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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 $\{a,b\} \in \sum$.

SECTION-B

Q3   a) Construct a DFA for the regular expression (0+10)* 101(0+10)*.

     b) Design a DFA accepting language $L = \{a^n bb \mid n \geq 1 \, \& \, \{a,b\} \in \sum\}$

Q4   Construct a CFG for $L = \{a^n b^m c^p \mid n+m = p, p > 1 \, \& \, \{a,b,c\} \in \sum\}$

SECTION-C

Q5   Explain the following :

     a) Ambiguity in CFG

     b) DPDA

Q6   Show that language $L = [a^n b^n c^n \mid n \geq 0 \, \& \, \{a,b,c\} \in \sum]$ 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.