MALLA REDDY UNIVERSITY
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Assignment -II

Discrete Mathematics

1. Let S = {1,2,3} and *P(S)*, the power set of S. On *P(S)*, define the relation R by XRY iff X ⊆ Y. Show that (*P*(*S*), ⊆) is Poset, check whether it is Toset or not and also draw its Hasse diagram.
2. Prove that for any positive integer m, the relation congruence modulo m is an equivalence relation on integers.
3. If A = {1,2,3,5,30} and *R* is the divisibility relation, draw its Hasse diagram and verify that (A, R) is lattice or not?
4. If the functions $f, g: Q \to Q$ are defined by $f(x) = 2x$ *and* $g(x) = x - 2$ then prove that $(fog)^{-1} = g^{-1} o\, f^{-1}$.
5. Prove using laws of logic $(p \vee q) \wedge \sim(\sim p \vee q) \Leftrightarrow p \wedge \sim$q.
6. Obtain PDNF and PCNF of $p \longrightarrow (q \longrightarrow r)$.
7. Verify the validity of following argument
   It is not sunny this afternoon and it is colder than yesterday,
   We will go swimming only if it is sunny,
   If we do not go swimming then we will take a Hyderabad trip
   If we take the Hyderabad trip then we will be home by sunset
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   ∴ We will be home by sunset.
8. Verify the validity of following argument
   If you send me an email, then I will finish writing the program
   If you do not send me an email, then I will go to sleep early
   If I go to sleep early then I will wake up feeling refreshed
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   ∴ If I do not finish writing the program, then I will wake up feeling refreshed.
9. All integers are rational numbers
   Some integers are powers of 2

   ∴ Some rational numbers are powers of 2.
10. All men are mortal
    Sachin is a man

    ∴ Sachin s mortal
11. Slove the recurrence relation $a_n = a_{n-1} + \frac{1}{n(n+1)}$, $a_0 = 1$.

12. Slove the recurrence relation $a_n = 2a_{n-1} + 1 \; for \; n \geq 2$ and $a_1 = 2$.

13. What is the solution of the recurrence relation $a_n = a_{n-1} + 2a_{n-2}$ and $a_0 = 2;\ a_1 = 7$.

14. Find the solution of the recurrence relation $a_n + 4a_{n-1} + 4a_{n-2} = 0$ and $a_0 = 2;$ $a_1 = 1$.