

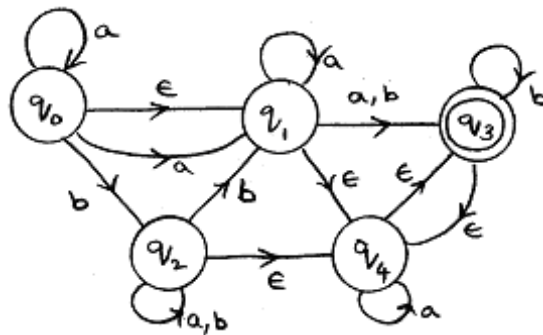
II B.Tech II Semester Supplementary Examinations, April/May 2005
THEORY OF COMPUTATION
(Information Technology)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions
 All Questions carry equal marks

- Let $R = (1,2), (2,2), (2,3)$ be a relation on the set $\{1, 2, 3\}$, Find R^* .
 - Develop a Deterministic Finite Automation accepting the language given over the alphabet $\{0, 1\}$. $L = \{ \text{the set of all strings such that every block of five consecutive contain at least two o's} \}$
 - Give mathematical definition of NFA and state main differences between NFA and DFA.
- For the NFA- ϵ given, check whether the string aannanan is accepted or not, If accepted write the transition path. Find the equivalent NFA without epsilon transitions, explain the procedure used and check the string given on your new NFA.



- List the closure properties of regular sets and explain any two of them.
 - State and explain Ardens theorem with a suitable example.
 - Construct FA for regular expression $0^*1 + 10$.
- Construct regular grammar G generating the regular set $a^*b(a+b)^*$.
 - Define CFG and give examples. What is CFL generated by the grammar $S \rightarrow abB, A \rightarrow aaBb, B \rightarrow bbAa, A \rightarrow E$.
- Construct a context free Grammar which accepts $N(A)$ and simplify the same.
 where $A = (\{q_0, q_1\}, \{a, b\}, \{z_0, z\}, \delta, q_0, z_0, \phi)$
 where δ is given by

$$\begin{aligned} \delta(q_0, b, z_0) &= \{(q_0, zz_0)\} \\ \delta(q_0, \epsilon, z_0) &= \{(q_0, \epsilon)\} \\ \delta(q_0, b, z) &= \{(q_0, zz)\} \\ \delta(q_0, a, z) &= \{(q_1, z)\} \\ \delta(q_1, b, z) &= \{(q_1, \epsilon)\} \\ \delta(q_1, a, z_0) &= \{(q_0, z_0)\} \end{aligned}$$

6. (a) Give formal definition of Turing Machine and explain the concept behind saying “Turing Machine is more powerful than the digital computer”.
- (b) Design Turing Machines for the following:
- i. To complement a given binary number.
 - ii. To compute $f(x,y) = x+y$ for x and y positive integers represented in Unary.
7. Construct LR(0) items for the grammar given, find its equivalent DFA. Check the parsing by taking a suitable derived string.
- $$S' \rightarrow S$$
- $$S \rightarrow A S \mid \lambda$$
- $$A \rightarrow a A \mid b$$
8. (a) Show or explain that PCP is decidable for words over a one symbol alphabet.
- (b) Explain the Halting problem of Turing machine, Discuss why this problem is undecidable.
