Roll No. ……..

MCA–18

Formal Language and Automata

Master of Computer Application (MCA-11/16/17)

Fifth Semester, Examination, 2018

Time : 3 Hours **Max. Marks : 80**

Note : This paper is of **eighty (80)** marks containing **three (03)** Sections A, B and C. Attempt the questions contained in these Sections according to the detailed instructions given therein.

Section–A

(Long Answer Type Questions)

Note : Section 'A' contains four (04) long answer type questions of nineteen (19) marks each. Learners are required to answer *two* (02) questions only.

1. (a) How does Moore and Mealy machine work in Computer Memory ? What is their importance in computing ?

   (b) Draw a deterministic and non-deterministic finite automate which accept 00 and 11 at the end of a string containing 0, 1 in it, e. g., 01010100 but not 000111010.

2. (a) What is the difference between derivation tree and total tree ?

   (b) Design a DFA corresponding to the regular expression (a + b)* aba(a + b)*.

3. (a) Define Turing machine.

   (b) Design a turing machine which can perform subtraction operation.

4. (a) What do you understand by post-correspondence problem ?

   (b) Find whether the lists M = (ab, bab, bbaaa) and N = (a, ba, bab) have a Post-Correspondence Solution ?

Section–B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short answer type questions of eight (8) marks each. Learners are required to answer *four* (04) questions only.

1. What is Deterministic Finite Automata ? Explain.
2. What is Content Free Grammar ? Explain.
3. What is Push Down Automata ? Explain.
4. What is the difference between Acceptability and Decidability in Turing Machine ?
5. What is Primitive Recursive function ? Explain.
6. What is Halting problem ? Explain.
7. What is Port's correspondence problem ? Explain.
8. What do you understand by the term formal language ?

Section–C

(Objective Type Questions)

Note : Section 'C' contains ten (10) objective type questions of one (01) mark each. All the questions of this Section are compulsory.

1. There are ..... tuples in finite state machine.

   (a) 4 (b) 5

   (c) 6 (d) unlimited

2. $\delta^*(q, ya)$ is equivalent to :

   (a) $\delta(\delta(q, y), a)$

   (b) $\delta(\delta^*(q, y), a)$

   (c) $\delta(q, ya)$

   (d) Independent from δ notation

3. Language of finite automata is :

   (a) Type 0 (b) Type 1

   (c) Type 2 (d) Type 3

4. Regular expression for all strings starts with ab and ends with bba is :

   (a) aba*b*bba

   (b) ab(ab)*bba

   (c) ab(a+b)*bba

   (d) All of the mentioned

5. The basic limitation of finite automata is that :

   (a) If can't remember arbitrary large amount of information

   (b) If sometimes recognize grammar that are not regular

   (c) It sometimes fails to recognize regular grammar

   (d) All of the mentioned

6. Which of the following options is correct ?

   Statement 1 : Initial state of NFA is initial state of DFA.

   Statement 2 : The final state of DFA will be every combination of final state of NFA.

   (a) Statement 1 is true and Statement 2 is true.

(b) Statement 1 is true and Statement 2 is false.

(c) Statement 1 can be true and Statement 2 is true.

(d) Statement 1 is false and Statement 2 is also false.

7. NFA, in its name has 'non-deterministic' becauses of :

(a) The result is undetermined

(b) The choice of path is non-deterministic

(c) The state to be transited next is non-deterministic

(d) All of the mentioned

8. Moore machine is an application of :

(a) Finite automata without input

(b) Finite automata with output

(c) Non-finite automata with output

(d) None of the mentioned

9. Which of the given are correct ?

(a) Moore machine has 6-tuples

(b) Mealy machine has 6-tuples

(c) Both Mealy and Moore machine has 6-tuples

(d) None of the mentioned

10. The number of tuples in an extended Non-deterministic Finite Automaton :

(a) 5 (b) 6

(c) 7 (d) 4