AT7 Chapter 89 L3 26 Questions

EV and HEV High-Voltage Batteries

1. What is the primary advantage of increasing the voltage provided to the electric motors in HEVs?

A. Decreases the amount of current needed to meet wattage requirements

B. Increases the amount of current needed to meet wattage requirements

C. Has no effect on the amount of current needed to meet wattage requirements

D. Decreases the overall power output of the electric motors

2. What are the primary components of a nickel-metal hydride battery?

A. Nickel and cadmium

B. Nickel hydroxide and a hydrogen-absorbing alloy

C. Lithium and cobalt

D. Lead and sulfuric acid

3. What are the advantages of using a prismatic type of NiMH battery cell?

A. Higher mechanical stability and longer life

B. Lower cost and higher energy density

C. More environmentally friendly and better high-temperature performance

D. Better cycle life and lower self-discharge

4. What are the advantages of using lithium-ion battery technology in EV and HEV applications?

A. Lower cost and better environmental performance

B. Higher specific energy and good high-temperature performance

C. Longer cycle life and lower self-discharge

D. Higher mechanical stability and longer life

5. What are the disadvantages of using lithium-ion batteries in EV and HEV applications?

A. High cost and issues related to battery overheating

B. Poor environmental performance and low specific energy

C. Short cycle life and high self-discharge

D. Low mechanical stability and short life

6. What is the packaging efficiency of pouch cell batteries?

A. 50-60%

B. 70-80%

C. 80-90%

D. 90-95%

7. What type of electric vehicles use pouch packs?

A. Only consumer vehicles

B. Only military vehicles

C. Only automotive vehicles

D. All of the above

8. What is unique about General Motor's Ultium batteries?

A. They use cylindrical cell design

B. They use prismatic cell design

C. They use lead-acid battery technology

D. They use large-format, pouch-style cells

9. What is the purpose of alternative cathode materials in lithium-ion batteries?

A. To increase the cost of batteries

B. To reduce the durability of batteries

C. To make batteries safer and more durable

D. To make batteries less efficient

10. What are solid-state batteries?

A. Batteries that use a liquid or gel electrolyte

B. Batteries that do not use a liquid or gel electrolyte

C. Batteries that have a higher operating temperature

D. Batteries that are less efficient than traditional batteries

11. What do cooling systems in hybrid electric vehicles prevent?

A. Overheating of electronic components

B. Overcharging of the battery

C. Undercharging of the battery

D. None of the above

12. What is the unit of measurement for fuel economy in the US?

A. Miles per gallon

B. Liters per kilometer

C. Kilometers per liter

D. Gallons per mile

13. What is the unit of measurement for fuel economy in Europe?

A. Miles per gallon

B. Liters per kilometer

C. Kilometers per liter

D. Gallons per mile

14. What is a kilowatt-hour?

A. A unit of power

B. A unit of energy

C. A unit of voltage

D. A unit of current

15. How is electric vehicle range measured?

A. Miles per gallon

B. Kilometers per liter

C. Miles per kilowatt-hour

D. Liters per kilometer

16. What is MPGe?

A. A unit of measurement for energy consumption in electric vehicles

B. A unit of measurement for energy consumption in fossil fuel vehicles

C. A unit of measurement for battery capacity

D. A unit of measurement for battery charge rate

17. How can you estimate the range of an electric vehicle?

A. Divide the battery capacity in kWh by three

B. Multiply the battery capacity in kWh by three

C. Add the battery capacity in kWh to three

D. Subtract the battery capacity in kWh from three

18. What does the battery control module monitor?

A. Voltage blocks, current sensors, and temperature sensors

B. Fuel economy and range

C. Battery charge rate and cooling system operation

D. None of the above

19. What does the electrical distribution system (EDS) do?

A. Monitors and controls temperature, voltage, SOC, SOH, SOF, and safety.

B. Isolates the conduction path, measures current and voltage, provides pre-charge function, fuses the HV line, and monitors insulation.

C. Draws energy from the most charged cell and dissipates it as heat.

D. Calculates SOC and determines optimal charging rate

20. What is the procedure for replacing a defective battery module?

A. Measuring module voltages, installing a new module in the module charge balancer, and removing the defective module

B. Monitoring and controlling temperature, voltage, SOC, SOH, SOF, and safety.

C. Passive balancing draws energy from the most charged cell and dissipates it as heat.

D. High-voltage system needs to be isolated and tested with a meg ohm meter.

21. What is passive balancing?

A. Draws energy from the least charged cell.

B. Draws energy from the most charged cell and dissipates it as heat.

C. Isolates the conduction path, measures current and voltage, provides pre-charge function, fuses the HV line, and monitors insulation.

D. Monitors and controls temperature, voltage, SOC, SOH, SOF, and safety.

22. How are high-voltage batteries in HEVs charged and discharged?

A. Through DC-DC converters.

B. Through AC-DC converters.

C. Through passive balancing.

D. Through active balancing.

23. What is the role of the battery management system (BMS)?

A. Measures current and voltage

B. Provides pre-charge function.

C. Monitors cycles and controls battery temperature, current, and voltage

D. Monitors insulation.

24. What factors affect battery life and degradation?

A. Liquid-cooled vs. air-cooled batteries.

B. Vehicle use

C. Temperature

D. All of the above

25. How do dealerships recharge HV batteries?

A. Through special chargers.

B. Through passive balancing.

C. Through DC-DC converters.

D. Through active balancing.

26. What should you do if the HV battery becomes discharged?

A. Start the vehicle to recharge the battery pack.

B. Replace the entire battery.

C. Use a meg ohm meter to test the battery.

D. None of the above

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1. A

2. B

3. B

4. B

5. A

6. D

7. C

8. D

9. C

10. B

11. A

12. A

13. B

14. B

15. C

16. A

17. B

18. A

19. B

20. A

21. B

22. A

23. C

24. D

25. A

26. A