Code No: 155BK

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, September - 2021
FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, IT)

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

Answer any five questions
All questions carry equal marks

1.a) Convert the following NFA to DFA

State	a	b
Q_0	Q_0	Q_1
Q_1	Q_0	$\{Q_0,Q_1\}$
Q_2	Q_0	Q_3
Q_3^*	Q_0	---

b) Construct a DFA to accept the binary strings consisting of even number of 0's and odd number of 1's. [8+7]

2.a) Construct a DFA to accept the binary strings divisible by 5.
b) Eliminate the €-transactions of the following NFA. [7+8]

State	a	b	€
Q_0	Q_0	Q_1	Q_2
Q_1	Q_1	Q_2	Q_3
Q_2	Q_2	Q_3	
Q_3^*	Q_0	---	

3.a) Prove that Regular Languages are closed under i) Reverse ii) Union.
b) Identify the regular expression accepted by the following DFA. [7+8]

State	a	b
Q_0	Q_2	Q_1
Q_1	Q_3,	Q_2
Q_2	Q_0	Q_3
Q_3^*	--	---

4.a) Prove that $L=\{WW^r / W$ is a binary sting$\}$ is not regular language.
b) Construct a DFA accepting language represented by (0+1)* (00+11) (0+1)*. [7+8]

5.a) Construct a PDA to accept the binary strings consists of number of 0's not equal to number of 1's.
b) Construct a PDA to accept the language generated by the following CFG. [7+8]
S→Aab
A→Aab|b

6.a) Construct a PDA to accept the following language $L= \{a^n b^n / n>0\}$.
b) Construct a CFG to generate the binary strings consisting the number of 0's is equal to the twice the number of 1's. [8+7]
ex: 010, 001010

7.a) Convert the following grammar into CNF.
S→aSa | bSb | a | b | aa | bb

b) Simplify the following CFG
S→aA|aBB
A→ Aaa|€
B→bB|bbC
C→b [8+7]

8.a) Construct Turing Machine to accept following language and give its state Transition table and diagram. Check the machine by tracing a suitable instance.

$L = \{ a^n b^n c^n \mid n \geq 1 \}$.

b) Design a TM which subtracts two unary numbers. i.e m-n where m>=n. [7+8]

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