TE | Comp | V (Rev) 8|12|12

TCS

P4–RT–Exam.–Oct.–12–19

Con. 7632–12.

KR–5348

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Draw **suitable** diagrams wherever **necessary**.
(4) Assume **suitable** data, if **necessary**.

1. (a) What is finite automation ? Give the finite automation M accepting (a,b)*(baaa). **5**
   (b) Explain Chomsky Hierarchy with languages used, forms of productions in grammars and accepting device. **5**
   (c) Differentiate Moore and Mealy machine. **5**
   (d) Give and explain ambiguous context free language. **5**

2. (a) Design finite state machine to add 2 binary numbers of equal length. **10**
   (b) Give the rules for defining languages associated with any regular expression : **10**
   Let L1 = all words beginning with a
   L2 = all words ending with a
   what is L1 intersection L2 ?

3. (a) Give the statement for pumping Lemma for regular languages. **2**
   (b) Construct an NFA–$\wedge$ for – **8**
   (i) (00 + 1) * (10)*
   (ii) ((0 + 1)*10 + (00)*(11)*)*
   (c) Let G be the grammar **10**
   $S \rightarrow aB \mid bA$
   $A \rightarrow a \mid aS \mid bAA$
   $B \rightarrow b \mid bS \mid aBB$
   Find the leftmost derivation, right most derivation and parse tree for the string "bbaaabbaba".

4. (a) What is TM ? Give the power of TM over FSM. Explain undecidebility and incompleteness in Turing machine. **10**
   (b) Explain PDA and power of PDM. Also design the NPDA for the given – . **10**
   CFG
   $S \rightarrow aAA$
   $A \rightarrow bS$
   $A \rightarrow aS$
   $S \rightarrow a$

[TURN OVER

5. (a) Explain basic Complexity classes. 6

(b) Define NP-hard and NP-complete languages. 4

(c) Using pumping lemma, check whether $a^n b^n$ is regular or not. 10

6. (a) How regular expression is converted to DFA ? Explain all rules with example. 10

(b) Construct a PDA accepting the language of Palindromes. 10

7. Write short notes on (any **four**) :– 20

(a) Myhill Nerode Theorem

(b) Universal TM

(c) Rice Theorem

(d) Closure properly and decision algorithm for CFL

(e) Application areas of RE, FA, PDA, CFG, TM.