JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2015
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and Engineering)

Time: 3 Hours Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Define δ in NFA with ε (Epsilon) moves. [2M]
  b) Design NFA to accept set of all strings does not contain 3 consecutive zeros. [3M]
  c) Define Left Linear Grammar. [2M]
  d) Define Recursive Definition for Regular Expression. [3M]
  e) Define UNIT Production. [2M]
  f) When Will you say that Grammar is Left Recursive? How to eliminate Left recursion. [3M]
  g) Give Instantaneous Description ID of Turing Machine. [2M]
  h) Define Linear Bounded Automaton. [3M]
  i) Give any two examples of Undecidable Problems. [2M]
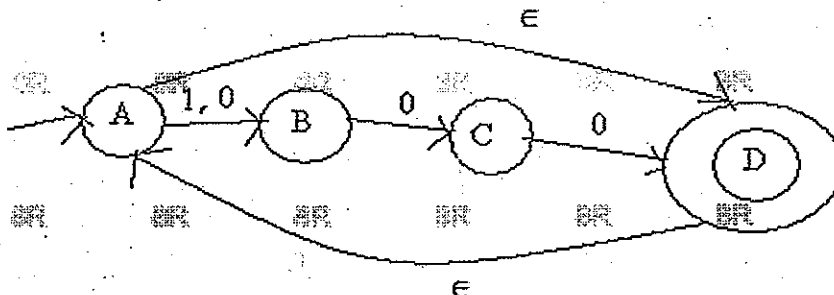 j) Give any three examples of recursive languages. [3M]

PART-B
(50 Marks)

2.a) Design a DFA to accept strings with 0's and 1's such that the number of 1's should be even.
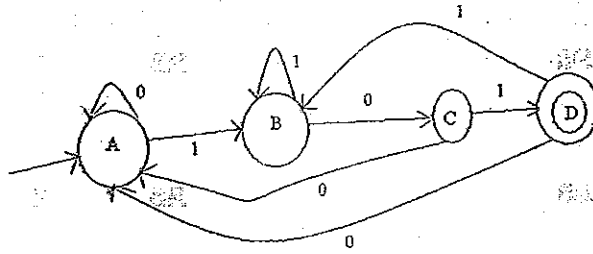 b) Construct DFA for given NFA. [4+6]
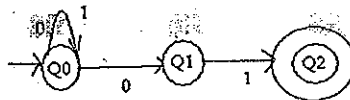
OR

3.a) Construct NFA for given NFA with $\in$ –moves.

  b) Define Moore Machine. [8+2]

4. Obtain a regular expression for the following FA. [10]

OR

5. Construct a DFA accepting language represented by 0*1*2*? [10]

6. Convert the following grammar to Greibach Normal Form
   $G = (\{A1, A2, A3\}, \{a, b\}, P, A)$
   Where P consists of the following
   A1→A2 A3
   A2→A3 A1 | b
   A3→A1 A2 | a [10]

OR

7. Design Push Down Automata for the language $L = \{a^n b^{2n} | n \geq 1\}$. [10]

8. Design Turing Machine for multiplication of two unary numbers. [10]

OR

9. Design Turing Machine $L = \{a^n b^n c^n | n \geq 1\}$. [10]

10. Define the following and give examples:
    a) NP – type problem
    b) NP – complete problem. [5+5]

OR

11. Write briefly about the following:
    a) Decidability of problems
    b) Define PCP. Give the solution of PCP A = (ba, ab, a, baa, b) and B = (bab, baa, ba, a, aba). [5+5]

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