TCS-402

B. TECH. (CSE) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, March, 2024 FINITE AUTOMATA AND FORMAL

Time: 11/2 Hours

LANGUAGES

Maximum Marks: 50

- Note: (i) Answer all the questions by choosing any *one* of the sub-questions.
 - (ii) Each sub-question carries 10 marks.
- 1. (a) Design a minimal DFA to accept all strings in which every 'a' should never be followed by 'bb'. (CO1)

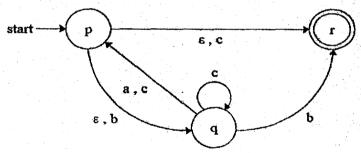
acceptable strings: abab, ab, ba not acceptable: abb, babba

OR.

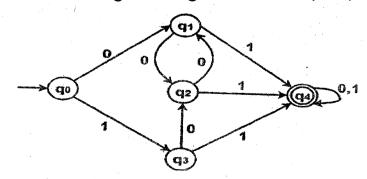
- (b) Construct a minimal DFA that accepts all the strings of a's and b's where length of string is divisible by 2 or 3. (CO1)
- 2. (a) Design a NFA for a language L = (ab U aba)* and convert the NFA to required DFA. (CO1)

OR

(b) Convert the ε -NFA to the NFA for given diagram: (CO1)



3. (a) Construct a minimum DFA equivalent to the DFA given in figure below: (CO1)



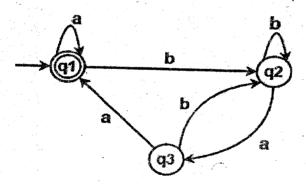
OR

- (b) Show that $L = \{WW^R/W \in (a, b)^*\}$ is not regular. (CO1)
- 4. (a) Construct a DFA with reduced states equivalent to the regular expression [ab + (b + aa)b*a]. (CO2)

OR

(b) Find the regular expression from the following automata using Arden's theorem:

(CO2)



5. (a) Design a Moore machine for all the strings of 0's and 1's which when interpreted as decimal no.'s must be divisible by 2 and leaves output as 0 otherwise 1. (CO2)

OR

(b) Construct a Moore machine equivalent to the Mealy machine M defined in table below: (CO2)

Current State	Next State			
	0	Output	1	Output
$\rightarrow Q_1$	$\overline{Q_1}$	1	Q_2	0
Q_2	Q_4	1	Q ₄	1
Q_3	Q_2	1	Q_3	1
Q ₄	Q_3	0	Q_1	1