

**M. SC. (COMPUTER SCIENCE) SEM – I (CHOICE BASED
CREDIT & GRADE SYSTEM) : SUMMER - 2018
SUBJECT: ELECTIVE-I: b) THEORY OF AUTOMATA**

Day: Wednesday
Date: 18/04/2018

Time: 03.00 PM TO 06.00 PM
Max. Marks: 60

S-2018-0920

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw figures **WHEREVER** necessary.

Q.1 What is CFG? What do you mean by ambiguity in CFG? How to remove ambiguity in CFG? (15)

OR

Describe Turing Machine Model in detail. Construct a TM for language
 $L = \{a^m b^n \mid n \geq m \text{ and } m \geq 1\}$

Q.2 A) Answer **ANY ONE** of the following: (08)

- i) Describe non-deterministic automata (NFA). Also construct NFA for language which accepts a string starting with 'a' ending with 'b' or starting with 'b' ending with 'a'.
- ii) Define Moore machine. Construct Moore machine to generate 1's complement of binary number.

B) Answer **ANY ONE** of the following: (07)

- i) Convert the following CFG into CNF.
S → aSd | aAd
A → bAc | bc
- ii) Elaborate properties of regular languages.

Q.3 Answer **ANY THREE** of the following: (15)

- a) Explain recursively enumerable set in brief.
- b) Explain Chomsky Hierarchy in detail.
- c) What is lexical analyzer?
- d) Construct PDA to check well-formedness of parenthesis.
- e) Construct regular expression for the following languages:
 - i) String ending with 'aaa' over $\Sigma = \{a, b, c\}$
 - ii) String starting with '0' and ending '10' over $\Sigma = \{0, 1\}$

Q.4 Write short notes on **ANY THREE** of the following: (15)

- a) Push Down Automata
- b) Russel Paradox undesirability
- c) Greibach Normal Form (GNF)
- d) Pumping Lemma
- e) Operations on Sets

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