

# CS402 Theory of Automata

Final Term Examination - February 2004

Session -1

Time Allowed: 150 Minutes

Please read the following instructions carefully before attempting any question:

1. The duration of this examination is **150 Mins**.
  2. This examination is **closed book, closed notes, closed neighbors**; any one found cheating will get no grade.
  3. Do not ask any questions about the contents of this examination from anyone.
    - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
    - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
  4. Most, but not all, of the examination consists of MCQ's. Choose only one choice as your answer.
  5. You are allowed to use any Software for Diagrams and Symbols like MS Word, Math Type and Visio etc.
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Total Questions 12

## Q No. 1

Choose the right option: (2)

- A) The language EQUAL of strings with number of a's equal to number of b's,  $S = \{a, b\}$ , is regular language.
- B) The language EQUAL of strings with number of a's equal to number of b's,  $S = \{a, b\}$ , is not regular language.
- ☐ B only
  - ☐ A only

## Q No. 2

Choose the right option: (2)

- A) Concatenation of any two strings of  $L^0 (a + b)^*(aa + bb)^*(a + b)^*$  may not belong to L
- B) Concatenation of any two strings of  $L^0 (a + b)^*(aa + bb)^*(a + b)^*$  must belong to L
- ☐ B only
  - ☐ A only

## Q No. 3

Choose the right option: (2)

- A) The set of input letters and the set of output characters in a Moore machine, may not be same
- B) The set of input letters and the set of output characters in a Moore machine, must be same
- ☐ B only

- A only

**Q No. 4**

Choose the right option: (2)

- A) A sequential circuit is an example of Mealy machine
  - B) A sequential circuit can't be considered to be an example of Mealy machine
- B only
  - A only

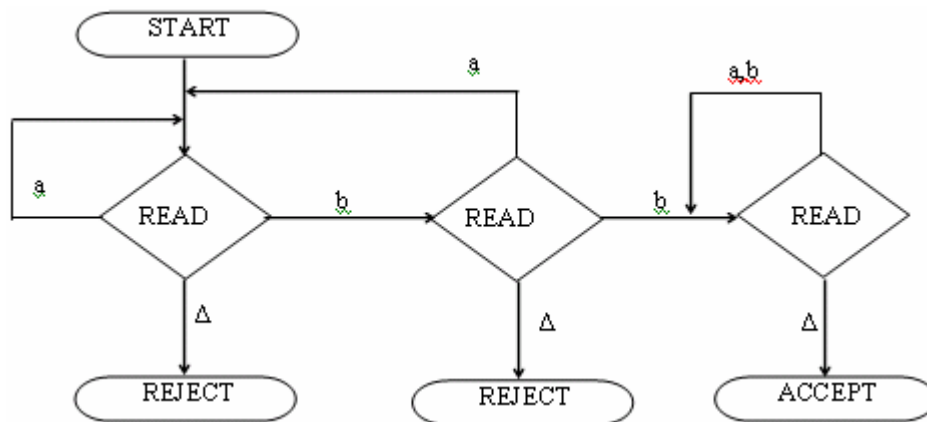
**Q No. 5**

Choose the right option: (2)

- A) There does not exist any CFG defining a regular language
  - B) There is at least one CFG defining a regular language
- B only
  - A only

**Q No. 6**

Identify the language accepted by the following PDA. Build an FA accepting the corresponding language. Write the corresponding RE as well (10)



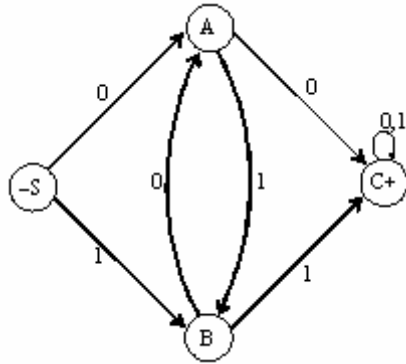
**Q No. 7**

Derive any two words of length 4, from the following CFG. (5)

$S \rightarrow aXb, X \rightarrow aX \mid bX \mid \epsilon$

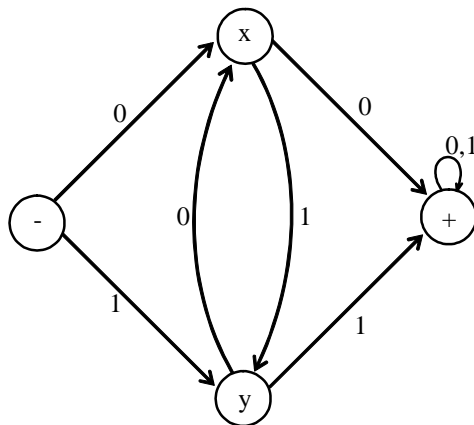
**Q No. 8**

Determine the CFG corresponding to the following FA (5)



**Q No. 9**

By searching at least 4 strings of length 4 each, determine the language accepted by the following FA (5)

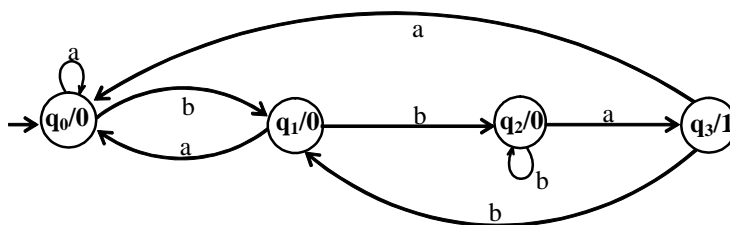


**Q No. 10**

Using complementing and incrementing technique subtract 89 from 97, (convert the numbers to the binary form first) (5)

**Q No. 11**

Construct the transition table for the following Moore Machine (5)



**Q No. 12**

Show that the pumping Lemma Version I, is satisfied by PALINDROME defined on  $S = \{a, b\}$  (5)