Code No: CT1508   **GEC-R14**

II B. Tech I Semester Regular Examinations, November 2016
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. Give the examples/applications designed as finite state system.

2. Define   i) Finite Automaton(FA)   ii)Transition diagram

3. Write a regular Expression to denote a language L which accepts all the strings which begin or end with either 00 or 11.

4. What are the applications of pumping lemma?

5. What is the language generated by the grammar G=(V,T,P,S)

   where P={S->aSb, S->ab}?

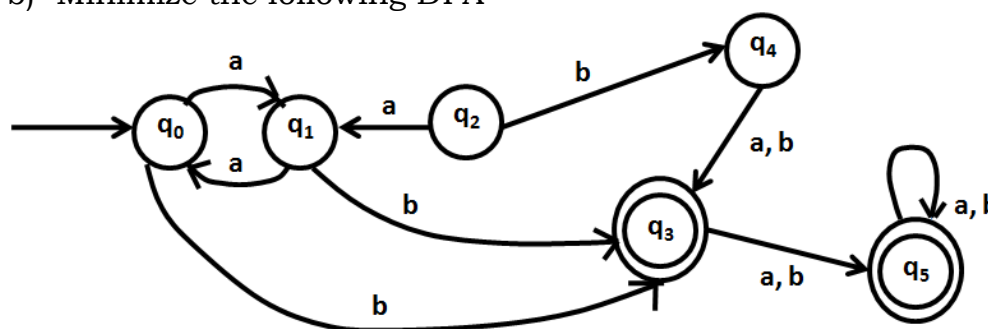6. Differentiate PDA and TM.

PART-B

4 × 12 = 48M

1. a) Design a DFA to accept the following language.
   L = {w: |w| mod 3 = 0} on Σ = {a}   (6M)

   b) Minimize the following DFA

   (6M)

2. a) Convert the following ε-NFA to an equivalent DFA E = (Q , Σ , δ , q0 , F),
   Q ={ q0,q1,q2},Σ = { a, b, c},q0 = q0 , F = { q2}, δ is as follows : δ(q0,a) = q0, δ(q0,b) = Φ, δ(q0,c) = Φ ,δ(q0, ε) = q1, δ(q1,a) = Φ, δ(q1,b) = q1, δ(q1,c) = Φ ,δ(q1, ε) = q2, δ(q2,a) = Φ, δ(q2,b) = Φ, δ(q2,c) = q2,δ(q2, ε) = Φ
                                                                              (6M)

   b) Show that if L is accepted by a NFA with ε-transitions, then L is also accepted by a NFA withoutε-transitions   (6M)

3. a) Explain in detail about closed properties and identity rules of Regular sets. (6M)

   b) Show that the language L= $\{0^{3x}1^{2y} / x > y > 0\}$ is not regular using Pumping Lemma. (6M)

4. a) Let G be the grammar (6M)

   S-> aB| bA
   A-> a |aS | bAA
   B-> b | bS | aBB
   For the string aaabbabbba , find
   i) Leftmost Derivation.
   ii) Rightmost Derivation.
   iii) Derivation Tree.

   b) Define ambiguous grammar. Consider the grammar G=(V,T,E,P) with V={E,I}, T={a,b,c,+,*,(,)} and the productions : E->I, E->E + E, E->E * E, E-> (E), I-> a |b | c Verify whether the given grammar is ambiguous? (6M)

5. a) For the following grammar : (6M)

   S -> ABC | BbB , A-> aA | BaC|aaa , B-> bBb| a|D , C->CA|AC , D-> ε
   i) Eliminate ε-productions.
   ii) Eliminate any unit productions in the resulting grammar.
   iii) Eliminate any useless symbols in the resulting grammar.
   iv) Put the resulting grammar in Chomsky Normal Form.

   b) Obtain the PDA for the given regular language: (6M)
   i) L={ww^R | w is in (0 + 1)*}
   ii) The language for even length palindrome, Also show the moves of the PDA to accept the string 101101 for the above grammar.

6. a) Design a Turing Machine to accept the following language,

   L = { 0^n1^n | n ≥1} (6M)

   b) Write short notes on
   i) Post correspondence problem
   ii) Undecidability of problems (6M)

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