Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

MAKE UP EXAMINATIONS DECEMBER 2025

Date: 29 – 12- 2025 **Time:** 09:30am – 12:30pm

School: SOCSE	**Program:** B. Tech	
Course Code: CSE2018	**Course Name:** Theory of Computation	
Semester: MK	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4
Marks	26	26	24	24

Instructions:

(i) Read all questions carefully and answer accordingly.

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

Part A

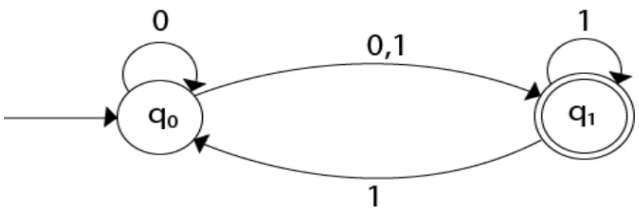
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

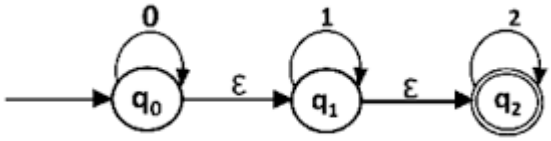
1.	Explain hierarchy of Automata in terms of representation power	**2 Marks**	**L2**	**CO1**
2.	Define language with an example.	**2 Marks**	**L2**	**CO1**
3.	Explain reversal and length of the string with example	**2 Marks**	**L2**	**CO1**
4.	State pumping lemma theorem for regular languages	**2 Marks**	**L2**	**CO2**
5.	Define Context Free Grammar with example	**2 Marks**	**L2**	**CO2**
6.	Differentiate NFA and DFA	**2 Marks**	**L2**	**CO2**
7.	Define left recursion in grammar the suitable example	**2 Marks**	**L2**	**CO3**
8.	Define Leftmost derivation and rightmost derivation	**2 Marks**	**L2**	**CO3**
9.	Differentiate Turing machine and PDA	**2 Marks**	**L2**	**CO4**
10.	Explain the 7 tuples of Turing machine	**2 Marks**	**L2**	**CO4**

Part B

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

11.	**a.**	**Let L1= {a, b} L2= {00, 11} and L3= {x, y, z}, Find the following operations.** **1. Concatenation of L1L2.** **2. L2 $L2^R$** **3. $L3^*$** **4. $L2^+$** **5. $L3^3$**	**10 Marks**	**L3**	**CO1**
	b.	**List out the applications of** **1. Finite Automata** **2. Pushdown Automata** **3. Turing Machine**	**10 Marks**	**L2**	**CO1**
		Or			
12.	**a.**	**Let $L=\{x,y\}^2$ and $M=\{0,1\}^2$. Generate the language X Such that string in $X=\{w/w \in LM\}$, show any three operations possible on the resultant language.**	**10 Marks**	**L2**	**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**

13.	**a.**	**Convert the Regular Expression (b + (ab))* a into NFA with ε using Thompson's rule.**	**10 Marks**	**L3**	**CO2**
	b.	**Construct DFA to accept the strings with a's and b's such that the string end with 'baa'.**	**10 Marks**	**L3**	**CO2**
		Or			
14.	**a.**	**Convert the given NFA into its equivalent DFA.** 	**10 Marks**	**L3**	**CO2**

	b.	**Convert the given NFA into its equivalent DFA.**  	**10 Marks**	**L3**	**CO2**

15.	**a.**	**Consider the following grammar,** **S -> aB | bA** **A -> aS | bAA | a** **B -> bS | aBB | b** **Find the Left most Derivation, Right most Derivation and Parse Tree for the string aabbabba.**	**10 Marks**	**L3**	**CO3**
	b.	**Minimize the given grammer** **S → ASB** **A → aAS | a | ε** **B → SbS | A | bb**	**10 Marks**	**L3**	**CO3**
		Or			
16.	**a.**	**Consider the following grammar,** **E-> E+T | T** **T-> T * F | F** **F-> (E) | id** **Find the Left most Derivation, Right most Derivation and Parse Tree for the string id + (id * id).**	**10 Marks**	**L3**	**CO3**
	b.	**Prove using pumping Lemma that $L=\{a^nb^n/n>0\}$ is regular or not**	**10 Marks**	**L3**	**CO3**

17.	**a.**	**Design PDA for $L=\{a^nb^n/n>0\}$ with final state design**	**10 Marks**	**L3**	**CO3**
	b.	**Design a Turing Machine to perform twos complement of binary number.**	**10 Marks**	**L3**	**CO4**
		Or			
18.	**a.**	**Design PDA for $L=\{PP^R/P\epsilon(x,y)^+\}$ with final state acceptance**	**10 Marks**	**L3**	**CO4**
	b.	**Design a Turing Machine to accept $L=\{a^nb^n/n>0\}$ and represent in all three forms**	**10 Marks**	**L3**	**CO4**