

III B.Tech I Semester Supplementary Examinations, November 2006
THEORY OF COMPUTATION

(Common to Computer Science & Engineering, Information Technology
 and Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. Define NFA mathematically. Explain its significance and function. Convert the given Finite automaton is into Deterministic equivalent. Explain method used. Taking suitable example prove both accept the same strings. Figure 1 [16]

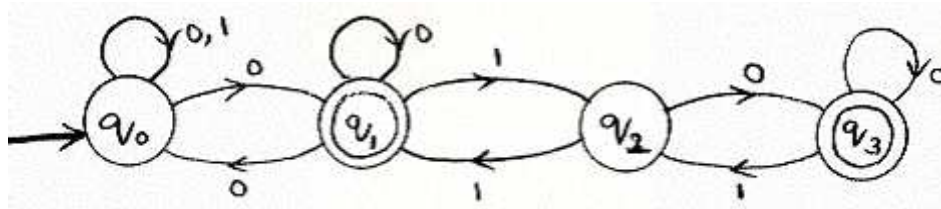


Figure 1

2. 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. Figure 2 [16]

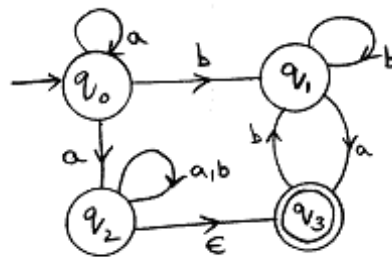


Figure 2

3. (a) Construction a DFA for the regular expression $r = (a+b)^* a bb$ and optimize the states.
 (b) Show that $L = \{a^p/p \text{ is prime}\}$ is not regular. [8+8]
4. (a) Construct a regular grammar G generating the regular set represented by $a^*b(a+b)^*$.
 (b) Give the CFG to generating the following sets
 The set of all strings of balanced parenthesis [8+8]
5. (a) Convert the following grammar into CNF
 $E \rightarrow E + T/T$
 $T \rightarrow a/(E)$

- (b) Convert the following to GNF

$$S \rightarrow AB$$

$$A \rightarrow BS/b$$

$$B \rightarrow SA/a$$

[8+8]

6. Define Turing Machine formally, explain how Turing Machine can be used to compute integer functions. Design the Turing Machine to compute following function, show its transition diagram also $f(x) = x^2$ where x is integer represented in unary.

[16]

7. (a) Discuss the Chomsky Hierarchy of languages.

- (b) For the grammar shown below construct the sets of LR(0) items.

$$S' \rightarrow S\$$$

$$S \rightarrow aSb \mid ab$$

[6+10]

8. (a) Is concept of universal gates like Nor and Nand and the universal Turing machine same. Explain the UTM in detail.

- (b) What is modified version PCP? Show or explain that if the PCP is decidable then modified PCP is also decidable.

[8+8]
