(3 Hours) [Total marks: 80]

Instructions:
1. **Question 1 compulsory**.
2. Attempt any **three** questions from the remaining **five** questions.
3. Figures to the right indicate full marks.
4. Assume suitable data wherever required but justify the same.

Q.1.		Solve ANY FOUR questions from following.	
	a	List four levels of automation with suitable examples	05
	b	Explain backpropagation algorithm used in Artificial Neural Networks.	05
	c	Define Continuous path control system used in robotic system with suitable applications.	05
	d	Summarize with a schematic block diagram, an automated system showing all the basic elements.	05
	e	Explain the concept of Timers and Counters used in PLC architecture.	05
Q.2.	a.	Design an electro- pneumatic circuit for two-cylinder operation with following sequence using 5/2 both side solenoid operated valve as DCV. A+ , Delay B+ , A-B-	10
	b	Illustrate with neat diagram counter balance valve and Bleed off hydraulic circuits used in hydraulic system.	10
Q.3.	a.	Illustrate with neat sketches any three types of drives used in robotic system with its advantages and disadvantages.	10
	b.	Illustrate Goal based reflex agents and Model based intelligent agents in AI with examples.	10
Q.4	a.	Design a hydraulic circuit for two cylinder operation with following sequence using 4/2 pilot operated valve as DCV using cascade method , A+ , B+ , Delay B- , A-	08
	b	Differentiate between supervised and unsupervised techniques used in machine learning.	07
	c	Define the terms Robot Degrees of freedom for robotic system.	05
Q.5.	a.	Explain the significance of latching in PLC.	06
	b.	Illustrate K nearest neighbours algorithm used in machine learning.	08
	c.	Illustrate with neat sketches, the logic of AND and OR gates, used in operation of pneumatic circuits.	06
Q.6	a.	Differentiate between tree and graph search used in Machine Learning.	08
	b.	Illustrate the concept of Logistic regression in machine learning.	06
	c	Illustrate the concept of Artificial Neural Networks (AAN) in detail.	06

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