

Code: CS4T1

II B.Tech - II Semester – Regular Examinations - JUNE 2015

**THEORY OF COMPUTATION
(COMPUTER SCIENCE & ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

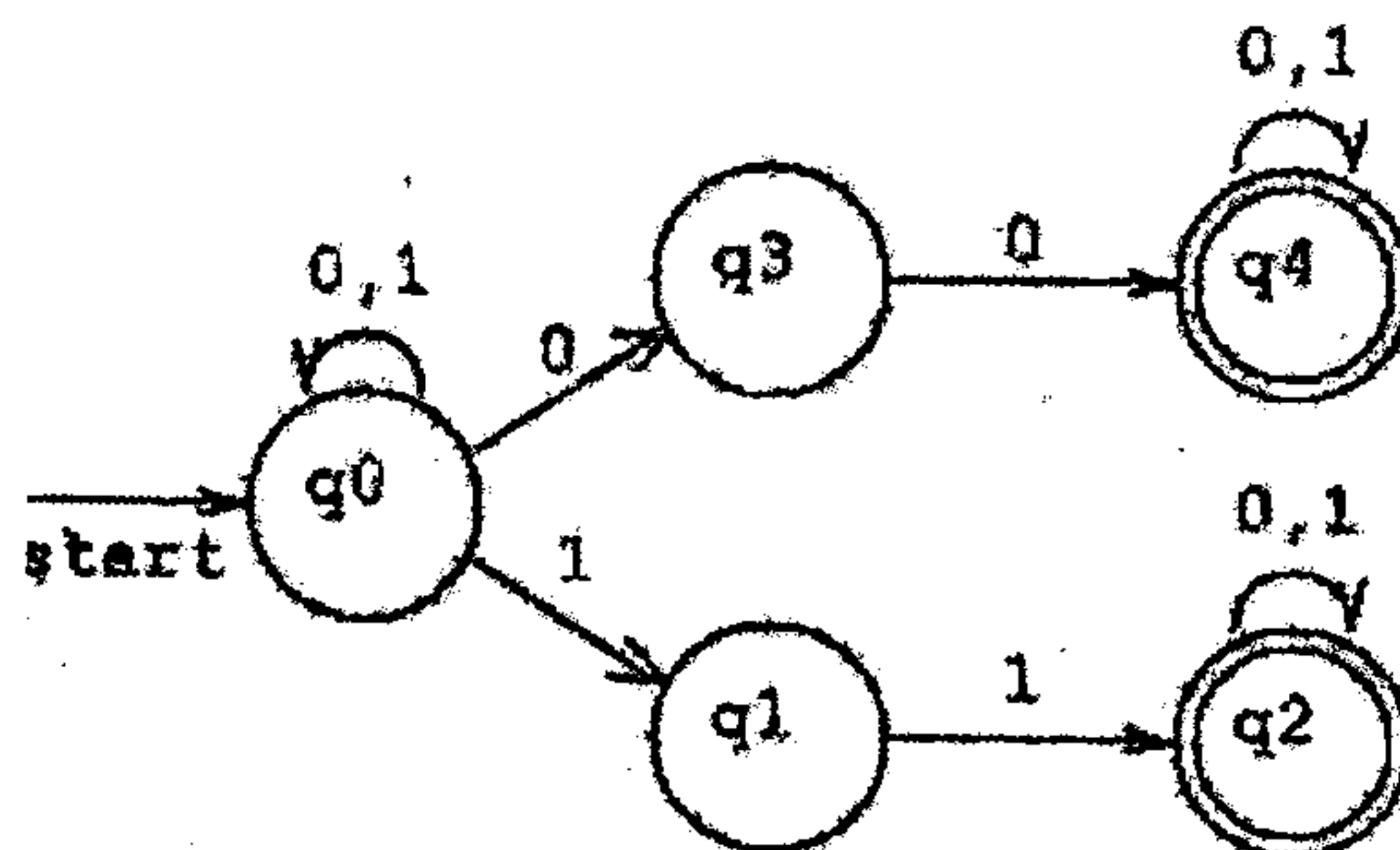
Answer any FIVE questions. All questions carry equal marks

1 a) Define set and relation. Discuss operations on sets and properties of a relation. 6 M

