MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS

VI SEMESTER B.TECH. (MECHATRONICS)
END SEMESTER EXAMINATION

SUBJECT: Electric Vehicle Technology (OE) Subject Code: MTE 4302

Date: 03/06/2023

Time: 3 Hrs **Exam Time 2:30PM – 5:30PM** **MAX. MARKS: 50**

Name:……, Registration No:……..

- Answer **ALL** the questions.

Q. No.	Questions	M	CO	PO	LO	BL
1A	Classify different hybrid electric drive train configurations used in electric vehicles, based on their working principle, and suitability for different vehicle applications.	**2**	**CO2**	**1, 3**	**1**	**3**
1B	Evaluate the design process of the electric motor in an electric vehicle and its effect on the vehicle performance parameters.	**3**	**CO4**	**1,3**	**2**	**5**
1C	Analyze the role of the Electronic Control Unit (ECU) in Electric Vehicles, specifically in terms of its integration with various sensors, actuators, and communication networks to ensure optimal performance, efficiency, and safety of the vehicle.	**5**	**CO3**	**1,2**	**1**	**4**
2A	Illustrate the different components of the electric propulsion unit in electric vehicle.	**2**	**CO4**	**1,3**	**1**	**4**
2B	Assess the design considerations and trade-offs involved in the development of a series hybrid drive train for an electric vehicle, and there effect on the overall performance, efficiency, and cost of the hybrid system.	**3**	**CO4**	**1, 5**	**2**	**5**
2C	Assess the effectiveness and advantages of regenerative braking systems in hybrid and electric vehicles as compared to the traditional braking systems.	**5**	**CO3**	**1, 3**	**1**	**5**
3A	Deduce the difference in the impact of gear ratios on the acceleration and top speed of an ICE vehicle, and impact of gear ratios on the acceleration and range of an EV based on the speed torque curve.	**2**	**CO4**	**1,3**	**2**	**4**
3B	Evaluate the impact of different propulsion motor sizes on the energy efficiency and performance of an electric vehicle, based on driving conditions and vehicle type.	**3**	**CO4**	**1,5**	**2**	**5**

3C	Examine the importance of the dynamic equations on EVs and ICE vehicles for the development of advanced vehicle control systems, such as traction control or stability control.	**5**	**CO1**	**1,2**	**2**	**3**
4A	Analyze the impact of different operating modes on the vehicle's range and battery life in an electric vehicle.	**2**	**CO4**	**1,5**	**1**	**4**
4B	Evaluate the key factors that influence the selection of energy storage technology for a specific application, such as electric vehicles.	**3**	**CO5**	**1,3**	**1**	**5**
4C	Evaluate the effectiveness and suitability of hydrodynamic transmission in various vehicle applications, considering its working principles, advantages, and limitations, as compared to other types of transmissions.	**5**	**CO1**	**1,2**	**1**	**5**
5A	Deduce a comprehensive classification of different energy management strategies (EMS) to improve the overall performance of a vehicle.	**2**	**CO4**	**1,3**	**1**	**3**
5B	Critically evaluate 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.	**3**	**CO5**	1,3	**4**	**5**
5C	Assess a comprehensive design framework for the calculation of gear ratios for a series hybrid drivetrain that optimizes performance, sustainability, and reliability, taking into account the unique needs and constraints of the application.	**5**	**CO4**	**1,3**	**2**	**5**