Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS

II SEMESTER M.TECH (IAR). MECHATRONICS

END SEMESTER EXAMINATIONS, APRIL-MAY. 2024

SUBJECT: ELECTRIC VEHICLE TECHNOLOGY SUBJECT CODE: MTE 5303

(Date: 11/05/2024, Timing – 09.30 AM to 12.30 AM)

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	Evaluate and compare vehicle technologies considering both economic and environmental aspects based on factors such as cost of ownership, fuel efficiency, emissions, and sustainability to provide a comprehensive understanding of the economic and environmental implications of different vehicle technologies.	**4**	**1**	**5**	**2**	**5**
1B	Analyze various configurations of hybrid and electric drivetrains used in electric vehicles, highlighting their distinct features and operational advantages.	**4**	**2**	**4**	**2**	**4**
1C	Evaluate the ethical implications of the hybrid design philosophy in terms of its impact on environmental sustainability, resource utilization, and societal well-being.	**2**	**6**	**5**	**1**	**5**
2A	Analyze different electric motors used in EV applications with their features.	**5**	**3**	**4**	**2**	**4**
2B	Assess the significance and effectiveness of torque coupling and speed coupling within Parallel Hybrid Electric Drive Trains, examining their impact on performance, efficiency, and overall system dynamics.	**5**	**3**	**4**	**2**	**5**
3A	Inspect the different types of regenerative braking implemented in EV application.	**4**	**4**	**4**	**2**	**4**
3B	Analyse the energy management strategies used in hybrid and electric vehicles.	**3**	**4**	**4**	**2**	**4**
3C	Evaluate the effectiveness of control systems in Electric Vehicles (EVs) and Hybrid Electric Vehicles (HEVs) for optimizing energy efficiency and range, considering factors such as regenerative braking, powertrain coordination, and battery management strategies.	**3**	**5**	**3**	**1**	**5**
4A	Critically assess the potential impact of ethical, and safety standards/ issues on the adoption and diffusion of EVs in the market, and strategies for mitigating any challenges or obstacles that may arise as a result.	**5**	**5**	**4**	**2**	**5**

4B	Examine the Electronic Control Unit's (ECU) function in electric vehicles, focusing on its incorporation with diverse sensors, actuators, and communication networks.	**5**	**5**	**4**	**2**	**4**
5A	Categorize hybrid vehicle types based on their degree of hybridness.	**5**	**6**	**5**	**2**	**4**
5B	Compare and contrast the impact of hybrid drive train architectures on vehicle handling, stability, and overall driving experience, focusing on how torque coupling and speed coupling contribute to seamless power delivery and traction control.	**5**	**6**	**3**	**1**	**4**