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}

(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={$a^n b^n c^n$ |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.   (10×2=20)