Total No. of Printed Pages: 02

PRN No.	

PAPER CODE	U225-233(ESE)

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

SY B.TECH (SEMESTER - II)

COURSE NAME: Theory of Componutation | **Branch: Computer Engineering** | **COURSE CODE: CS22233**

SY (Pattern 2023)

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 sub question each from Questions 1 , 2 ,3 and 4**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a)Build the corresponding DFA for following NFA. where M=({q0,q1},{0,1},∂,q0,{q1}) be an NFA with ∂(q0,0)={q1} ∂(q0,1)={q0,q1}, ∂(q1,1)={q0,q1}	[5]	1	Apply
	b)Build a Moore machine for 1's complement of binary number and Mealy machine for 2's complement of a given binary number.	[5]	1	Apply
	c)i)Design a Deterministic finite automata for regular expression (111+000)*0 ii)Construct a regular expression over ∑0,1 for all strings that do not end with 01.	[5]	1	Apply
Q2	a)Simplify the following grammar S→AB A→aAA|€ B→bBB|€	[5]	2	Analyze
	b)Simplify the following grammar in CNF form S→Aba S→aab B→Ac	[5]	2	Analyze
	c) Check whether the following grammar is Ambiguous or not by developing parse tree of any string belongs to the same . S→aB|ab A→aAB|a B→ABb|b	[5]	2	Analyze

Q3	a) Construct a PDA to accept the language of odd-length palindromes over {a,b} by null stack. Describe how the PDA uses the stack to verify the palindrome structure.	[5]	3	Apply
	b)Construct a Push Down Automata accepting balanced parenthesis involving any 2 types of parenthesis.ex.{ [ ] }	[5]	3	Apply
	c)Solve using instantaneous description method for the PDA that accepts L= $\{a^n b^n, n>0\}$ Demonstrate how the stack changes at each step for the input string "aabb "	[5]	3	Apply
Q4	a)Design a Turing Machine that accepts strings over {a,b} with an even number of a's. The machine should ignore b^s and halt only when the condition is met.	[5]	4	Apply
	b) Design a Turing Machine that computes the sum of two unary numbers separated by a C, e.g., input 000C000 should produce 000000. Explain the transitions and logic used.	[5]	4	Apply
	c)Design a Turing Machine for 1's complement considering any suitable string.	[5]	4	Apply