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Total No. of Pages : 02

Total No. of Questions : 18

MCA (E-I) (2015 to 2018) (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 have 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) Discuss one-one onto function by taking suitable example.

b) Prove that $\sum (n-1) = \frac{n(n-1)}{2}$ using mathematical induction.Q2 Design an automaton accepting all the strings ending with bb. Where $\{a,b\} \in \Sigma$.**SECTION-B**Q3 a) Construct a DFA for the regular expression $(0+10)^* 101(0+10)^*$.b) Design a DFA accepting language $L = \{a^n b b \mid n \geq 1 \text{ \& } \{a,b\} \in \Sigma\}$ Q4 Construct a CFG for $L = \{a^n b^m c^p \mid n+m=p, p > 1 \text{ \& } \{a,b,c\} \in \Sigma\}$ **SECTION-C**

Q5 Explain the following :

a) Ambiguity in CFG

b) DPDA

Q6 Show that language $L = \{a^n b^n c^n \mid n \geq 0 \text{ \& } \{a,b,c\} \in \Sigma\}$ is not context free

SECTION-D

- Q7 Design a Turing Machine which recognizes palindromes over $\{0,1\}$.
- Q8 Explain the following :
- a) Multitape Turing Machine
 - b) Chomsky Hierarchy

SECTION-E

Write briefly :

- Q9 State pumping lemma for regular languages.
- Q10 Discuss the concept given by Arden's theorem.
- Q11 What is meant by regular expression?
- Q12 Define a Derivation Tree for a CFG.
- Q13 What are two normal forms for a CFG?
- Q14 Define Acceptance of PDA by Empty Stack.
- Q15 What is halting problem of Turing Machine?
- Q16 Compare PDA and TM.
- Q17 Write two properties of recursively enumerable languages.
- Q18 Define NP complete problem.

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.