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Question Paper Code: U9379

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Open elective

Civil Engineering

21UEE979 ELECTRIC AND HYBRID VEHICLES

(Common to All branches)

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5x 20 = 100 Marks)

1. (a) List and explain the essential components of an electric vehicle, including the power train, battery, motor, and control systems. Discuss how these components work together to achieve efficient and sustainable transportation. **CO1- U** (20)
Or
(b) Discuss the importance of charging infrastructure in the widespread adoption of electric vehicles. Analyze the challenges and opportunities associated with developing a robust charging network. **CO1- U** (20)
2. (a) Compare the advantages and disadvantages of various battery types in terms of energy density, cycle life, cost, and environmental impact. Discuss factors influencing the selection of a specific battery type for different devices or systems. **CO2- App** (20)
Or
(b) Define Depth of Discharge (DOD) and explain its significance in battery performance. Discuss how DOD affects the lifespan and efficiency of batteries. **CO2- App** (20)
3. (a) Provide an overview of DC machines and their applications in Electric Vehicles. Discuss the advantages and challenges of using DC machines in the propulsion systems of electric vehicles. **CO3- Ana** (20)
Or
(b) Analyze the challenges and innovations in designing electrical machines for specific industries or emerging technologies. **CO3 -Ana** (20)

4. (a) Identify and explain the key components of the electric vehicle drive train, including motors, inverters, batteries, and controllers. Discuss the role of each component in the efficient operation of the electric drive train. **CO4- Ana** (20)
- Or
- (b) Compare the advantages and disadvantages of different regenerative braking and friction braking integration strategies. Discuss the impact on overall vehicle safety and efficiency. **CO4- Ana** (20)
5. (a) Analyze the impact of design choices on the overall performance, fuel efficiency, and emissions reduction in hybrid electric vehicles. **CO5 -App** (20)
- Or
- (b) Analyze the impact of component sizing on the overall efficiency, power delivery, and energy storage capacity of hybrid electric vehicle drivetrains. **CO5 -App** (20)