Code: 9A05407

R9

II B. Tech II Semester (R09) Supplementary Examinations, November/ December 2011

FORMAL LANGUAGES & AUTOMATA THEORY

(Computer Science & Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

*****

1 (a) Show that language containing strings formed from a, b and c in which the number of a's, number of b's and number of c's are equal is not a CFL.

(b) Prove that the union of two context free languages is also a context free language.

2 (a) Define recursively enumerable languages and recursive languages. Prove that the union of two recursive languages is also recursive.

(b) Design a TM for computing the square of a given positive integer. Show the moves of the TM for a value of 2.

3 Construct CFG for the language recognized by the following PDA.

$\delta(q0, a, Z_0) = (q0, AZ_0)$ $\delta(q0, a, A) = (q0, A)$

$\delta(q0, b, A) = (q1, Є)$ $\delta(q1, Є, Z_0) = (q2, Є)$

For the string aaaab, show the moves of the PDA and the derivation in the grammar.

4 (a) Explain about Chomsky hierarchy of Languages.

(b) Explain in detail about Universal Turing Machine.

5 Draw a DFA that recognizes the language of all strings of 0's and 1's for length ≥ 1 that, if they were interpreted as binary representations of integers, would represent integers evenly divisible by 3. Leading 0's are permissible.

6 (a) Discuss binary the significance of NFA and DFA.

(b) Write about NFA with ε transitions and also discuss the significance of NFA with ε.

7 (a) What is the closure property of regular sets?

(b) What is the relationship between finite automata and regular expression?

(c) Give the R.E for the language such that every string will have atleast one 'a' followed by at least one 'b'.

8 Discuss and explain the following:

a) CFL are not closed under intersection and complementation.

b) A regular grammar generates an empty string.

c) A regular language is also context free but not reverse.

*****