

## PART A

Answer All Questions. Each Question carries 4 marks

1. Define equivalence relation with suitable example.
2. Let  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = x+1$ ,  $g(x) = 2x^2+3$  find  $f \circ g$  and  $g \circ f$ . Is  $f \circ g = g \circ f$ ?
3. What do you mean by Total order relation? Give an example.
4. Draw the Hasse diagram for the Poset  $[P(U), \subseteq]$  where  $U = \{1,2,3\}$ .
5. Find the rank of the matrix  $\begin{bmatrix} 0 & 3 & 4 \\ -3 & 0 & -5 \\ -4 & 5 & 0 \end{bmatrix}$

## PART B

Answer any five question. Each Question carries 6 marks .

6. Write the Warshall algorithm. Use to find the transitive closure of the relation  $\{(1,3),(3,2),(2,4),(3,1),(4,1)\}$  on  $\{1,2,3,4\}$ .
7. If  $R$  is an equivalence relation then Prove that  $R^{-1}$  is also an equivalence relation.
8. Find the eigen values and eigen vectors of the matrix  $\begin{bmatrix} 4 & 2 & -2 \\ 2 & 5 & 0 \\ -2 & 0 & 3 \end{bmatrix}$
9. Solve the system of linear equations  $x + y + z = 6$   
 $x + 2y - 3z = -4$   
 $-x - 4y + 9z = 18.$
10. Prove that  $(\mathbb{Z}, /)$  is a Partial Ordered set where  $/$  is the relation divides.
11. If  $R$  be a relation in the set of integers  $\mathbb{Z}$  defined by  $R = \{(x,y) : x \in \mathbb{Z}, y \in \mathbb{Z}, x-y \text{ is divisible by } 3\}$  Describe the distinct equivalence class.
12. Consider the following relation on  $\{1,2,3,4,5,6\}$ .  $R = \{(i,j) : |i - j| = 2\}$ . Is  $R$  an equivalence Relation?