H.T.No. | | | | | | | | | | |

Code No: CT1508 **GEC-R14**

II B. Tech I Semester Supplementary Examinations, January 2017

FORMAL LANGUAGES AND AUTOMATA THEORY

(Computer Science and Engineering)

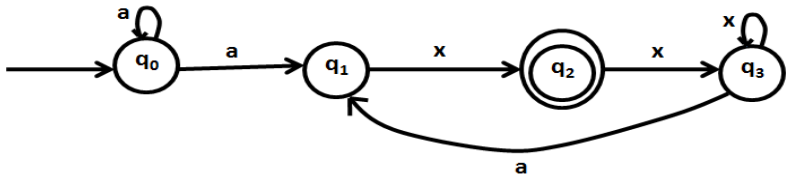
Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. Design a DFA to accept strings of a's and b's having even number of a's and b's.
2. For the NFA given below;
   i. Check whether the string axxaxxa is accepted or not
   ii. Give atleast two transition paths



3. Obtain a regular expression for L = { VUV | U,V ∈{ a,b}* and |V| = 2 }.
4. Is the following grammar ambiguous?
   S-> AB|aaB
   A-> a|Aa
   B->b
5. Identify the nullable variables from the following CFG

   S→ABCa | bD, A→BC |b , B→b | ε , C→c | ε , D→d
6. Explain individually classes P and NP.

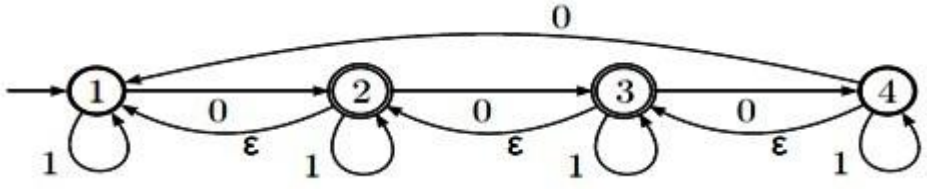
PART-B

1. a) Construct a finite state automata that accepts those strings over {a,b} that contains ***aaa*** as substring. (6M)

   b) Construct a DFA equivalent to M=({q_0,q_1},{a,b,c},δ,q_0,{q_1}) where δ is given in the following table. (6M)

δ	a	B	c
q_0	{ q_0,q_1}	{q_1}	∅
q_1	∅	{ q_0,q_1}	{ q_1}

2. a) Construct a NFA without ∈ for the follwing NFA with ∈. (6M)



b) Construct a Mealy machine which is equivalent to the Moore machine given in table. (6M)

Present State	Next State		Output
	A=0	A=1	
➔ q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

3. a) Let G be the grammar. S→ aS | aSbS | ε. Prove that L(G) = {x | such that each prefix of x has atleast as many a's as b's}. (6M)

   b) Using pumping lemma show that the following sets are not regular:

   a) $\{a^n b^{2n} \mid n > 0\}$

   b) $\{a^n b^m \mid 0<n<m\}$ (6M)

4. a) Eliminate epsilon productions from the grammar `G' given as

   A-> aBb|bBa

   B-> aB|bB|∈ (6M)

   b) Give CFG for generating odd palindromes over the string {a,b}. (6M)

5. a) Convert the following Grammar into CNF.

   S → AbcD / abc

   A → aASB / d

   B → b/ cb

   D → d (6M)

   b) Convert the following Context Free Grammar to Push Down Automata.

   S→ aAA

   A→aS | bS | a (6M)

6. a) Obtain a Turing machine to recognize $0^n1^n 2^n$. Ex: 000111222…… (6M)

   b) Explain in detail about posts correspondence problem and 2-way infinite Turing machine. (6M)

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