

Inter Session Examination - December 2013

Course : ITE203 - Theory of Computation Slot: A1+A2+T2

Class NBR : 1058

Time : Three Hours Max.Marks:100

PART – A (8 X 5 = 40 Marks) Answer ALL Questions

- 1. Provide an NFA with at most six states for the following language: $L=\{w \mid w \text{ contains an even number of 0's , or exactly two 1's}\}.$
- 2. Construct NFA for the following regular expressions

0+10* +01*0

- 3. Show that $\{a^p : p \text{ is a prime}\}\$ is not regular.
- 4. Explain the terms: Push Down Automata and context free language.
- 5. Construct a CFG so that $L(G) = \{a^nba^m \mid m,n >= 1\}.$
- 6. Describe a TM M_2 that recognizes the language

$$A=\{0^{2n}|n\geq 0\}$$

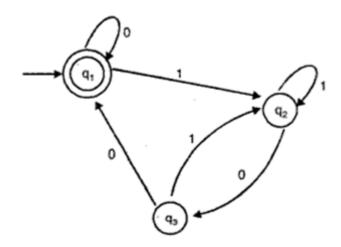
- 7. Define Regular grammar, right linear and left linear grammars. Give examples.
- 8. Explain the classification of grammars with a neat diagram.

$PART - B (6 \times 10 = 60 \text{ Marks})$

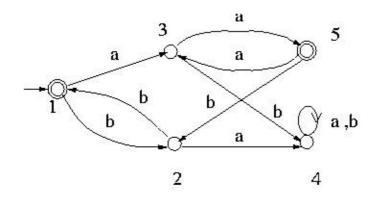
Answer any **SIX** Questions

- 9. Construct DFA for the following:
 - a) L= $\{w/w \text{ has both an even number of 0's and even number of 1's}$ [5]
 - b) L= { w/w is in the form of 'x01y' for some strings x and y consisting of 0's and 1's}. [5]

10. Convert the following automaton to an equivalent RE



11. Minimize the states for the following DFA



12. a) Construct a grammar G generating set of all palindromes over {a, b} [5]

b) Construct a grammar generating

 $L = \{wcw^R \mid w \in \{a, b\}^*\}$

13. Convert the following grammar to Greibach Normal Form

 $S \rightarrow SS$

 $S \rightarrow 0S1 \mid 01$

- 14. Explain the different kinds of Turing Machines in detail.
- 15. a) Design a Turing Machine that accepts the set of all even palindromes over {0,1}. [5]
 - b) Given $\Sigma = \{0,1\}$, design a Turing machine that accepts the language denoted by the regular expressions 00^* .
- 16. a) Describe linear bounded automata. [5]
 - b) Explain Universal Turing Machine. [5]