Question Paper Code: R18A22CS03

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, Jan/Feb-2024

FORMAL LANGUAGES AND AUTOMATA THEORY

(COMPUTER SCIENCE AND ENGINEERING)

Time: 3 Hours **Max.Marks:75**

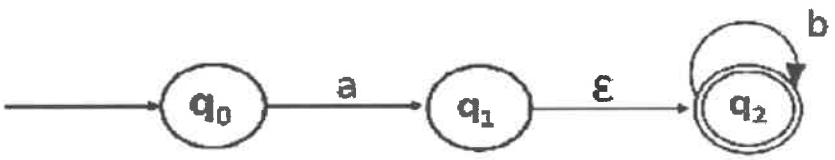
Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	Define finite automata.	CO1	L1	2M
2.	Design a DFA such that L(M)={x|x is a string of 0's and 1's and |x|>2}.	CO1	L2	3M
3.	Define mealy machine with example.	CO2	L1	2M
4.	Write the regular expression for binary numbers which are divisible by 3.	CO2	L2	3M
5.	State the pumping lemma for context free languages.	CO3	L1	2M
6.	Write a short note on closure properties of a context free languages.	CO3	L2	3M
7.	Define Deterministic Pushdown Automata.	CO4	L1	2M
8.	Define context sensitive grammar with an example.	CO4	L2	3M
9.	Define turing machine.	CO5	L1	2M
10.	Find whether the lists M = (ab, bab, bbaaa) and N = (a, ba, bab) have a Post Correspondence Solution?	CO5	L2	3M

Section B (Essay Questions)

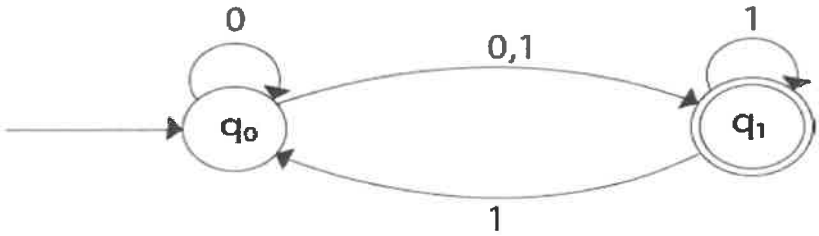
Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	Convert the following NFA with ε to NFA without ε.	CO1	L3	10M



OR

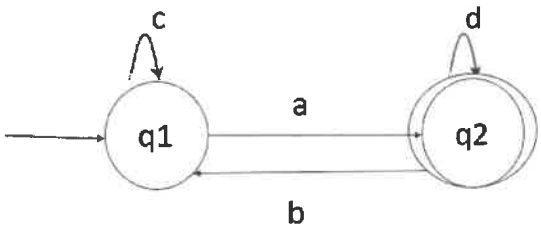
B)	Convert the following NFA to DFA.	CO1	L3	10M



12. A)	State pumping lemma for regular languages. Prove that L = {1^n0^n | n ≥ 0} is not regular.[3+7].	CO2	L3	10M

OR

B)	Convert the given finite automata to regular expression.	CO2	L3	10M



13. A)	i) Define left recursive grammar and right recursive grammar.	CO3	L3	3M
	ii) Construct a derivation tree for the string aabbabba for the CFG given by, $S \rightarrow aB \mid bA$ $A \rightarrow a \mid aS \mid bAA$ $B \rightarrow b \mid bS \mid aBB$			7M
	OR			
B)	i) Define sentential form.	CO3	L3	3M
	ii) Convert the given below CFG to CNF. $S \rightarrow a \mid aA \mid B$ $A \rightarrow aBB \mid \varepsilon$ $B \rightarrow Aa \mid b$			7M
14. A)	Construct a PDA from the following CFG. $G = (\{S, X\}, \{a, b\}, P, S)$ where the productions are – $S \rightarrow XS \mid \varepsilon$, $A \rightarrow aXb \mid Ab \mid ab$	CO4	L3	10M
	OR			
B)	Design a PDA for the following language $L=\{ 0^n1^{2n} / n\geq 1\}$.	CO4	L3	10M
15. A)	Design a turing machine for subtraction of two numbers.	CO5	L3	10M
	OR			
B)	Explain about turing machine halting problem.	CO5	L3	10M