Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 19 / 12/ 2025 **Time: 01:00pm – 04:00pm**

School: PSCS &IS	**Program:** B.Tech-CSE	
Course Code:CSE2266	**Course Name:** Theory of Computation	
Semester: 5th	**Max Marks**: 100	**Weightage**: 50%

CO – Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**24**	**26**	**12**	**12**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Explain basic structure of Automata	**2 Marks**	**L2**	**CO1**
2.	Define language with an example.	**2 Marks**	**L2**	**CO1**
3.	Explain reversal and length of the string with example	**2 Marks**	**L2**	**CO1**
4.	Define E-Closure in ENFA with an example	**2 Marks**	**L2**	**CO2**
5.	List all basic building blocks of Thomson's methods	**2 Marks**	**L2**	**CO2**
6.	What you mean by sentinel form in context of parse tree	**2 Marks**	**L2**	**CO3**
7.	Illustrate ambiguity in grammar with an example	**2 Marks**	**L2**	**CO3**
8.	Illustrate parsing with an example	**2 Marks**	**L2**	**CO3**
9.	Chomsky's hierarchy of Languages	**2 Marks**	**L2**	**CO4**
10.	Explain the 7 tuples of Turing machine	**2 Marks**	**L2**	**CO5**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Let A= {p, q, pq} B= {1, 11} and C= {x, xy, yx}, Find the following operations. 1. Concatenation of AB. 2. AA^R 3. C^* 4. B^+ 5. B^3	**10 Marks**	**L3**	**CO1**
	b.	Explain about the following with examples. 1) Alphabet 2) Strings 3) Empty Strings 4) Length of the string **5)** Concatenation of two strings	**10 Marks**	**L2**	**CO1**
		Or			
12.	**a.**	Let P= {x, y, xy} Q= {00, 11} and R= {a, aa, bb}, Find the following operations. 1. Concatenation of PR. 2. $P P^R$ 3. R^3 6. Prefixes (00 a a b b) 7. Sufixes (aa bb 11 xy)	**10 Marks**	**L3**	**CO1**
	b.	Explain the following Definitions with examples. 1. Language 2. Grammar 3. Tuple representation of Finite Automata 4. Transition table 5. Kleene * and Kleene +	**10 Marks**	**L2**	**CO1**

13.	**a.**	Construct the epsilon NFA using Thomson construction for the given regular expression 0*1*(1+1)* . Show all the steps in construction.	**10 Marks**	**L3**	**CO 2**

	b.	Minimize the following DFA 		0	1
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→A	A	B
B	C	E
*C	E	C
D	A	B
E	E	A | 	10 Marks	**L3**	**CO 2**
		Or			
14.	**a.**	Construct a DFA accepting the even binary number. Check acceptance of the strings 011101 and 110010 .	**10 Marks**	**L3**	**CO 2**
	b.	Convert the following NFA into DFA 		0	1
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→a	{a,b}	{c}
B	{d}	{b,c}
*c	{a}	{c}
D	{a,c}	{b} | 	**10 Marks**	**L3**	**CO 2**

15.	**a.**	Consider the following grammar, S -> 0B | 1A A -> 0S | 1AA | 0 B -> 1S | 1BB | 1 Find the Left most Derivation, Right most Derivation and Parse Tree for the string 00110110.	**10 Marks**	**L3**	**CO3**
	b.	Apply Pumping Lemma theorem to prove L={0^n1^n ,n>0} is regular language or not	**10 Marks**	**L3**	**CO3**
		Or			
16.	**a.**	Simplify the given grammar by removing Unit Productions, Null Productions and Useless production rules from the following CFG S → ASB | XY A → aAS | a | ε B → SbS | A | bb | CD	**10 Marks**	**L3**	**CO3**
	b.	Apply Pumping Lemma theorem to prove L={ww^R ,w{0,1}*} is not regular language ?	**10 Marks**	**L3**	**CO3**

17.	**a.**	Construct a PDA for the language L={ww^R| w contains a's and b's} also write the instantaneous descriptor for the given string aabbaa	**10 Marks**	**L3**	**CO4**

	b.	Design a Turing machine to find complement of L={w/wϵ(a,b)*}	**10 Marks**	**L3**	**CO5**
Or					
18.	**a.**	Construct a PDA for the language L={wcw^R| w contains 0's and 1's} also write the instantaneous descriptor for the given string 101c101.	**10 Marks**	**L3**	**CO4**
	b.	Design a Turing machine to find sum of unary language. Show addition of 2+2 in the designed machine.	**10 Marks**	**L3**	**CO5**