

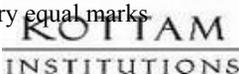
Code No: R5310501

III B.Tech I Semester(R05) Supplementary Examinations, December 2009
 FORMAL LANGUAGES AND AUTOMATA THEORY
 (Computer Science & Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks



1. Design DFA for the following over $\{0,1\}^*$. [4×4]
 - (a) The language of all string that do not end with 01.
 - (b) The language of all strings that beginning (or) end with 00 or 11.
 - (c) The language of all strings containing no more than one occurrence of the string 00.
 - (d) The language of all strings in which every 0 is followed by a immediately by 11.
2. Construct a NFA, which accepts language $L = \text{set of strings with zero (or) more number of 0's followed by zero (or) more number of 1's followed by zero (or) more number of 2's}$ And construct equivalent DFA. [16]
3. Is Arden's lemma is applicable to an NFA consisting with ϵ -moves? If not? Then why? Explain. [16]
4. (a) $S \rightarrow aS \mid bS \mid a \mid b$
 Generate the regular expression for the above CFG
 Give automata for the above grammar and write what is the language accepted by the above automata? Is both the derived automata and the given CFG generates same language.
 (b) $S \rightarrow aSbS \mid bSaS \mid \epsilon$
 What is the language generated by the above grammar? [2×8]
5. (a) Reduce the Grammar G given by $S \rightarrow aAa$
 $A \rightarrow Sb \mid bcc \mid DaA$
 $C \rightarrow abb \mid DD$
 $E \rightarrow ac$
 $D \rightarrow aDA$
 into an equivalent grammar by removing useless symbols and useless productions from it.
 (b) Convert the following grammar into CNF.
 $S \rightarrow aAD$
 $A \rightarrow aB \mid bAB$
 $B \rightarrow b$
 $D \rightarrow d$. [8+8]
6. (a) Construct the PDA A accepting L by empty stack equivalent to the following context free grammar
 $S \rightarrow 0BB, B \rightarrow 0S \mid 1S \mid 0$.
 Test whether 0104 is accepted by the PDA.
 (b) Construct a PDA A accepting the set of all strings over $\{a,b\}$ with equal number of a's and b's. [10+6]
7. (a) Design A Turing machine that accepts $L = \{a^n b^n \mid n = 0\}$
 (b) What does the Turing Machine described by the 5-tuples
 $(q_0, 0, q_0, R), (q_0, 1, q_1, 0, R), (q_0, B, q_2, B, R),$
 $(q_1, 0, q_1, 0, R), (q_1, 1, q_0, 1, R)$ and (q_1, B, q_2, B, R)
 do when given a bit string as input? [8+8]
8. (a) Explain about undecidability of posts correspondence problem.
 (b) Explain NP complete problem. [8+8]