



VIT-AP University, Amaravati

CAT-1

Course Title: Discrete Mathematical Structures
Course Code: MAT1003

Class: B.Tech.
Semester: Winter

- 1) Assume
F(x): x is a fox.
S(x): x is sly.
T(x): x is trustworthy.
and the universe of discourse for all three functions is the set of all animals.
Then write the logical expression for the followings
 - a) Everything is a fox
 - b) All foxes are sly
 - c) If any fox is sly, then it is not trustworthy. **-9 Marks**
- 2) Using method of contradiction prove that there is no rational number p/q whose square is 2, where p and q are integers and $q \neq 0$. **-10 Marks**
- 3) Check the validity of the following argument without using truth table
If it is snowing, it is cold
If it is cold, John is wearing a coat
It is snowing
Therefore, John is wearing a coat **-10 Marks**
- 4) In MH-1 to reach 5th floor there are certain amount of stairs. If a resident takes 2 stairs at one step he will have to cover 1 stair at the end; If he takes 3 stairs at one step he will have to cover 2 stairs at the end and if he takes 5 stairs at one step he will have to cover 3 stairs at the end. How many stairs are there to reach 5th floor? **-12 Marks**
- 5) a) What is the secret message produced from the message “I LOVE MATHEMATICS” using the Caesar cipher (Shift=3)? **-4 Marks**
b) Decrypt the cipher text message “LEWL PLUJL” that was encrypted with the affine cipher with $f(p) = (7p + 5) \bmod 26$. **-5 Marks**