Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

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	Compare the performance of ICE based conventional vehicle and electric vehicles.	(5)
2	What is meant by "gradeability" of vehicles? Explain with mathematical expression.	(5)
3	How the electric motors used in EVs differs from that of used in industrial application?	(5)
4	What is Peukart's capacity of battery? What are the significance applications? Calculate the Peukart's capacity of a 135Ahr battery with C10 (10Ahr) rating. (Peukart's coefficient is 1.2)	(5)
5	Explain briefly the electrical and mechanical constraints to be considered while sizing an electrical machine for an EV.	(5)
6	What are the steps in designing power electronics for hybrid Electric vehicle?	(5)
7	What are the supporting subsystems in an electric/hybrid vehicle?	(5)
8	What are the advantages of fuzzy logic-based energy management control strategy in hybrid vehicles?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	a)	What are the resistive forces acting on a four-wheel vehicle?	(6)
	b)	Explain briefly the performance parameters of vehicle.	(4)
10		Draw and explain ideal traction power plant characteristics of various power plants and various power source characteristics used in electric and hybrid electric vehicles.	(10)
11		Draw and explain architecture and power flow control of series parallel hybrid electric vehicle.	(10)

PART C

Answer any two full questions, each carries 10 marks.

12	a)	A 96 V battery pack is connected to a series RL load with L=150mH .The battery pack has a battery capacity of 150Ahr. At t = 0 the switch is closed and the battery begins to discharge. Calculate the battery discharge current, if the steady state discharge rate is C/2. Neglect battery voltage drop.	(5)

	b)	Compare different batteries based on their specific energy, specific power and suitability for EV/HEV applications.	(5)
13	a)	Discuss the possible power converter topologies that can be used in induction motor drive for EV/HEV.	(6)
	b)	Explain the operation, advantage and disadvantages of fly wheel energy storage.	(4)
14		Explain the four-quadrant operation of speed control of DC motor driven electric vehicle.	(10)

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

15	a)	Draw and explain typical CAN system of an HEV.	(10)
16	a)	Classify and explain the basic principles of rule-based energy management system.	(10)
17	a)	Explain the sizing procedures of energy storage systems for electric hybrid vehicle.	(5)
	b)	Draw the typical torque - speed envelope curves of drive train motors and how the continuous, intermittent and peak overload ratings.	(5)

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