Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Exam (FT / PT) April 2025 (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		Considering the present scenario, what are the advantages and limitations of Electric vehicles.	(3)
2		Explain the impact of IC engine-based automobiles to nature.	(3)
3		Draw the block diagram of a Series Hybrid Electric Vehicle	(3)
4		Explain power flow control in a parallel hybrid vehicle.	(3)
5		What are the desired features of motors used Hybrid Electric vehicles?	(3)
6		Explain the features of BLDC which make them suitable for EV application.	(3)
7		Describe the terms Practical capacity and Discharge rate as applied to EV batteries.	(3)
8		Explain V2G concept and its applications.	(3)
9		What is continuous, intermittent and peak overload ratings of drive train motors?	(3)
10		Explain the role of communication network in electric vehicles.	(3)

PART B

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

Module I

11	a)	Give the economic and environmental significance of electric vehicle.	(6)
	b)	What are the resistive forces acting on a four wheeled vehicle during climbing uphill. Develop the dynamic equation of the vehicle movement.	(8)

OR

12	a)	Why a gear system is needed for an ICE? Explain with relevant characteristic curves.	(8)
	b)	Explain the levels of automation and its significance in autonomous vehicles	(6)

Module II

21

13	a)	Draw the functional block diagram of Electric drive train.	(8)
	b)	What are the EV drive train alternatives based on power source configuration	(6)

OR

14	a)	Illustrate how power flow is controlled in EM dominated series-parallel hybrid electric vehicle.	(7)
	b)	What are the EV drivetrain alternatives based on drivetrain configurations.	(7)

Module III

15	a)	Explain with block diagram the speed and torque closed loop control of DC motor drives.	(8)
	b)	Permanent Magnet Synchronous Motor is extensively used in EV passenger cars. Justify.	(6)

OR

16	a)	Why Field Oriented Control is preferred for motor drives control?	(8)
	b)	Draw the block diagram of sensor less Field Oriented Control in PMSM drive.	(6)

Module IV

17	a)	Explain the factors on which the sizing of energy storage system for electric vehicle depends considering Vehicle range and specific power.	(7)
	b)	Explain the different charging algorithms used for charging of EVs and applications.	(7)

OR

18	a)	Explain the role of renewable energy source for charging EV batteries and its environmental significance.	(7)
	b)	Explain the operation of fuel cell. List out the merits and demerits	(7)

Module V

19	a)	Explain the power train sizing constraints of in EV/EHV.	(7)
	b)	What is a Controller Area Network associated with EV/EHV? Explain its significance with the help of diagrams.	(7)

OR

20	a)	Explain the FLEXRAY communication system employed in EVs with the help of necessary block diagram.	(8)
	b)	Explain the function of control pilot and proximity pilot pins of EVs.	(6)

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