CBCS SCHEME

21AU584

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Question Paper Version : A

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.2024
Battery Management System

Time: 1 hr.] [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. What is the primary function of a Battery Management System?
   a) Power generation b) Voltage regulation
   c) Battery Monitoring and Control d) Temperature control

2. The BMS helps in preventing which of the following issues in batteries.
   a) Overcharging b) Undercharging c) Over discharging d) All of these

3. What does SoC stand for in the context of batteries?
   a) State of conductivity b) State of charge
   c) System of cells d) System of capacitance

4. What type of batteries is commonly used in electric vehicles and requires an active BMS?
   a) Alkaline batteries b) Lithium – ion batteries
   c) Lead acid batteries d) Nickel – metal Hydride batteries

5. What is the primary purpose of a Coulomb counter in a BMS?
   a) Measuring batteries capacity
   b) Regulating temperature
   c) Balancing cell voltages
   d) Controlling Humidity

6. Which communication protocol is commonly used for Battery Management Systems in electric vehicles?
   a) USB b) Bluetooth
   c) CAB (Controller Area Network) d) Wi - Fi

7. Which of the following is a common method for thermal management in a BMS?
   a) Liquid cooling b) Air cooling c) Both a and b d) None of these

8. Which component in a BMS is responsible for balancing individual cells within a battery pack?
   a) Charge controller
   b) Cell balancer
   c) Voltage regulation
   d) Temperature sensor

9. Which of the following is a crucial parameter monitored by a BMS?
   a) Air pressure
   b) Humidity
   c) State of charge (SoC)
   d) Wind speed

10. Which parameter does a BMS monitor to ensure proper cell balancing?
   a) Voltage
   b) Current
   c) Temperature
   d) All of these

11. What is the primary advantage of using a modular BMS architecture?
   a) Increased complexity
   b) Scalability and flexibility
   c) Reduced battery capacity
   d) Lower cost

12. In a BMS, what is the purpose of a shunt resistor?
   a) Measure current
   b) Regulate voltage
   c) Monitor temperature
   d) Balance cells

13. How does a BMS protect against short circuits?
   a) By activating a fuse
   b) By disconnecting the load
   c) By reducing charging current
   d) All of these

14. How does a BMS prevent over temperature in a battery packs?
   a) By disconnecting the load
   b) By reducing charging current
   c) By activating cooling systems
   d) All of these

15. What safety feature does a BMS provide to prevent thermal run away in batteries?
   a) Over current protection
   b) Over voltage protection
   c) Thermal management
   d) Short circuit protection

16. Which of the following parameters is not typically monitored by an electric vehicle BMS?
   a) State of charge (SOC)
   b) Tire tread depth
   c) Cell temperature
   d) State of Health (SOH)

17. What is the purpose of a current sensor in an electric vehicle BMS?
   a) To measure tire wear
   b) To monitor charging current
   c) To control steering sensitivity
   d) To adjust lighting system

18. What is the primary purpose of a Coulomb counter in an electric vehicle BMS?
   a) Measuring tire pressure
   b) Balancing cell voltages
   c) Regulating suspension system
   d) Monitoring Battery capacity

19. What is the purpose of a galvanic isolator in an electric vehicle BMS?
    a) To prevent electrical interference
    b) To control time pressure
    c) To adjust the suspension system
    d) To measure charging current

20. What is the significance of a state estimation in an electric vehicle BMS?
    a) Predicting future tire wear
    b) Predicting future battery performance
    c) Balancing cell voltages
    d) Controlling the air conditioning system

21. What role does a watch dog timer play in an electric vehicle BMS?
    a) Monitoring Battery temperature
    b) Resetting the system if a malfunction is detected
    c) Adjusting tire pressure
    d) Controlling transmission

22. Which type of battery degradation does an electric vehicle BMS monitor through the state of health parameter?
    a) Tire wear
    b) Cell aging
    c) Charging efficiency
    d) Steering sensitivity

23. In an electric vehicle BMS, how does a voltage regulation contribute to battery safety?
    a) By adjusting tire pressure
    b) By preventing over voltage
    c) By controlling suspension system
    d) By regulating transmission

24. In a series – parallel battery pack topology, what does "series" refer to?
    a) Cells connected side by side
    b) Cells connected end to end
    c) Cells connected in a loop
    d) Cells connected randomly

25. What is the main challenge associated with series battery pack topology?
    a) Reduced capacity
    b) Increased complexity
    c) Limited voltage
    d) Difficulty in charging

26. What is the primary function of a battery pack topology in an EV?
    a) To control the charging speed
    b) To determine the size of the battery
    c) To manage the distribution of power among individual cells
    d) To regulate the temperature of the battery

