

**B.Tech DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of Third Year)**

**COMPUTER SCIENCE & IT**

**Paper - I : Automata Theory & Formal Languages**

**Time : 3 Hours**

**Maximum Marks : 75**

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Answer question No.1 compulsory

*(15 × 1 = 15)*

Answer ONE question from each unit

*(4 × 15 = 60)*

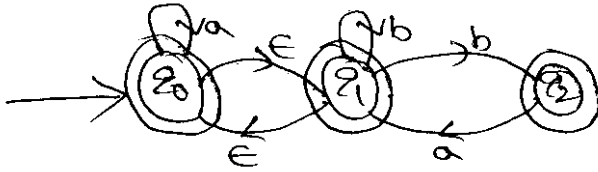
- 1) a) What is the difference between NFA and DFA?
- b) What is meant by Regular language?
- c) Define pumping lemma.
- d) What is the difference between regular grammar and context free grammar?
- e) What is Chomsky normal form?
- f) Write any two properties of CFLS.
- g) Define pushdown Automata.
- h) Define Finite State machine.
- i) What is the use of MYHILL-NERODE Theorem?
- j) What is meant by ambiguous grammar?
- k) Define Turing machine.
- l) What is meant by recursively enumerable language?

Draw Transition Diagrams for the following regular expressions

- m)  $(a + b)^* abb$ .
- n)  $a(a + b)^* ab$ .
- o)  $(a + b)^* a(a + b) (a + b)$ .

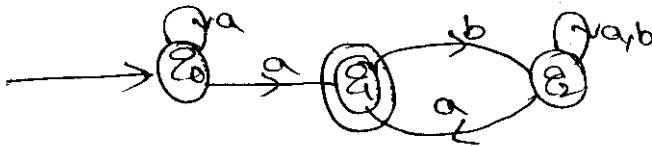
## UNIT - I

- 2) Construct DFA for the following Transition Diagram.



OR

- 3) a) Find out DFA for the following diagram.



- b) Construct mod-3 counter using ternary representation.

## UNIT - II

- 4) a) Define CFG. Write CFG for the language  $L = \{0^n 1^n \mid n \geq 1\}$

- b) Consider the grammar  $S \rightarrow aS \mid aSbS \mid \epsilon$

Is the above grammar ambiguous?

Show in particular that the string 'aab' has no :

- i) Parse tree
- ii) Leftmost derivation
- iii) Rightmost derivation

OR

- 5) a) Consider the grammar  $E \rightarrow + EE \mid * EE \mid - EE \mid x \mid y$ .

Find the leftmost and right most derivation for the string

' $+* -xyxy$ ' and write parse tree

- b) Explain briefly the closure properties of regular sets.

## UNIT - III

- 6) Convert the following grammar into GNF

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid a$$

OR

- 7) Construct PDA for the language  $L = \{w \in w^R \mid w \in (a + b)^*, \text{ where } w^R \text{ is reverse of } w\}$ .

## UNIT - IV

8) Design Turing machine for the language  $L = \{a^n b^n c^n / n > 1\}$

OR

9) Discuss about :

- a) Universal Turing Machines.
- b) Techniques of Turing machine construction.

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