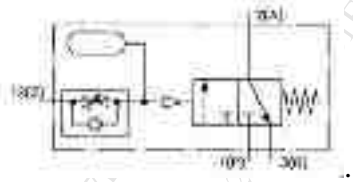
(3 hours) **Total Marks:** 80

NB 1) **Question No. 1 is compulsory**
2) **Attempt any three questions out of the remaining five questions.**
3) **Figures to the right indicate full marks.**
4) **Assume suitable data wherever required but justify the same.**

Q1. **Attempt any four** (20)

A. Explain the difference between programmable and flexible automation.
B. Explain Automation migration strategy.
C. List and explain types of joints used in Robots.
D. Identify the component and explain the functioning of the component.



E. What is an end effector? Explain the magnetic gripper with suitable example.

Q2 **A.** Design electro Pneumatic circuit for two cylinder operation with following sequence using 5/2 both side solenoid operated valve as DCV. (10)
A+B+Delay B- A-
With user selection option single cycle Multicycle operation.
B. Explain concept of Artificial Neural Networks (ANN) in detail. List and define Terminologies of ANNs. (10)

Q3 **A.** What is a significance of Cascade method? List rules for cascade method along with example. (10)
B. Differentiate between PLC and Relays. (05)
C. Write short note on industrial application of Robots. (05)

Q4 **A.** Compare Supervised, Unsupervised and reinforcement learning with different parameters. (10)
B. Design simple pneumatic circuit for two cylinder operation with following sequence using 4/2 pilot operated valve as DCV using cascade method (10)
Delay B+ A+ A- B
With user option of single cycle – multi cycle. Also draw displacement diagram.

Q5 **A.** Explain depth first search algorithm with example. (08)
B. Write note on different actuation methods for Direction control valves (05)
C. Explain linear regression technique with suitable example. (05)

Q6 **A.** Explain hierarchical Clustering with as example. (08)
B. Write detail note on Meter in circuit used in Hydraulics operations. (05)
C. For a given data set [2,4,10,12,3,20,30,11,25], find the final cluster centres using K=2 clusters. (05)

==========XOX==========