Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS

VI SEMESTER B.TECH. MECHATRONICS

END SEMESTER MAKEUP EXAMINATIONS, JUNE. 2024

SUBJECT: ELECTRIC VEHICLE TECHNOLOGY SUBJECT CODE: MTE 4302

(Date: 27/ 06 /2024)

Time: 3 Hrs **Max. Marks: 50**

Instructions to Candidates: Answer all questions. Missing data may be suitably assumed and justified.

Q. No	Problem Statement	M	CO	PO	LO	BL
1A	Discuss the operational versatility of motor drives in electric vehicles, particularly focusing on their ability to function across four distinct quadrants.	**4**	**1**	**2**	**2**	**4**
1B	Explain the different types of transmissions used in vehicles in detail.	**4**	**1**	**1**	**1**	**4**
1C	Examine the diverse energy management strategies utilized in Electric Vehicle (EV) technology and explore the challenges associated with their implementation.	**2**	**3**	**1**	**1**	**4**
2A	Compare and contrast the acceleration, range, and energy efficiency of two different electric vehicle models within the same price range.	**4**	**2**	**2**	**2**	**4**
2B	Contrast the theoretical speed-torque traits with the actual characteristics of traction motors utilized in both Internal Combustion Engine (ICE) vehicles and Electric Vehicles (EVs).	**4**	**2**	**2**	**2**	**4**
2C	Inspect the role of powertrain in electric vehicle.	**2**	**3**	**1**	**1**	**4**
3A	Analyze the utilization of regenerative braking, powertrain control algorithms, and battery management systems to enhance energy conservation and extend driving range in hybrid and electric vehicles.	**4**	**3**	**2**	**2**	**4**
3B	Evaluate the significance of energy sources and auxiliary subsystems in electric vehicles for ensuring optimal performance.	**3**	**3**	**2**	**2**	**5**
3C	Contrast the theoretical speed-torque traits with the actual characteristics of traction motors utilized in both Internal Combustion Engine (ICE) vehicles and Electric Vehicles (EVs).	**3**	**3**	**2**	**2**	**4**
4A	Explore the implementation of optimization-based control strategies in Electric Vehicles (EVs) and Hybrid Electric Vehicles (HEVs) to enhance performance and efficiency.	**4**	**4**	**2**	**2**	**4**

4B	Assess the strengths and weaknesses of regenerative braking in hybrid electric vehicles, considering factors such as energy efficiency, wear and tear, and environmental impact, in contrast to traditional braking systems.	**3**	**4**	**4**	**2**	**5**
4C	Analyze the specific features and functionalities of each energy management strategy, considering their impact on factors such as fuel efficiency, power distribution, and overall system integration.	**3**	**4**	**1**	**1**	**4**
5A	Examine the key design considerations in electric motor systems for Electric Vehicles (EVs) and analyze the challenges faced in motor power designing.	**4**	**5**	**2**	**2**	**4**
5B	Inspect the methodology for calculating the size and capacity of the fuel cell stack and energy storage system.	**3**	**5**	**2**	**2**	**4**
5C	Identify specific ethical and safety issues in FCVs that may impact the widespread acceptance of FCEVs.	**3**	**5**	**1**	**1**	**3**