Hall Ticket No | | | | | | | | | | | Question Paper Code: AEEB54

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal-500043, Hyderabad

B.Tech VIII SEMESTER END EXAMINATIONS (REGULAR) - JUNE 2022
Regulation: R18

ELECTRICAL AND HYBRID VEHICLES

Time: 3 Hours **(EEE)** **Max Marks: 70**

Answer FIVE Questions choosing ONE question from each module
(NOTE: Provision is given to answer TWO questions from any ONE module)
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Discuss the reasons for failure of HEVs in early 90s in terms of manufacturing cost, policies, substitutes, and technology. [BL: Understand| CO: 1|Marks: 7]

   (b) Draw the drive train scheme for modern electric vehicle. Discuss the energy source and tractive force aspects of electric drive train. [BL: Understand| CO: 1|Marks: 7]

2. (a) List various types of drive trains. Interpret the impact of hybrid drive-train on transportation and economy. [BL: Understand| CO: 1|Marks: 7]

   (b) Explain the transmission characteristics of conventional vehicles with an example. Differentiate between conventional and electric vehicles. [BL: Understand| CO: 1|Marks: 7]

MODULE – II

3. (a) Interpret the power flow control in parallel hybrid electric vehicle drive train for acceleration and braking. [BL: Understand| CO: 2|Marks: 7]

   (b) List the configuration of electric vehicles. Elucidate the power flow mechanism in multi motor electric drive train configuration. [BL: Apply| CO: 2|Marks: 7]

4. (a) Explain the series - parallel configurations of hybrid drive train with neat diagram. List the benifits of hybrid drive train. [BL: Understand| CO: 2|Marks: 7]

   (b) List out the power control strategies of electric drive train. Describe in detail about speed coupling and torque coupling of parallel hybrid train. [BL: Apply| CO: 2|Marks: 7]

MODULE – III

5. (a) Explain the two-quadrant operation of chopper fed DC motor drive with suitable waveforms for electric vehicle. [BL: Understand| CO: 3|Marks: 7]

   (b) Analyze the speed control of induction motors for electric and hybrid electric vehicle application. [BL: Understand| CO: 3|Marks: 7]

6. (a) Write a short note on electric motors used for EV and HEV drives. Explain the multi-quadrant control of DC motors used in hybrid electric vehicles. [BL: Understand| CO: 3|Marks: 7]

   (b) Sketch and explain converter configuration and control algorithm for SRM based electric drive for vehicle propulsion. [BL: Apply| CO: 3|Marks: 7]

MODULE – IV

7. (a) Explain the techniques to enhance of hybrid performance in energy storage based system. Describe the Bi-directional battery chargers for EV/HEV. [BL: Understand| CO: 4|Marks: 7]

   (b) List different types of energy storage systems. Describe the basic principle of super capacitors based energy storage system in hybrid electric vehicles. [BL: Understand| CO: 4|Marks: 7]

8. (a) Describe the cell level and system level characteristics of fuel cell based energy source. [BL: Understand| CO: 4|Marks: 7]

   (b) Explain the voltage measurement and coulomb counting methods of state of charge measurement. [BL: Understand| CO: 4|Marks: 7]

MODULE – V

9. (a) List out the various states involved in the control strategy of HEV. Explain the basic principles of rule based control methods of HEV? [BL: Understand| CO: 5|Marks: 7]

   (b) Sketch the control area network communication pertaining to a hybrid electric vehicle and describe its components. [BL: Understand| CO: 5|Marks: 7]

10. (a) List various energy management stratergies employed in Electric vehicles. Explain any one of them. [BL: Understand| CO: 5|Marks: 7]

    (b) Elaborate on significance of control parameters pertaining to various sub systems of and electric or hybrid electric vehicles. [BL: Understand| CO: 5|Marks: 7]

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