Hall Ticket No: | | | | | | | | | | |

Question Paper Code: AEE013

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B.TechVI 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 social impacts of Hybrid Electric Vehicles?	[7M]
	b)	Describe the Transmission Characteristics of Conventional Vehicles?	[7M]
2	a)	Explain the History of Hybrid Electric Vehicles?	[7M]
	b)	Explain about the Vehicle power Source Characterization?	[7M]

UNIT – II

3	a)	Explain the Series Configurations of Hybrid Drive Train with Neat Diagram?	[7M]
	b)	Explain about Vehicle performance of Electric Vehicles?	[7M]
4	a)	Explain the Series - Parallel Configurations of Hybrid Drive Train with Neat Diagram?	[7M]
	b)	Explain about Traction Motor characteristics in Electric vehicles?	[7M]

UNIT – III

5	a)	Describe about Direct Rotor Flux Orientation Schemes of Induction motor Drives used in Hybrid Electric Vehicles?	[7M]
	b)	What are the Advantages and Disadvantages of Induction Motors used in Hybrid Electric Vehicles?	[7M]
6	a)	Explain the Extension of speed Technology of PMMC Motor Drives in Hybrid Electric Vehicles?	[7M]
	b)	Explain about Field Orientation Control of Induction Motor Drives in Hybrid Electric Vehicles?	[7M]

UNIT – IV

7	a)	Describe the Different types of battery technologies in Energy Storage Based System of Hybrid Electric Vehicles?	[7M]
	b)	Describe the Basic Principle of Super Capacitors based Energy Storage System in Hybrid Electric Vehicles?	[7M]
8	a)	Explain the Operation and Principle of Flywheel Based Energy Storage System in Hybrid Electric Vehicles?	[7M]
	b)	Explain Mathematical modelling for Lead Acid battery in Energy Storages Systems in Hybrid Electric Vehicles?	[7M]

UNIT – V

9	a)	How to use FUZZY LOGIC in design of Controllers in Energy Management System in Hybrid Electric Vehicles?	[7M]
	b)	Classify Energy Management Systems and explain about the Different types of Energy Management Systems?	[7M]
10	a)	Draw the Block diagram of Control Architecture of Hybrid Electric Vehicles and Analyze the Each part of the Block diagram?	[7M]
	b)	Explain about Deterministic Rule Based Strategies in hybrid Electric Vehicles?	[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 Modelling 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 energystorage 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	AEE019.01	Explain the social and environmental importance 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	Analyzing
2	a	AEE019.01	Explain the social and environmental importance of hybrid and electric vehicles.	CO 1	Remember
	b	AEE019.04	Discuss the basic concepts of electric traction.	CO 1	Understand
3	a	AEE019.05	Explain power flow control in hybrid and electric drive train topologies.	CO 2	Understand
	b	AEE019.08	Illustrate the configuration and control of induction motor drives.	CO 3	Understand
4	a	AEE019.05	Explain power flow control in hybrid and electric drive train topologies.	CO 2	Understand
	b	AEE019.04	Discuss the basic concepts of electric traction.	CO 2	Understand
5	a	AEE019.08	Illustrate the configuration and control of induction motor drives.	CO 3	Analyzing
	b	AEE019.08	Illustrate the configuration and control of induction motor drives.	CO 3	Understand
6	a	AEE019.09	Classify the configuration and control of permanent magnet motor drives.	CO 3	Understand
	b	AEE019.08	Illustrate the configuration and control of induction motor drives.	CO 3	Understand
7	a	AEE019.12	Analyze the various energy storage systems based on battery and fuel cell based on battery and fuel	CO 4	Remember
	b	AEE019.12	Analyze the various energy storage systems based on battery and 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	AEE019.12	Analyze the various energy storage systems based on battery and fuel cell based on battery and fuel cell.	CO 4	Understand
9	a	AEE019.16	Discuss the implementation issues of energy management strategies	CO 5	Analyzing
	b	AEE019.15	Classify different energy management strategies used in hybrid and electric vehicles.	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

Signature of Course Coordinator **HOD, EEE**

G. Kranthi Kumar, Assistant Professor.