Unit - V

9. a) Show that travelling salesman problem is NP-complete. 7

b) Write short notes on following (any two) 7

i) NP hard Vs NP complete

ii) Vertex cover problem

iii) Hamiltonian path problem

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Roll No .....

CS - 505

B.E. V Semester

Examination, December 2013

Theory of Computation

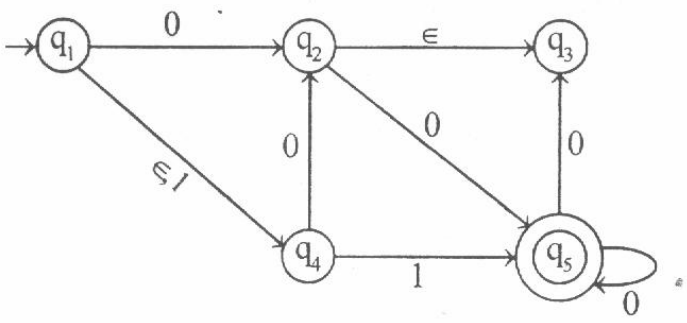
Time : Three Hours

Maximum Marks : 70

Note: Attempt one question from each unit. All questions carry equal marks.

Unit - I

1. a) Consider the FA below and construct the, smallest DFA which accepts the same language. 7



b) Give mealy and Moore machines for the input from (0+1)*, if the inputs ends in '000', output A; if the input ends in '111', output B; otherwise output C. 7

OR

2. a) Explain pumping lemma for regular sets. Prove by pumping lemma the following set is not regular.

$L = \{W \subset W^R / W \in (0+1)^*\}$ 7

b) Design a DFA that accepts the string such that number of zero divisible by five and number of one divisible by three. 7

Unit - II

3. a) Write the CFG for the following language 7

i) $L = \{0^i 1^j 2^k / i = j \text{ or } j = k\}$

ii) $L = \{0^n 1^n / n \geq 1\}$

b) Convert the following grammar G into chomsky Normal Form. 7

$S \rightarrow ABAC$
$A \rightarrow aA / \in$
$B \rightarrow bB / \in$
$C \rightarrow c$

OR

4. a) Convert the following grammar into GNF. 7

$A_1 \rightarrow A_2 A_3$
$A_2 \rightarrow A_3 A_1 / b$
$A_3 \rightarrow A_1 A_2 / a$

b) Find regular grammars for the following languages on {a,b}. 7

i) L = {w: n_a(w) and n_b(w) are both even}

ii) L = {w: (n_a(w)-n_b(w)) mod 3 = 1}

Unit - III

5. a) Design a PDA which accepts the language $L = \{W \in (a,b)^* / W$ has the equal number of a's and b's$\}$. 7

b) Explain closure properties of CFL's. 7

OR

6. a) Design PDA corresponding to given CFG 7

$S \rightarrow aSa$
$S \rightarrow bSb$
$S \rightarrow c$

b) Explain pumping lemma for CFL. Prove that following language is CFL or not? 7

$L = \{a^n b^n c^n / n \geq 1\}$

Unit - IV

7. a) What do you mean by recursive language. Prove that complement of a recursive language is recursive. 7

b) Build a Turing machine that accepts the language: 7

$L = \{a^n b^{2n}\}$

OR

8. a) Design a turing machine to compute the function $f(m,n) = m + n$ where m and n are non negative numbers. 7

b) What do you mean by Turing machine. Explain multiple tapes Turing machine. 7