14643

B. Tech 4th Semester Examination

Theory of Computation (N.S.)

CS-222

Time : 3 Hours  Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five question in all selecting one question each from sections A, B, C, D and Section E is compulsory. Each question carry 20 marks.

SECTION - A

1. (a) (i) CNF and GNF Notation.

(ii) Turing machine and its application.

(b) Construct a DFA that will accept strings on \{a, b\} where the number of b’s divisible by 3.  (20)

2. Construct a finite automaton that accepts the set of all strings in \{a, b, c\}^* such that the last symbol in input string appears earlier in the string.  (20)

SECTION - B

3. Construct a NFA for regular expression \((a/b)^*abb\) and draw its equivalent DFA.  (20)

4. (a) Construct a CFG accepting \(L=\{ambn/n\}\)

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(b) Convert the grammar with productions into CNF A→Bab/λ. (20)

SECTION - C

5. (a) Explain Turing machine. What is the physical significance of Turing Machine?

(b) Show there exists a TM for which the halting problem is unsolvable. (20)

6. (a) Prove that the function fadd (x,y)=x+y is a primitive recursive

(b) Explain Mealy and Moore machine with examples. (20)

SECTION - D

7. (a) Consider the following grammar; find the Left most derivation, Right most derivation and construct a derivation tree whose yield is aabbaa. And also find the grammar is ambiguous or not? S→aAS | a
    A→SbA| SS | ba

(b) Construct a DFA that accept all the string of even length contains odd no. of 0’s over the alphabet (0,1). (20)

8. (a) State and explain the Chomsky classification.

(b) Design a Turing machine for L= {a"b"c" |n>0} (20)

SECTION - E

9. This section is compulsory. Each question carry 2 marks

(a) State the difference between NFA and DFA.

(b) Construct the DFA for all string that do not contain the substring 110.
(c) Is the grammar below ambiguous, $S \rightarrow SS[(S)]S(S)S|E$?

(d) Explain Turing machine.

(e) What is context free grammar?

(f) Define pushdown automata.

(g) Define Automaton?

(h) What is the principle of mathematical Induction?

(i) Construct a DFA for the regular expression $aa^*bb^*$. ..

(j) Construct a DFA over $\Sigma = (a,b)$ which produces not more than 3 a's. 

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10 \times 2 = 20
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