

(Please write your Exam Roll No.)

Exam Roll No.

END TERM EXAMINATION

SECOND SEMESTER [MCA] MAY-2010

Paper Code: MCA 104

Subject: Theory of Computation

Paper ID: 44104

Time : 3 Hours

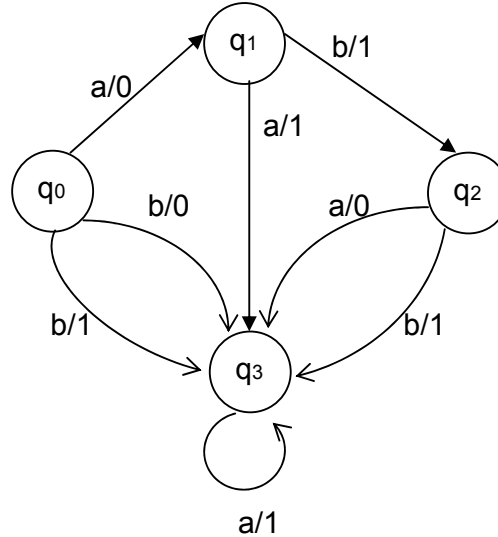
Maximum Marks : 60

Note: Question I is compulsory. Attempt one question from each unit. Assume suitable data wherever necessary

- Q 1. (a) Construct a DFA that accepts all strings on $\{0,1\}$ that have every block of five consecutive symbols contains at least two 0's. (4)
- (b) For the grammar defined below, give derivation tree for the sentential form babab. (5)
 $S \rightarrow AB, D \rightarrow a, A \rightarrow Aa, A \rightarrow bB, B \rightarrow Sb$
- (c) Show that the grammar is ambiguous (5)
 $S \rightarrow a \mid Sa \mid bSS \mid SSb \mid SbS$
- (d) What is reducibility? (2)
- (e) State Post Correspondence Problem. (2)
- (f) what is undecidability (2)

Unit-I

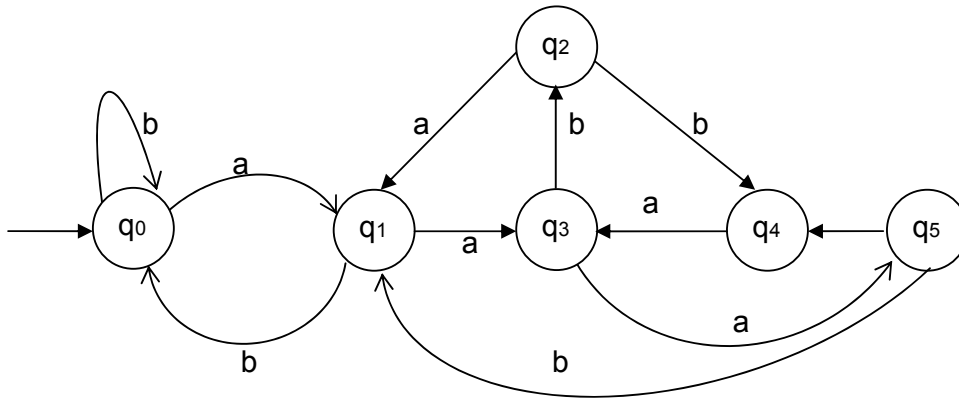
- Q 2. (a) Construct equivalent Moore machine for the given Mealy machine as shown below. (5)



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- (b) Minimize the finite automata given in the following figure and show that both given reduced are equivalent. (5)



- Q 3 (a) Construct a regular grammar G generating the regular set represented by $a^*b(a+b)^*$. (5)
(b) State and explain Pumping Lemma. (5)

Unit-II

- Q 4 (a) Draw/design Push Down Automata equivalent to the grammar and verify the result for string:- aabaaa. (5)
 $S \rightarrow aAA$
 $A \rightarrow aS \mid bS \mid a$
(b) Prove or explain that if L is a Context Free Language then there exist an equivalent Push Down Automata. (5)
- Q 5 (a) Prove that every language recognized by a PDA is Context- free. (6)
(b) Convert the following grammar into CNF. Also give the language recognized by the grammar. (4)
 $S \rightarrow AB$
 $A \rightarrow a$
 $B \rightarrow C/b$
 $C \rightarrow a$

Unit-III

- Q 6 (a) In the context of primitive functions, state the initial functions and the rules of primitive recursion and composition. (5)
(b) Differentiate between a phrase structured Grammar and a Matrix grammar. (5)
- Q 7 (a) For $\Sigma = \{a,b,c\}$, find a Post System that generates the languages $L(a^*b+ab^*c)$. (5)
(b) Find an L-system that generates $L(aa^*)$. (5)

Unit-IV

- Q 8 (a) Prove that the halting problem of Turing Machine is Not Decidable. (5)
(b) Define the Classes P & NP. (5)
- Q 9 Write short notes on:
(a) Post Correspondence Problem (2x5=10)
(b) Computational Complexity.