





Summer 2024 ▼



Model Questions

PRS/KS/24/2211

Faculty of Science and Technology B.E. (Information Technology) Fourth Semester (C.B.S.) Examination THEORY OF COMPUTATION

Paper—3

Time: Three Hours] [Maximum Marks: 80 INSTRUCTIONS TO CANDIDATES (1) All questions carry marks as indicated. (2) Solve Question 1 OR Question No. 2. (3) Solve Question 3 OR Question No. 4. (4) Solve Question 5 OR Question No. 6. (5) Solve Question 7 OR Question No. 8. (6) Solve Question 9 OR Question No. 10. (7) Solve Question 11 OR Question No. 12. (8) Assume suitable data wherever necessary. (9) Illustrate your answers wherever necessary with the help of neat sketches. 5 1. (a) Explain with the help of diagram working model of finite automata. (b) Define string, substring and length of string 3 (c) Differentiate between (i) NFA and DFA (ii) Grammar and Language OR 2. (a) Convert following NFA to DFA.

state Σ	0	1
→ ⁹ 1	9, 9,	9,
9,	9, 9,	
* 93	9,	9, 9,

NFA = $(\{9, 9, 9, \}, \{0,1\}, \& \{9,\}, \{9,\})$

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3

3

7

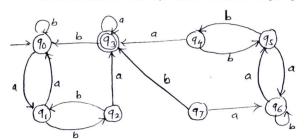
6

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6

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(b) construct minimum state automation equivalent to the transition diagram given fig.



3. (a) Find minimum state DFA for the regular expression. 7

10 + (0 + 11) 0 * 1

(b) Explain the chomsky hierarchy of language. For each also write the appropriate grammar. 6

OR

4. (a) Obtain an equivalent left linear grammar from the given right lines grammar. 5

 $S \longrightarrow bA$

$$A \longrightarrow aA |bB| b$$

 $B \rightarrow bA$

(b) Write short note on

"Pumpin lemma"

(c) What are the properties of Regular set.

(a) What is Ambiguous grammar? Cheke ambiguity of following grammar

S—→aSSb|bSSa|a

(b) Convert the grammar given below in to GNF.

 $S \rightarrow XY$

 $X \rightarrow Ys|i$

 $Y \rightarrow Sx|q$

(c) What is context free grammar?

(a) What is push down automata? Explain the model of push down automata.

(b) Construct PDA for following language.

 $L = \left\{ a^n b^n \mid n > 0 \right\}$

7. (a) What is Turing Machine? Explain the basic model of Turing machine.

(b) Design Turing Machine to recognize words in $L = \{a^n b^n a^n | n^3 \ge 1\}$

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OR

8.	(a)	Write short note on Linear bounded automata.	6
	(b)	Explain concept of Universal Turing Machine.	7
9.	(a)	Write short note on Church's hypothesis.	6
	(b)	Consider PCP system that described by the following test.	
		$\mathbf{A} = \{10, 01, 0, 100, 1\}$	
		$\mathbf{B} = \{101, 100, 10, 0, 010\}$	
		Does this PCP have solution ?	7
		OR	
10.	(a)	Define Ackermann's function. Compute	
		A (1, 1) A (2, 1) A (2,2)	6
	(b)	What do you mean by recursion? Explain the properties of recursive and recursively enumerate	able
		languages.	7
11.	(a)	Explain mod and div function with example.	
	(b)	Explain bounded minimization in detail.	6
		OR	
12.	(a)	Show that the function g $(x, y) = x^y$ is primitive recursive.	6
	(b)	Write short notes on (any two):	8
		(i) μ - recursive function	
		(ii) Unbounded minimization	
		(iii) Halting problem.	

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