

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

MCA (E-I) (2019 & Onwards) (Sem.-3)

THEORY OF COMPUTATION

Subject Code : MCA-305B

M.Code : 74078

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTIONS-A, B, C & D contains TWO questions each carrying TEN marks each and students has to attempt any ONE question from each SECTION.
2. SECTION-E is COMPULSORY consisting of TEN questions carrying TWENTY marks in all.

SECTION-A

- Q1. a) What is the application of principle of mathematical induction in computer science? Explain.
- b) Define equivalence relation. Prove that $RR^* = R^* = R^*R$. if R is a regular expression.
- Q2. a) Design a DFA for language $L = \{w \mid \#0,1\}^*$ & Number of 0's = Number of 1's in w}.
- b) Design a DFA accepting set of positive even integers between 0 and 998.

SECTION-B

- Q3. Explain the following :
- a) Kleene's Theorem
 - b) Pumping Lemma for regular Languages
- Q4. a) What is meant by ambiguity of context free grammar? Explain.
- b) What is the need of having Chomsky Normal Form of CFG? Explain.

SECTION-C

- Q5. a) Design a PDA accepting even palindrome strings over $\{0,1\}^*$.
- b) Design a context free grammar corresponding to above PDA.
- Q6. Explain the following :
- a) Intersection of two Context Free Grammars.
 - b) Decision problems involving CFGs.

SECTION-D

- Q7. a) Design a turing machine which can multiply two unary numbers.
b) Design a multi tape turing machine to search a substring from a given string.
- Q8. a) What are recursive languages? Explain by taking examples.
b) Demonstrate Chomsky hierarchy in detail.

SECTION-E

Q9. Answer the following :

- a) "Every DFA is a transition system". Justify the statement.
- b) Define DPDA.
- c) Show that complementation of regular set is regular.
- d) Define the term $T(M)$. If M is given automata.
- e) List the restriction of Chomsky Normal Form.
- f) What is the difference between top down parsing and bottom up parsing?
- g) What is meant by Mealy machine?
- h) What kind of grammar is termed as context sensitive?
- i) Give two examples of regular grammars.
- j) List two characteristics of Turing machines.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.