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SEAT No. :

PE326

[Total No. of Pages : 2

[6579]-326

T.E. (Computer Engineering)/(Computer Science) (Insem)

**THEORY OF COMPUTATION**

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

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Q1) a) Design DFA which accepts set of strings over alphabet  $\Sigma\{a, b\}$  such that [8]

- i) if it contains exactly 3 number of a' s.
- ii) if it contains at least 3 number of a' s.

b) Consider the following Mealy Machine of Construct equivalent Moore machine. [7]

Also differentiate between Moore and Mealy machine (any 4 points).



OR

Q2) a) Design Moore machine such that for every substring that ends in bab the machine will give output 1 over alphabet  $\Sigma\{0, 1\}$ . Further convert the same Moore machine into Mealy machine. [8]

b) Design a DFA which can accept a binary number divisible by 3. Explain the logic also. [7]

P.T.O.

**Q3) a)** Write a regular expression to accept following language over alphabet  $\{a,b\}^*$  [6]

- i) Strings having at least one occurrence of substring 'aaa'.
- ii) Strings starting and ending with same symbol.
- iii) Strings having even number of a's.

b) Using Arden's theorem, find regular expression. [5]



c) Draw NFA with epsilon Moves for RE =  $(a^*+b^*)$  [4]

OR

**Q4) a)** Check the equivalence of the Regular Expression. [6]

- i)  $(a^*bbb)^*a^*$  &  $a^*(bbba^*)^*$
- ii)  $((a+bb)^*aa)^*$  &  $\epsilon+(a+bb)^*aa$

b) Describe the languages accepted by the following regular expression and justify. [5]

- i)  $a(a+b)^*ab$
- ii)  $(1^*01^*01^*)^*$

c) Show that  $L = \{a^n | n \text{ is a prime}\}$  is not regular. [4]

