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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, June 2015
(2008 Scheme)
Branch : COMPUTER SCIENCE AND ENGG.
08.603 : Formal Languages and Automata Theory

Time: 3 Hours Max. Marks: 100

PART – A

(Answer **all** questions)

1. Define two-way finite automata.
2. Define Mealy machine.
3. State pumping lemma for regular language.
4. What is meant by useless symbol ? Give an example.
5. List the closure properties of CFL's.
6. Define pushdown automata.
7. Construct left-linear grammar for the language :

   $0^* (1(0 + 1))^*$.
8. Define : (a) recursive set (b) recursively enumerable language.
9. Write a note on multitape turing machine.
10. What is meant by decidable and undecidable problems ? **(10×4=40 Marks)**

PART – B

Answer **one full** question from **each** Module.

Module – I

11. a) Design a Moore machine which determine the residue mod 3 for each binary string, treated as a binary integer. 12

    b) Explain any two applications of finite automata. 8

OR

12. a) Write regular expressions for each of the following languages over the alphabet {0, 1}. 10

i) The set of all strings with at most one pair of consecutive 0's and at most one pair of consecutive 1's.

ii) The set of all strings in which every pair of adjacent 0's appears before any pair of adjacent 1's.

iii) The set of all strings not containing 101 as a substring.

b) Explain finite automata minimization algorithm. 10

Module – II

13. a) Give CFGs generating the following sets : 12

i) The set of all strings of balanced parentheses, ie, each left parenthesis has a matching right parenthesis and pairs of matching parentheses are properly nested.

ii) The set of all strings over alphabet {a, b} with the number of a's and b's the same.

iii) $\left\{ a^m b^n c^{m+n} \mid m, n \geq 1 \right\}$.

b) Differentiate between deterministic PDA and non-deterministic PDA, with examples. 8

OR

14. a) Construct PDA for the following language : 10

$\left\{ O^n \mid^{2n} \mid n \geq 1 \right\}$.

b) Find a Greibach normal form grammar equivalent to the following CFG : 10

$S \rightarrow AA/0$

$A \rightarrow SS/1$.

Module – III

15. Design a turing machine to recognize the set of strings with an equal number of 0's and 1's. 20

OR

16. Explain the techniques for turing machine construction. 20