Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U3407

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Professional Elective

Electrical and Electronics Engineering

21UEEV407- INTELLIGENT CONTROL OF ELECTRIC VEHICLES

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

Answer All Questions

PART – A (5 x 20= 100 Marks)

1.	(a)	Explain the process of obtaining the transfer functions for a BLDC motor. Compare and contrast the advantages and disadvantages of using differential equations versus transfer functions for modeling	CO1-U	(16)
		Or		
	(b)	Investigate the dynamic characteristics of a BLDC motor during rapid changes in speed or load. Discuss the role of damping and inertia in the dynamic response.	CO1-U	(16)
2.	(a)	Describe the concept of an anti-windup controller and its significance in the context of speed control for electric drives. Provide examples of scenarios where anti-windup controllers are crucial.	CO1-U	(16)
		Or		
	(b)	Explain the concept of vector control in the context of electric drives. Discuss how vector control enhances the performance of motor drives in terms of speed and torque control.	CO1-U	(16)
3.	(a)	Discuss the key features of membership functions in fuzzy logic. Explain the process of fuzzification and how membership functions are utilized in converting crisp inputs to fuzzy sets.	CO1-U	(16)
		Or		
	(b)	Define fuzzy propositions and discuss the formation of fuzzy rules in fuzzy inference systems. Explore the decomposition of rules and its impact on the interpretability of the fuzzy rule base.	CO1-U	(16)

4.	(a)	Provide an overview of VHDL basics, emphasizing its role in hardware description. Discuss the fundamental concepts of VHDL, including entities, architectures, and signals.	CO3-Ana	(16)
		Or		
	(b)	Explore the VHDL instruction set and its role in programming FPGAs. Discuss the types of instructions commonly used in VHDL and their significance in hardware design.	CO3-Ana	(16)
5.	(a)	Explain the key considerations in designing an inverter for electric vehicles. Discuss the components and features necessary for efficient power conversion in the context of electric propulsion.	CO1-U	(16)
		Or		
	(b)	Discuss the advantages of using fuzzy logic control in the context of electric vehicle propulsion. Explain the key components and decision-making processes involved in fuzzy logic control.	CO1-U	(16)