Roll No .....

MCA-304

M.C.A. III Semester

Examination, November 2019

Theory of Computation

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Construct a finite state machine that accepts exactly those input strings of 0's and 1's that ends with "11". 7

   b) If L is accepted by an NFA with ε–transition then show that L is accepted by an NFA without ε–transition. 7

2. a) Construct a NDFA accepting all string in {a, b} with either two consecutive a" s or two consecutive b "s. 7

   b) Construct a DFA equivalent to the NFA M = ({a, b, c,d}, {0, 1}, δ, a, {b, d}) where δ is a defined as: 7

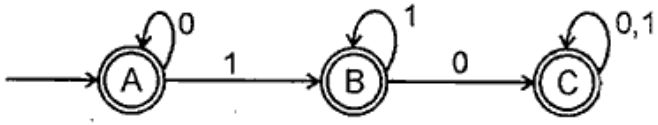
δ	0	1
a	{b, d}	{b}
b	c	{b, c}
c	d	a
d	-	a

3. a) Find a grammar in Chomsky Normal Form equivalent to S - > aAD; A - > aB / bAB; B - > b, D - > d. 7

   b) Construct a grammar on GNF which is equivalent to the grammar:
   S - > AA / a , A - > SS / b 7

4. a) Construct an NFA equivalent to the following regular expression:01*+1 7

   b) Find the regular expression corresponding to the finite automaton given below: 7



5. a) Give a detailed description of ambiguity in Context free grammar. 7

   b) Explain different types of acceptance of a PDA. Are they equivalent in sense of language acceptance? Justify your answer. 7

6. a) Define Deterministic Push Down Automata DPDA. Is it true that DPDA and PDA are equivalent in the sense of language acceptance is concern. Justify your answer. 7

   b) Explain in detail about equivalence of Push Down Automata and CFG 7

7. a) Design a Turing Machine to accept the language $L = \{0^n 1^n / n >= 1\}$. 7

   b) Explain in detail notes on Universal Turing Machines with example. 7

8. a) Show that for two recursive language L_1 and L_2 each of the following is recursive 7
   i) $L_1 \cup L_2$
   ii) $L_1 \cap L_2$
   iii) L_1 *

   b) Explain the Halting problem. Is it decidable or undecidable problem. 7