Discrete Mathematics Assignment-I

1. Define set and explain any four types of sets. If U={0,1,2,3,4,5,6,7,8,9}, A={1,2,3,4,5} and B= {0, 2, 4, 6, 8} find A∪B, B∩A, 𝐵𝐶, and (𝐴 ∩ 𝐵)𝐶 .
2. Let A= {1, 2, 3}, B= {a, b, c}, and C={x, y, z}. Consider the following relations R and S from A to B and from B to C, respectively. R= {(1, b), (2, a), (2, c)} and S = {(a, y), (b, x), (c, y), (c, z)}.
   1. Find the composition relation RoS with arrow diagram.
   2. Find the matrices MR, MS, MRoS and the product MR.MS of the respective relations R, S and RoS.
3. Define relation and give one example. Define types of relations with examples.
4. Let A={1,2,3,4,5,6,7} and R={(x, y)/(x-y) is divisible By 3, for all x, y∈ 𝐴 } show that R is an Equivalence relation.
5. Define partially ordered set and let A={1,2,3,4,6,8,12} and R={(a, b)∕ a divides b,∀a,b∈ A} show that relation R is partial ordering.
6. Define function, one-one function, onto function. Let 𝑓: 𝑅 → 𝑅 be defined by𝑓(𝑥) = 3𝑥 + 4, show 𝑓 is one-one and onto also find 𝑓−1.
7. Let the function 𝑓: 𝑅 → 𝑅 and 𝑔: 𝑅 → 𝑅 be defined by𝑓(𝑥) = 2𝑥 + 1, 𝑔(𝑥) = 𝑥2 − 2. Find 𝑓𝑜𝑔(1), 𝑔𝑜𝑓(2).
8. Define the following terms with truth tables
   1. Negation b) Conjunction

c) Disjunction d) Conditional

1. Show that p∨ (𝑞 ∧ 𝑟) 𝑎𝑛𝑑 (𝑝 ∨ 𝑞) ∧ (𝑝 ∨ 𝑟) are Logically Equivalent.
2. Show that (p→ 𝑟) ⋀(𝑞 → 𝑟) 𝑎𝑛𝑑 (𝑝 ∨ 𝑞) → 𝑟 are Logically Equivalent.