

MCA-18

December - Examination 2017

MCA IIIrd year Examination**Formal Language and Automata****Paper - MCA-18****Time : 3 Hours]****[Max. Marks :- 80**

Note: The question paper is divided into three sections A, B and C. Write answers as per given instructions.

Section - A**8 × 2 = 16**

(Very Short Answer Questions)

Note: Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum upto 30 word. Each question carries 2 marks.

- 1) (i) Define Universal Turing machine.
- (ii) Define grammar.
- (iii) What is the difference between FA and PDA?
- (iv) When a language is known as recursively enumerable language?
- (v) Which data structure is used in pushdown automata?
- (vi) Explain Kleene's star operation.
- (vii) What is halting problem?
- (viii) What is the use of Pumping Lemma?

Section - B**4 × 8 = 32**

(Short Answer Questions)

Note: Answer **any four** questions. Each answer should not exceed 200 words. Each question carries 8 marks.

- 2) Explain how we can convert a NFA- ϵ to DFA.
- 3) Differentiate between the following terms and their Purpose
 - (i) Final states, Trap state, non-final state
 - (ii) Deterministic and non-deterministic finite automata
- 4) State and explain pumping Lemma.
- 5) Write down the closure properties of regular languages.
- 6) Design DFA and NFA to recognize the following set of strings.
abb, abaa, assuming that $\Sigma = \{a, b\}$
- 7) Write a regular expression for each of the following language over the alphabet $\{a, b\}$.
 - (i) The set of string containing ab as a substring.
 - (ii) The set of string having at most one pair of consecutive a's and at most one pair of consecutive b's.
- 8) What is ambiguity in context free grammar?
- 9) Discuss Chomsky Hierarchy in detail with suitable diagram.

Section - C**2 × 16 = 32**

(Long Answer Questions)

Note: Answer **any two** questions. You have to delimit your each answer maximum upto 500 words. Each question carries 16 marks.

- 10) Construct a Turing machine over $\Sigma = \{0, 1\}$ to accept the language $L = \{0^m 1^{2m} \mid m > 0\}$.
- 11) Find a grammar in Chomsky Normal form equivalent to $S \rightarrow aAbB$, $A \rightarrow aA/a$, $B \rightarrow bB/b$.
- 12) Construct a PDA accepting the set of all even length palindromes over $\{a, b\}$ by empty stack.
- 13) For the following transition table construct the minimum state equivalent DFA. A is starting state and D is final state.

Input → State ↓	0	1
→ A	B	A
B	A	C
C	D	B
*D	D	A
E	D	F
F	G	E
G	F	G
H	G	D
