



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

III B.Tech I Sem Supply End Examination, July 2022

Formal Languages and Automata Theory

(CSE & IT)

Time: 3 Hours.**Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part – A, answer all questions which carries 20 marks.

3. In Part – B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART- A**(10*2 Marks = 20 Marks)**

1. a) Draw a NFA which accepts the set of all strings whose second last from LHS symbol is 1? 2M C01 BL1
- b) Construct a Finite Automata that accepts $\{0,1\}^+$ 2M C01 BL1
- c) If a Regular grammar G is given by $S \rightarrow aS/a$ Find DFA (M) accepting $L(G)$? 2M C02 BL1
- d) Construct a regular grammar for $L = \{0^n 11/n \geq 1\}$ 2M C02 BL1
- e) Construct a Derivation tree for the string 0011000 using the grammar $S \rightarrow A0S/0/SS, A \rightarrow S1A/10$? 2M C03 BL1
- f) Define Push Down Automata? 2M C03 BL1
- g) Give an Example of a Recursive enumerable language? 2M C04 BL1
- h) When do you say that a Turing Machine accepts a string? 2M C04 BL1
- i) What is undecidable problem? How it can be solved? 2M C05 BL1
- j) Define Unrestricted grammar? 2M C05 BL1

PART- B**(10*5 Marks = 50 Marks)**

- 2 a) Construct an NFA for $r = (a+bb)^* ba^*$ 5M C01 BL3
- b) Write in detail the Chomsky hierarchy of formal languages? 5M C01 BL1

OR

- 3 Construct a NFA equivalent to the regular expression $(10+11)^*00$. 10M C01 BL3
- 4 a) Define Regular Expression? Explain about the Properties of Regular Expressions? 5M C02 BL4
- b) Write the Algorithm for minimizing DFA? 5M C02 BL1

OR

- 5 Explain in brief about closure properties of regular languages? 10M C02 BL4

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| 6 | a) | Construct a Derivation tree for the string 0011000 using the grammar
$S \rightarrow A0S/0/SS$
$A \rightarrow S1A/10$ | 5M | C03 | BL3 |
| | b) | Construct a PDA for $L = \{wcw^R / w \text{ belongs to } (0+1)^*\}$ | 5M | C03 | BL3 |
| OR | | | | | |
| 7 | | Show that for every PDA then there exists a CFG such that $L(G) = N(P)$? | 10M | C03 | BL3 |
| 8 | a) | Obtain GNF equivalent to the grammar $E \rightarrow E+T/T, T \rightarrow T*F/F, F \rightarrow (E)/a$? | 5M | C04 | BL3 |
| | b) | Design a Turing Machine to recognize the language $\{0^n 1^n / n \geq 1\}$ | 5M | C04 | BL6 |
| OR | | | | | |
| 9 | | Discuss in brief about church hypothesis? | 10M | C04 | BL2 |
| 10 | a) | Explain in detail about NP Complete and NP hard problems | 5M | C05 | BL4 |
| | b) | Define Post Correspondence Problem? Explain in brief about PCP with an example | 5M | C05 | BL1 |
| OR | | | | | |
| 11 | | Explain about the Decidability and Undecidability Problems? | 10M | C05 | BL4 |

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