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PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – May / June 2026

Date: 20- 05-2026

Time:01:00pm – 04:00pm

School: SOCSE AND SOIS	Program: B.Tech	
Course Code: CSE2266	Course Name: Theory of Computation	
Semester: VI	Max Marks: 100	Weightage: 50%

CO – Levels	C01	C02	C03	C04	C05
Marks	22	20	22	18	18

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	C01
2.	Define language with an example.	2 Marks	L2	C01
3.	Explain reversal and length of the string with example	2 Marks	L2	C01
4.	Define E-Closure in ENFA with an example	2 Marks	L2	C02
5.	List all basic building blocks of Thomson's methods	2 Marks	L2	C02
6.	What you mean by sentinel form in context of parse tree	2 Marks	L2	C03
7.	Illustrate ambiguity in grammar with an example	2 Marks	L2	C03
8.	Illustrate parsing with an example	2 Marks	L2	C03
9.	Chomsky's hierarchy of Languages	2 Marks	L2	C04
10.	Explain the 7 tuples of Turing machine	2 Marks	L2	C05

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	8 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	8 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. Suffixes (aa bb 11 xy)	8 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 +	8 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.	8 Marks	L3	CO2

	b.	Minimize the following DFA	8 Marks	L3	CO2																		
		<table><tr><td></td><td>0</td><td>1</td></tr><tr><td>→A</td><td>A</td><td>B</td></tr><tr><td>B</td><td>C</td><td>E</td></tr><tr><td>C</td><td>E</td><td>C</td></tr><tr><td>*D</td><td>D</td><td>B</td></tr><tr><td>E</td><td>C</td><td>E</td></tr></table>		0	1	→A	A	B	B	C	E	C	E	C	*D	D	B	E	C	E			
	0	1																					
→A	A	B																					
B	C	E																					
C	E	C																					
*D	D	B																					
E	C	E																					

Or

14.	a.	Construct a DFA accepting the even binary number. Check acceptance of the strings 011101 and 110010 .	8 Marks	L3	CO2
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	b.	Convert the following NFA into DFA																		
		<table><tr><td></td><td>0</td><td>1</td></tr><tr><td>→a</td><td>{a,b}</td><td>{c}</td></tr><tr><td>B</td><td>{d}</td><td>{b,c}</td></tr><tr><td>*c</td><td>{a}</td><td>{c}</td></tr><tr><td>D</td><td>{a,c}</td><td>{b}</td></tr></table>		0	1	→a	{a,b}	{c}	B	{d}	{b,c}	*c	{a}	{c}	D	{a,c}	{b}	8 Marks	L3	CO2
	0	1																		
→a	{a,b}	{c}																		
B	{d}	{b,c}																		
*c	{a}	{c}																		
D	{a,c}	{b}																		

15.	a.	Consider the following grammar, $S \rightarrow 0B \mid 1A$ $A \rightarrow 0S \mid 1AA \mid 0$ $B \rightarrow 1S \mid 1BB \mid 1$ Find the Left most Derivation, Right most Derivation and Parse Tree for the string 00110110.	8 Marks	L3	CO3
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	b.	Apply Pumping Lemma theorem to prove $L=\{0^n1^n, n>0\}$ is regular language or not	8 Marks	L3	CO3
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Or

16.	a.	Simplify the given grammar and convert to GNF $S \rightarrow ASB \mid XY$ $A \rightarrow aAS \mid a \mid \epsilon$ $B \rightarrow SbS \mid A \mid bb \mid CD$	8 Marks	L3	CO3
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	b.	Apply Pumping Lemma theorem to prove $L=\{ww^R, w\{0,1\}^*\}$ is not regular language ?	8 Marks	L3	CO3
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17.	a.	Construct a NPDA for the palindrome language $L=\{ww^R \mid w \text{ contains a's and b's}\}$ also write the instantaneous descriptor for the given string aabbaa	16 Marks	L4	CO4
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Or

18.	a.	Construct a PDA for the language L having palindrom strings with C as pivotal point contains 0's and 1's, also write the instantaneous descriptor for the given string 101c101.	16 Marks	L4	CO4
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19.	a.	Design a Turing machine to find complement of strings of language $L=\{w/we\in(0,1)^*\}$. Validate your design with appropriate input strings.	16 Marks	L4	CO5
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Or

20.	a.	Design a Turing machine to find sum of strings of unary language. Show addition of 2+2 in the designed machine.	16 Marks	L4	CO5
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