

Unit - V

5. a) What is complexity theory?
- b) When the problem is said to be undecidable? Give an example.
- c) Show that the union of recursive language is recursive.
- d) Show that the following problem is undecidable : "Given two CFG's G_1 and G_2 , is $L(G_1) \cap L(G_2) = \phi$ "

OR

Explain content sensitive grammars and their equivalence.

Roll No

MCA - 304

MCA. III Semester

Examination, December 2015

Theory of Computation

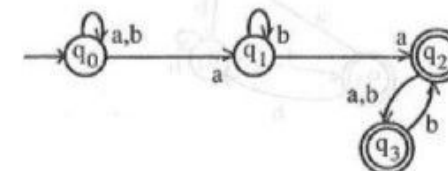
Time : Three Hours

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 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.

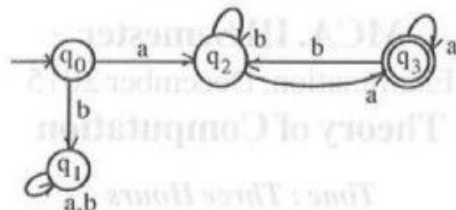
Unit - I

1. a) State the principle of induction.
- b) Differentiate between Mealy and Moore Machine.
- c) Design a finite automata that accepts strings containing exactly 1 over alphabet $[0, 1]$.
- d) Convert the NFA into DFA.



OR

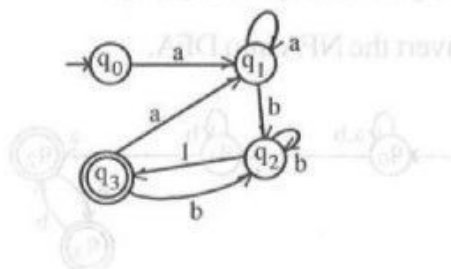
Find the language accepted by given DFA :

**Unit - II**

- a) What is Homomorphism?
- b) Write regular expression for the following language :
- All strings not ending in 01.
 - All set of strings of 0's and 1's not containing |0| as a substring.
- c) Explain the closure properties of Regular languages.
- d) Prove that $L = \{0^n 1^{2n} \mid n \geq 1\}$ is not regular.

OR

Find the regular expression corresponding to the automata :

**Unit - III**

3. a) What is ambiguity in grammar? Discuss the associated Problems.
- b) What is GNF? Explain with example.
- c) Remove the Unit productions from the given grammar :
- $$S \rightarrow A \mid bb$$
- $$A \rightarrow B \mid b$$
- $$B \rightarrow S \mid a$$
- d) Construct PDA for the language $L = \{a^m b^n \mid n < m\}$.

OR

Convert the grammar to CNF :

$$S \rightarrow 1A \mid 0B$$

$$A \rightarrow 1AA \mid 0S \mid 0$$

$$B \rightarrow 0BB \mid 1$$

Unit - IV

4. a) Give tuple definition of Turing machine and explain the significance of movement of R|W head.
- b) "Turing machine as a computer of integer function", Explain.
- c) Explain the types of Turing Machine.
- d) Design a Turing Machine to accept the language
- $$L = \{a^n b^m a^{n+m} \mid n \geq 0, m \geq 1\}$$

OR

Design a Turing machine which compute and the function

$$f(w) = \{ww^R \mid w^R \text{ is the reverse of string } w, w \in (a,b)^*\}$$