Mid-West University
Examinations Management Office
Final Examinations -2081

Level: Bachelor /B.Sc. CSIT/ Semester: IV   F.M: 60
Time: 3hrs.   P.M: 30
Subject: Theory of Computation (COM445)

Candidates are required to give their answers in their own words as far as practicable. Figures in the margins indicate marks.

Group A

Very short questions (Attempt ALL)   [8 x 2 = 16]

1. Define context free grammar.
2. Design a DFA that accepts strings containing 0101 as substring over the alphabet {0,1}.
3. Define regular expression with an example.
4. What is parse tree? Illustrate with an example.
5. Discuss tractable and intractable problems with example.
6. Differentiate between recursive and recursively enumerable languages.
7. Define the languages accepted by PDA.
8. Explain Chomsky hierarchy of grammars.

Group B

Short answer questions (Attempt ANY FIVE)   [5 x 4 = 20]

9. Explain finite automata with their types. State the applications of finite automata.
10. Define the term: Parse Tree, left-most and right-most derivation, and ambiguity with example.
11. Explain left recursion in CFG and how is it eliminated. Illustrate with an example.
12. Prove that the CFLs are closed under concatenation.
13. Design a PDA for the language L = { anbnab | n>=1} over the alphabet {a,b}.
14. Prove that for every regular expression there is a finite automaton.

Group C

Long answer questions (Attempt ANY THREE)   [3 x 8 = 24]

15. Discuss subset construction algorithm with a suitable example.
16. State and prove pumping lemma for regular languages.
17. Convert the following CFG into CNF.

    S → aAa | bBb | ∈
    A → c | a
    B → c | a
    C → CDE | ∈
    D → A | B | ab
    E → e

18. Explain the roles of Turing machine. Design the Turing machine accepting language of palindrome over the alphabet {a, b}.

The End