Mid-West University

Examinations Management Office

End-Semester Examinations -2080

Bachelor level/ B.E. Computer /4th Semester
Time: 3 hours
Subject: Theory of Computation (CO508/CO441)

Full Marks: 50
Pass Marks: 25

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

1. What is the logic behind studying theory of computation? How can you justify DFA and NDFA are different in nature? [2+3]
2. What is the relation between PDA and CFG? Explain Pushdown automata with your own example. [1+4]
3. Discuss the decision algorithm for regular sets. Explain Pumping Lemma theory in the context of regular sets with your own example. [2+3]
4. What are normal forms in CFG? Explain LDT and RDT with suitable example (make tree also). [1+4]
5. a) Remove the Null production from the Grammar. [2.5]

   $S \rightarrow ABAC$

   $A \rightarrow aA/\epsilon$

   $B \rightarrow bB/\epsilon$

   $C \rightarrow c$

   b) Show that $L = \{a^n b^n c^n \backslash n \geq 0\}$ is not a context free language.

   [Use Pumping Lemma for CFL] [2.5]
6. Draw the graphical representation of PDA. Construct a PDA that accepts even palindromes of the form $L=\{WW^R/W=(a+b)^+\}$ [1+4]
7. Define Turing Machine formally also write its application. Explain Church's Hypothesis. [1+1+3]
8. What is Universal Turing Machine? Explain the properties of recursive and recursively enumerable language. [1+4]
9. Define CFL. Compare Decidability with Un-decidability with an example. [1+4]
10. Write short Notes on any ***TWO*** [2.5+ 2.5]
    a) Decision algorithm for Context Free Languages
    b) Theory of Computational Complexity
    c) Intractable Problems
    d) NP-Complete Problems

THE END