

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (IT) III Year I-Semester Supplementary Examinations, May/June-2018

Theory of Automata

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A $(10 \times 2 = 20 \text{ Marks})$

- 1. Write the basic differences between a DFA and an NFA?
- 2. Define regular expression and give two examples.
- 3. State the pumping lemma for regular languages.
- 4. What is a parse tree? Give one example.

Time: 3 hours

- 5. Construct a PDA equivalent to the following grammar.
 S → aAA
 A→ aS | bS | a
- 6. List the closure properties of context free languages.
- 7. Describe Multi Stack Turing Machine?
- 8. Write the formal definition of Turing Machine
- 9. Define Modified Post's Correspondence Problem (MPCP).
- 10. What is an NP Complete Problem?

Part-B $(5 \times 10 = 50 Marks)$

- 11. a) Construct an E- NFA for the regular expression (00 + 11) 0*
 - b) Convert the following ε NFA to NFA (without ε transitions)

	E	a	b	С
→p	{q, r}	ф	{q}	{r}
q	ф	{p}	{r}	{p, q}
*r	ф	ф	•	¢

12. a) Minimization the following DFA.

δ	. 0	.1
→A	В	E
В	C	F
С	D	Н
*D	E	Н
E	F	I
F	G	В
G	H	В
H	I	С
*I	A	E

b) Check whether the following grammar is ambiguous or not.
 S -> aB / bA

 $A \rightarrow aS/bAA/a$

 $B \rightarrow bS / aBB / b$

[4]

[4]

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			:	:: 2 ::	Code No. : 31
3	a) Design a PD	A that accepts	{wew ^r wi	in (0+1)* }	
					prove that the following
		not Context fr			prove that the following
	{0 ⁿ 1 ⁿ 2 ⁿ n>	=1}	ELAN	TOTAL TO CLASS	
	and and			A SANA IN MOMENT	
4. :	a) Design a Turi below	ing Machine to	o compute	the proper subtraction	function which is defined as
	m-n = m-1	n if m > = n			The loc is no discovery is
	= 0	if m < n			
	b) Explain the h	nalting probler	n of Turin	g machines.	
5.	a) What is PCP	and test whet	her the fol	lowing PCP instance h	as a solution or not.
		c, c) $B = (b$			a nalivlopa Adita sarahi
	b) Define unive	ersal language	e and wri	te the binary code co	orresponding to the turing
	machine M v	whose moves a	-	as:	the character and the
		$\delta(q_1,1)=(q_3,0,\delta(q_3,0)=(q_1,1,0)$			
		$\delta(q_{3},1)=(q_{2},0,1)$		Samba	
		$\delta(q_3,B)=(q_3,1)$,L)	andaoM Zahu	in a manufact heat hat and
	a) Convert the	following DFA	A to a regu	lar expression using A	rden's Theorem.
		δ	a	b	
		> *P	S	P	
			D		
		Q	P	S	
		Q R	P R		
		Q	Р	S	
	b) Show that {(Q R S	P R Q	S Q R	
		Q R S	P R Q) = 1} is no	S Q R	
	Answer any two	Q R S) ⁱ 1 ^j gcd (i, j) o of the follow	P R Q) = 1} is not ving:	S Q R ot regular.	allowing PD A
	Answer any <i>two</i> a) Obtain a	Q R S) ⁱ 1 ^j gcd (i, j) o of the follow CFG that gene	P R Q) = 1} is no ving: erates the l	S Q R ot regular. anguage accepted by f	ollowing PDA
	Answer any two a) Obtain a $M = (\{q_0\}$	$ \begin{array}{c c} Q \\ R \\ \hline S \\ \hline i 1 \ j gcd (i, j) \\ o of the follow \\ CFG that gene \\ o, q_1, \{a,b\}, \end{array} $	P R Q Q $P = 1 is not provide the left of the$	S Q R ot regular. anguage accepted by f , q_0, Z, { q_1 }) , Z) = (q_0, A Z)	ollowing PDA
	Answer any two a) Obtain a $M = (\{q_0\}$	$ \begin{array}{c c} Q \\ R \\ \hline S \\ \hline i 1 \ j gcd (i, j) \\ o of the follow \\ CFG that gene \\ o, q_1, \{a,b\}, \end{array} $	P R Q Q $P = 1 is not ving:$ erates the l A,Z , δ $\delta(q_0, a)$ $\delta(q_0, b)$	S Q R ot regular. anguage accepted by f , q_0, Z, { q_1 }) , Z) = (q_0, A Z) , A) = (q0, AA)	ollowing PDA
	Answer any two a) Obtain a M = ({qo with	$\frac{Q}{R}$ $\frac{S}{s}$ $p^{i}1^{j} gcd(i,j)$ o of the follow CFG that generations (a, q_1), {a,b}, the transitions	P R Q Q $P = 1 is not ving:$ erates the l A,Z , δ $\delta(q_0, a)$ $\delta(q_0, a)$ $\delta(q_0, a)$	S Q R ot regular. anguage accepted by f , q_0, Z, { q_1 }) , Z) = (q_0, AZ) , A) = (q_0, AA) , A) = (q_1, \epsilon)	n A &
	Answer any two a) Obtain a M = ({qo with b) Discuss a	Q R S) ⁱ 1 ^j gcd (i, j) o of the follow CFG that gene (), q1}, {a,b}, the transitions	P R Q P = 1 is not ving: erates the l $\{A,Z\}$, δ s $\delta(q_0, a)$ $\delta(q_0, b)$ $\delta(q_0, a)$ modification	S Q R ot regular. anguage accepted by f , q_0, Z, { q_1 }) , Z) = (q_0, A Z) , A) = (q0, AA)	n A &
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