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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January 2024 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 22EE7OE2EV **Max Marks: 100**
Course: Electric and Hybrid Vehicles

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			CO	PO	Marks
		UNIT - I			
1	a)	How has the development of modern transportation systems impacted the environment over the past century? Can you trace the historical evolution of automobiles and their environmental implications?	*CO1*	*PO1*	**08**
	b)	What is the historical background of electric vehicles, and when did they first emerge as a viable transportation option?	*CO1*	*PO2, 6, 7*	**06**
	c)	How has the development of efficient and sustainable transportation systems influenced urban planning and development?	*CO1*	*PO7*	**06**
		UNIT - II			
2	a)	Define tractive effort in the context of electric vehicles and discuss its significance in determining the vehicle's performance.	*CO2*	*PO2*	**06**
	b)	With a neat diagram, discuss the configuration and operating modes of a series hybrid electric drive trains.	*CO2*	*PO2*	**08**
	c)	Compare and contrast the architecture of series and parallel hybrid electric drive trains.	*CO2*	*PO4*	**06**
		UNIT - III			
3	a)	With a neat diagram, explain the electric propulsion system for an electric vehicle.	*CO4*	*PO4*	**10**
	c)	Describe the working principle of switched reluctance motor drives and their application in electric vehicles. What are the benefits and challenges associated with this type of motor?	*CO4*	*PO4*	**10**
		UNIT - IV			
4	a)	What are the key energy storage requirements for electric vehicles.	*CO3*	*PO2,4*	**06**

		b)	Compare and contrast different types of batteries commonly used in electric vehicles, highlighting their advantages and disadvantages.	*CO3*	*PO2,3, 4*	**08**
		c)	Explain the principles of Proton Exchange Membrane Fuel Cells (PEMFCs).	*CO3*	*PO2,3, 4*	**06**
			OR			
	5	a)	Explain the significance of battery parameters such as capacity, voltage, Energy Density and power density in the context of electric vehicle energy storage.	*CO3*	*PO2,3, 4*	**06**
		b)	Discuss the various types of fuel cells used in electric vehicles, emphasizing their characteristics and applications.	*CO3*	*PO2,3, 4*	**08**
		c)	With a neat sketch explain the working of the Lithium ion Battery.	*CO3*	*PO2,3, 4*	**06**
			UNIT - V			
	6	a)	Explain the design considerations for the power processing system in a series hybrid electric vehicle.	*CO4*	*PO2,3, 4*	**10**
		b)	Discuss the factors influencing the sizing of major components in a series hybrid system	*CO4*	*PO2,3, 4*	**10**
			OR			
	7	a)	Draw and explain the overall control scheme of parallel torque coupling hybrid drivetrain.	*CO2*	*PO2,3, 4*	**10**
		b)	Describe the operating patterns of series hybrid electric drive trains.	*CO4*	*PO2,3, 4*	**10**

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