

D 51642

(Pages : 2)

Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
DECEMBER 2008

CS 04 506—THEORY OF COMPUTATION  
(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

Answer all the questions.

- I. (a) Define a regular expression. Find the regular expression for the language accepted by the automata :



- (b) Compare DFA and N DFA.
- (c) Define a PDA. Give an example.
- (d) Show that the family of context-free languages is closed under union.
- (e) Briefly explain the various types of Turing machines.
- (f) Write a short note on Turing machine halting problem.
- (g) What are tractable and intractable problems? Explain with examples.
- (h) What are polynomial time algorithms? Give examples.

(8 × 5 = 40 marks)

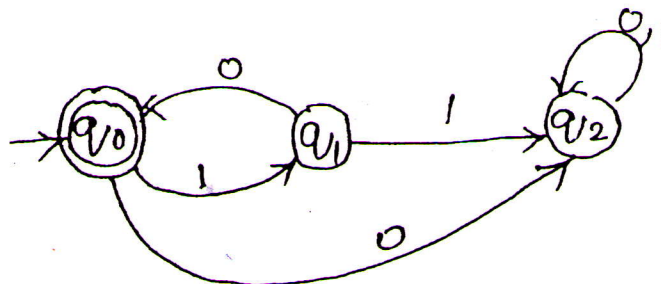
- II. (a) (i) Prove that family of regular languages is closed under intersection. (7 marks)

- (ii) Find minimal DFA for the language  $L = \{a^n b^m / n \geq 2, m \geq 1\}$ . (8 marks)

Or

- (b) (i) Let L be a language accepted by N DFA. Prove that there exists a DFA that accepts L. (9 marks)

- (ii) Convert the following N DFA into an equivalent DFA :



(6 marks)

Turn over

III. (a) (i) Construct a PDA to accept the language  $L = \{a^n b^n / n \geq 0\}$  by final state. (10 marks)

(ii) Convert the grammar  $S \rightarrow AB, A \rightarrow aA/dB/b, B \rightarrow b$  into Greibach normal form. (5 marks)

Or

(b) Construct a PDA to accept the language  $L = \{w \in \{a,b\}^x \text{ and contains equal number of } a\text{'s and } b\text{'s}\}$ . (15 marks)

IV. (a) Show that the language  $L_d$  is neither recursive nor recursively enumerable. (15 marks)

Or

(b) Design a Turing machine to recognize the language  $L = \{0^n 1^n 0^n / n \geq 1\}$ . (15 marks)

V. (a) State the CNF-satisfiability problem. Show that it is an NP-problem. (15 marks)

Or

(b) State the clique problem. Show that it reduces to the node cover decision problem. (15 marks)

[4 × 15 = 60 marks]