

[Oct 22/TE/Insem]-526

T.E. (Computer Engineering)

THEORY OF COMPUTATION

(2019 Pattern) (Semester -I) (310242)

Time : 1 Hour]

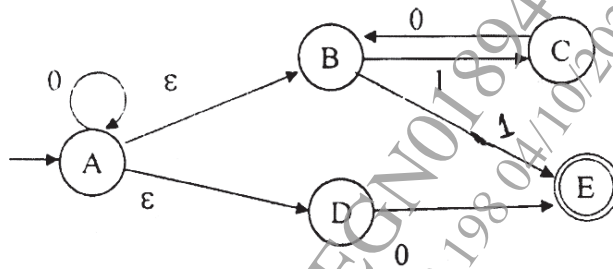
[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) Convert the given NFA- ϵ to an NFA to DFA.

[10]



b) Define Pumping Lemma and apply it to prove the following

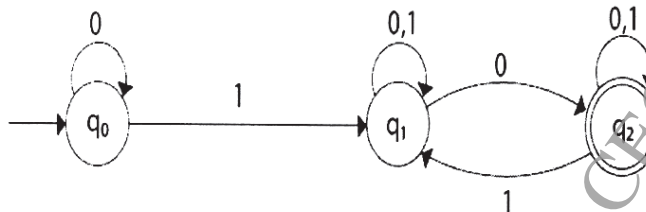
 $L = \{0^m 1^n 0^{m+n} \mid m \geq 1 \text{ and } n \geq 1\}$ is not regular

[5]

OR

Q2) a) Convert following NFA to DFA

[6]



b) Design a Mealy machine that accepts strings ending in '00' or '11'.
Convert the Mealy machine to the equivalent Moore machine [9]

P.T.O.

Q3) a) Convert the following RE to ϵ -NFA and find the ϵ -closure of all the states and corresponding DFA. $(0+1)^*. 1.(0+1)$ [9]

- b)
- The set of strings over $\{0,1\}$ that have at least one 1. [6]
 - The set of strings over $\{0,1\}$ that have at most one 1.
 - The set of all strings over $\{0,1\}$ ending with 00 and beginning with 1.

OR

Q4) a) Consider the two RE $r=0^*+1^*$, $s=01^*+10^*+1^*0+(0^*1)^*$ [8]

- i) Find the string corresponding to r but not to s .
ii) Find the string corresponding to s but not to r .
iii) Find the string corresponding to both r & s .
iv) Find the string corresponding to neither r nor s .

b) Write regular expressions for the following languages over the alphabet $\Sigma=\{a,b\}$ [7]

- i) All strings that do not end with 'aa'.
ii) The set of all strings ending neither in b nor in ba
iii) Find the shortest string that is not in the language represented by the regular expression $a^*(ab)^*b^*$.

