Code No: 154CK **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, April/May - 2023
FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE(AI&ML), CSE(DS))

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) 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

(25 Marks)

1.a) Define Finite Automation in tuple notation. [2]
b) Mention any three differences between Moore and Melay. [3]
c) Give regular expression to recognize the strings consisting of a,b such that strings contain sub string "ab". [2]
d) List any three closure properties of Regular languages. [3]
e) Give context Free Grammar to accept even palindrome consisting of 0,1. [2]
f) Define PDA. [3]
g) What are the rules for a CFG to be in CNF? [2]
h) Define twinning machines in tuple form. [3]
i) What is the difference between recursive languages and recursively enumerable languages? [2]
j) Mention any two properties of recursive languages. [3]

PART – B

(50 Marks)

2.a) Give NFA to recognize strings consisting of a, b such that strings contain sub string 'ab' at the end.
b) Convert the above NFA to DFA. [5+5]

OR

3. Convert the following NFA with € transitions to NFA without € transitions

	a	b	c	€
→Qo	Q0	--	--	Q1
Q1	--	Q1	--	Q2
Q2	--	--	Q2	--

Where Q2 is accepting state. [10]

4.a) State Pumping Lemma for Regular Languges.

b) Using Pumping Lemma for regular languages show that L={a^p} where p is a prime number. [4+6]

OR

5. Minimize the following DFA

	0	1
→ A	B	A
B	A	C
C	D	B
D	D	A
E	D	F
F	G	E
G	F	G
H	G	D

Where D is the final state. [10]

6. Give PDA design to accept strings consisting of a,b such that number of a's are equal to b's. [10]

OR

7.a) Show that following grammar is Ambiguous

S→ iCtS / iCtSeS / a

C→ b

b) Differentiate PDA acceptance by final state method to empty stack method. [5+5]

8. Convert the following grammar to Griebech Normal form

S→ AA / 0

A → SS / 1. [10]

OR

9. Construct the Turing machine to accept L = { $a^n b^n c^n$ }. [10]

10.a) Write a brief note on types of turing machines.

b) Describe about halting problem of a TM. [5+5]

OR

11.a) What is post correspondence problem? Give an example.

b) Write about counter machines. [5+5]

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