

29/6/22 (E)  
6/2/22

Exam.Code:0924  
Sub. Code: 6853

2062  
B.E. (Information Technology)  
Sixth Semester  
IT-603: Theory of Computation

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

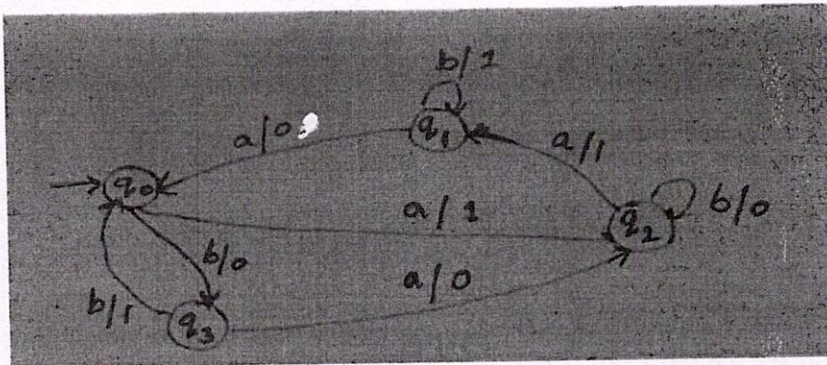
x-x-x

1. Attempt the following:-

- Differentiate between top-down and bottom-up parsing?
- What is the minimum number of states in finite automata to process a string of length  $n$ ? Justify your answer with example.
- Write regular expressions for the language  $L = \{a^n b^m \mid n \geq 4, m \leq 3\}$
- Define useless productions.
- Define ambiguity in Context free grammar. (5x2)

**Section - A**

- Explain in detail Chomsky hierarchy for formal languages. (10)
- a) Convert the following Mealy machine to corresponding Moore machine.

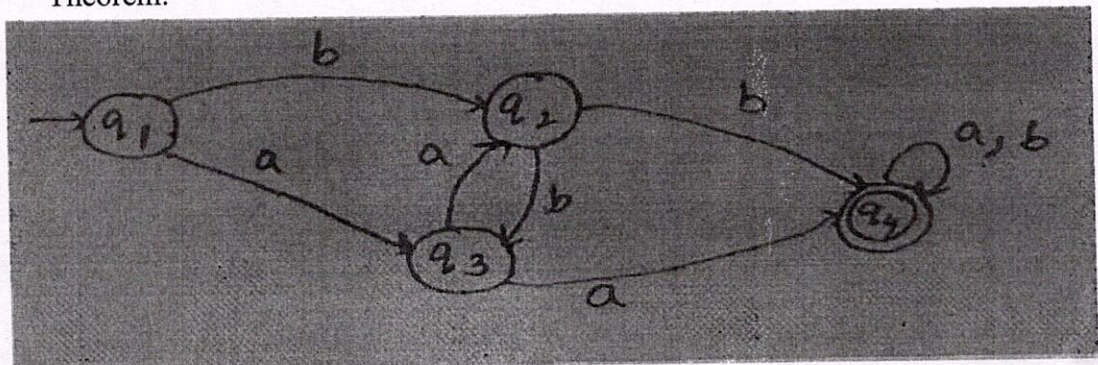


b) Convert the following NFA to DFA

$\delta/\Sigma$	a	b
$\rightarrow q_0$	{q0, q1}	{q2}
q1	{q0}	{q1}
q2	$\emptyset$	{q0, q1}

(2x5)

4. a) Find the regular expression for the following transition diagram using ARDEN'S Theorem.



(5)

P.T.O.

(2)

b) Let  $\Sigma = \{a, b\}$ , show that  $L = \{w \in \Sigma^* \mid n_a(w) < n_b(w)\}$  is not regular. (5)

**SECTION-B**

5 a) Convert the following CFG into Greibach Normal Form (5)

$S \rightarrow AB$

$A \rightarrow BS|a$

$B \rightarrow SA|b$

b) Design a PDA that accepts the following language (5)

$L = \{0^n 1^{2n} \mid n > 0\}$

6) Design a Turing machine which takes  $w_1 b w_2$  as input and gives  $w_1$  as output, where  $\Sigma = \{1\}$ . Also, simulate the moves of Turing machine for the string 11b111. (10)

7) Write notes on the following:

a) Linear-bounded Automata

b) Undecidability

(5\*2=10)

x-x-x