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MCA
(SEM II) THEORY EXAMINATION 2017-18
INTRODUCTION TO AUTOMATA THEORY & FORMAL LANGUAGE

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. What is null string (λ)?
b. Define regular expression?
c. What is the concept of PDA?
d. What is unit production?
e. Define multitape turing machine.
f. Write short notes on strings.
g. Write regular expression for the language that have the set of all strings of 0's and 1's beginning with 00.

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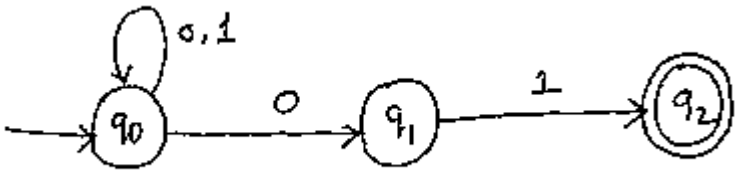
SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. Show that the set $L=\{a^n b^n / n>=1\}$ is not a regular.
b. Construct DFA equivalent to the NFA given below:



c. If G is the grammar S->Sbs/a, Show that G is ambiguous.
d. Find the language generated by a grammar G=({S},{a,b},{S->aSb, S->ab},S)
e. Define a PDA. Give an Example for a language accepted by PDA by empty stack.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Find a grammar in Chomsky Normal form equivalent to S->aAD;A->aB/bAB; B->b, D->d.
(b) Show that the language $\{0^n1^n2^n / n>=1\}$ is not a Context free language.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Design a Turing Machine to accept the language $L=\{0^n 1^n / n>=1\}$
(b) Define Post correspondence problem with an example.

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5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Construct an NFA equivalent to the regular expression ((0+1)(00+11)(0+1))*

(b) Show that Ln is recursively enumerable.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define a context free grammar. What is the language generated by CFG or G? Explain with an example.

(b) Construct the grammar for the language L={ a^n b a^n | n>=1}.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is mealy and moore machine. Explain it using transition diagram.

(b) Write short notes on :

(i) Transition diagram

(ii) Differentiate DFA with NFA

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