



Reg. No. :

Name :

Sixth Semester B.Tech. Degree Examination, June 2018
(2008 Scheme)
08.603 : FORMAL LANGUAGES AND AUTOMATA THEORY (R)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions.

(10×4=40 Marks)

1. Design a DFA for a language of strings with 01 as substring.
2. Differentiate NFA and DFA.
3. Prove that the language $L = \{0^m 1^m \mid m \geq 1\}$ is not regular.
4. List the properties under which regular languages are closed.
5. Give the leftmost derivation of the string 00101 from the grammar.
 $S \rightarrow A 1B$
 $A \rightarrow 0A \mid \epsilon$
 $B \rightarrow 0B \mid 1 B \mid \epsilon$
6. What are sentential forms ?
7. Do DPDAs are equivalent to NPDA ?
8. What is meant by reducing one problem to another ?
9. Differentiate context free and context sensitive languages.
10. What is a universal turing machine ?



PART – B

Answer any one question from each Module (a or b) :

(3×20=60 Marks)

Module – I

11. a) i) Convert the NFA in Fig. 1 to a DFA and give the regular expression for the language recognized by the finite automata. 12

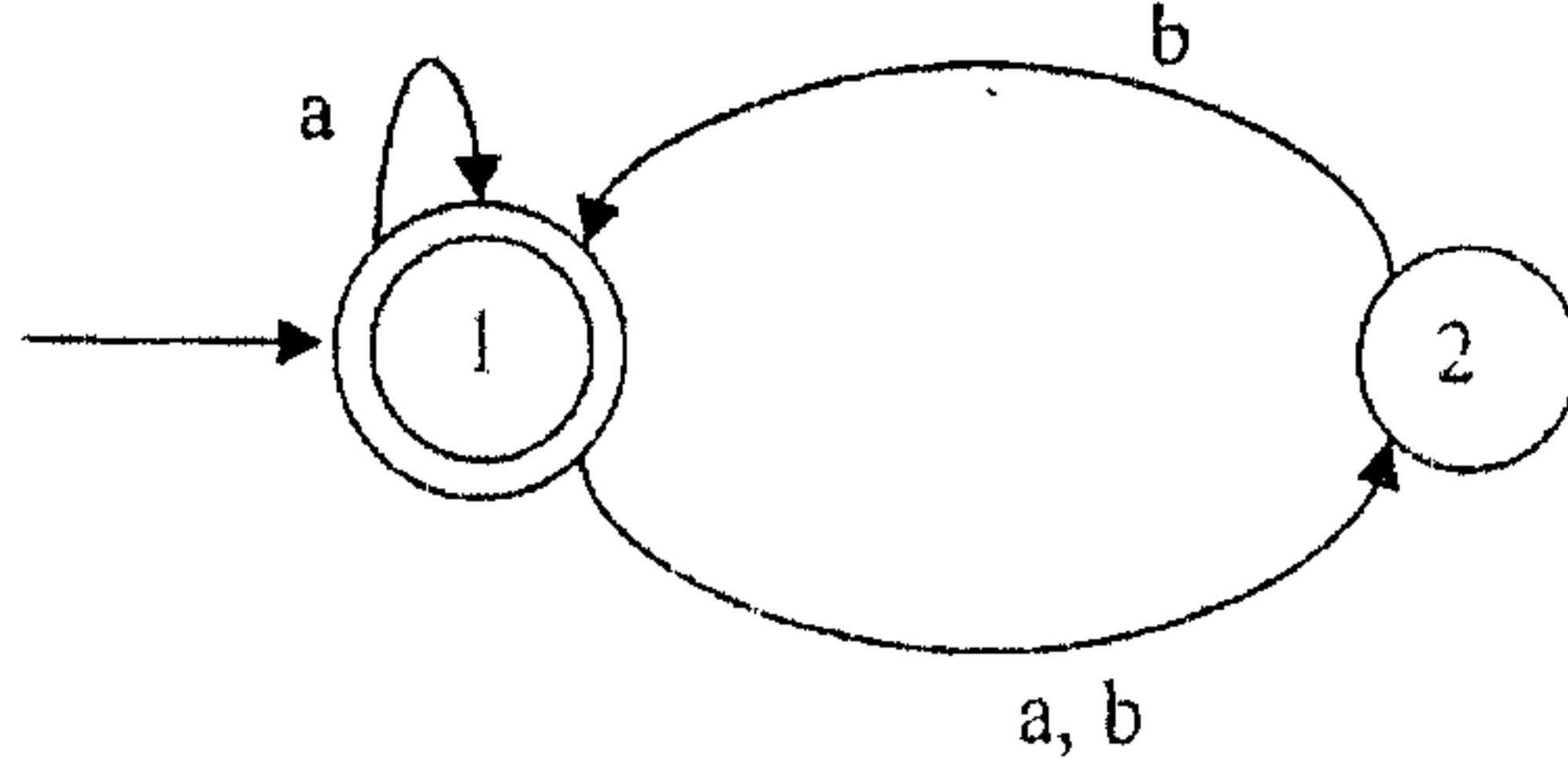


Fig. 1

- ii) Given a DFA in Fig. 2 that accepts language L, design a DFA to accept complement of L. 8

