

SECTION – C

6. (a) Design a PDA to accept the language  
 $L = \{0^n 1^{n+2} \mid n \geq 1\}$ . 10  
(b) Define Halting and PCP problem of Turing machine. 10
7. (a) Design a DPDA that accept strings with more a's than b's. 10  
(b) Design a Turing machine a accept the language with even number of a's and even number of b's. 10

SECTION – D

8. (a) Explain the Chomsky hierarchy of languages. 10  
(b) What is Primitive recursive function ? Explain in detail. 10
9. (a) Write short notes on : 4 + 3 + 3  
(i) Context free grammar  
(ii) Context Sensitive grammar  
(iii) Relation between languages
- (b) Show that the Predecessor and Minus are primitive recursive functions. 10

Roll No. ....

24266

B. Tech. 5th Semester (CSE)  
Examination – February, 2022

THEORY OF AUTOMATA COMPUTATION

Paper : CSE-305-F

Time : Three Hours ]

[ Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

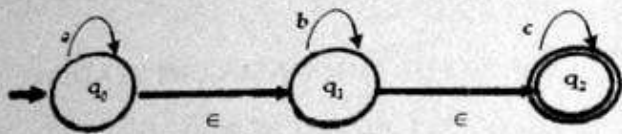
Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory.

1. (a) Explain the use of Dead state in designing of Finite Automata with the help of example. 8 × 2.5 = 20  
(b) What is Kleene closure' ? Explain by taking an example.  
(c) What is closure property in Automata' ?  
(d) Explain any one method briefly to remove ambiguity from CFG.  
(e) Define NDPDA mathematically.

- (f) Define about Multitape Turing Machine with the help of diagram.
- (g) Explain Context Free Grammar with the help of example.
- (h) Define computability.

**SECTION - A**

2. (a) Remove the  $\epsilon$  transition from given NFA (using  $\epsilon$ - Closure method only): 10



- (b) Convert the Mealy Machine into equivalent Moore machine: 10

Present State	Next State			
	a		b	
	State	O/P	State	O/P
q <sub>1</sub>	q <sub>1</sub>	1	q <sub>2</sub>	0
q <sub>2</sub>	q <sub>4</sub>	1	q <sub>4</sub>	1
q <sub>3</sub>	q <sub>2</sub>	1	q <sub>3</sub>	1
q <sub>4</sub>	q <sub>3</sub>	0	q <sub>4</sub>	1

3. (a) Design a finite automata to accept equal number of a's and b's over the alphabets  $\Sigma = (a, b)^*$ . Also draw the transition table for the designed automata. 10
- (b) Convert the Mealy Machine into equivalent Moore Machine. 10

Present State	Next State 0		Next State 1	
	State	O/P	State	O/P
q <sub>1</sub>	q <sub>1</sub>	0	q <sub>2</sub>	0
q <sub>2</sub>	q <sub>2</sub>	1	q <sub>3</sub>	0
q <sub>3</sub>	q <sub>2</sub>	0	q <sub>3</sub>	1

**SECTION - B**

4. (a) State and prove pumping lemma for regular languages. 10
- (b) Convert the given CFG into Chomsky Normal form. 10
- $S \rightarrow ASB$   
 $A \rightarrow aAS \mid a \mid \epsilon$   
 $B \rightarrow SbS \mid A \mid bb$
5. (a) Prove that the language  $L = \{a^n b^n \mid n \geq 0\}$  is not regular. 10
- (b) Remove the useless symbols from the given grammar. 10
- $S \rightarrow aaB \mid abA \mid aaS$   
 $A \rightarrow aA$   
 $B \rightarrow ab \mid b$   
 $C \rightarrow ad$