SE - SEM-IV I.T. CBSGS 25/5/16

Automata Theory -

QP Code :549701

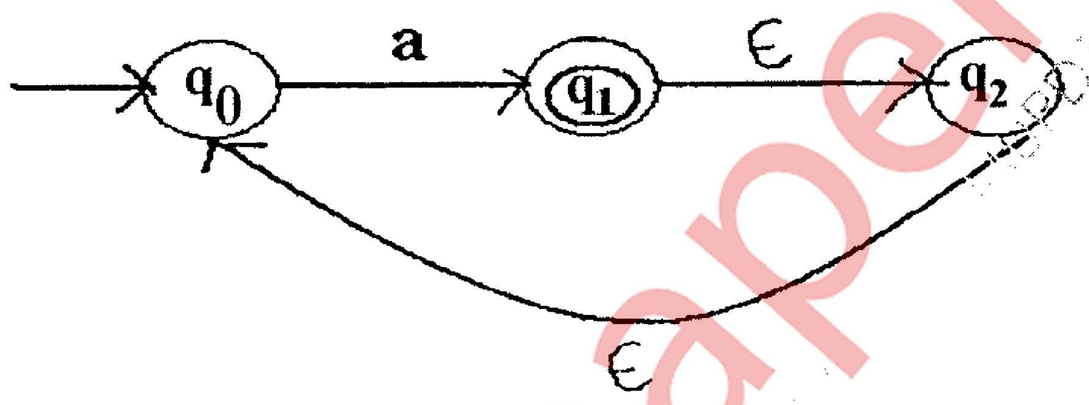
(3 Hours) [Total Marks : 80

NB : (1) Question no. 1 is **compulsory.**

(2) Solve any **Three** questions from remaining questions.

(3) Draw **diagrams** wherever **necessary.**

1 (a) What is the complement of the language accepted by the NFA shown below? 2
Assume S ={a} and ϵ is the empty string.



(b) Definition of a language L with alphabet {a} is given as following 2
$\{ a^{nk} | k > 0$, and n is a positive integer constant $\}$
What is the minimum number of states needed in a DFA to recognize L?

(c) What is Multi-Tape Turing Machine ? 3

(d) Design Mealy Machine to convert each occurrence of substring 1000 by 1001 . 7

(e) State that whether a following Language is Regular or not.

1) $L=\{WW^R \mid |W|=2$ over $\Sigma=\{a,b\}\}$ 3

2) $L=\{WW^R \mid W \epsilon (a,b)^*\}$ 3

2 (a) Give formal definition of a Turing Machine . 5

(b) Write a regular expression for the following languages, over sigma={a,b}. 10

1. Seventh symbol from right must be *a*.

2. Every second character is *b*.

3. Exactly one *ab*.

(c) Explain Chomsky Hierarchy. 5

[Turn Over

3 (a) Construct a TM for accepting Even palindromes. 10

(b) Design PDA For recognizing $L=\{a^n b^{2n+1} \mid n>=1\}$ 10

4 (a) Convert the following grammar to Chomsky Normal Form. Show all the relevant steps briefly. 10

S --->bA | aB
A --->bAA | aS | a
B--->aBB | bS | b

(b) Give the technical strategy to convert CFG to GNF. 10
Convert the following grammar to GNF.

S →AA | a
A →SS | b

5 (a) Enumerate the differences between finite automata and non-deterministic automata? 8

(b) Construct NFA,DFA for the regular Expression R=ab(a+b)+abb.Obtain minimized DFA. 7

(c) Give formal definition of a Push Down Automata(PDA) . 5

6 Write short notes on:- (Any Two) 20

(a) Unsolvable problems

(b) Recursive and Recursively enumerable languages.

(c) Simplification Of CFG