Time: 1 hr **Max. Marks: 20**

PART-A

(Answer All Questions. Each question carries 2.5 marks)

1. Consider the following relation on $\{1,2,3,4,5,6\}$. $R = \{(i,j): |i-j| = 2\}$. Is R reflexive? Symmetric? Transitive? Justify.

2. If $R = \{(1,2),(4,3),(2,2),(2,1),(3,1)\}$ be a relation on $S = \{1,2,3,4\}$, find the symmetric closure of R.

3. Find the rank of the matrix $A = \begin{bmatrix} 3 & 0 & 2 & 2 \\ -6 & 42 & 24 & 54 \\ 21 & -21 & 0 & -15 \end{bmatrix}$

4. Solve the system, $x + y - z = 9,\ 8y + 6z = -6,\ -2x + 4y - 6z = 40$

(Total : 4*2.5= 10 marks)

PART-B

(Each question carries 5 marks)

5. Let $A = \{1,2,3,4\}$, for the relation R whose matrix is given below. Find the matrix of transitive closure by using Warshall's algorithm.

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

OR

6. Prove that if A is a non-empty set and R is an equivalence relation on A, then the distinct equivalence classes of R form a partition of A.

7. Determine the values of λ and μ such that the following system of equations has no solution, unique solution and infinite number of solutions.

$$2x - 5y + 2z = 8,\ 2x + 4y + 6z = 5,\ x + 2y + \lambda z = \mu$$

OR

8. Express the polynomial $v = t^2 + 4t - 3$ as a linear combination of the polynomials $p_1 = t^2 - 2t + 5,\ p_2 = 2t^2 - 3t,\ p_3 = t + 1$.

(Total: 2*5= 10 marks)

Question No	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Course Outcome	*CO-1*	*CO-1*	*CO-2*	*CO-2*	*CO-1*	*CO-1*	*CO-2*	*CO-2*
Knowledge level								