Q. Code:489219

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

B.E / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Sixth Semester

AE18602 – HYBRID AND ELECTRIC VEHICLES

(Common to Automobile Engineering and Mechanical Engineering)

(Regulation 2018/2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Outline the need and history of alternative systems for vehicle propulsion and compare their performance with conventional vehicles.	**3**
CO 2	Discuss and compare the construction, working and performance of various energy storage devices and fuel cells.	**3**
CO 3	Discuss and compare the architecture, performance of electric vehicles and their safety aspects.	**3**
CO 4	Classify and discuss the different hybrid vehicle architecture and study their merits and demerits.	**3**
CO 5	Describe the working, characteristics of propulsion motors and speed controllers.	**3**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Identify the substantial contributors with their sources for the global warming.	**1**	**3**
2.	The operating cost of an electric vehicle is cheaper than a conventional vehicle - Justify.	**1**	**3**
3.	Prioritize the undesirable conditions to be addressed in the protection of a li-ion cell.	**2**	**3**
4.	Compare the performance of an ultra-capacitor with that of a lead acid battery.	**2**	**3**
5.	Identity the significant parameters to evaluate the vehicle's driving performance.	**3**	**3**
6.	Identify the necessity of an auxiliary battery for an electric vehicle.	**3**	**3**
7.	Select the best single shaft torque combination parallel hybrid electric drive train.	**4**	**3**
8.	Differentiate mild hybrid electric vehicle with a full hybrid electric vehicle.	**4**	**3**
9.	Distinguish between the rated torque and peak torque available in an electric motor.	**5**	**3**
10.	Identify the significance of making the armature core into thin laminations.	**5**	**3**

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Compare the performance and emission characteristics of an electric vehicle with that of diesel engine operated vehicle.	**(14)**	**1**	**3**

(OR)

(b)	Identify the key specifications of any one of the recently launched electric vehicle and discuss their significance in detail.	**(14)**	**1**	**3**

12. (a)	Identify the most commonly used battery for electric vehicles and explain its construction and working with neat sketches.	**(14)**	**2**	**2**
	(OR)				
(b)	Identify the most commonly used fuel cell for electric vehicles and explain its construction and working with neat sketches.	**(14)**	**2**	**2**

13. (a)	Illustrate the effects of adopting different speed ratios while selecting the traction motor for electric vehicles with suitable graphs.	**(14)**	**3**	**3**
	(OR)				
(b)	Illustrate the signal interface between the major electronic control modules of an electric vehicle with a neat block diagram.	**(14)**	**3**	**3**

14. (a)	Identify the hybrid electric vehicle most suited for urban and suburban driving modes and discuss its different operating modes with a neat sketch.	**(14)**	**4**	**3**
	(OR)				
(b)	Identify the key components of a hybrid electric vehicle with a charging port for external charging and discuss them in detail.	**(14)**	**4**	**3**

15. (a)	Identify the most commonly used electric motor for an electric vehicle and discuss its working with a neat sketch.	**(14)**	**5**	**3**
	(OR)				
(b)	Identify the necessity and key components of the controller in an electric vehicle and discuss its working with a neat block diagram.	**(14)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Identify and analyze the significant safety aspects and challenges in electric vehicles.	**(10)**	**3**	**3**

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