

Roll No.

MCA–18

Formal Languages & Automata

Master of Computer Applications

(MCA–11/MCA–16)

Fifth Semester, Examination, 2017

Time : 3 Hours

Max. Marks : 60

Note : This paper is of **sixty (60)** 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 fifteen (15) marks each. Learners are required to answer *two* (02) questions only.

1. Explain Universal turing machine and Multiple track turing machine with example.
2. What is PUSH DOWN AUTOMATA (PDA) ? Explain how context languages are accepted by PDA ?
3. Define DFA. Find a grammar generating
$$L = a^n b^n c^i \mid n \geq 1, i \geq 0$$
.
4. Define CFG. Obtain CFG for the following language :
 - (a) $L = \{WW^R \mid W \in \{a, b\}^*, W^R \text{ is the reversal of } W\}$
 - (b) $L = \{W : W \text{ has a substring } ab\}$

Section-B**(Short Answer Type Questions)**

Note : Section 'B' contains eight (08) short answer type questions of five (5) marks each. Learners are required to answer *four* (04) questions only.

1. State the pumping lemma for CFG.
2. Define regular expression. Explain the use of regular expression.
3. Differentiate between Top down parsing and Bottom up parsing.
4. State the difference between turing acceptability and turing decidability in brief.
5. Define Chomsky Hierarchy.
6. Define the turing machine halting problem.
7. What do you mean by parsing in automata ? Explain top down and bottom up parsing.
8. Mention the difference between DFA, NFA and E-NFA.

Section-C**(Objective Type Questions)**

Note : Section 'C' contains ten (10) objective type questions of one (1) mark each. All the questions of this section are compulsory.

1. The basic limitations of finite automat is that :
 - (a) It can't remember arbitrary large no. of information
 - (b) It sometimes recognize grammar that are not regular.
 - (c) It sometimes fails to recognize regular grammar
 - (d) All of the mentioned

2. Finite automata requires minimum number of stacks.
- (a) 1 (b) 0
(c) 2 (d) None of these
3. Language of finite automata is :
- (a) Type 0 (b) Type 1
(c) Type 2 (d) Type 3
4. A vertex of degree one is called as :
- (a) rendent
(b) isolated vertex
(c) null vertex
(d) coloured vertex
5. Number of states required to accept string ends with 10 :
- (a) 3 (b) 2
(c) 1 (d) can't be determined
6. There are tuples in finite state machine.
- (a) 4 (b) 5
(c) 6 (d) None of these
7. Language of automata is :
- (a) If it is accepted by automata
(b) If it halts
(c) If automata touch final state in its life time
(d) All languages are language of automata

8. How many DFA's exist with two states over input alphabet $\{0, 1\}$?
(a) 16 (b) 26
(c) 32 (d) 64
9. The language accepted by the push down automation in which stack is limited to 10 items is best described as :
(a) Deterministic context free
(b) Context free
(c) Regular
(d) Recursive
10. If the string of the language L can be effectively enumerated in lexicographic (i. e. alphabetic) order then which of the following statements is true ?
(a) L is necessarily finite
(b) L is regular but not necessarily finite
(c) L is context free but not necessarily regular
(d) L is recursive but not necessarily context free