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MCA-18

June - Examination 2016

MCA IIIrd Year Examination

Formal Language and Automata

Paper - MCA-18

Time : 3 Hours] **[Max. Marks :- 80**

Note: The question paper is divided into three sections A, B and C. Write answers as per given instructions.

Section - A $8 \times 2 = 16$

(Very Short Answer Questions)

Note: Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum upto 30 words. Each question carries 2 marks.

1) (i) What is difference between deterministic finite automata and non-deterministic finite automata?

(ii) Construct FA for the following regular expressions.
0 + 10 + 010.

(iii) What is Null String (Λ)?

(iv) What do you mean by Parse tree?

(v) Write down the statement of Church Thesis.

(vi) Define grammars and name their types.

(vii) What are the productions?

(viii) Why context free grammars are called “Context Free”?

Section - B $4 \times 8 = 32$

(Short Answer Questions)

Note: Answer **any four** questions. Each answer should not exceed 200 words. Each question carries 8 marks.

2) Convert the following CFG into Chomsky Normal Form:

S ->ABA

A ->aA|$\in$

B ->bB|$\in$

3) Construct PDA's that recognizes the languages:

$L = \{ a^n b^n : n \geq 1 \}$

4) Check whether the given grammar is ambiguous or not

S ->iCtS

S ->iCtSeS

S ->a

C ->b

5) Explain pumping lemma for CFL. Consider the following language $L = \{ a^n b^n c^n \mid n \geq 1 \}$, using pumping lemma show that L is not CFL.

6) Convert into equivalence Melay Machine

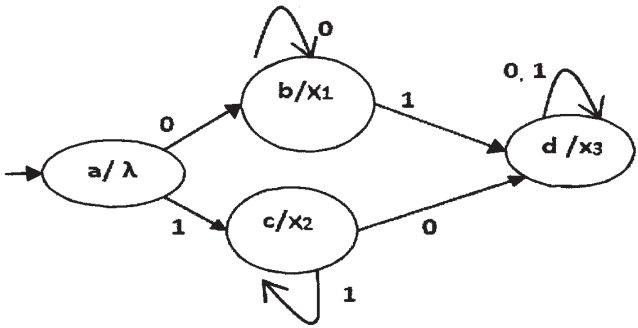

Fig. No. 1

7) Give a Turing machine for the following that computes ones complement of a binary number.

8) Explain Finite State Automata with the help of suitable example.

9) What is Greibach normal form? Write the procedure to convert CFG into Greibach normal form.

Section - C $2 \times 16 = 32$

(Long Answer Questions)

Note: Answer **any two** questions. Limit your answer to 500 words. Each question carries 16 marks.

10) Convert given NFA into equivalence DFA.

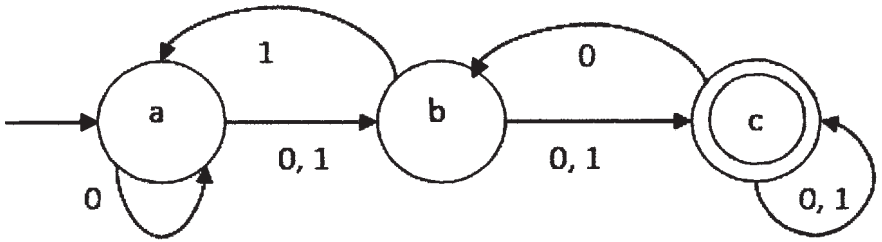

Fig. No. 2

11) Explain the steps involved in construction of Turing machine in detail with the help of suitable example.

12) Explain decidability and undecidability problems, with the help of Halt machines.

13) Construct a regular expression corresponding to the automata given below using Arden's Theorem.

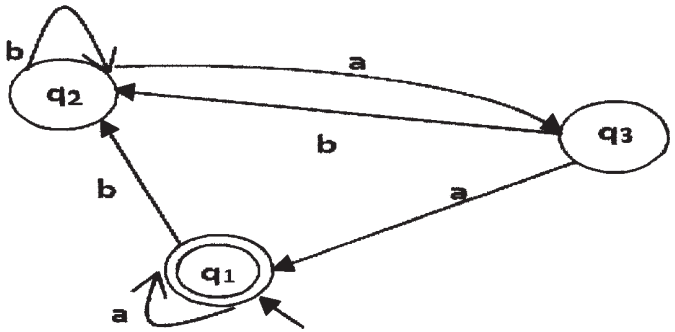

Fig. No. 3