Subject Code: TCS-403

PAPER ID-TCS-403

Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | |

B.Tech.

Brach name : Computer Science & Engineering   **Semester: IV**

Subject name : Theory of Automata & Formal Languages(Subject code: TCS-403)

Time- 3 Hours   **Max marks: 100**

NOTE:

i.   All questions are compulsory.
ii.   Draw diagrams wherever necessary.
iii.   All questions carry equal marks.

Q1. Attempt any FOUR parts of the following: **(5X4=20)**

(A) Design a DFA L = { x | x does not end with 001 }

(B) Construct a Moore machine to determine residue mod 3 for binary number.

(C) Define the following.

    I.   Chomsky Normal form

    II.   Greibach Normal form

(D) Construct the context free grammar (CFG)equivalent to a regular expression

$$(011+1)^*(01)^*$$

(E) Consider the following production:

$$S \rightarrow aAS \mid a$$
$$A \rightarrow SbA \mid SS \mid ba$$

Find out LMD,RMD

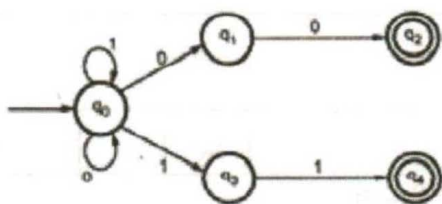(F) .Transform the grammar with productions:

$$S \rightarrow abAB$$
$$A \rightarrow bAB \mid \wedge$$
$$B \rightarrow BAa \mid \wedge \mid A \quad \text{into Chomsky normal form}$$

Q2. Attempt any FOUR parts of the following: **(5X4=20)**

(A) Convert the given NFA to equivalent DFA

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a.

(B) Design a DFA which accepts even number of 0's and even 1's.

(C) Design a Turing machine for L= $\{a^n b^n c^n\}$ where n$\geq$1.

(D) Design a PDA for the language L= $\{a^n b^{2n}\}$ where n $\geq$ 1

(E) Explain P and NP class problem in detail?

(F) Design a Turing machine which recognizes the set of all even length palindromes over $\{0,1\}$.

Q3. Attempt any TWO parts of the following: (10X2=20)
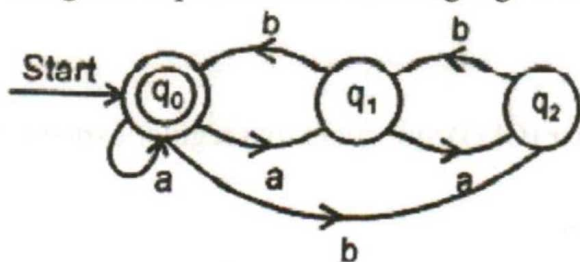
(A) Write Short note on

   i)   Decidibility

   ii) Halting Problem

(B) Design a Turing machine which recognizes the input language having a substring as 101 and replace every occurrence of 101 by 110.

(C) Find the regular expression for the language accepted by the following automata.

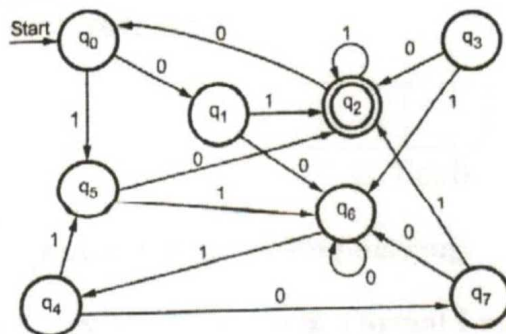**Q4. Attempt any TWO parts of the following:** (10X2=20)

(A) Give an example of language which is accepted by PDA but not by DPDA. Also design the PDA for that language.

(B) Consider the regular expression R

(a+b)*(aa+bb)(a+b)*

Which described the set of all words over Σ={a,b} containing either two consecutive a's or two b's. Construct a DFA that will accept the same set of words

(C) Construct the minimum state automaton for the following transition diagram

Q5. Attempt any TWO parts of the following: (10X2=20)

(A) Given a grammar, make non-deterministic finite automata and convert it to deterministic form:

S→0S | 1A | 1
A→0 | 0A | 1S

(B) Design a DFA for following
(1+01)*(0+00)(1+10)*

(C) Consider following NFA with ^ convert it to its equivalent DFA

Input State	a	b	c	^
P	P	q	r	Ø
q	q	r	Ø	p
r	r	Ø	p	q

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