		Register Number	2	1	C	S	R	0	1	4

VELALAR COLLEGE OF ENGINEERING AND TECHNOLOGY

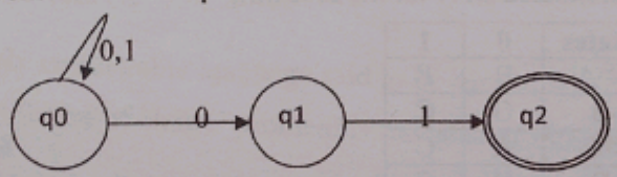
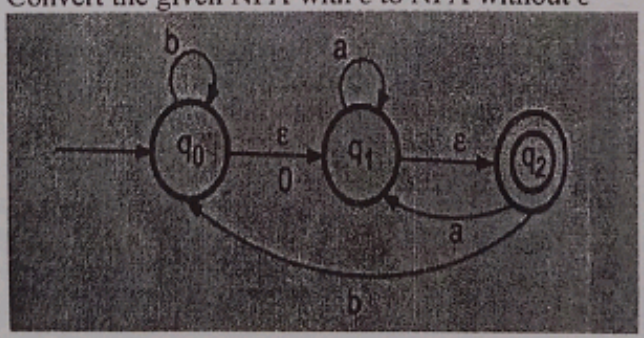
(An Autonomous Institution, Affiliated to Anna University, Chennai)

Continuous Assessment Test - I			QP Set	1	Regulations-2018 Ver.4	
Programme	B.E - CSE	Semester: 5	Max. Marks:	50	Duration	2.0 Hrs
Course Code & Title:	21CST53 & Theory of Computations					
Class: 21CS5A&B	Date:08.09.2023		Time: 11.0 am – 12.30 pm			
Knowledge Levels (KL)	K1 – Remembering		K3 – Applying		K5 – Evaluating	
	K2 - Understanding		K4 – Analysing		K6 – Creating	

Part A – 10x2 = 20 Marks

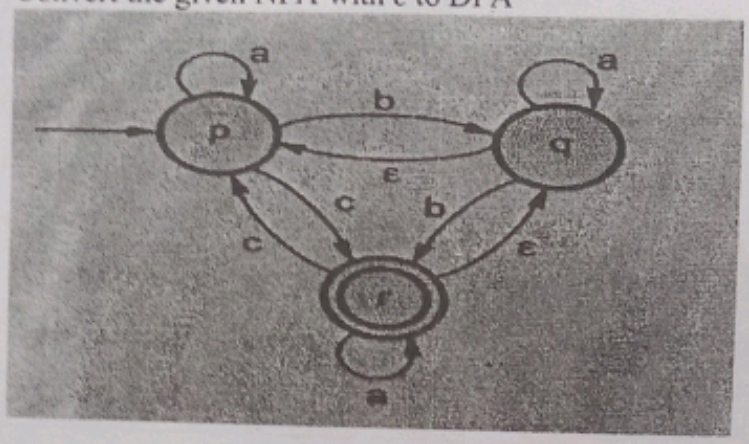
1.	Design FA to accept the string that always ends with 00.	CO1	K3
2.	Enumerate the difference between DFA and NFA.	CO1	K2
3.	What is induction principle? Give an example.	CO1	K1
4.	Define ε closure with example.	CO1	K1
5.	Prove by induction 1+2+3+….n = n(n+1)/2	CO1	K3
6.	Define Regular expression.Give an example.	CO2	K1
7.	Write Regular Expression for the language that have the set of strings over {a,b,c} containing at least one 'a' and at least one 'b'.	CO2	K3
8.	Construct regular expression which denotes a language L over the set Σ = {0} having even length of string.	CO2	K3
9.	Construct a NFA for the regular expression ba*	CO2	K3
10.	State Pumping lemma for regular sets.	CO2	K1

Part B – 2x15 = 30 Marks

No.		Question	Marks	CO	KL
11.	(i)	Construct DFA equivalent to NFA 	5	CO1	K3
	(ii)	Convert the given NFA with ε to NFA without ε 	10	CO1	K3

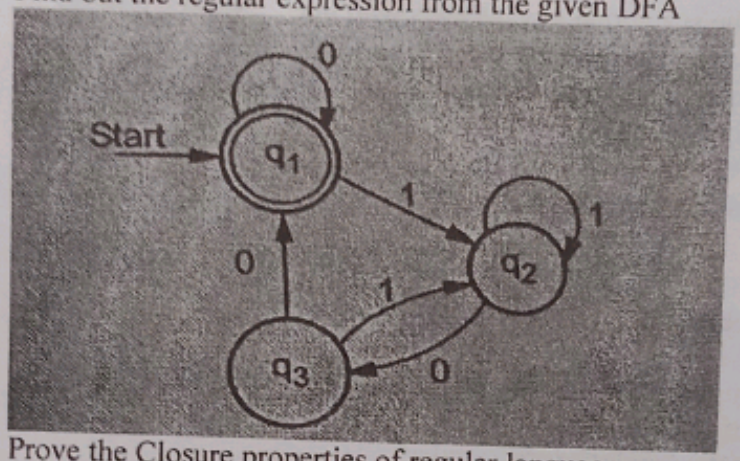
OR

11. (b) Convert the given NFA with ε to DFA



15 CO1 K3

(a) (i) Find out the regular expression from the given DFA



7 CO2 K3

12. (ii) Prove the Closure properties of regular languages 8 CO2 K2

OR

(i) Construct Σ - NFA for the given regular expression using Thompson's construction:
(i) (ab+c*)* b 7 CO2 K2

(b) (ii) Construct a minimized DFA for the following.

