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MCA

THEORY EXAMINATION (SEM–II) 2016-17

INTRODUCTION TO AUTOMATA THEORY & LANGUAGES

Time : 3 Hours *Max. Marks : 70*

Note : Be precise in your answer.

SECTION : A

1 **Attempt all questions.** 7x2=14

a) Define DFA using diagram.

b) Define mealy machine.

c) Define context free grammar with an example.

d) Define regular grammar with an example.

e) Define Push down Automata.

f) What are the special features of Turing machine (TM)?

g) Define Post Correspondence Problem?

SECTION-B

2 **Attempt any five questions.** 5x7=35

(a) Construct a Mealy Machine to equivalent Moore machine which is given below -

Next State

Present State	Input a = 0		Input a = 1	
	State	Output	State	Output
$\rightarrow q_1$	q_1	1	q_2	0
q_2	q_4	1	q_4	1
q_3	q_2	1	q_3	1
q_4	q_3	0	q_1	1

(b) Construct a minimum state automation equivalent to a given automation M whose transition table is given below:

States	Input	
	a	b
$\rightarrow q_0$	q_0	q_3
q_1	q_2	q_5
q_2	q_3	q_4
q_3	q_0	q_5
q_4	q_0	q_6
q_5	q_1	q_4
(q_6)	q_1	q_3

(c) If $G = (\{S\}, \{0,1\}, \{S \rightarrow 0S1/01\}, S)$, find the language generated by G.

(d) Give the Chomsky Hierarchy of grammars specifically giving form of production rules in each class of grammar .

(e) State and proof Arden's theorem ?

(f) State and proof pumping lemma for regular set.

(g) Show that the language $\{ 0^n 1^n 2^n / \ n \geq 1\}$ is not a context free language .

(h) Show that the context free grammar G given by production S -> SBS / a , B -> b , is ambiguous .

SECTION-C

Attempt any two questions. Each question carry 10.5 marks **2x10.5=21**

3. Show that the halting problem of Turing Machine is undecideble

4. Reduce the following grammar G to CNF
   G is $S \rightarrow aAD, A \rightarrow aB/bAB$, $B \rightarrow b, D \rightarrow d.$

5. Design a Turing machine recognizing the following language :
   L = { ww^R / w is in (0+1)* and w^R represents reverse w }

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