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Question Paper Version : A

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Battery Management System

Time: 1 hr.]

[Max. Marks: 50]

INSTRUCTIONS TO THE CANDIDATES

- Answer all the **fifty** questions, each question carries one mark.
 - Use only **Black ball point pen** for writing / darkening the circles.
 - For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
 - Darkening two circles for the same question makes the answer invalid.
 - Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.
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- What is the primary function of a Battery Management System (BMS)?
 - Power transmission
 - Speed regulation
 - Monitoring and protecting the battery pack
 - Mechanical support
 - What does SoC stand for in BMS context?
 - Source of Charge
 - Speed of Charging
 - State of Charge
 - Size of cell
 - What is cell balancing in a battery pack used for?
 - To reduce weight
 - To maintain equal energy levels in cells
 - To increase resistance
 - To improve aerodynamics
 - What is a typical cell configuration in a battery pack topology?
 - Series only
 - Parallel only
 - Series – Parallel combination
 - Circular pattern
 - Which topology offers redundancy and fault tolerance?
 - Star
 - Ring
 - Parallel configuration
 - Series – only configuration
 - What is a module in a battery pack?
 - A single cell
 - A set of series or parallel connected cells
 - The charger circuit
 - The BMS itself
 - The BMS uses current sensors primarily to
 - Detect cell color
 - Measuring insulation resistance
 - Monitor charging / discharging current
 - Detect noise

8. What is the purpose of using parallel connections in a battery pack?
 - a) To increase voltage
 - b) To reduce temperature
 - c) To increase capacity
 - d) To monitor GPS
9. Which component is responsible for isolating the battery from the load when needed?
 - a) BMS controller
 - b) Contactor or relay
 - c) Cooling fan
 - d) Inverter
10. Which of the following topologies minimized voltage drops over long connections?
 - a) Series
 - b) Tree
 - c) Parallel with local balancing
 - d) Bus – based connection
11. Which component is typically used for temperature sensing in battery packs?
 - a) Inductor
 - b) Thermistor
 - c) Capacitor
 - d) Diode
12. What does a Hall effect sensor measure?
 - a) Pressure
 - b) Voltage
 - c) Current using magnetic field
 - d) Light intensity
13. Which type of sensor is least effected by electrical noise?
 - a) Shunt resistor
 - b) Thermocouple
 - c) Hall effect sensor
 - d) Voltage divider
14. In voltage sensing, what is commonly used to scale down high voltages?
 - a) Transformer
 - b) Voltage divider
 - c) Capacitor
 - d) Fuse
15. What happens if a temperature sensor fails in BMS?
 - a) Overcharging protection activates
 - b) BMS ignores SoC
 - c) Thermal protection may not function
 - d) Cells stop charging
16. Where is the hall effect sensor typically placed in a battery pack?
 - a) On battery terminals
 - b) Around current – carrying conductors
 - c) Inside the battery cell
 - d) Near the cooling fan
17. What does overvoltage protection prevent?
 - a) Temperature increase
 - b) Memory loss
 - c) Battery cell degradation
 - d) Excess charge beyond safe limits
18. What factor can affect Hall effect sensor accuracy?
 - a) Air Humidity
 - b) Nearby magnetic fields
 - c) Voltage drop
 - d) Light exposure
19. Which component helps measure both current and direction of flow?
 - a) Fuse
 - b) Thermistor
 - c) Hall effect sensor
 - d) Shunt resistor
20. How can a BMS use current sensing to estimate State of Charge (SoC)?
 - a) By tracking temperature.
 - b) By integrating current over time
 - c) By averaging voltage
 - d) By measuring light

