CBCS SCHEME

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BEE515C

Fifth Semester B.E/B.Tech. Degree Examination, June/July 2025
Electric Vehicle Fundamentals

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Write short notes on need of electric vehicle.	5	L1	CO1
	b.	Explain about lithium – ion battery technology with relevant chemical reaction equation and also state the advantage of it.	10	L1	CO2
	c.	With a neat diagram, describe about the cable and components required for electric vehicle.	5	L1	CO2
		OR			
2	a.	Explain the operating principle of lead acid battery with relevant chemical reaction equation.	8	L2	CO1
	b.	What are the different methods of charging and also explain alternate charging sources.	7	L1	CO1
	c.	List out various parameters specified in battery by manufacture.	5	L2	CO1
		Module – 2			
3	a.	Explain the working principle of DC motor with neat diagram and also explain the different types of DC motor.	10	L2	CO2
	b.	Explain various control strategies employed in a series hybrid eclectic drive train for vehicle with different mission requirement.	10	L2	CO4
		OR			
4	a.	Explain the overall configuration of the parallel torque coupling hybrid drive train with a neat schematic diagram.	10	L2	CO2
	b.	With a neat diagram, explain the construction of 3ϕ induction motor and also explain the working principle of it.	10	L2	CO2
		Module – 3			
5	a.	Explain the phase flux linkage based sensorless control to estimate the rotor position used for EV and HEV.	6	L2	CO3
	b.	Explain the phase inductance based sensorless control to estimate the rotor position need for EV and HEV.	8	L2	CO3
	c.	Explain the frequency modulation and AM and PM method to estimate the rotor position.	6	L2	CO3
		OR			
6	a.	Describe the purpose of an inverter and converter in electric vehicle application.	6	L2	CO3
	b.	Explain briefly about risk and precaution with respect to electric vehicle safety.	6	L2	CO3
	c.	With symbolic representation, explain output and transfer characteristics of BJT and MOSFET.	8	L2	CO3
		Module – 4			
7	a.	With neat layout classify the hybrid electric vehicle.	10	L2	CO4
	b.	What are the different types of electric vehicle based on electrification, explain each type.	10	L1	CO4

OR					
8	a.	Write short notes on energy consumption during braking.	**5**	**L1**	**CO1**
	b.	Define series hybrid electric drive train and explain the configuration of it with a neat diagram by incorporating various operating modes in it.	**10**	**L2**	**CO2**
	c.	Briefly explain about vibration and noise reduction in electric vehicle.	**5**	**L2**	**CO2**
Module – 5					
9	a.	Explain the operation principle of fuel cell.	**6**	**L1**	**CO5**
	b.	Classify fuel cell into various types based on type of electrolyte used and explain Proton Exchange Membrane Fuel Cell [PEMFC].	**8**	**L2**	**CO5**
	c.	Explain the characteristics of fuel cell system.	**6**	**L1**	**CO5**
OR					
10	a.	Explain the control strategy of fuel cell with the help of flow chart.	**10**	**L1**	**CO5**
	b.	Write short notes on life time cost of fuel cell vehicle.	**5**	**L1**	**CO5**
	c.	Describe the durable and efficiency of fuel cell vehicle.	**5**	**L2**	**CO5**

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