



B.Tech IV Semester Supplementary Examinations, July 2024

FORMAL LANGUAGES & AUTOMATA THEORY
 (Common to CSE, CSE(AI&ML) & IT)

Maximum Marks: 70

Date: 27.07.2024 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks		(10X2M=20 Marks)	CO	Bloom Tx
1	Define ϵ - NFA with Example.		1	L1
2	Give differences between Mealy Machine and Moore Machine		1	L1
3	Give any two algebraic properties of Regular Expressions		2	L1
4	Write the steps for the conversion of DFA to Regular Expression.		2	L1
5	How do we say that the given grammar is ambiguous?		3	L1
6	Explain the concept of push down automata?		3	L1
7	Define Chomsky Normal Form.		4	L1
8	Discuss how Total Turing Machine is Different from Simple Turing Machine.		4	L1
9	Explain the classes P and NP		5	L1
10	Define unrestricted grammar		5	L1

Part-B

Answer All the following questions.		(5X10M=50Marks)		
11	Convert the following NFA with ϵ - transitions to DFA. [10]		1	L2
OR				
12	a. Construct DFA and NFA accepting the set of all strings containing 110 as a substring. [5] b. Define NFA with epsilon with an example. [5]		1	L3
13	State and prove pumping lemma for regular languages. Apply pumping lemma for following language and prove that it is not regular $L = \{a^m b^n \gcd(m,n)=1\}$. [10]		2	L5

	OR		
14	Show that $L = \{a^n n \geq 1\}$ is not regular. [10]	2	L2
15	Consider the grammar $E \rightarrow E + E \mid E * E \mid id$. Write the right-most derivation and left most derivation for the sentence $id * id + id$. Discuss whether the given grammar is ambiguous or not. Justify your assertion. [10]	3	L5
	OR		
16	a) Define Regular Grammar. Explain in detail obtaining a right linear and left linear grammar for the following FA. [5] b) Find the right linear grammar and left linear grammar for the regular expression $(0+1)^*010(1(0+1))^*$ [5]	3	L2
17	List and explain in details about the closure properties if Context Free Languages. [10]	4	L4
	OR		
18	Construct Turing Machine over $\{0,1\}$ $L = \{w/w \text{ is multiple of } 3\}$ and draw the transition diagram. [10]	4	L3
19	What are P and NP class of Languages? What is NP Complete and give examples? [10]	5	L2
	OR		
20	What are P and NP problems? Give at least five problems that can be classified as NP problem. Justify. [10]	5	L2