T.E-Sem V-OLD-Computer-TCS

QP Code: 3792

(OLD COURSE)

Duration: 3 hours

Total marks: 100

Note.(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.

Q1. (a) Explain Chomsky Hierarchy

(10)

- (b) Let G be the grammar . Find the leftmost derivation, rightmost derivation and parse (10) tree for the string 00110101
 - G: $S \rightarrow OB \mid 1A$

A →0 | 0S | 1AA

 $B \rightarrow 1 | 1S | OBB$

Q2. (a) For the aiphabet $\Sigma = \{0,1\}$, design a DFA to accept

(10)

- (i) a set of all strings ending with 100 or 101.
- (ii) a set of all strings that contain at least three 1's.
- (b) What is a regular expression? Give formal definition of a regular expression . Design a (10)

 DFA corresponding to the regular expression (a+b) * aba(a+b)*
- Q3. (a) Design a Moore and Mealy machine to convert each occurrence of a substring 100 by 101. (10)
 - (b) Convert the following NFA to a DFA

(10)



Q4. (a) Using pumping lemma prove that the following language is not regular

(10)

$$L = \{a^n b^n | n >= 0 \}$$

(b) List and explain closure properties of regular languages .

(10)

Q5. (a) Design a Turing machine to accept the language $L = \{ a^n b^n \mid n \ge 1 \}$

(10)

(b) Explain the rules for simplification of a context free grammar.

(10)

Q6 (a) Explain Chomsky Normal Form and convert the following CFG to CNF

(10)

$$S \rightarrow bA \mid aB$$

A →bAA | aS | a

B →aBB |bS |b

(b) Define a PDA and construct a PDA for checking well formedness of parenthesis.

(10)

Q7. Write short notes on (any two)

(20)

- (a) Turing Machine
- (b) Halting Problem
- (c) Intractable Problems
- (d) Recursive and recursively enumerable languages

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