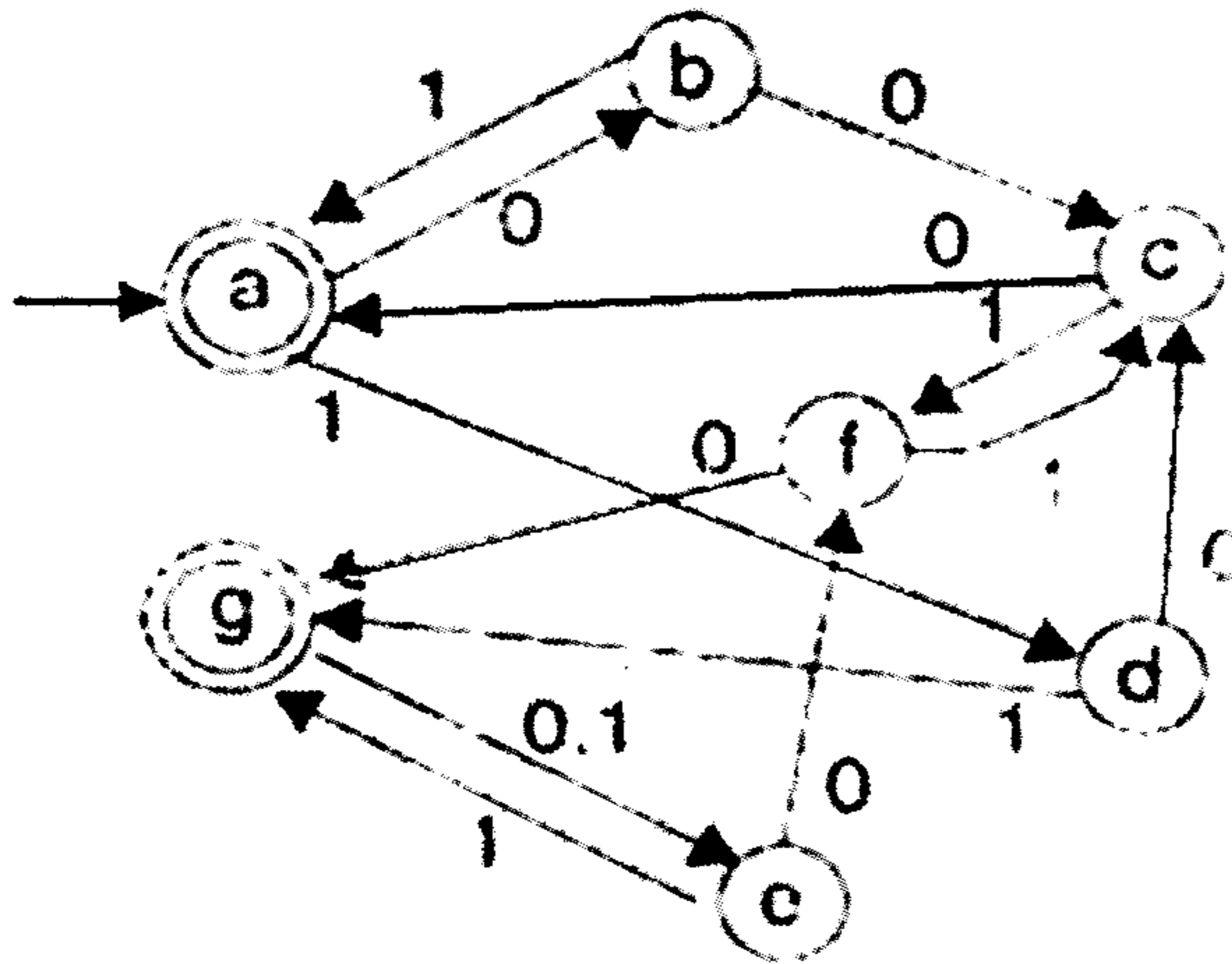
b) i) Design Deterministic Finite Automata to accept strings with a's and b's such that number of a's are divisible by 3. 4 M

ii) Design Non Deterministic Finite Automata to accept set of strings in $(0+1)^*$ such that some two 0's are separated by a string whose length is $4i$, for some $i \geq 0$. 4 M

2 a) Construct Deterministic Finite Automata equivalent to the following Non Deterministic Finite Automata 7 M



