Total No.	of Questions : 8]	SEAT No. :	
P-482		[Total No. of Pag	ges : 2
	[6003]-701		
	T.E. (Information Techn	ology)	
	~ Y 6. V		
	THEORY OF COMPUTA		
	(2019 Pattern) (Semester - I	) (314441)	
Time : 21/	2 Hours]	[Max. Marks	s : 70
Instructio	ons to the candidates:		
1)	Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7		
2)	Neat diagrams must be drawn wherever necessar	y.	
<i>3) 4)</i>	Figures to the right side indicate marks.  Assume suitable data, if necessary.		
7)	Assume suitable utilit, if necessary.		
01)			[7]
<b>Q1</b> ) a)	Eliminate useless symbols from the following	ig grammar.	[6]
	$^{\vee}S \rightarrow aA \mid bB$		
	$A \rightarrow aA \mid a$		
	$B \rightarrow bB$		
b)	Prove that CFL's are closed under union, con	catenation, Kleene's clo	
			[6]
c)	What is an ambiguous grammar? Explain w	ith a suitable example.	[6]
	OR		
<b>Q2</b> ) a)	Convert the following CFG to Chomsky No	ormal Form (CNF)	[8]
	$S \rightarrow aAbB$		
	$A \rightarrow aA$	9, 3,	
	$B \rightarrow bB \mid b$	0, 6.	
b)	Construct NFA for the following left linear r	egular grammar.	[6]
	$S \rightarrow B1 \mid A0 \mid C0$	20	
	$B \rightarrow B1 \mid 1$	3 100	
	$A \rightarrow A1 \mid B1 \mid C0 \mid 0$	00,	
	$C \rightarrow A0$	3	
c)	Write a note on Pumping lemma for CFL	5.	[4]
,		,	_
			<i>P.T.O.</i>

<b>Q</b> 3)	<u>a)</u>	Design a Pushdown Automata for the language $L=\{a^n b^{2n} \mid n > 0\}$ . [6]		
-	b)	Construct a PDA equivalent to the following CFG.		
		$S \rightarrow 0BB$		
		$B \rightarrow 0S \mid 1S \mid 0$		
	9)	Write a note on Post machine.	[5]	
		OR		
<b>Q4</b> )	a)	Design a Pushdown Automata which accepts only odd number of b		
		over $\sum = \{a, b\}$ . Simulate PDA for the string "bbaba".	[8]	
	b)	Explain the acceptance by PDA	<b>[6]</b>	
		i) By final state		
		ji) By empty stack		
,	c)	Define Push down Automata.	[3]	
		26.		
<b>Q</b> 5)	a)	Design a Turing machine to accept language $L = \{a^n \ b^n \ c^n \mid n > 0\}$ .	[7]	
	b)	Write a short note on Post Correspondence problem.		
	c) (	Differentiate between Push Down Automata and Turing Machine.	<b>[6]</b>	
	V	ORO / O.		
<b>Q6</b> )	a)	Explain Church Turing hypothesis.	[3]	
	b)	b) Design a Turing machine to add two unary numbers.		
	c)	Write a short notes on Universal Turing machine.	[8]	
<b>Q</b> 7)	<u>.</u> .	Explain in detail Decidable problems concerning regular languages.	[5]	
	b)	Explain the satisfiability problem with an example.	[6]	
	c)	What is Polynomial time reduction? Explain it with a suitable example	[6]	
0.0	,	OR OR		
<b>Q</b> 8)	a)	Show that for two recursive languages $L_1$ and $L_2$ , $L_1$ U $L_2$ is also recursive.  [4]		
	b)	What do you mean by NP-Complete problems? List the problems in		
		class and explain any one problem in detail.	[7]	
	c)	What do you mean by Mapping Reducibility? Explain it with an exam	ıple.	
			<b>[6]</b>	
		6.		
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