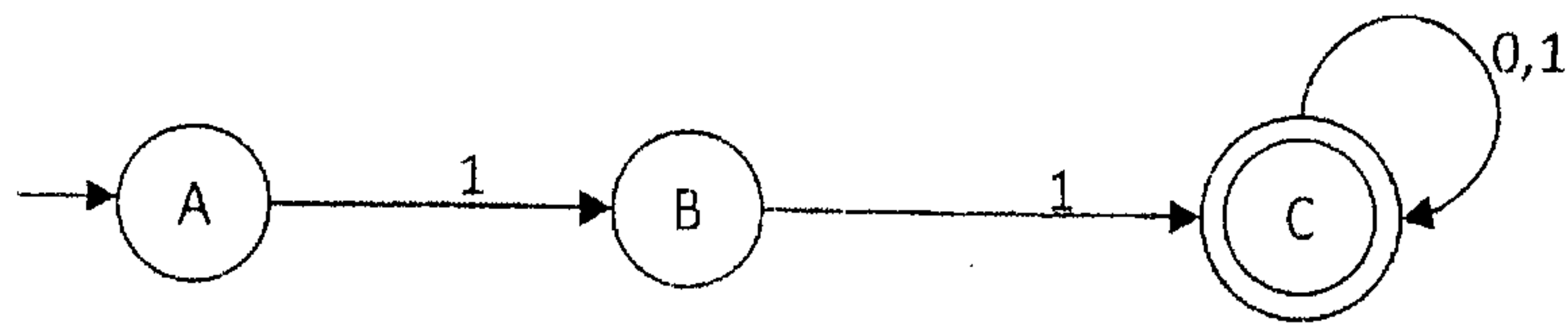


Fig. 2

- b) i) Determine whether the DFA in Fig. 3 is a minimized one. 16

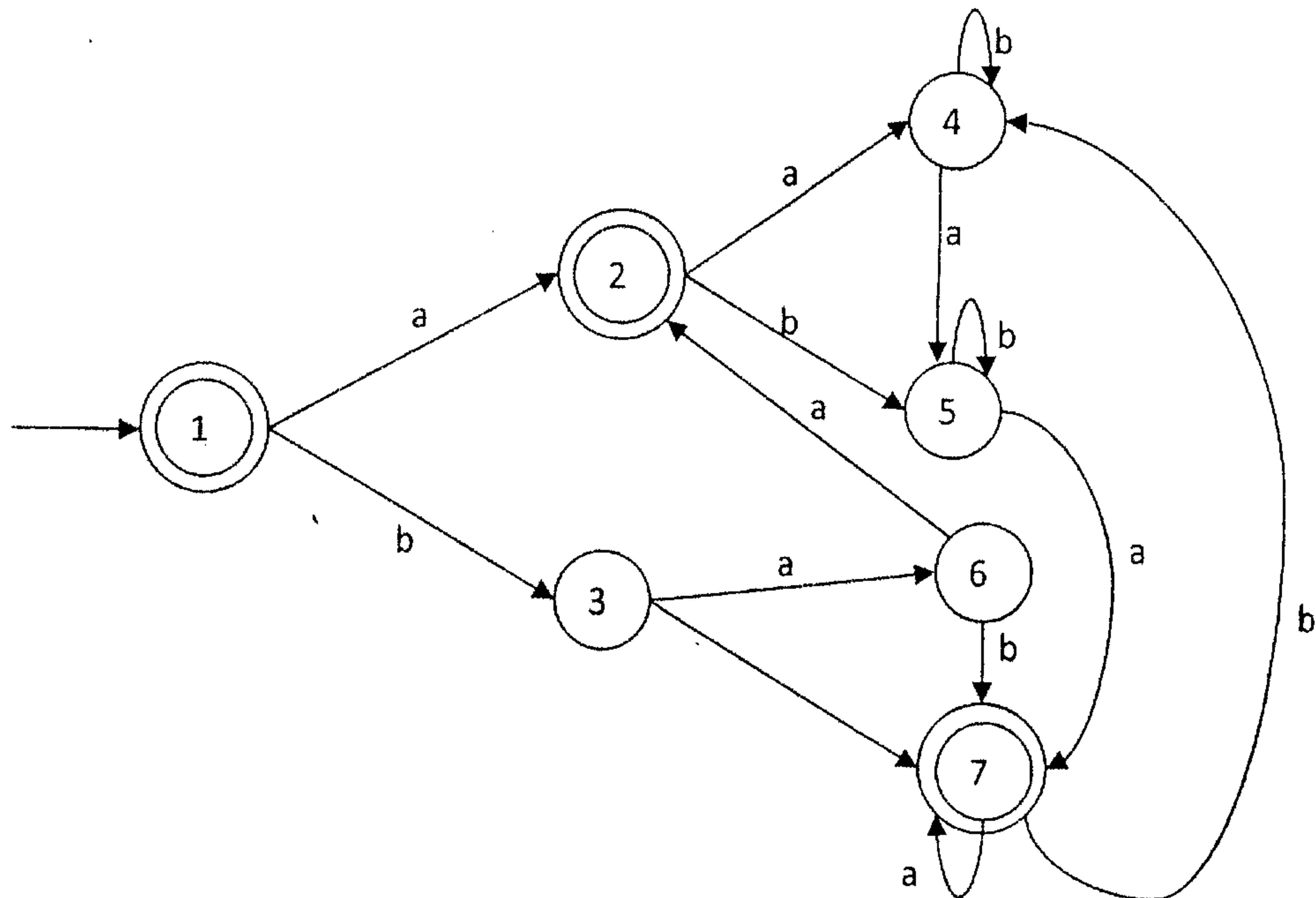


Fig. 3

- ii) Prove that the set of odd length strings over {0, 1} with middle symbol 0 is not regular. 4



Module – II

12. a) i) Draw the parse tree for the string $a*a + a$, derived from the grammar with productions and check if the grammar is ambiguous ? 8
- $E \rightarrow E + E$
 $E \rightarrow E * E$
 $E \rightarrow a$
- ii) Construct the equivalent PDA for CFG G with the productions $S \rightarrow a | aS | bSS | SSb | SbS$. 12
- b) i) Determine whether the string “aab” can be derived from CFG with productions $S \rightarrow aSb | \epsilon$. 4
- ii) Write down the decision algorithm to find out whether a given context free language is infinite. Determine whether the grammar G with the productions $S \rightarrow aSb | \epsilon$ is finite. 16

Module – III

13. a) i) Design a multi tape turing machine to multiply two numbers a and b. 12
- ii) Prove that multi tape turing machines are equivalent to single tape turing machines. 8
- b) i) Prove that Halting problem is undecidable. 16
- ii) What are recursive and recursively enumerable languages ? Give examples. 4
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