INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
B.Tech IV Semester End Examinations (Supplementary) - July, 2018
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) Define the following terms and give an example for each: i) Language ii) Star closure of a language iii) Non Deterministic Finite Automata (NFA)   **[7M]**

   (b) Define a Deterministic finite automata (DFA). Design a DFA for the language over {1,0} consisting of strings ending with 10.

       [7M]

2. (a) Design NFA for recognizing relational operators of C Programming language.   **[7M]**

   (b) Convert the following NFA to DFA.   **[7M]**
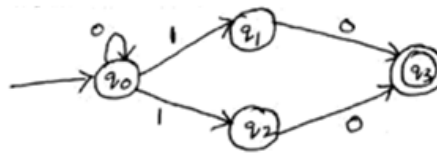

Figure 1

UNIT − II

3. (a) Construct the NFA for the regular expression $(a + b)(a^* + b^*)$.   **[7M]**

   (b) Give regular expression for the following language L over {1,0} where L consists of strings of length multiples of 3.   **[7M]**

4. (a) Describe the closure properties of Regular Languages.   **[7M]**

   (b) Write the right linear grammar for the regular expression $(0+1)^*$.   **[7M]**

UNIT − III

5. (a) Give the context free grammar for the following language: L= $\{a^n b^m \ / \ n=m+2 \}$.   **[7M]**

   (b) Convert the following grammar into CNF: **[7M]**
   S –> aAa | bBb | ε
   A –> C | a
   B –> C | b
   C –> CDE | ε
   D –> A | B | ab

6. (a) State and explain with an example pumping lemma theorem for context free languages. **[7M]**

(b) Consider the Grammar G=(V,T,E,P) with the following productions.

$$E \to E + T \mid F, T \to T * F \mid F, F \to (E) \mid id$$

Write the leftmost and rightmost derivation and parse tree for the string id+id*id. Is the grammar ambiguous? **[7M]**

UNIT – IV

7. (a) Compare DPDA and NPDA. Give one example for each. **[7M]**

(b) Convert the following grammar to a PDA **[7M]**
I $\to$ a | b | Ia | Ib | I0 | I1
E $\to$ I | E * E | E + E | (E)

8. (a) Design a NPDA to accept a balanced strings of parentheses. **[7M]**

(b) Explain the following **[7M]**
   i. PDA accepting through empty stack
   ii. PDA Accepting through final state.

UNIT – V

9. (a) Define a Turing machine and with a neat diagram, explain its working principle. **[7M]**

(b) Design a Turing machine that will accept the language L over $\{a,b\}\, where L = \{a^n b^n c^n\}\,.|n \geq 0.$ **[7M]**

10. (a) List the different types of languages and show the relationship using chomsky hierarchy. **[7M]**

(b) Define the following with an example: **[7M]**
   i. Recursively enumerable languages
   ii. Recursive languages
   iii. Universal languages

$$- \circ \circ \bigcirc \circ \circ -$$