INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
B.Tech IV Semester End Examinations (Regular / Supplementary) - May 2019
Regulation: IARE – R16
THEORY OF COMPUTATION
Time: 3 Hours   (Common to CSE | IT)   Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Describe NFA with ε to NFA conversion with an example. **[7M]**

   (b) Design a DFA for the set of all strings with exactly three consecutive zeros, $\Sigma = \{0,1\}$. **[7M]**

2. (a) Define string. Explain the properties of strings and languages. **[7M]**

   (b) Construct an equivalent NFA without ε moves for Figure.1 shown. **[7M]**
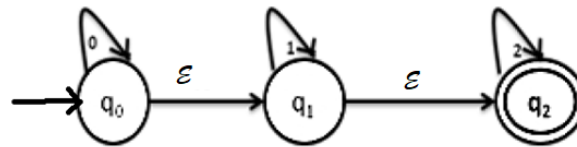

Figure 1

UNIT – II

3. (a) Define regular languages and pumping lemma for regular languages. List the advantages of regular expressions. **[7M]**

   (b) Show the following languages are not regular **[7M]**
   i) L=$a^{(n^2)}|n = 1$
   ii) L $= a^i b^{2i}/i > 0$

4. (a) Explain about the closure properties of regular sets and give an example for a regular set. **[7M]**

   (b) Obtain NFA for the following right linear grammar
   $S \rightarrow 1A/0B, A \rightarrow 1C/0, B \rightarrow 0D/1, C \rightarrow 1A, D \rightarrow 0B$ **[7M]**

UNIT – III

5. (a) Write short notes on Chomsky normal form and Greibach normal form. **[7M]**

   (b) Define Pumping Lemma for Context free languages. Apply pumping lemma and prove that $\{a^n b^n a^n | n >= 1\}$ is not context free. **[7M]**

6. (a) Explain the following terminology with an example. **[7M]**
   (i) Derivation Tree
   (ii) Yield of a tree
   (iii) Sentential Form and Left most sentential form

   (b) Convert the following grammar to Greibach Normal Form. **[7M]**
   S → ABA | AB | BA | AA |B
   A → aA |a
   B → bB |a

UNIT – IV

7. (a) Define NPDA(Non deterministic PDA) and DPDA(deterministic PDA) Illustrate with an example. **[7M]**

   (b) Construct a PDA that accepts the language
   $L = \{ww^R | w \ is \ in \ (0+1)*\}$

   [7M]

8. (a) i. Define the instantaneous description of a PDA. **[7M]**
   ii. Give the formal definition of a Push Down Automata.
   iii. Write short notes on applications of PDA.

   (b) Design the PDA which accepts the language over alphabet {a , b} by empty stack for the following:
   $\{a^n b^{2n} | n >= 0\}$ **[7M]**

UNIT – V

9. (a) Write short notes on Chomsky hierarchy of languages. **[7M]**

   (b) Design a Turing machine to perform proper subtraction. **[7M]**

10. (a) Draw a transition diagram for a Turing machine accepting the language. **[7M]**
    $\{a^n \ b^n \ c^n \ |n>=1\}$

    (b) What is Turing machine and explain the working of Turing machine with neat diagram. Write about recursive and recursively enumerable languages. **[7M]**

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