R20 Regulation *Subject code: 3P4EE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Supplementary Examinations, June 2026

FORMAL LANGUAGES & AUTOMATA THEORY

(Common to CSE & CSE(AI&ML))

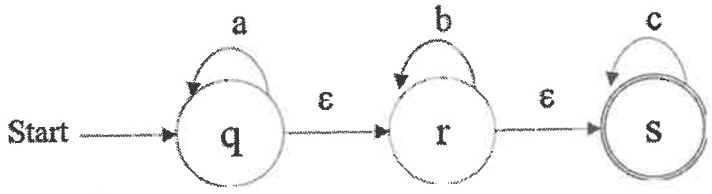
Maximum Marks: 70 Date: 17.06.2026 Duration: 3 hours

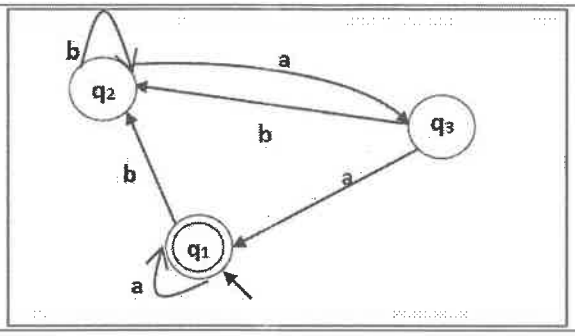
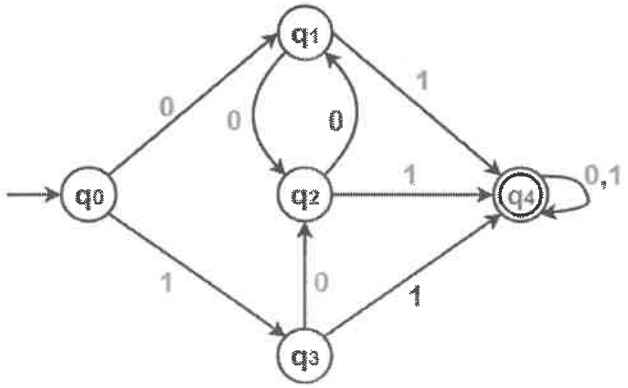
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	How the kleen's closure or closure of L can be denoted?	2M	1	L1
2	Define NFA.	2M	1	L1
3	Write the regular expression for the language in which every string will have at least one 'a' followed by at least one 'b'.	2M	2	L1
4	Name any two closure properties of regular languages.	2M	2	L1
5	Define Context free grammar.	2M	3	L1
6	Define NDPDA.	2M	3	L1
7	Write about TYPE-0 grammar.	2M	4	L1
8	What is Multi-Tape TM.	2M	4	L1
9	Define decidability and undecidability.	2M	5	L1
10	What are Class P problems?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Construct a Mealy machine that take set of all strings over alphabet {0, 1} and make 1's complement of an input bit string in binary number. b)Construct DFA to accept the language of all strings of even number of a's and number of b's over alphabet Σ={a,b}	5M 5M	1	L2
	OR			
12	Tabulate the difference between the NFA and DFA. Convert the following ε-NFA to DFA. 	10M	1	L2
13	State and prove Arden's theorem. Find out the regular expression for the following finite automata.	10M	2	L2

				
	OR			
14	Minimize the finite automata shown in figure below and show both the given and reduced one are equivalent. 	10M	2	L2
15	Design a nondeterministic PDA for {wwr/w ϵ (0+1)*}	10M	3	L2
	OR			
16	Construct a PDA which accepts i) L = {0n1m2m3n | n>=1, m>=1} ii) L = {anbm+ncm |m, n >=1}	 5M 5M	3	L2
17	(a) Convert the following grammar to CNF S → aAD, A → aB / bAB, B → b, D → d (b) Convert the following grammer to GNF S → XB | AA A → a | SA | B → b X → a	5M 5M	4	L2
	OR			
18	Define a Turing Machine. With a neat diagram explain the working of a Turing Machine for the language L={$a^n b^n c^n$/n>=1}.	10M	4	L2

19	Write a shot notes on post's correspondence problem and check the following is PCP or not. List A List B Wi Xi 00 0 001 11 1000 011	10M	5	L2
	OR			
20	What are P an NP problems? Give at least five problems that can be classified as NP problem. Justify.	10M	5	L2