2517

Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, May 2013
(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. Explain any one application of finite automata.
2. Define Moore Machine.
3. List the closure properties of regular sets.
4. State the pumping Lemma for CFL's.
5. Explain Chomsky hierarchy of languages.
6. Find a CFG with no useless symbols equivalent to :

   $S \rightarrow AB \mid CA$

   $A \rightarrow a$

   $B \rightarrow BC \mid AB$

   $C \rightarrow aB \mid b$

7. Define Turing machine.
8. Write down Church's hypothesis.
9. Write a note on multidimensional Turing machine.
10. Define (a) total recursive function (b) partial recursive function. **(10×4=40 Marks)**

PART – B

Module – I

11. a) Give deterministic finite automata accepting the following languages over the alphabet {0, 1}.

i) The set of all strings ending in 00.

ii) The set of all strings with three consecutive 0's. **10**

b) Explain finite automata minimization algorithm. **10**

OR

12. a) Construct NFA for the following : **10**

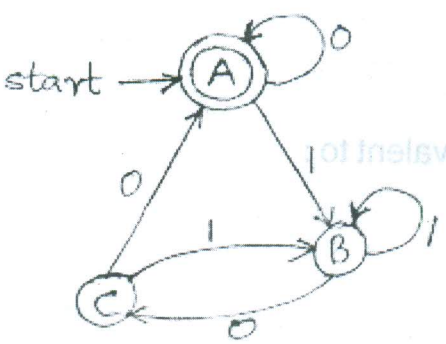
i) 10 + (0 + 11) 0*1

ii) 01 [((10)* + 111)* + 0]*1

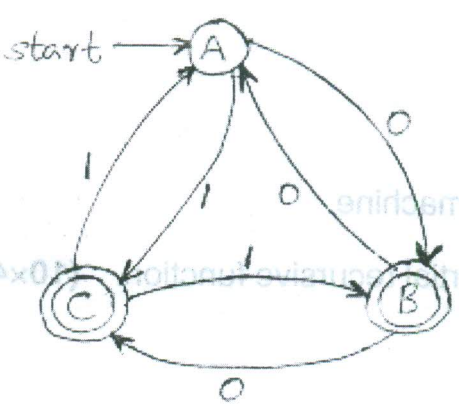
iii) (1 + 01 + 001)*(∈ + 0 + 00).

b) Construct regular expressions corresponding to the state diagrams given below : **10**

i)



ii)



Module – II

13. a) Convert the following grammar to Chomsky Normal form : 12

$S \rightarrow bA \mid aB$

$A \rightarrow bAA \mid aS \mid a$

$B \rightarrow aBB \mid bS \mid b$

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

OR

14. a) Give Context-Free Grammars generating the following sets : 10

i) The set of palindromes over alphabet {a, b}.

ii) The set of all strings over alphabet {a, b} with exactly twice as many a's as b's.

iii) $\{a^i b^j c^k \mid i = j \text{ or } j = k\}$.

b) Construct a PDA equivalent to the following grammar : 10

$S \rightarrow aAA,\ A \rightarrow aS \mid bS \mid a$

Module – III

15. Explain the techniques for Turing machine construction. 20

OR

16. Design a Turing machine that multiplies two binary numbers. 20
