

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
II B. TECH II SEMESTER SUPPLIMENTRY EXAMINATIONS NOV -2025
FORMAL LANGUAGES AND AUTOMATA THEORY
(CSE)

Time: 3 hours**Max. Marks: 70****The Question paper consists of Part A & Part B.****Part A is compulsory, Answer all questions. Part B Answers any one question from each unit.***********

- 1 **PART-A** (20Marks)
- Define Mealy machine and Moore machine. [2]
 - Show that $(0^*1^*)^* = (0+1)^*$. [2]
 - List out the identities of Regular expression [2]
 - List out Chomsky classification of grammars [2]
 - Differentiate between leftmost and rightmost derivations in context-free grammars. [2]
 - Define Ambiguous Grammars? [2]
 - List out the applications of Push down Automata [2]
 - Explain how PDA overcomes the limitations of Finite Automata [2]
 - Define an undecidable problem. [2]
 - Differentiate between universal and Restricted Turing Machine [2]

PART-B

(50Marks)

Question from Unit - I

- 2 a) Convert the following Mealy machine into its equivalent Moore machine. [5]

Present State	I/P=0		I/P=1	
	Next State	O/P	Next State	O/P
→ A	C	0	B	0
B	A	1	D	0
C	B	1	A	1
D	D	1	C	0

- b) Draw DFA which accepts strings ending with 11 where the input is $\{0,1\}$ [5]
(OR)

- 3 a) Define NFA. Construct DFA for the given NFA [5]

	Next state	
	0	1
→ q0	q0, q1	q0
q1	q2	q1
q2	q3	q3
q3	-	q2

- b) Draw the transition diagram of a FA which accepts all strings of 0's and 1's in which the number of 0's are odd and 1's are even. [5]

Question from Unit - II

- 4 a) Explain in detail about Chomsky hierarchy of formal languages. [5]
 b) Construct the left linear grammar for the language $(0+1)^*00(0+1)^*$ [5]
(OR)
- 5 a) Apply pumping lemma for the language $L = \{a^n/n \text{ is prime}\}$ and prove that it is not regular. [5]
 b) From the identities of RE, prove that [5]

- i) $10+(1010)^*[\wedge+(1010)^*]=10+(1010)^*$
 ii) $(0+011^*)+(0+011^*)(01+0100^*)(01+0100^*)^*=01^*(010^*)^*$

Question from **Unit - III**

- 6 a) Prove that the following grammar is ambiguous on the string 'aab' [5]
 $S \rightarrow aS | aSbS | \epsilon$
 b) Write the procedure and Eliminate left recursion from the following [5]
 Grammar

$E \rightarrow E+T/T$

$T \rightarrow T * F / F$

$F \rightarrow (E) / id$

(OR)

- 7 a) Find the GNF equivalent to the following [5]
 $S \rightarrow AA | 0$
 $A \rightarrow SS | 1$
 b) Convert the following grammar into CNF [5]
 $S \rightarrow bA/aB$ $A \rightarrow bAA/aS/a$ $B \rightarrow aBB/bS/a$

Question from **Unit - IV**

- 8 a) Convert the following Context Free Grammar to Push Down Automata [5]
 $S \rightarrow aA | bB$
 $A \rightarrow aB | a$
 $B \rightarrow b$
 b) Explain about the graphical notation of PDA. [5]

(OR)

- 9 a) Define push down automata? Explain acceptance of PDA with empty stack [5]
 b) Define Instantaneous description (ID) in PDA. [5]

Question from **Unit - V**

- 10 a) Describe various ways of representing Turing machines with suitable examples [5]
 b) Check whether the following post correspondence problem has a solution or not. [5]

I	List A	List B
1	111	11
2	1001	01
3	1110	1001

(OR)

- 11 a) Discuss in detail about Church's hypothesis. [5]
 b) Briefly explain about post's correspondence problem. [5]
