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RCA203

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

- Define DFA using diagram.
- Define mealy machine.
- Define context free grammar with an example.
- Define regular grammar with an example.
- Define Push down Automata.
- What are the special features of Turing machine (TM)?
- 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 -

Present State	Next State		Input a = 1	
	State	Output	State	Output
→ 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
→ 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

- If $G = (\{S\}, \{0,1\}, \{S \rightarrow 0S1/01\}, S)$, find the language generated by G.
- Give the Chomsky Hierarchy of grammars specifically giving form of production rules in each class of grammar.
- State and proof Arden's theorem?
- State and proof pumping lemma for regular set.
- 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 $S \rightarrow SBS / a$, $B \rightarrow b$, 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 undecidable
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 :
 $L = \{ ww^R / w \text{ is in } (0+1)^* \text{ and } w^R \text{ represents reverse } w \}$