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# PRESIDENCY UNIVERSITY

BENGALURU

## Mid - Term Examinations - March 2026

Date: 11-03- 2026

Time: 11.45am to 01.15pm

<b>School:</b> SOCSE	<b>Program:</b> B.Tech		
<b>Course Code :</b> CSE2266	<b>Course Name:</b> Theory of Computation		
<b>Semester:</b> VI	<b>Max Marks:</b> 50	<b>Weightage:</b> 25%	

<b>CO - Levels</b>	<b>C01</b>	<b>C02</b>
<b>Marks</b>	<b>23</b>	<b>27</b>

### 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.

5Q x 2M=10M

1	Define Non Deterministic Finite Automata.	2 Marks	L1	C01
2	Write $L^3$ for alphabet set $L=\{0,b\}$ .	2 Marks	L2	C01
3	List any four applications of Push down automata machines.	2 Marks	L1	C01
4	Differentiate Klene $^+$ and Klene $^*$ operations with an example.	2 Marks	L2	C01
5	What is a regular expression? Represent binary numbers ending with 101 using regular expression.	2 Marks	L1	C02

### Part B

Answer the Questions.

Total Marks 40M

6.	a.	Let $P=\{a,b\}^2$ and $M=\{x,y\}^3$ . Generate the language X Such that string in $X=\{w/wePM\}$ .	5 Marks	L3	C01
	b.	Explain any five operations on languages with examples.	5 Marks	L2	C01
<b>Or</b>					
7.	a.	Consider the language definition $L=\{a^2b^2\}$ , $N=\{0^21^2\}$ , where $D=\{W/W\epsilon N^RL\}$ . Write the string set available in D.	5 Marks	L3	C01

	<b>b.</b>	Explain any four operations possible in strings	<b>5 Marks</b>	<b>L2</b>	<b>C01</b>
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<b>8.</b>	<b>a.</b>	Differentiate Non deterministic Finite Automata and DFA	<b>5 Marks</b>	<b>L1</b>	<b>C01</b>
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	<b>b.</b>	Design DFA to accept language contains binary language ends with bab .	<b>5 Marks</b>	<b>L3</b>	<b>C02</b>
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**Or**

<b>9.</b>	<b>a.</b>	Differentiate Epsilon NFA and Non deterministic Finite Automata.	<b>5 Marks</b>	<b>L1</b>	<b>C01</b>
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	<b>b.</b>	Design DFA to accept language having Prefix 110.	<b>5 Marks</b>	<b>L3</b>	<b>C02</b>
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<b>10</b>	Design DFA for (a)All strings beginning with 'aa' and ending with 'ab' (b) All strings over {0,1} with the substring '1001'	<b>10 Marks</b>	<b>L3</b>	<b>C02</b>
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**Or**

<b>11.</b>	Present state	Next state			<b>10 Marks</b>	<b>L3</b>	<b>C02</b>
		A	B	ε			
	->p	{q,s}	{p}	{q}			
	q	{p,r}	{s,r}	{s}			
	*r	{q}	{p,r}	{p}			
	*s	{p,t}	{s}	{q}			
	t	{q}	{p}	{q,r}	Construct equivalent DFA from the given EpsilonNFA?		

<b>12.</b>	<b>Minimize the given Automata using State equivalence method.</b>	<b>10 Marks</b>	<b>L3</b>	<b>C02</b>																				
	<table border="1"> <tr> <td rowspan="2">Present state</td> <td colspan="2">Next state</td> </tr> <tr> <td>0</td> <td>B</td> </tr> <tr> <td>P</td> <td>Q</td> <td>P</td> </tr> <tr> <td>-&gt;Q</td> <td>P</td> <td>S</td> </tr> <tr> <td>*R</td> <td>Q</td> <td>T</td> </tr> <tr> <td>*S</td> <td>R</td> <td>S</td> </tr> <tr> <td>T</td> <td>Q</td> <td>P</td> </tr> </table>	Present state	Next state		0	B	P	Q	P	->Q	P	S	*R	Q	T	*S	R	S	T	Q	P			
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*S	R	S																						
T	Q	P																						

**Or**

<b>13.</b>	<b>Construct an equivalent DFA from the given NFA</b>	<b>10 Marks</b>	<b>L3</b>	<b>C02</b>																				
	<table border="1"> <tr> <td rowspan="2">Present state</td> <td colspan="2">Next state</td> </tr> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>P</td> <td>{q,s}</td> <td>{p}</td> </tr> <tr> <td>-&gt;q</td> <td>{p}</td> <td>{s,r}</td> </tr> <tr> <td>R</td> <td>{q}</td> <td>{p,r}</td> </tr> <tr> <td>*s</td> <td>{p,r,t}</td> <td>{s}</td> </tr> <tr> <td>T</td> <td>{q}</td> <td>{p}</td> </tr> </table>	Present state	Next state		0	1	P	{q,s}	{p}	->q	{p}	{s,r}	R	{q}	{p,r}	*s	{p,r,t}	{s}	T	{q}	{p}			
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