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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, March 2015
(2008 Scheme)
Branch : Computer Science & Engg.
08.603 : FORMAL LANGUAGES AND AUTOMATA THEORY
(Special Supplementary)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. Define NFA mathematically. Explain its significance and function.
2. What are the applications of Regular expressions and Finite automata ?
3. Construct a DFA for languages which do not contain two consecutive a's but contain two consecutive b's over alphabet {a, b}.
4. When is a CFG said to be a linear grammar ? Explain with example.
5. Define different normal forms of CFG's. Give the applications of each normal forms.
6. State 'pumping lemma' for context free languages.
7. Differentiate between DPDA and NPDA. Give an example for a language which can be accepted only by NPDA.
8. What do you mean by Recursively enumerable language ?
9. Design a Turing machine to compute for positive integer n : f (n) = n+1
10. Define reducibility.

(10×4 = 40 Marks)

P.T.O.

PART – B

Module – I

11. a) Give the regular set or language for the regular expression
    i) $1\,(01)^*\,(10)^*\,1$ ii) $(1+10)^*001$. 10

    b) State pumping lemma for regular languages and hence prove
    $L=\{w\in\Sigma^* \mid n_a(w)<n_b(w)\}$ is not regular. 10

OR

12. a) Prove the equivalence of Mealy machine and Moore machine. 12

    b) Design a Moore machine to calculate MOD 5 of binary input. (Input string is treated as a binary number). 8

Module – II

13. a) Find the grammar that generate following languages.
    i) $L=\{a^n b^{2n} \mid n>0\}$ ii) $L=\{0^n 1^m \mid n\geq 0, m>n\}$. 12

    b) What is ambiguous grammar. Test whether the following grammar is ambiguous.
    $S \rightarrow a/Sa/bSS/SSb/SbS$. 8

OR

14. a) Construct a PDA that accepts the language generated by the grammar with productions $S \rightarrow aSbb/a$. 7

    b) Convert the following CFG into CNF

    $S \rightarrow AACD$

    $A \rightarrow aAb/\in$

    $C \rightarrow aC/a$

    $D \rightarrow aDa/bDb/\in$. 13

Module – III

15. a) Construct a Turing machine to add two unary numbers. 7

    b) Prove the equivalence of Single tape and Multitape Turing machines. 13

OR

16. a) Prove that halting problem of Turing machine is undecidable. 10

    b) Design a Turing machine which finds 2's complement of a given number. 10