States	0	1
->A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

8 CO2 K3

		Register Number	2	1	C	S	R	0	5	9

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Continuous Assessment Test - II				QP Set	1	Regulations-2018 Ver.4	
Programme	B.E - CSE	Semester:	5	Max. Marks:	50	Duration	1.30 Hrs
Course Code & Title:	21CST53 & Theory of Computations						
Class: 21CS5A&B	**Date:**17.10.2023			**Time:** 02.30 pm – 04.00 pm			
Knowledge Levels (KL)	K1 – Remembering			K3 – Applying		K5 – Evaluating	
	K2 - Understanding			K4 – Analysing		K6 – Creating	

Part A – 10x2 = 20 Marks

No	Question	CO	KL
1.	What is Context free grammars? Give an example.	CO3	K1
2.	Construct a grammar for the language containing strings of atleast two a's	CO3	K2
3.	What is parse tree? Construct the derivation tree for the string "aabbabba" from the CFG given by S -> aB/bA A-> a/aS/bAA B-> b/bS/Abb	CO3	K3
4.	Define ambiguity give example	CO3	K1
5.	Write the condition of CNF & GNF.	CO3	K2
6.	Define pushdown automata.	CO4	K1
7.	What are the different types of languages accepted by a pushdown automata and define them	CO4	K1
8.	Convert the following CFG to a PDA: S -> aS / bS / a / b	CO4	K3
9.	Compare NFA and PDA	CO4	K2
10.	Is it true that non-deterministic PDA is more powerful than that of deterministic PDA? Justify your answer.	CO4	K2

Part B – 2x15 = 30 Marks

No.		Question	Marks	CO	KL
11.	(a) (i)	Consider the grammar S-> a | AAB A -> ab | Ab | ε B ->aba | ε 1) Eliminate useless symbols 2) Eliminate ε Productions 3) Eliminate unit production 4) Find Chomsky normal form.	7	CO3	K3
	(ii)	Consider the grammar S-> ABA A -> aA | ε B -> bB | ε Convert the given CFG to Greibach Normal Form.	8	CO3	K3

OR

(b)	(i)	Optimize the CFG by reducing the grammar S-> A| 0C1 A->B|01|10 C-> ε|CD	10	CO3	K3
11.					
	(ii)	Show that the grammar S->a | abSb | aAb, a-> bS | aAAb is ambiguous	5	C03	K3
(a)	(i)	Design PDA to accept the language L= $\{a^m b^m c^n$ / m, n >=1} by empty stack and by final state.	8	CO4	K3
	(ii)	Design PDA to accept the language L= $\{a^n b^{2n}$ / n >=1} by empty stack and by final state.	7	CO4	K3

OR

12.		Obtain CFG for the PDA P={(qo,q1),(0,1),(A,Z), δ,qo,Z) to a CFG,if δ is given by			
(b)		δ (qo,0,Z)=(q0,AZ) δ (qo,0,A)=(q0,AA) δ (qo,1,A)=(q1, ε) δ (q1,1,A)=(q1, ε) δ (q1, ε,A)=(q1, ε) δ (q1, ε,Z)=(q1, ε)	15	CO4	K3

		Register Number	2	1	C	S	R	O	1	4

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Continuous Assessment Test - III				QP Set	1	Regulations-2018 Ver.4	
Programme	B.E - CSE	Semester:	5	Max. Marks:	50	Duration	1.30 Hrs
Course Code & Title:	21CST53 & Thoery of computations						
Class: 21CS5A&B	**Date**:16.11.2023			**Time:** 11.00 am – 12.30 pm			

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 – Evaluating
	K2 - Understanding	K4 – Analysing	K6 – Creating

Part – A, Answer ALL Questions. 10 x 2 = 20 marks

No.	Question	KL	CO
1.	When a problem is said to be decidable and give an example of undecidable problem.	K2	CO5
2.	Show that the union of recursive languages is recursive.	K1	CO5
3.	Differentiate between recursive and recursively enumerable languages.	K2	CO5
4.	When do you say a problem is NP-hard?	K2	CO5
5.	Is travelling salesman problem a NP or P problem? Justify.	K2	CO5
6.	What is Post's correspondence problem?	K1	CO5
7.	What do you mean by universal turing machine?	K1	CO5
8.	Define the classes P and NP.	K1	CO5
9.	When a recursively enumerable language said to be recursive?	K2	CO5
10.	Identify whether 'Tower of Hanoi' problem is tractable or intractable. Justify your answer.	K2	CO5

PART - B 2 x 15 = 30

			Marks	KL	CO
11.	(a)	i)List the operations on turing machine ii)Prove that Lu is RE but not recursive. iii)State and prove Rice's theorem.	15	K2	CO5
		(OR)			
	(b)	Explain in detail about the properties of recursive and recursive enumerable languages.	15	K2	CO5

12. (a) (i) Let $\Sigma = \{0,1\}$ Let A and B be the lists of 3 strings each defined as given below — 5 — K3

i	List A(w_i)	List B(X_i)
1	1	111
2	10111	10
3	0	10

Does this PCP have a solution?

(ii) Let A = {001,0011,11,101} and B = {01,111,111,010}. Does a pair(A,B) have post correspondence solution? Does the pair (A,B) have modified posts correspondence (MPC) solution? — 10 — K3

(OR)

12. (b) Describe in detail about P and NP problems with an example. — 15 — K2

9/11/23
Faculty Incharge
K. MOHANA PRIYA

HOD 9/11/23

Approved

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