T.E. Sem VI, Mechanical, Cochone, 9/12/25, OPC-97663, V1

(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	What are the main elements of an automated system? Describe each briefly.	05
	b	What is a tree search? How is it used in AI problem-solving?	05
	c	What are the degrees of freedom in a robot? Give example.	05
	d	Explain the concept of Natural Language Processing (NLP) and its relevance in automation systems	05
	e	Explain the working principle of a 5/2 double solenoid valve.	05
Q.2.	a.	Draw a regenerative hydraulic circuit and explain its working.	10
	b	Explain the types of drives and transmission systems used in robots	10
Q.3.	a.	Explain depth-first search (DFS) and breadth-first search (BFS). Compare their advantages and limitations.	10
	b.	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+ , (AB) –	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-	10
	b	Define and explain the types of intelligent agents in AI.	10
Q.5.	a.	Define Timers, Counters, Flags, and Latching in PLC-controlled pneumatic systems.	10
	c.	Explain the purpose of a counterbalance valve in a hydraulic system and describe how it functions.	10
Q.6	a.	What are genetic algorithms, and explain how are they used for optimization in automation?	10
	b.	List any four limitations of regression models in AI?	05
	c	Illustrate K nearest neighbours algorithm used in machine learning.	05

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