

Hall Ticket No:

Question Paper Code: AEE013



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B.Tech VI Semester End Examinations (Regular), April – 2020

Regulation: IARE–R16

HYBRID ELECTRIC VEHICLES

(Electrical and Electronics Engineering)

Time: 3 hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

- 1 a) What are the Comparisons of Hybrid Electric Vehicles and Conventional Vehicles? [7M]
- b) Explain the Impact of modern Drive Trains on Energy Supplies? [7M]
- 2 a) Explain about the induced cost of conventional Vehicles [7M]
- b) Write about the one of the environmental unburned Hydro Carbons? [7M]

UNIT – II

- 3 a) Explain the Power Flow Analysis of Hybrid Drive Trains? [7M]
- b) Explain the Series - Parallel Configurations of Electric Drive train with Neat Diagram? [7M]
- 4 a) Explain the Series - Parallel Configurations of Hybrid Drive Train with Neat Diagram? [7M]
- b) Explain about Speed coupling of Parallel Hybrid train? [7M]

UNIT – III

- 5 a) Explain the Chopper Control of DC Motors used in Hybrid Electric Vehicles? [7M]
- b) Explain about Sensor less Techniques of PPMC Machine? [7M]
- 6 a) Explain the Multi-quadrant Control of DC Motors used in Hybrid Electric Vehicles? [7M]
- b) Explain the Performance Analysis of PPMC machine? [7M]

UNIT – IV

- 7 a) Describe the Basic Principle of Super Capacitors based Energy Storage System in Hybrid Electric Vehicles? [7M]
- b) Explain about Lithium Based Batteries in Energy Storage System? [7M]
- 8 a) Explain about Fly Wheel Technologies in Hybrid Electric Vehicles? [7M]
- b) Explain The concept of Parallel Hybridization in Energy Storages of Hybrid Electric Vehicles [7M]

UNIT – V

- 9 a) Explain the Different Categories of Energy Management Strategies in Electric Vehicles and Hybrid Electric Vehicles? [7M]
- b) Draw the Block diagram of Control Architecture of Hybrid Electric Vehicles and Analyze the Each part of the Block diagram? [7M]
- 10 a) Explain about the Battery Management System in Hybrid Electric Vehicle? [7M]
- b) Explain About Control Area Network (CAN)? [7M]



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COURSE OBJECTIVES:

The course should enable the students to:

I	Interpret the social and environmental importance of hybrid and electrical vehicles
II	Discuss the concept of hybrid traction and electric traction with the help of hybrid drive train
III	Explain the electric propulsion unit of hybrid electric vehicles.
IV	Understand the configuration and control of different types of electric drives.
V	Demonstrate the concepts of energy storage and energy management in hybrid electric vehicles.

COURSE OUTCOMES (COs):

CO 1	Impacts of Conventional Vehicles on the Society and Different Types of Drive Train Topologies.
CO 2	Load Modeling based on the Road Profile and Braking Systems used in Hybrid Electric Vehicles.
CO 3	Different Types of Motors used in Electric Vehicles and Hybrid Electric Vehicles.
CO 4	Different Types of Energy Storage Systems Used in Hybrid Electric Vehicles.
CO 5	The Concept of Energy Management Strategies Used in Hybrid Electric Vehicles.

COURSE LEARNING OUTCOMES (CLOs):

AEE019.01	Explain the social and environmental importance of hybrid and electric vehicles.
AEE019.02	Describe the performance of hybrid and electric vehicles.
AEE019.03	Discuss the basic concepts of hybrid traction, introduction to various hybrid drive-train topologies.
AEE019.04	Discuss the basic concepts of electric traction.
AEE019.05	Explain power flow control in hybrid and electric drive train topologies.
AEE019.06	Analyze the fuel efficiency of hybrid and electric drives.
AEE019.07	Examine the configuration and control of DC motor drives.
AEE019.08	Illustrate the configuration and control of induction motor drives.
AEE019.09	Classify the configuration and control of permanent magnet motor drives.
AEE019.10	Explain the configuration and control of switched reluctance motor drives.
AEE019.11	Discuss the energy storage requirements in hybrid and electric vehicles.
AEE019.12	Analyze the various energy storage systems based on battery and fuel cell based on battery and fuel cell.
AEE019.13	Analyze the various energy storage systems based on super capacitor and flywheel.
AEE019.14	Explain the hybridization of various energy storage devices, its advantages and challenges.

AEE019.15	Classify different energy management strategies used in hybrid and electric vehicles.
AEE019.16	Discuss the implementation issues of energy management strategies
AEE019.17	Understand the impact of the professional engineering solutions in societal and environmental contexts.

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES:

SEE QUESTIONNo			OUTCOMES	COURSE OUTCOMES	BLOOM TAXONOMY LEVELS
1	a	AEE019.02	Describe the performance of hybrid and electric vehicles.	CO 1	Understand
	b	AEE019.03	Discuss the basic concepts of hybrid traction, introduction to various hybrid drive-train topologies.	CO 1	Understand
2	a	AEE019.02	Describe the performance of hybrid and electric vehicles.	CO 1	Remember
	b	AEE019.01	Explain the social and environmental importance of hybrid and electric vehicles.	CO 1	Analyzing
3	a	AEE019.05	Explain power flow control in hybrid and electric drive train topologies.	CO 2	Understand
	b	AEE019.03	Discuss the basic concepts of hybrid traction, introduction to various hybrid drive-train topologies.	CO 3	Understand
4	a	AEE019.03	Discuss the basic concepts of hybrid traction, introduction to various hybrid drive-train topologies.	CO 2	Understand
	b	AEE019.03	Discuss the basic concepts of hybrid traction, introduction to various hybrid drive-train topologies.	CO 2	Understand
5	a	AEE019.07	Examine the configuration and control of DC motor drives.	CO 3	Analyzing
	b	AEE019.09	Classify the configuration and control of permanent magnet motor drives.	CO 3	Understand
6	a	AEE019.08	Illustrate the configuration and control of induction motor drives.	CO 3	Understand
	b	AEE019.09	Classify the configuration and control of permanent magnet motor drives.	CO 3	Understand
7	a	AEE019.13	Analyze the various energy storage systems based on super capacitor and flywheel.	CO 4	Remember
	b	AEE019.12	Analyze the various energy storage systems based on battery fuel cell based on battery and fuel cell.	CO 4	Understand
8	a	AEE019.13	Analyze the various energy storage systems based on super capacitor and flywheel.	CO 4	Understand
	b	AEE019.11	Discuss the energy storage requirements in hybrid and electric vehicles.	CO 4	Understand
9	a	AEE019.15	Classify different energy management strategies used in hybrid and electric vehicles.	CO 5	Analyzing
	b	AEE019.16	Discuss the implementation issues of energy management strategies	CO 5	Understand
10	a	AEE019.15	Classify different energy management strategies used in hybrid and electric vehicles.	CO 5	Understand

	b	AEE019.16	Discuss the implementation issues of energy management strategies	CO 5	Understand
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Signature of Course Coordinator

HOD, EEE

G.Kranthi Kumar, Assistant Professor.