S.E. (Computer) (Sem-IV) (CBSGS) (R-2012)

Paper / Subject Code: 38905 / THEORETICAL COMPUTER SCIENCE Date - 17/12/1

(3 Hours) **[Total Marks : 80]**

N.B. (1)Question No. 1 is compulsory
(2) Attempt any three out of remaining five questions
(3) Assumptions made should be clearly stated

1. (a) Explain Chomsky Hierarchy. 5
   (b) Differentiate between NFA and DFA. 5
   (c) Define Regular Expression and give regular expression for 5
   Set of all strings over { a, b,c } that starts and ends with different symbol.
   (d) Explain Post Correspondence problem. 5
2. (a) Design F.A. for following R.E. 10
   (a+b)*abb(a+b)*

   (b)Give and Explain formal definition of Pumping Lemma for Regular Language and prove that following language is not regular. 10
   $L=\{ a^n b^m \mid 1<=n<=m \}$
3. (a) Test whether 001100, 001010 are in the language generated by grammar 10
   $S \rightarrow 0S0|0A|0|1B|1$
   $A \rightarrow 0A|0$
   $B \rightarrow 1B|1$

   and draw parse tree.

   (b) Construct PDA for a language $L=\{wcw^R \mid w \varepsilon \{a,b\}$ and w^R is reverse of $w\}$ 10
4. (a) Construct TM to check palindrome over $\Sigma=\{0,1\}$ 10
   (b) Explain CNF and GNF in detail and convert given grammar in GNF. 10

   $S \rightarrow XA|BB$

   $B \rightarrow b|SB$

   $X \rightarrow b$

   $A \rightarrow a$
5. (a) Convert (0+1) $(01)^*(0+\in)$ into NFA with ε-moves and obtain DFA. 10
   (b) Design Mealy Machine that accepts an input from (0+1)* if the input ends in 101, output A; if the input ends in 110, output B, otherwise C. then convert into Moore Machine. 10
6. Write short note on following (any 4) 20
   (a) Closure properties of Context Free Language
   (b) Myhill Nerode theorem
   (c) Rice's Theorem
   (d) Moore and Mealy Machine
   (e) Variant of TM