21. What is typically used to control high voltage contactors?
 - a) AC relay
 - b) Microcontroller signal
 - c) Manual switch
 - d) Diode
22. Why does a BMS use a pre – charge circuit with the contactors?
 - a) To heat the battery
 - b) To reduce inrush current
 - c) To improve isolation sensing
 - d) To recharge capacitors
23. What units are used to measure isolation resistance?
 - a) Volts
 - b) Ohms
 - c) Amps
 - d) Farads
24. Thermal control in a BMS primarily ensures
 - a) Faster charging
 - b) Maximum voltage output
 - c) Safe operating temperature for cells
 - d) Mechanical durability
25. What type of cooling systems may be integrated into a battery pack for thermal control?
 - a) Wind
 - b) Air or liquid cooling
 - c) Magnetic
 - d) Acoustic
26. Where are temperature sensors typically located in a battery pack?
 - a) On wires only
 - b) Outside the enclosure
 - c) On or near battery cells and modules
 - d) In the cooling fan
27. What controls the opening and closing of high – voltage contactors?
 - a) Temperature sensor
 - b) Contactor controller logic
 - c) Cooling fan
 - d) Hall sensor
28. Why must contactors be rated for high voltage and current?
 - a) For insulation testing
 - b) For safety and reliable disconnection
 - c) To reduce battery weight
 - d) For improved SoC estimation
29. Which BMS function protects the battery from operating in extreme temperatures?
 - a) Voltage sensing
 - b) Thermal management
 - c) Contact control
 - d) SoC estimation
30. What is typically considered a safe minimum insulation resistance in EV battery system?
 - a) 1 ohm
 - b) 10 ohms
 - c) 500 ohms
 - d) 500 kilo-ohms or none
31. What is the primary role of the BMS in charger control?
 - a) Speed control
 - b) Load balancing
 - c) Manage charging process safely
 - d) GPS tracking
32. What does CAN stand for in automotive communication?
 - a) Control and Navigation
 - b) Controller Area Network
 - c) Charge and Network
 - d) Communication and Navigation
33. What is typically included in a CAN message sent from the BMS to the charger?
 - a) Tire pressure data
 - b) GPS coordinates
 - c) Charge limits and status flags
 - d) Wind speed

34. Which component helps the BMS estimate remaining driving range?
 a) Ambient temperature sensor
 b) Current sensor and SoC estimation algorithm
 c) Voltage divider
 d) Voltage regulation
35. What does SoC stand for in BMS context?
 a) State of coolant
 b) Safety of charging
 c) State of charge
 d) System of communication
36. Why is CAN bus preferred over VART for BMS communication?
 a) Its more expensive
 b) Its slower
 c) It supports multiple devices on the same network with error detection
 d) It works only at short distances
37. What is the function of a charge enable signal from the BMS?
 a) Turns on motor drive
 b) Power sensors
 c) Permits on blocks charging operation
 d) Activates the GPS
38. What parameter does the BMS use for estimate energy consumption rate?
 a) Voltage drop
 b) Current over time
 c) Frequency
 d) Ambient light
39. What data is typically broad cast by the BMS over CAN during normal operation?
 a) Battery SoC, Voltage , Current , Temperature
 b) Navigation maps
 c) Audio settings
 d) Brake wear information
40. What role does the charter play when receiving commands via CAN from the BMS?
 a) Ignores limits
 b) Mirrors voltage
 c) Adjusts output current and voltage accordingly
 d) Activates cooling fan
41. What does pack total energy represent in a battery system?
 a) Instantaneous current
 b) Amount of stored electrical energy
 c) Maximum power output
 d) Voltage at one terminal
42. What is required to calculate pack power output?
 a) Resistance and capacitance
 b) Temperature and pressure
 c) Voltage and current
 d) SoC and voltage only
43. How does the BMS estimate pack energy over time?
 a) Measures light intensity
 b) Integrates power over time
 c) Calculates peak voltage
 d) Uses internal temperature
44. What parameter does the BMS monitor to prevent over power conditions?
 a) Time
 b) State of health
 c) Pack current and voltage
 d) Cell diameter
45. How is battery energy capacity commonly expressed?
 a) Volts
 b) Joules per second
 c) Amp – hours
 d) Cycle per second

46. How does temperature influence energy and power estimation?
- a) It doesn't
 - b) It improves communication
 - c) It affects internal resistance, influencing current
 - d) It speeds up charging
47. Why is accurate power estimation important in EVs?
- a) For color display
 - b) To predict cell age
 - c) To control drive power and charging
 - d) To heat the seats
48. What contributes to energy loss in a battery system?
- a) Mechanical wear
 - b) Light exposure
 - c) Internal resistance
 - d) Fan vibration
49. What factor helps the BMS optimize energy usage?
- a) Cell color and arrangement
 - b) Load demand forecasting and thermal management
 - c) Battery size only
 - d) Type of cell packaging
50. What limits the maximum power the battery can deliver?
- a) Size of wiring
 - b) Ambient noise
 - c) Internal resistance the thermal limits
 - d) Cell label information
