

Total No. of Questions : 10 ] [ Total No. of Printed Pages : 3

Roll No. ....

### CS-505(N)

B. E. (Fifth Semester) EXAMINATION, June, 2011

(Computer Science & Engg. Branch)

THEORY OF COMPUTATION

[CS-505(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any five questions. All questions carry equal marks. Attempt one question from each Unit.

#### Unit-1

- (a) Show that the set  $L = \{bi^2/i > 1\}$  is not regular. 10
- (b) Construct a minimum state automaton for the following DFA. 10

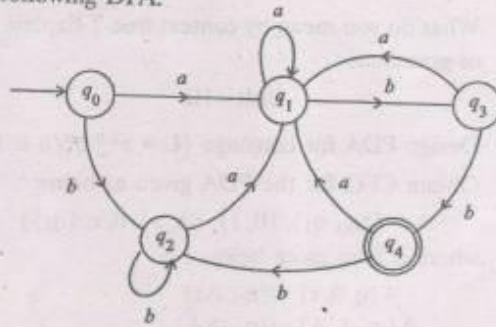


Fig. 1

P. T. O.

Or

2. (a) Convert the following NFA with  $\epsilon$  to equivalent DFA.

10

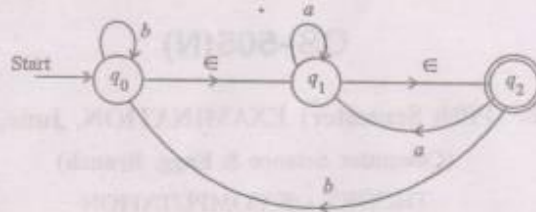


Fig. 2

- (b) Explain Myhill-Nerode theorem.

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## Unit - II

3. (a) Remove the  $\epsilon$  production from the following CFG :

$$S \rightarrow XYX$$

$$X \rightarrow OX/\epsilon$$

$$Y \rightarrow 1Y/\epsilon$$

- (b) Show that the grammar  $S \rightarrow a/Sa/bSS/SSb/SbS$  is ambiguous.

10

Or

4. (a) Explain LMD and RMD with example.

10

- (b) What do you mean by context free ? Explain the types of grammar.

10

## Unit - III

5. (a) Design PDA for language  $\{L = a^{2n} b^n / n \geq 1\}$ .

10

- (b) Obtain CFG for the PDA given as below :

10

$$A = (\{q_0, q_1\}, \{0, 1\}, \{A, z\}, d, z, \{q_1\})$$

where  $\delta$  is as given below :

$$\delta(q_0, 0, z) = (q_0, Az)$$

$$\delta(q_0, 1, A) = (q_0, AA)$$

$$\delta(q_0, 0, A) = (q, \epsilon)$$

Or

6. (a) Design DPDA for  $L = \{0^m 1^n 0^m \mid m, n \geq 1\}$  10  
(b) Explain *three* closure properties of CFL. 10

## Unit - IV

7. (a) Differentiate between composite and iterated TM. 10  
(b) Explain church hypothesis. 10

Or

8. (a) Explain TM and its parameter. 10  
(b) Show that the language  $L = \{a^i b^j c^k \mid i < j \text{ and } j < k\}$  is not context free language. 10

## Unit - V

9. (a) What is NP hard problem ? Write the name of problem and explain with example. 10  
(b) Discuss partition problem. 10

Or

10. (a) Prove that vertex cover is NP complete problem. 10  
(b) What is Hamiltonian Path problem ? Discuss with example. 10