

## III B.Tech I Semester Supplementary Examinations, November 2005

## 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

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1. (a) Let  $R = \{(1, 2), (2, 2), (2, 3)\}$  be a relation on the set  $\{1, 2, 3\}$ , Find  $R^*$ .  
 (b) Develop a Deterministic Finite Automation accepting the language given over the alphabet  $\{0, 1\}$ .  $L = \{\text{the set of all strings such that every block of five consecutive contain at least two o's}\}$   
 (c) Give mathematical definition of NFA and state main differences between NFA and DFA. [4+8+4]
2. For the NFA- 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 1 [16]

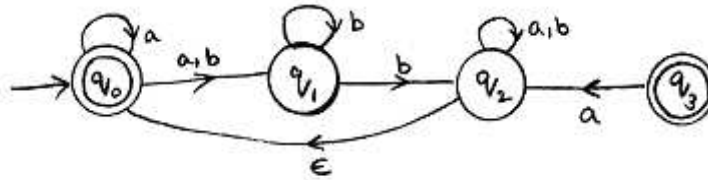


Figure 1:

3. (a) Construct a regular expression representing the following sets The set of all strings over  $\{a, b\}$  in which there are atleast two occurrences of b between any two occurrences of a.  
 (b) Describe whether  $L = \{a^{2n} | n \geq 1\}$  is regular. State and explain the theorem used. [8+8]
4. (a) Construct regular grammar G generating the regular set  $a^*b(a+b)^*$ .  
 (b) Define CFG and give examples. What is CFL generated by the grammar  
 $S \rightarrow abB, A \rightarrow aaBb, B \rightarrow bbAa, A \rightarrow \epsilon$  [8+8]
5. (a) Construct PDA for the grammar  
 $S \rightarrow aA$   
 $A \rightarrow aABC/bB/a$   
 $B \rightarrow b$

$$C \rightarrow c$$

- (b) Convert the following to CNF

$$S \rightarrow 0S0/1S1/A$$

$$A \rightarrow 2B3$$

$$B \rightarrow 2B3/3.$$

[8+8]

6. Construct Turing machine to accept following language and give its state transition table and diagram. Check the machine by tracing a suitable instance.

$$L = \{ a^n b^m : n \geq 1 \text{ and } n \neq m \}.$$

[16]

7. (a) Discuss different languages and their corresponding machines.

- (b) Write the design procedure of shift reduce parser by taking a suitable example.

[8+8]

8. (a) Explain the Turing reducibility in detail.

- (b) What is post correspondence problem? Is there any solution for the following PCP problem? If so give the solution If not discuss why?

[8+8]

	List A	List B
i	$w_i$	$x_i$
1	00	0
2	001	11
3	1000	011

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