

MCA (Sample Paper - 1)
(SEM II) THEORY EXAMINATION
INTRODUCTION TO AUTOMATA THEORY &
FORMAL LANGUAGES (RCA-203)

Time: 3 Hours

Total Marks: 70

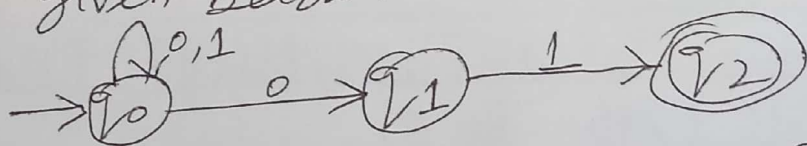
SECTION - A

- Q-(1) Attempt all questions in brief: $2 \times 7 = 14$
- What is null string (Λ or λ)?
 - Define regular expression.
 - What is Unit production?
 - What is concept of PDA?
 - Define Multitape Turing Machine.
 - Write short notes on strings.
 - Write Regular Expression for language that have set of all strings of 0's and 1's beginning with 00.

SECTION - B

- Q-(2) Attempt any three of following: $7 \times 3 = 21$
- Show that set $L = \{a^n b^n \mid n \geq 1\}$ is not regular.

- Construct DFA equivalent to NFA given below:



- If G is grammar $S \rightarrow Sbs|a$, show that G is ambiguous.
- Find language generated by a grammar $G = (\{S\}, \{a, b\}, \{S \rightarrow aSb, S \rightarrow ab\}, S)$
- Define PDA. Give an example for a language accepted by PDA by empty stack.

SECTION - C

- Q-(3.) Attempt any one part of following: $7 \times 1 = 7$
- Find a grammar in Chomsky Normal Form equivalent to $S \rightarrow aAD$; $A \rightarrow aB$ | bAB ; $B \rightarrow b$; $D \rightarrow d$.
 - Show that language $\{0^n 1^n 2^n \mid n \geq 1\}$ is not a context free language.
- Q-(4.) Attempt any one part of following: $7 \times 1 = 7$
- Design a Turing Machine to accept the language $L = \{0^n 1^n \mid n \geq 1\}$.
 - Define Post Correspondence Problem with an example.
- Q-(5.) Attempt any one part of following: $7 \times 1 = 7$
- Construct an NFA equivalent to regular expression $(0+1)(00+1)(0+1)^*$
 - Show that L_n is recursively enumerable.
- Q-(6.) Attempt any one part of following: $7 \times 1 = 7$
- Define Context-free Grammar. What is language generated by CFG? Give an example.
 - Construct grammar for language $L = \{a^n b a^n \mid n \geq 1\}$.
- Q-(7.) Attempt any one part of following: $7 \times 1 = 7$
- What is Mealy and Moore Machine. Explain with diagram.
 - State difference between DFA & NFA.