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MCA

THEORY EXAMINATION (SEM-II) 2016-17

INTRODUCTION TO AUTOMATA THEORY & FORMAL LANGUAGES

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer.

SECTION: A

1. Attempt all questions.

10 x 2 = 20

- What is the difference between DFA and NFA?
- Define regular set with example.
- Define context free grammar.
- Define undecidable problem with an example.
- What is context sensitive language?
- What is regular expression?
- Define regular grammar.
- What is the meant by Linear bounded automata?
- What is the role of checking of symbols in a Turing machine?
- What is Moore machine?

SECTION : B

2. Attempt any five questions.

5 x 10 = 50

- Show that the language $L = \{0^{3x} 1^{2y} / x > y > 0\}$ is not regular using Pumping Lemma,
- Construct an NFA equivalent to the regular expression $10 + (0 + 11)0^*1$
- Construct an equivalent grammar G in CNF for the grammar $G1 = (\{S, A, B\}, \{a, b\}, \{S \rightarrow bA / aB, A \rightarrow bAA / aS / a, B \rightarrow aBB / bS / b\}, S)$
- Show that the language $L = \{a^n b^n / n \geq 1\}$ is unambiguous .
- What is Push Down Automata? Explain how context free language is accepted by PDA.
- Show that the Context free languages are closed under union , concatenation and Kleene closure
- Show that L is recognized by a Turing machine with a two way infinite tape if and only if it is recognized by a Turing machine with a one way infinite tape.
- Show that that union of two recursive languages is recursive and the union of two recursive enumerable languages is also recursively enumerable.

SECTION : C

Attempt any two of the following.

2 x 15 = 30

- Design a Turing Machine for the following:
 $\{0^n 1^m 0^n 1^n / m, n \geq 1\}$
- Explain the linear bounded automata with an example. Also discuss about context sensitive's languages with an example.
- Prove that if L is a regular set then L is generated by some left linear grammar and right linear of grammar.