

Unit - V

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

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b) Write short notes on following (any two)

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i) NP hard Vs NP complete

ii) Vertex cover problem

iii) Hamiltonian path problem

Roll No

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

Examination, December 2013

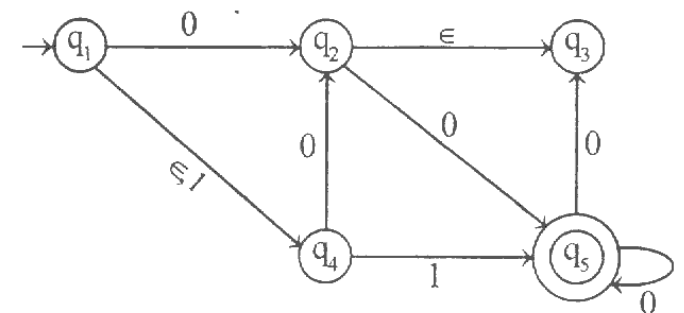
Theory of Computation*Time : Three Hours**Maximum Marks : 70*

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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.

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

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

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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

$$S \rightarrow ABAC$$

$$A \rightarrow aA / \epsilon$$

$$B \rightarrow bB / \epsilon$$

$$C \rightarrow c$$

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) $L = \{w : n_a(w) \text{ and } n_b(w) \text{ are both even}\}$

ii) $L = \{w : (n_a(w) - n_b(w)) \bmod 3 = 1\}$

Unit - III

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

- b) Explain closure properties of CFL's. 7

OR

6. a) Design PDA corresponding to given CFG 7

$$S \rightarrow aSa$$

$$S \rightarrow bSb$$

$$S \rightarrow c$$

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- 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