UNIT 1

INTRODUCTION TO ELECTRIC VEHICLES:

1. Describe the vehicle power plant characteristics in Hybrid vehicles
2. Describe the vehicle transmission characteristics in Hybrid vehicles
3. Write a short note on basics of vehicle performance
4. State and explain the dynamic equation of vehicle model? Or Describe the mathematical models to determine vehicle performance
5. Explain rolling resistance and aerodynamic drag in vehicles?

UNIT 2
INTRODUCTION TO HYBRID ELECTRIC VEHICLES:

1. Discuss the history of hybrid electric vehicles
2. Discuss the environmental importance of EV and their social impacts
3. Explain the functional block diagrams of the various HEV configurations
4. Explain the different power flow control modes of a typical series hybrid system with the help of block diagrams
5. Explain the different power flow control modes of a typical parallel hybrid system with the help of block diagrams
6. Explain the different power flow control modes of a typical Series-parallel hybrid system with the help of block diagrams.

UNIT 3:
ELECTRIC TRAINS & ELECTRIC PROPULSION UNIT

1. Discuss the Combined armature and Field Control method for DC Motor drives.
2. Explain the two-quadrant operation (Class-C) of chopper DC motor drive with suitable waveforms for electric vehicle.
3. Explain the four-quadrant operation of chopper DC motor drive for electric vehicle.
4. Discuss in detail about the control of permanent magnet motor drives.
5. Closed loop Torque control of BLDC motor drive
6. How to explain the concept of Sensorless Control of BLDC Motor drive using Back EMF method
7. Switch Reluctance Motor drives Modes of operation

UNIT 4

ENERGY STORAGE

1. Explain the Amp- hr measurement and direct measurement of SOC in battery.
2. Classify and Explain the different energy management strategies
3. Explain fuel cell and flywheel as energy source elements in electric and hybrid electric vehicle
4. How to explain the concept of Super Capacitor based energy storage
5. How to explain the concept of Lithium Ion Battery.
6. Explain the concept of operation principles of flywheels
7. Hybridization of different energy storage device

UNIT 5:
ENERGY MANAGEMENT STRATEGIES

1. Explain the different Energy Management Strategies used in hybrid and electric vehicles?
2. Compare and Explain different energy management strategies used in hybrid and electric vehicles?
3. What are the different implementation issues of energy management strategies?

R17

Code No: R17A0231

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech- II Semester Supplementary Examinations, May 2022

Electrical and Hybrid Vehicles

(EEE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 What is rolling resistance? Explain its impact on the movement of a vehicle. **[14M]**

OR

2 Describe the Transmission characteristics of a vehicle. **[14M]**

SECTION-II

3 With a neat sketch, explain the configuration of Series hybrid electric drive train. **[14M]**

OR

4 Explain the different power flow control modes of a typical parallel hybrid system with the help of block diagrams. **[14M]**

SECTION-III

5 Discuss in detail about the control of permanent magnet BLDC motor drives **[14M]**

OR

6 Explain the two-quadrant operation of chopper DC motor drive with suitable waveforms for electric vehicle. **[14M]**

SECTION-IV

7 Explain flywheel as energy source elements in electric and hybrid electric vehicle **[14M]**

OR

8 Describe the Hybridization of different energy storage devices. **[14M]**

SECTION-V

9 Why an energy management control system is required in an HEV? Do you think an elaborate energy management system similar to that applied to a hybrid vehicle, is required in an electric vehicle? Explain. **[14M]**

OR

10 Compare and Explain the different energy management strategies. **[14M]**

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Code No: R18A0227 **R18**

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Electrical and Hybrid Vehicles

(EEE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 Discuss the History of hybrid and electric vehicles in detail. **[14M]**

OR

2 Explain the Series, Parallel and Series-Parallel Hybrid Electric Vehicles. **[14M]**

SECTION-II

3 Explain rolling resistance and aerodynamic drag in vehicles. **[14M]**

OR

4 Draw a general lay out of a EV and discuss the transmission characteristics. **[14M]**

SECTION-III

5 Explain the Operating Principles of Plug-in Hybrid Vehicle in detail. **[14M]**

OR

6 What is the Plug-in Hybrid Electric Vehicle and mention the Functions and Benefits of PHEV. **[14M]**

SECTION-IV

7 What is the Electric Propulsion System and explain the electric components used in HEVs. **[14M]**

OR

8 Explain the Closed loop Torque control of BLDC motor drive in detail. **[14M]**

SECTION-V

9 Explain the Super Capacitor based energy storage and Fuel Cell based energy storage. **[14M]**

OR

10 Explain the Hybridization of different energy storage devices in detail. **[14M]**

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