Total No. of Printed Pages: 3

PRN No.	

PAPER CODE	U325-243 (ESE)

(AY:2024-25) May 2025 (ENDSEM) EXAM

TY (SEMESTER - II)

COURSE NAME: THEORY OF COMPUTATION **Branch: CSE (AI)** **COURSE CODE: CAUA32203**

TY (Pattern 2020R1)

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

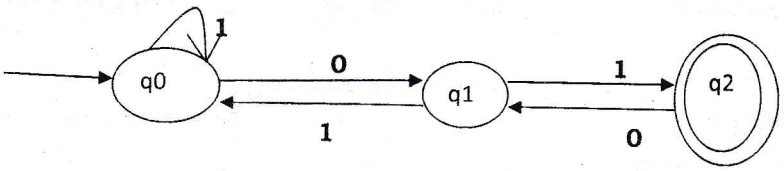
1) **Figures to the right indicate full marks.Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two subquestioneach from Questions 1 and 2**
4) **Solve any one subquestion (2 marks) from Questions 3 ,4 ,5 and 6 and sub question of 4 marks is compulsory from questions 3,4,5,and 6**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) solve to Convert the following Mealy machine into its equivalent Moore machine	[4]	CO1	3

Present State	I/P =0		I/P =1	
	Next State	O/P	Next State	O/P
->A	C	0	B	0
B	A	1	D	0
C	B	1	A	1
D	D	1	C	0

	b) Construct a Finite Automata which accept set strings where the number of 0's in every string is 1) Multiple of three over alphabet {0,1} 2) Multiple of four over alphabet {0,1}	[4]	CO1	3
	c) Modify the following finite Automata to Minimum state finite Automata	[4]	CO1	3

State/∑	0	1
→ q0	q1	q5
q1	q6	q2
q2	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q6
q6	q6	Q4
q7	q6	Q2

Q2	a) Construct epsilon NFA for the following Regular Expressions. i) (1+0)*(00+11+10) ii) 1(01+10)*+0(11+10)*	[4]	CO2	3
	b) Construct a regular expression corresponding to the automata given below –  	[4]	CO2	3
	c) Solve to Prove that (1+00*1) + (1+00*1)(0+10*1)* (0+10*1) = 0*1(0+10*1)*	[4]	CO2	3
Q3	a) Illustrate and show that G is ambiguious If G is the grammar S->SbS | a OR	[2]	CO3	2
	b) Examine the string "aabbabba" for leftmost derivation using a CFG given by S-> aB |bA S-> a| aS |bAA S-> b| aS |aBB	[2]	CO3	2
	c) Solve and Reduce the following grammar G to CNF. G is S->aAD, A-> aB | bAB , B->b , D->d	[4]	CO3	3
Q4	a) Compare between FA and PDA. OR	[2]	CO4	2
	b) Explain 7 tuple's definition of Push down automata.	[2]	CO4	2
	c) Construct a PDA for accepting a language $L=\{a^n b^m c^n \mid m,n>= 1\}$	[4]	CO4	3
Q.5	a) Distinguish Multihead and Multitape Turing machine. OR	[2]	CO5	2
	b) Trace the required field of instantaneous description of Turing machine.	[2]	CO5	2

	c) Construct a Turing Machine that accepts $\{0^n 1^n \mid n>=1 \}$	[4]	CO5	3
Q.6	a) Discuss when a language L is recursively enumerable. OR	[2]	CO6	2
	b) Summarize NP hard and NP completeness problem	[2]	CO6	2
	c) Solve by Considering the following instance of the Post Correspondence Problem List A : { 1, 110, 0111} List B : { 111, 001, 11} Determine whether there exists a solution (a sequence of indices) that makes the concatenated strings from List A and List B equal. Justify your answer briefly.	[4]	CO6	3

NOTE: [BT Level – 1. Remember 2. Understand 3. Apply 4. Analyze 5. Evaluate 6. Create]