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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree (Hons.) Examination December 2021 (2015 Scheme)(2018 admn.)

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		Describe the developmental activities in the field of EVs/EHVs from 1890 to present day.	(5)
2		Explain the power flow control mode of a complex hybrid vehicle.	(5)
3		Explain the combined effect of armature voltage and field control of dc motor drive system with suitable graph.	(5)
4		What is meant by charge equalization of batteries?	(5)
5		Discuss the approximate sizing of battery for a new design of electric vehicle.	(5)
6		Describe the selection of power semiconductor device and its range of voltage and current for the converter in EVs.	(5)
7		Explain the major functions of control systems in EVs/HEVs.	(5)
8		Draw the typical architecture of electronic control unit for EVs/HEVs.	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	a)	Explain with block diagram the major components of hybrid electric vehicle.	(4)
	b)	Explain the four resistive forces acting on the vehicle when it is moving and write the equations for those forces.	(6)
10	a)	Discuss the significant impacts of modern power train (EVs/EHVs) on utility power supply system.	(6)
	b)	What is meant by load power decomposition? Explain with suitable figures.	(4)
11	a)	Discus six alternatives of drivetrain configuration of electric vehicle with suitable figures.	(6)
	b)	Explain with suitable block diagram, the complete fuel consumption process in IC engine vehicle.	(4)

PART C

Answer any two full questions, each carries 10 marks.

12 a) Explain chopper-controlled dc motor (first quadrant-armature control) drive system with suitable figures and write the equations of output voltage and duty cycle. (5)

b) Explain the working of single phase fully controlled rectifier fed armature-controlled dc drive system with suitable diagram. (5)

13 a) Draw and explain the block diagram representation of closed loop induction motor drive with constant volts/hertz control strategy. (7)

b) Discuss the implementation of hysteresis controller for a DC motor chopper drive. (3)

14 a) Briefly explain different battery parameters. (6)

b) What is meant by Peukert coefficient, derive the equation for calculating the Peukert coefficient. (4)

PART D

Answer any two full questions, each carries 10 marks.

15 a) Explain peak torque, continuous rating, intermittent overload operation, and peak overload operation of electric motors used in electric vehicles. Also mark these parameters in the torque speed characteristics. (6)

b) Discuss the two fundamental sizing constraints of electric motors in EVs/EHVs. (4)

16 a) Explain the available options of the energy storage technologies for EVs. (6)

b) Explain the minor functions of control systems in EVs/HEVs (4)

17 a) Explain the use of control area network in electric vehicle. (6)

b) Explain the fuzzy logic-based energy management control strategy used in EHVs. (4)

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