Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree (R,S) Examination May 2024 (2019 Scheme)

Course Code: EET418

Course Name: ELECTRIC AND HYBRID VEHICLES

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1	Describe the conceptual advantages of a hybrid electric vehicle over electric vehicles	(3)
2	Explain the various resistive forces that oppose the motion of a four-wheel vehicle	(3)
3	The series hybrid drive configuration is used in heavy commercial vehicles whereas small vehicles use parallel configurations justify the statement.	(3)
4	Draw the block diagram representation of series a hybrid configuration of HEV	(3)
5	Explain some features of BLDC and PMS motors which make them suitable for EHV application.	(3)
6	What are the different electrical components of the propulsion system of an EV/EHV?	(3)
7	Define 'C' rating of a battery. What is its significance?	(3)
8	What superior characteristics of super capacitor make them suitable for EV application?	(3)
9	Explain the role of communication network in electric vehicles.	(3)
10	Enlist the factors which govern the sizing of power electronics for EHVs	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Explain the general electric vehicle configuration with the help of block diagram.	(10)

	b)	Explain the ideal torque-speed characteristics required for an electric/hybrid vehicle power plant.	(4)

OR

12	a)	From the fundamental law of motion derive the dynamic equation governing the motion of a four wheeler.	(8)
	b)	Explain the role of gear system in an ICE with the help of traction curve.	(6)

Module II

13	a)	Draw and explain drive train alternative based on drive train configuration in electric vehicle.	(10)
	b)	Draw the block diagram representation of parallel a hybrid configuration of HEV	(4)

OR

14	a)	Draw and explain drive train alternative based on power source configuration in electric vehicle	(10)
	b)	Give the block diagram representation of power flow control in series hybrid electric vehicle.	(4)

Module III

15	a)	With the help of block diagram explain v/f speed control of induction motors used in electric vehicle.	(8)
	b)	What are the desired features of motors used for electric vehicles?	(6)

OR

16	a)	With the help of necessary circuit diagram explain the forward motoring and forward braking control of a dc motor with a single chopper.	(10)
	b)	Enlist the merits and demerits of FOC of PMSM for EV applications.	(4)

Module IV

17	a)	Explain the construction, working, advantages and disadvantages of fuel cell as an energy storage device for EV application.	(10)
	b)	Explain the concept of vehicle to grid power feeding technology.	(4)

OR

18	a)	Explain the different charging algorithms used for charging of EVs.	(8)