

S.No. : 455

MCA2414

No. of Printed Pages :04

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 21215

Roll
No.

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M.C.A. Examination 2018-19

(Even Semester)

THEORY OF COMPUTATION

Time : Three Hours

[Maximum Marks : 60

Note. : Attempt all sections

Section-A

1. Attempt all parts of the following : $8 \times 1 = 8$
- (a) Define finite automata.
 - (b) Define alphabets, string, power of an alphabet and concatenation of strings.
 - (c) Write the notations of DFA.
 - (d) List the operators of Regular Expressions.
 - (e) What are the closure properties of context free-languages?
 - (f) State the pumping lemma for CFL's?
 - (g) Define turing machine.

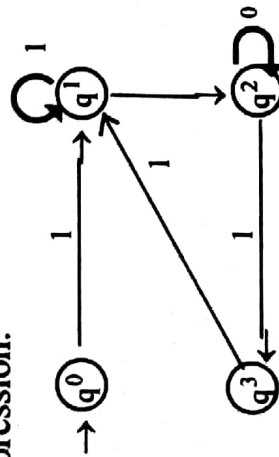
[P. T. O.

(h) List basic features of turing machine.

Section-B

2. Attempt any two parts of following. $2 \times 6 = 12$
- (a) Describe the fundamental differences in the rules for forming DFA and NFA. Are these differences important in terms of the languages they can recognise? Give a reason for your answer.

(b) Convert the following finite automata to regular expression.



Define the language too.

- (c) Construct a CFG to generate even and odd set of palindromes over alphabet $\{a, b\}$.
- (d) Prove that deterministic and non-deterministic PDA are not equivalent.

Section-C

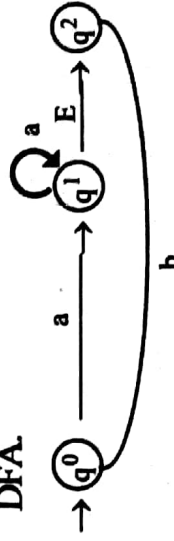
$10 \times 4 = 40$

Attempt all questions from this section.

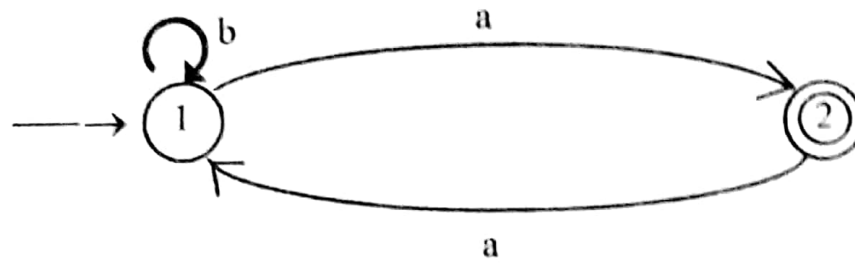
3. Attempt any two parts of following;
- (a) Check whether that string 101001 is accepted by given 2 DFA or not. Also writedown the crossing sequences for their string.

	0	1
$\rightarrow q_0$	(q_0, R)	(q_1, R)
$* q_1$	(q_1, R)	(q_2, L)
q_2	(q_2, R)	(q_2, L)

(b) Convert the following NFA with E-moves to DFA.



- (c) Write a short note on minimization of automata.
4. Attempt any two parts of following :
- (a) Compare and contract-Moore and Mealy machines. (Justify with diagram).
- (b) Construct regular expression from the following finite automata.



- (c) Discuss decision problem of regular languages.
5. Attempt any two parts of following
- (a) Define the Chomsky Hierarchy of grammar.
What are ambiguous grammar.
- (b) Define the following and give appropriate examples :
- (i) Derivation tree
- (ii) Context-free-grammar.
- (c) Discuss undecidable problems of CFL.
6. Attempt any two parts of following.
- (a) Design a PDA for checking the acceptance of string $a^n b^n c^n$.
- (b) Design a Turing machine which accepts the language which contain equal number of a's and equal number of b's and also check the undecidability of that Turing machine.
- (c) State and prove PDA=CFL.
