

**B. Tech 4th Semester Examination**

**Theory of Computation (NS)**

**CS-222**

**Time : 3 Hours**

**Max. Marks : 100**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Candidates are required to attempt five questions in all selecting one from each of the sections A, B, C & D. And all subparts of the questions in section E.

**SECTION - A**

1. Construct a DFA for the following:
  - (a) All strings that contain exactly 4 zeroes.
  - (b) All string that don't contain the substring 110. (20)
2. Explain the Difference and Equivalence between NFA and DFA (20)

**SECTION - B**

3. State and Prove pumping lemma for Context free languages. (20)
4. Write note on (a) Myhill-Nerode theorem (b) Minimization Algorithm. (20)

**SECTION - C**

5. Write a note on (a) Regular set (b) Context sensitive grammar (c) Pumping lemma (d) Parsing (4×5=20)

[P.T.O.]

6. (a) State the two normal forms and give an example.
- (b) State the Pumping lemma for CFG.
- (c) Write the formal definition of PDA.
- (d) Define ambiguity regular grammar. (4×5=20)

**SECTION - D**

7. (a) Explain how the multiple tracks in a Turing Machine can be used for testing given positive integer is a prime or not? (10)
- (b) Explain in detail: "The Turing Machine as a Computer of integer functions". (10)
8. (a) State the techniques for Turing machine construction? Illustrate with a simple language (10)
- (b) Explain Chomsky Hierarchies of Grammar. (10)

**SECTION - E**

9. (a) List any two ways of theorem proving.
- (b) Define transition diagram.
- (c) Differentiate between recursive and recursively enumerable language.
- (d) What is the need for finite automata?
- (e) Design a Turing machine to compute  $n \bmod 2$ .
- (f) Define DFA.
- (g) Application of Pushdown Machines
- (h) Primitive recursive function. (2½×8=20)