Q. Code:259526

Reg. No. | | | | | | | | | | | | | | |

B.E / B.TECH. DEGREE EXAMINATION, MAY 2023

Sixth Semester

AE18602 – HYBRID AND ELECTRIC VEHICLES

(Automobile Engineering)

(Regulation 2018)

TIME:3 HOURS **MAX. MARKS: 100**

CO 1 Outline the need and history of alternative systems for vehicle propulsion and compare their performance with conventional vehicles.

CO 2 Discuss and compare the construction, working and performance of various energy storage devices and fuel cells.

CO 3 Discuss and compare the architecture, performance of electric vehicles and their safety aspects.

CO 4 Classify and discuss the different hybrid vehicle architecture and study their merits and demerits.

CO 5 Describe the working, characteristics of propulsion motors and speed controllers.

PART- A (10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	List the needs of electric and hybrid vehicles.	**1**	**2**
2.	What are the major limitations of electric vehicles?	**1**	**2**
3.	List the various types of batteries used in EV and HEVs.	**2**	**2**
4.	What are the various types of fuel cells?	**2**	**2**
5.	How will you represent the basic configuration of an electric vehicle?	**3**	**3**
6.	Speed ratio of an electric motor influences the maximum torque generated. Justify.	**3**	**2**
7.	Differentiate a hybrid vehicle with a hybrid electric vehicle.	**4**	**3**
8.	Compare a torque coupling and speed coupling used in parallel hybrid electric drive train.	**4**	**2**
9.	Compare an electric motor with an internal combustion engine based on the rated horse power.	**5**	**2**
10.	Discuss the electrical characteristic curve of a direct current shunt motor.	**5**	**2**

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Discuss the parameters in detail that led to be more focused on the electric vehicle across the world nowadays.	**(14)**	**1**	**3**
	(OR)			
(b)	Compare the performance and emission characteristics of a diesel vehicle with that of an electric vehicle.	**(14)**	**1**	**3**

12. (a)	If you decide to purchase a battery for your car, what are the significant battery characteristics to be considered and explain any four of them in detail?	**(14)**	**2**	**3**
	(OR)			
(b)	Suggest the most ideal fuel cell for an electric vehicle and discuss its construction with relevant sketches.	**(14)**	**2**	**3**
13. (a)	How the configuration of a modern electric vehicle differs from that of a primary electric vehicle? Illustrate the concept of a generalized electric vehicle configuration with a block diagram.	**(14)**	**3**	**3**
	(OR)			
(b)	Discuss the significance of control system in an electric vehicle. Explain the signal interface between the major electronic control modules used in a modern electric vehicle.	**(14)**	**3**	**3**
14. (a)	The fuel consumption of a hybrid electric vehicle is better than a conventional vehicle - Justify. How the power sources of a hybrid electric vehicle varies based on their usage for different operating modes like light load, acceleration and deceleration?	**(14)**	**4**	**3**
	(OR)			
(b)	Compare a mild hybrid electric vehicle with a full hybrid electric vehicle. Discuss the architecture of a mild hybrid electric vehicle with a neat sketch.	**(14)**	**4**	**3**
15. (a)	Justify the reason for selecting a direct current motor over an alternating current motor in an electric vehicle. Discuss the working principle of a direct current motor with relevant sketches.	**(14)**	**5**	**3**
	(OR)			
(b)	Identify the most promising motor drive for an electric vehicle application and justify. Explain its basic working principle with a neat sketch.	**(14)**	**5**	**3**

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Compare lithium-ion battery and fuel cells on its significant characteristics and suggest a best energy storage device for electric vehicles.	**(10)**	**1**	**3**

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