15615

MCA 3rd Semester Examination

Theory of Computation (NS)

MCA-304

Time : 3 Hours   **Max. Marks : 60**

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 : Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D, and all the subparts of the questions in Section E.

SECTION - A

1. Design a Moore machine that counts how many times 001 occurs in a long input string.   (12)

2. Construct DFA which accepts strings having odd number of a's and even number of b's.   (12)

SECTION - B

3. State the principle of Pumping lemma. What are the applications of pumping lemma? Explain the closure properties of regular languages.   (12)

4. Write note on Chomsky Hierarchy of Languages.   (12)

SECTION - C

5. Find the grammar in GNF equivalent to the grammar:

   $E \rightarrow E+T \mid T$, $T \rightarrow T*F \mid F$, $F \rightarrow (E) \mid a$.   (12)

[P.T.O.]

6. Construct a pushdown automata A accepting the set of all strings over {a, b} with equal number of a's and b's.   (12)

SECTION - D

7. Design a Turing Machine over {1,b} which can compute a concatenation function over $\Sigma = \{1\}$. If a pair of words (w_1, w_2) is the input, the output has to be $w_1 w_2$.   (12)

8. Write note on Recursively and Recursively Enumerable Languages.   (12)

SECTION - E

9. (a) Define Context Free Grammar.

   (b) Define Pushdown Automata.

   (c) Write short note on Universal Turing Machine.

   (d) What do you mean by Kleen's Star?   (4×3=12)