

Reg. No.

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

Fifth Semester

AE18502 – BATTERY AND FUEL CELL TECHNOLOGY FOR ELECTRIC VEHICLES

(Automobile Engineering)

(Regulation 2018)

TIME:3 HOURS

MAX. MARKS: 100

- CO 1** Describe the construction, working, performance characteristics and maintenance of conventional automotive batteries.
- CO 2** Compare the construction and working of different storage systems and discuss battery management system used in electric vehicles.
- CO 3** Outline the working principle of different fuel cells used in electric vehicles.
- CO 4** Discuss the fuel cell performance and stack configuration for automotive application.
- CO 5** Compare the hydrogen storage techniques for fuel cell and its automotive applications.

PART- A (10x2=20Marks)

(Answer all Questions)

	CO	RBT LEVEL
1. What do you understand about maintenance free batteries?	1	2
2. Identify the testing method used to check the condition of battery plates.	1	2
3. What do you infer from an 18650 lithium-ion cell?	2	3
4. Compare the role of BMS master and slave.	2	3
5. Compare the characteristics of an automotive battery with a fuel cell.	3	3
6. Compare low temperature and high temperature proton exchange membrane fuel cell.	3	2
7. What is a bipolar plate and why it is called so?	4	3
8. Identify the effects of low humidity conditions in a fuel cell stack.	4	2
9. What do you understand about on-board hydrogen storage?	5	2
10. Identify the challenges in storing the hydrogen fuel in automobiles.	5	2

PART- B (5x 14=70Marks)

	Marks	CO	RBT LEVEL
11. (a) With proper justification select the most commonly used automotive battery and explain its construction and working with neat sketches.	(14)	1	3
(OR)			
(b) Discuss the most preferred battery charging technique to charge batteries with different voltage and charging capacities with a neat sketch.	(14)	1	3

12. (a) Identify the type of battery being used in electric vehicles widely throughout the world and explain its construction and working with a neat sketch. (14) 2 3

(OR)

(b) Identify the battery which employs the principle of superionic conductors and discuss its construction and working with a neat sketch. (14) 2 3

13. (a) Why the water management is more critical for the efficient operation of a proton exchange membrane fuel cell and explain how it is achieved? (14) 3 3

(OR)

(b) Briefly discuss the need for fuel cell and compare the two most commonly used fuel cells for automotive applications. (14) 3 3

14. (a) Identify the most common method to test the fuel cell and discuss the different regions of the same with a neat sketch. (14) 4 3

(OR)

(b) Identify and discuss the role of humidifiers and cooling plates in fuel cell stack design. (14) 4 3

15. (a) Classify and discuss the salient properties of hydrogen which makes it a better choice for automotive applications. (14) 5 3

(OR)

(b) Identify and compare the different types of hydrogen storage techniques available to be used as a fuel for an automotive fuel cell. (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
