

Unit - II

2. a) Give CFG for R.E $(011+1)*(01)*$.

   b) Explain GNF conversion steps.

   c) Explain ambiguous grammar problem.

   d) Convert following CFG to CNF

   $S \rightarrow ASB/E$

   $A \rightarrow aAS/a$

   $B \rightarrow SbS/A/bb$

OR

Convert the following grammar G into GNF

$S \rightarrow XA/BB$

$B \rightarrow b/SB$

$X \rightarrow b$

$A \rightarrow a$

Unit - III

3. a) Explain PDA.

   b) Explain how many way's PDA can accept (final out null store).

   c) Explain pumping lemma for CFL.

   d) Design push down automata which accepts

   $L = \left\{0^n 1^{2n} / n \geq 1\right\}$

OR

Design a push down automata which accepts set of balanced parentheses. $\left(\{\{(\ )\}\}\right)$

Unit - IV

4. a) Explain ID of a turing machine.

   b) Explain Multi Tape and Universal Turning machine.

   c) Explain church hypothesis.

   d) Design turing machine to add two numbers a and b.

OR

Design turning machine for accepting strings of the language defined as $\left\{\omega\omega\gamma / \omega \in (0+1)*\right\}$.

Unit - V

5. a) Explain P and NP problems.

   b) Difference between NP complete w NP hard problem.

   c) Explain process of Reducibility.

   d) Describe Hamiltonian path problem.

OR

Describe vertex cover problem.

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