<u>QUESTION BANK</u>

Discrete Mathematics (KCA-104)

1. Write down all Possible subsets of A = {2, 3} and B = {a, b, c}.
2. Define the Power set. If A = {1, 2, 3} find P(A) and n{P(A)}.
3. Illustrate the Distributive and Associative laws of set theory.
4. Show that for any two sets A and B in the set theory: $A-(A \cap B) = A-B$.
5. A computer company must hire 20 programmers to handle system programming jobs and 30 programmers for applications programming. Of these hired, 5 are expected to perform jobs of both types. How many programmers must be hired ?
   Ans:- 45
6. Define the Composite relation. And Led set A = {1, 2, 3}, B = {p, q, r}, C = {x, y, z} and the relations are, R = { (1, p), (1, r), (2, q), (3, q)} and S = { (p, y), (q, x), (r, z)}, then compute RoS.
7. Show that relation "xRy iff (x - y) is divisible by 3" is an equivalence relation on the set of integers.
8. Define the function and explain the difference between function and relation with example.
9. Let f and g : R $\rightarrow$ R, be defined as follows:
   f(x) = x + 2, g(x) = 1 / (x^2 + 1). Compute f o g (x).
10. Let X = {a, b, c}. Define $f : X \rightarrow X$ such that f = {(a, b), (b, a), (c, c)}.
    Find (i) f^2 (ii) f^3 (iii) f^4
    Ans:- f^2 = {(a, a), (b, b), (c, c)}, f^3 = {(a, b), (b, a), (c, c)} and f^4 = {(a, a), (b, b), (c, c)}
11. Consider the Poset S = ({1, 2, 3, 4, 6, 9, 12, 18, 36}, /). Find the Greatest Lower Bound and Least Upper Bound of the sets {6, 18} and {4, 6, 9}.
12. Explain the Hasse diagram with example.
13. Draw the Hasse diagram of poset (D_{72}, '/'). '/' represent the divisibility operation.
14. Let D_m denote the positive divisors of integers m ordered by divisibility. Draw the Hasse diagrams of : (a) D_{24} (b) D_{15}
15. State complement axiom of Boolean algebra.
16. Define the well-ordered set? Give an example of well-ordered set.
17. Define Complemented lattice with example.
18. Let S = {x, y, z} and P(S) be its power set. Show that (P(S), $\subseteq$) is a Lattice.
19. Classify the Modular Lattice. Also Show that: Every Distributive lattice is Modular.
20. If B = {1, 3, 5, 15}, then show that (B, +, . , ') is a Boolean Algebra, where a + b = lcm (a, b), a . b = gcd (a, b) and $a' = \dfrac{15}{a}$.