27. Which battery pack topology connects all cells in series?
    a) Parallel b) Series c) Series - Parallel d) Tandem

28. Which battery pack topology provides redundancy and fault tolerance?
    a) Series b) Parallel c) Series - Parallel d) Tandem

29. What is the advantage of a parallel battery pack topology?
    a) Increased voltage
    b) Increased capacity
    c) Faster charging
    d) Better thermal management

30. What does the term balancing refer to in the context of battery pack topology?
    a) Equalizing the charge of individual cells
    b) Replacing faulty cells
    c) Increasing the overall voltage
    d) Enhancing thermal conductivity

31. Which topology allows for hot – swapping of individual battery modules without affecting the entire pack?
    a) Series b) Parallel c) Series - Parallel d) Tandem

32. What is the purpose of a Battery Management System (BMS) in the context of battery pack topology?
    a) To connect cells in series
    b) To monitor and control individual cells
    c) To increase the overall capacity
    d) To improve thermal insulation

33. Which topology is commonly used to achieve high voltage and high capacity simultaneously?
    a) Series b) Parallel c) Series - Parallel d) Tandem

34. In a BMS, what is the role of a current sensor?
    a) Measure the battery voltage
    b) Monitor the charging current
    c) Regulates the ambient temperature
    d) Control the discharge rate

35. What is the purpose of a pre – charge circuit in a BMS?
    a) To discharge the battery
    b) To charge the battery
    c) To slowly charge a discharged battery before connecting it to the load
    d) To regulate battery voltage

36. In a BMS, what does the term "C – rate" refer to?
    a) Charge efficiency
    b) Discharge, efficiency
    c) Charging / discharging current relative to the battery capacity
    d) Charging / discharging voltage relative to the battery capacity.

37. What is the purpose of a state estimation in a BMS?
    a) Predicting future battery performance
    b) Measuring battery capacity
    c) Balancing cell voltages
    d) Regulating temperature

38. What does the term "Cell drift" refer to in the context of a BMS?
    a) Variation in cell voltages over time
    b) Balancing of cells
    c) Charging efficiency
    d) Discharge rate

39. What is the significance of a BMS in extending the overall lifespan of a battery pack?
    a) Balancing cells
    b) Monitoring temperature
    c) Preventing overcharging and over discharging
    d) All of these

40. What is the primary function of a BMS during rapid charging in an electric vehicle?
    a) Adjusting tire pressure
    b) Monitoring and controlling charging current
    c) Regulating suspension system
    d) Controlling transmission

41. How does a temperature sensor contribute to battery pack sensing?
    a) Monitoring external environmental conditions
    b) Regulating the charging speed
    c) Ensuring safe operating temperatures for cells
    d) Balancing the charge among cells.

42. What is the purpose of battery pack sensing in an Electric Vehicle (EV)?
    a) Regulating the temperature of the battery.
    b) Monitoring the state of charge
    c) Controlling the charging speed
    d) Determining the size of the battery

43. Which sensing technique is commonly used to measure the State Of Charge (SOC) of a battery pack?
    a) Voltage sensing
    b) Current sensing
    c) Temperature sensing
    d) Coulomb sensing

44. What is the role of a current sensor in battery pack sensing?
    a) Measuring the flow of electrical energy
    b) Monitoring the temperature of the battery
    c) Regulating the voltage of individual cells
    d) Balancing the charge among cells

45. How does Impedance spectroscopy contribute to battery pack sensing?
    a) Monitoring the temperature of individual cells
    b) Measuring the state of charge (SoC)
    c) Analyzing the internal resistance of the battery
    d) Controlling the charging speed.

46. Which sensing parameter is essential for predicting and preventing thermal runaway in a battery pack?
    a) Voltage b) Temperature c) Current d) Coulomb count

47. Which parameter is commonly sensed to monitor the health of individual cells in a battery pack?
    a) Voltage b) Temperature c) Capacity d) All of these

48. What is the purpose of a Coulomb counter in battery pack sensing?
   a) Measuring the flow of electrical energy
   b) Monitoring the temperature of the battery
   c) Counting the charge and discharge cycles
   d) Regulating the voltage of individual cells.

49. Which type of sensor is crucial for detecting and preventing overcharging in a battery pack?
   a) Voltage sensor
   b) Current sensor
   c) Temperature sensor
   d) Coulomb sensor

50. What does voltage sensing help determine in a battery pack?
   a) The temperature of individual cells
   b) The state of charge (SoC)
   c) The internal resistance of the battery
   d) The capacity of individual cells.

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