Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (S, FE) / S7 (PT) (S, FE) Examination December 2023 (2015 Scheme)

Course Code: EE469

Course Name: Electric and Hybrid Vehicles

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 5 marks.   Marks

1	Explain the historical background of electric and hybrid electric vehicles in detail.	(5)
2	Define the term "gradeability" with respect to a vehicle.	(5)
3	Explain the forward motoring and regenerative (forward) braking control of a DC motor with a single chopper.	(5)
4	Explain the operation of a Fuel cell in detail.	(5)
5	How to size the power electronics for hybrid Electric vehicles? Discuss the steps involved.	(5)
6	Discuss the electrical and mechanical constraints to be considered while sizing an electrical motor for an EV.	(5)
7	Draw and explain the typical CAN system of an HEV.	(5)
8	What are the various communication networks that can be used in Electric /Hybrid vehicles?	(5)

PART B
Answer any two full questions, each carries 10 marks.

9	a)	Explain shape drag and skin effects in vehicles.	(5)
	b)	What are the social and environmental impacts of hybrid vehicles?	(5)
10		Describe in detail the important subsystems in an electric/hybrid vehicle.	(10)
11		Draw six different configurations of drivetrains in electric vehicles. Briefly explain each configuration.	(10)

PART C
Answer any two full questions, each carries 10 marks.

12	Explain the working, advantages, and disadvantages of supercapacitors as energy storage devices in electric vehicles.	(10)

13 a) What are the advantages of AC motors over DC motors for EV applications? (5)

b) Explain the following terms: Specific power and Energy density. (5)

14 Explain the closed-loop speed control of a two-quadrant 3-phase converter-controlled (armature control) DC motor drive system with a suitable block diagram. (10)

PART D
Answer any two full questions, each carries 10 marks.

15 With the help of block diagrams explain the battery management supporting system of hybrid vehicles. (10)

16 a) Draw and explain the block diagram of a general Fuzzy Logic Controller (FLC). (6)

b) What are the advantages of a fuzzy logic-based energy management control strategy in hybrid vehicles? (4)

17 a) Draw and explain the control architecture of HEV. (5)

b) With the help of block diagrams explain the hierarchical power and data transmission networks of Hybrid vehicles. (5)

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