Roll No. .....

23067

M.Tech. 1st Semester (Computer Engg.) Examination–May, 2014

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Paper MTCE-603-A

Time : 3 hours ***Max. Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt any **five** questions.

1. (a) Make a DFA that accept all the string that do not end with 101. 6

(b) Design an NFA with ε-transition that accept all the string of the alphabet {a, b, c} in which one character is missing. 6

(c) Make a DFA that accept all the decimal numbers that are divisible by 3. 8

2. (a) Prove pumping lemma for regular language and also prove that the language L = {w | w is a palindrome over {0, 1}} is not regular. 10

(b) Convert the following CFG in GNF. 10

$S \rightarrow YY \mid 0$

$Y \rightarrow SS \mid 1$

3. (a) Design a PDA M to accept the language $L = (a^n b^{2n} \mid n \geq 1)$ and also the acceptance of a string by taking an example. 10

(b) Explain LBA. 4

(c) Explain the decidability of PCP. 6

4. (a) Design a T.M. to compute m × n where m and n are positive integers. 12

(b) Explain the concept of design of parser using PDA. 8

5. (a) Explain T.M. as an Enumerator. 8

(b) Design a T.M. that accepts the language of palindrome (both Even and Odd length). 12

6. (a) Design a post machine to accept the language $L = \{a^n b^n c^n \mid n \geq 0\}$. 10

(b) If two languages L1 and L2 are recursive enumerable, then their intersection $L1 \cap L2$ is also recursive enumerable. Explain. 10

7. (a) Explain the complexity classes of T.M. *i.e.* (Deterministic and Non-deterministic T.M.). 10

(b) State and prove Rice Theorem. 10

8. Write short notes on :

(i) Space and time complexity of T.M. 10

(ii) Post correspondence problem. 10
