

**M. SC. (COMPUTER SCIENCE) SEM – I (CHOICE BASED
CREDIT & GRADE SYSTEM) : WINTER - 2017
SUBJECT: ELECTIVE-I: b) THEORY OF AUTOMATA**

Day: Tuesday
Date: 31/10/2017

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

W-2017-0820

N.B:

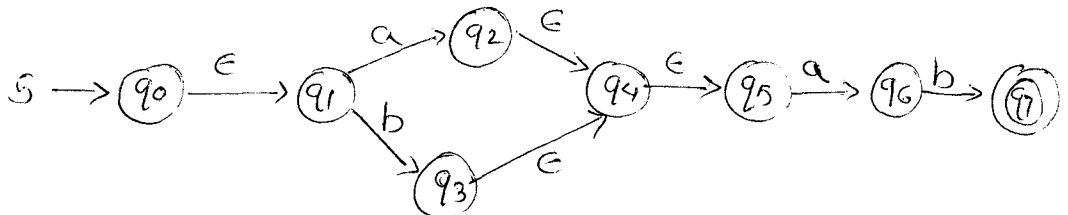
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw figures **WHEREVER** necessary.

- Q.1** Define CFG. Construct the CFG for the following language: **(15)**
- i) $L = \{a^m b^n c^n d^m \mid m, n \geq 1\}$
 - ii) Strings containing equal number of a's and b's.

OR

Differentiate between DFA and NFA. Construct DFA for the following:

- i) $L = L_1 \cap L_2$ over $\Sigma = \{a, b\}$
 $L_1 =$ all strings starting with 'a'
 $L_2 =$ all strings not having 'ab' as a substring
 - ii) Construct DFA over $\Sigma = \{0,1\}$ such that even position is occupied by '0' and odd by '1'.
- Q.2** A) Answer **ANY ONE** of the following: **(08)**
- i) Define pumping lemma. Show that $L = \{a^n b^n c^n \mid n \geq 1\}$ is non regular.
 - ii) Explain Moore and Mealy machine in detail.
- B) Answer **ANY ONE** of the following: **(07)**
- i) Construct TM for $L = \{0^n 1^n 2^n \mid n \geq 1\}$
 - ii) For the following NFA find equivalent DFA.



- Q.3** Answer **ANY THREE** of the following: **(15)**
- a) Find the CNF for the following CFG:
 $S \rightarrow aAbB \mid BbS$
 $A \rightarrow Ab \mid aBb \mid a$
 $B \rightarrow aAbA \mid Aab \mid b$
 - b) Write a note on text editor.
 - c) Describe halting problem for TM.
 - d) List down the steps to prove that the language is not context free.
 - e) Explain Chomsky Hierarchy in detail.

- Q.4** Write short notes on **ANY THREE** of the following: **(15)**
- a) Operations on sets
 - b) Reduction
 - c) Applications of Finite Automata
 - d) Comparison of TM with other machines
 - e) Minimization of FA