PVP 20

Code: 20BS1403

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2024

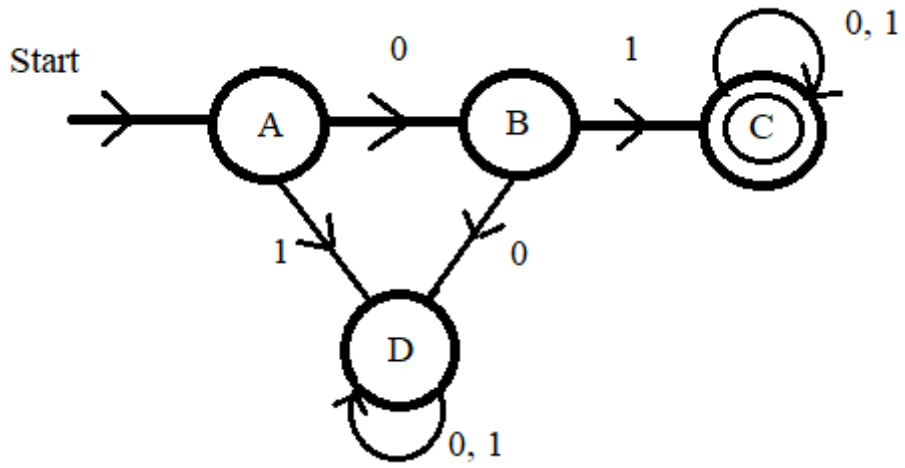
FORMAL LANGUAGES AND AUTOMATA THEORY
(Common for CSE, AIML, DS)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	How does Automata Theory contribute to advancements in technology and software development?	L2	CO1	7 M
	b)	What is Automata? Explain classification of Automata.	L2	CO1	7 M
		OR			
2	a)	Explain the design of a finite state machine with an example.	L4	CO4	7 M
	b)	Design DFA for the language L={aaa,aaaa,baaa,aaaaa,abaaa,baaaa,bbaaa, aaaaaaa,……}	L3	CO2	7 M

		UNIT-II			
3	a)	Convert the following Finite automata to regular expression.  	L3	CO2	7 M
	b)	Construct a NFA equivalent to the regular expression 10(0+11)0*1.	L3	CO2	7 M
		OR			
4	a)	Write in brief about the algebraic rules for regular expressions.	L2	CO2	7 M
	b)	Discuss in brief about applications of pumping lemma for regular language.	L2	CO2	7 M
		UNIT-III			
5	a)	Simplify the following CFG and Convert it into CNF. S -> AaB | aaB A -> ε B -> bbA | ε	L3	CO2	7 M
	b)	Simplify the following CFG with no useless symbols. S -> AB | DA B -> BD | AB D -> aB | b A -> a	L3	CO2	7 M

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">6</td><td>a)</td><td>Write in detail the Chomsky hierarchy of formal languages.</td><td>L2</td><td>CO2</td><td>7 M</td></tr>
<tr><td>b)</td><td>Check whether the language L = $\{a^n b^n c^n | n>=0\}$ is context free or not.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td colspan="6">UNIT-IV</td></tr>
<tr><td rowspan="2">7</td><td>a)</td><td>Design PDA that accepts Language L = $\{wcw^R | w \text{ in } (0+1)^*\}$, by empty stack. Where w^R is the reverse of w.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td>b)</td><td>Construct PDA equivalent to the following grammar.
S -> aAA
A -> aS | bS | a</td><td>L4</td><td>CO4</td><td>7 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">8</td><td>a)</td><td>Define Push Down Automata. Explain the basic structure of PDA with a neat graphical representation.</td><td>L2</td><td>CO2</td><td>7 M</td></tr>
<tr><td>b)</td><td>Construct a PDA that accepts L = $\{0^n 1^n \mid n \geq 0\}$.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td colspan="6">UNIT-V</td></tr>
<tr><td rowspan="2">9</td><td>a)</td><td>Design a Turing Machine to accept
L= $\{0^n 1^n 0^n \mid n \geq 1\}$.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>Explain about Universal Turing Machine.</td><td>L2</td><td>CO3</td><td>7 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">10</td><td>a)</td><td>Let A and B be lists of three strings each
<table>
<tr><td></td><td>List A</td><td>List B</td></tr>
<tr><td>i</td><td>w_i</td><td>x_i</td></tr>
<tr><td>1</td><td>1</td><td>111</td></tr>
<tr><td>2</td><td>10111</td><td>10</td></tr>
<tr><td>3</td><td>10</td><td>0</td></tr>
</table>
Check whether this PCP has a solution or not.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>What is Halting Problem of Turing Machine? Is it decidable or not? Explain.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
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