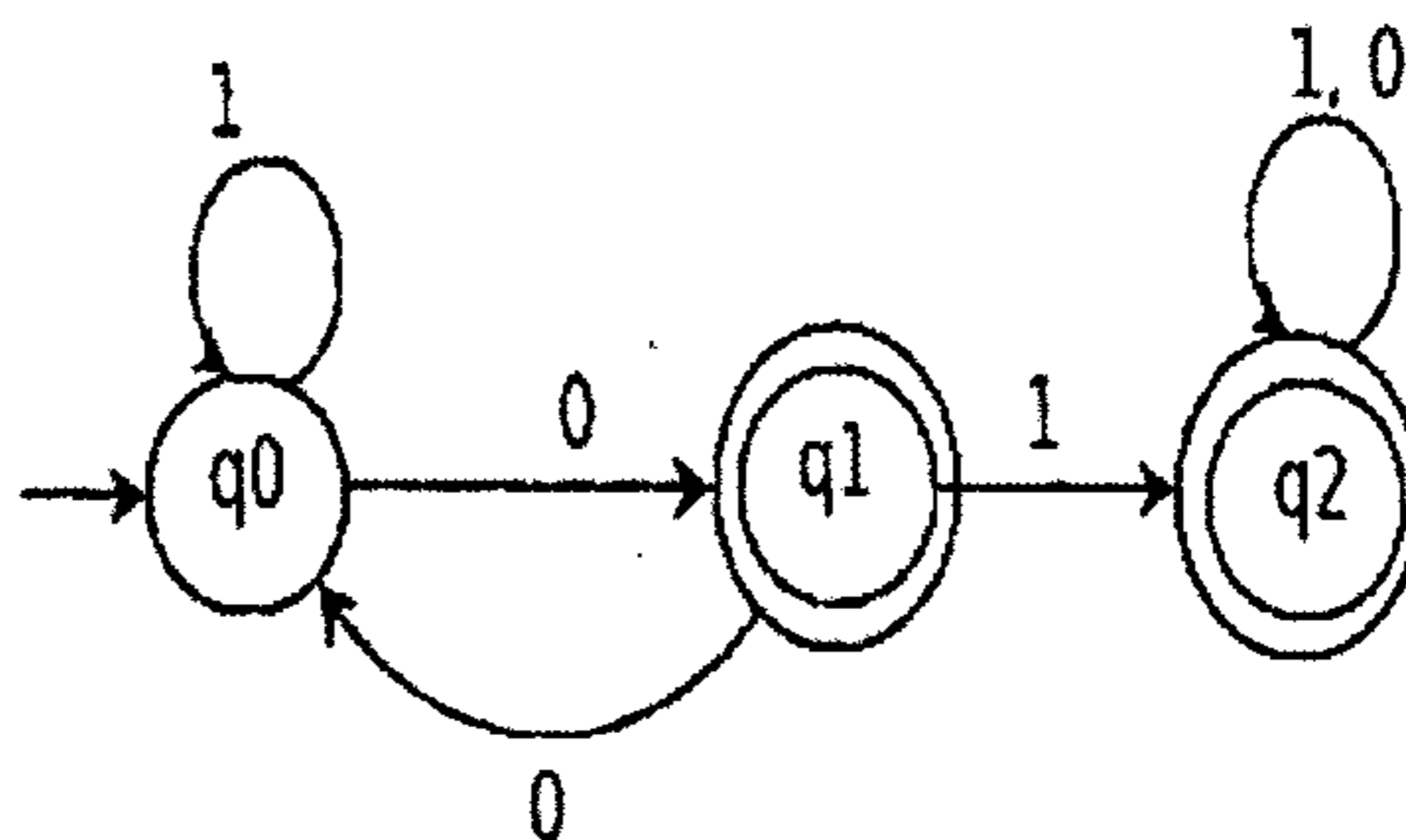
b) Construct the minimum state automata equivalent to the following Finite Automata. 7 M



3 a) Write regular expression for the following over alphabet $\{0,1\}$ 6 M

- i) All the strings with atleast two 0's.
- ii) All the strings with exactly two 0's.
- iii) All the strings with alternating 0's and 1's.

b) Write equivalent regular expression for the following Deterministic Finite Automata. 8 M



4 a) Define Grammar. Discuss Chomsky classification of languages with examples? 7 M

b) Construct an equivalent Non Deterministic Finite Automata with ϵ -transitions for the following right linear grammar

$$\begin{aligned} S &\rightarrow 0A \\ A &\rightarrow 10A \mid \epsilon \end{aligned}$$

7 M

5 a) Define Context Free Grammar. Construct a Context Free Grammar that generates the set of palindromes over alphabet $\{a,b\}$. 7 M

b) Convert the following Context Free Grammar into equivalent Chomsky Normal Form(CNF) 7 M

$$S \rightarrow aAbB \quad A \rightarrow aA \mid a \quad B \rightarrow bB \mid b$$

6 a) Define Pushdown Automata(PDA). Design PDA that accepts the language $L = \{WCW^R \mid W \text{ in } (0+1)^*\}$ by empty stack. 7 M

b) Construct an equivalent PDA for the following context free grammar. 7 M

$$S \rightarrow aAA \quad A \rightarrow aS \mid bS \mid a$$

7 a) Define Turing Machine(TM) model. Design a TM that can accept the set of all palindromes over $\{0,1\}$. 8 M

b) Explain in detail representation and types of turing machines.

6 M

8 a) Explain Universal Turing Machine(UTM)?

6 M

b) What are undecidable problems? Explain with examples.

8 M