

USN

--	--	--	--	--	--	--	--	--	--

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

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.**

-
1. What does BMS stands for in Electric Vehicles?
a) Battery Management Software b) Battery Monitoring Software
c) Battery Management System d) Basic Motor System
 2. Which of the following is NOT a core function of a battery management system?
a) Cell balancing b) State of charge estimation
c) Charging station location tracing d) Thermal Management
 3. The main purpose of the BMS is to
a) Increase battery weight b) Maximize battery life and ensure safety
c) Decrease the voltage of the battery d) Increase the size of the battery pack
 4. Which of the following is a key sub – division of BMS functionality?
a) Engine calibration b) State of Charge (SOC) estimation
c) Gearbox management d) Exhaust gas control
 5. State of Health (SDH) is a BMS refers to
a) How healthy the driver is
b) Number of charging cycles completed
c) The overall condition and performance capability of the battery
d) Voltage of the battery at given time
 6. What is cell balancing in BMS?
a) Balancing the car's weight b) Equalizing charge across all battery cells
c) Stabilizing the voltage output d) Managing the motor's torque

7. Which of these topologies connects cells in a simple linear fashion with a single controller?
 - a) Modular topology
 - b) Centralized topology
 - c) Distributed topology
 - d) Hybrid topology
8. What is the disadvantage of centralized BMS topology?
 - a) Lower cost
 - b) Higher reliability
 - c) Difficult to scale
 - d) Simple wiring
9. Which BMS topology uses slave control units in modules to report data to a master unit?
 - a) Distributed
 - b) Hybrid
 - c) Centralized
 - d) Star topology
10. Which BMS function is responsible for ensuring battery does not overheat?
 - a) Communication protocol
 - b) Voltage protection
 - c) Thermal management
 - d) Power inverter
11. Which sensor is commonly used to measure the voltage of individual cells in a battery pack?
 - a) Thermister
 - b) Shunt resister
 - c) Voltage divider
 - d) Hall effect sensor
12. What device is typically used in BMS for temperature sensing?
 - a) Inductor
 - b) Thermister
 - c) Capacitor
 - d) Diode
13. Current sensing in a battery pack is important for
 - a) Estimating battery size
 - b) Measuring air flow
 - c) Estimating State of Charge (SOC)
 - d) Displaying speed meter readings
14. Hall effect sensors are used to measure
 - a) Light intensity
 - b) Cell voltage
 - c) Magnetics fields and current
 - d) Temperature variations
15. What can happen if battery pack temperature is not properly monitored?
 - a) Improved battery life
 - b) Uniform charge discharge
 - c) Risk of thermal runaway
 - d) Increased charging speed
16. Which of the following is not a feature of Hall effect current sensors?
 - a) Galvonic isolation
 - b) Contactless measurement
 - c) High power consumption
 - d) Suitable for both AC and DC current
17. What is a typical placement for temperature sensors in a battery pack?
 - a) Only on the positive terminal
 - b) Only near the cooling system
 - c) Near cells and heat – sensitive areas
 - d) Outside the battery enclosure
18. A Hall effect sensor works on the principle of
 - a) Resistance change due to pressure
 - b) Capacitance variation
 - c) Voltage generated due to magnetic field
 - d) Thermal conductivity change

19. What is the advantage of using Hall effect sensors over shunt resistors for current sensing?
 - a) Non – intrusive and low power loss
 - b) Lower cost
 - c) Higher heat dissipation
 - d) Lower accuracy
20. Which unit is used to measure the temperature in BMS?
 - a) Ohms
 - b) Degrees Celsius (or) Fahrenheit
 - c) Amperes
 - d) Volts
21. What is the purpose of using corona rings in high voltage transmission lines?
 - a) To measure voltage
 - b) To reduce corona discharge
 - c) To increase corona discharge
 - d) To protect against lightning
22. Which insulating material is commonly used in high voltage cables?
 - a) XLPE (cross – linked polyethylene)
 - b) PVC (Polyvinyl chloride)
 - c) Wood
 - d) Rubber
23. Which of the following test is used in the factory site for isolating the defective insulation?
 - a) Partial discharge
 - b) Scanning test
 - c) Corrosion test
 - d) High – voltage tests
24. Which of the following is not a primary function of protective relay?
 - a) Detecting abnormal system conditions
 - b) Isolating faulted equipment
 - c) Initiating corrective actions
 - d) Providing backup power
25. Overcurrent relays operate on the principle of
 - a) Change in voltage
 - b) Rate of change of current
 - c) Magnitude of current exceeding a preset threshold
 - d) Impedance measurement
26. Directional relays distinguish between
 - a) Fault current and load current
 - b) AC & DC currents
 - c) Single phase and three phase faults
 - d) Forward and reverse power flow
27. Which of the following types of relay is LEAST suited for protecting overhead lines against lightning strikes?
 - a) Distance relay
 - b) Over current relay
 - c) Surge arrester
 - d) Differential relays
28. A thermal runaway event can be prevented through
 - a) Increase SOC
 - b) Thermal Management & Protection circuits
 - c) Overcharging the battery
 - d) Shutting off communication interfaces
29. Thermal control in a battery system includes
 - a) GPS synchronization
 - b) Motor speed regulation
 - c) Active / Passive cooling (or) heating
 - d) Voltage spike suppression

30. Isolation sensing in a BMS is used to
- Control current
 - Detect insulation failure between high voltage and chassis
 - Reduce voltage ripple
 - Communicate with the motor controller
31. What is the role of the CAN bus in BMS?
- Physically protect the battery
 - Carry coolant to battery
 - Provide a communication link between components
 - Store thermal energy
32. What is the main role of charger control in an electric vehicle?
- Control motor torque
 - Balance tire pressure
 - Manage battery charging process safely
 - Increase audio system output
33. Which of the following is essential for accurate range estimation in an EV?
- Highlight Wattage
 - Number of passengers
 - Car stereo volume
 - Battery state of charge and recent consumption patterns
34. What type of data does the log book function typically record in a BMS?
- Music playlist
 - Tire alignment data
 - Wind speed and direction
 - Changing cycles, temperature, faults and usage history
35. State of charge (SOC) estimation tells us.
- Current battery voltage
 - The estimated percentage of battery charge remaining
 - Battery's manufacturing date
 - Number of wheels rotating
36. Which communication protocol is most commonly used for charger – BMS communication?
- Wi - fi
 - CAN bus
 - Bluetooth
 - GSM
37. Which algorithm is often used for SOC estimation in BMS?
- Machine translation
 - Coulomb counting
 - Speed averaging
 - Binary division
38. An inaccurate SOC estimation may result in
- More entertainment options
 - Poor acceleration
 - Tire imbalance
 - Unexpected vehicle shutdown (or) charging errors
39. What does the range estimation feature help the driver with?
- Predicting engine oil condition
 - Calculating remaining driving distance based on SOC and consumption
 - Adjusting seat position
 - Turning the motor sound tuning

40. The CAN bus in EVS is primarily used for
 a) Controlling the cooling fan
 b) Broadcasting FM radio signals
 c) Communication between Electronic Control Units (ECUS)
 d) Increasing battery voltage
41. What is the unit of energy in battery systems?
 a) Amperes b) Watt – hours (Wh) c) Volts d) Ohms
42. What is the formula to calculate power in an electrical system?
 a) Power = Voltage $\times$ Current b) Power = Voltage + Current
 c) Power = Resistance $\div$ Current d) Power = Current $\div$ Voltage
43. Pack total energy refers to
 a) Energy of the smallest cell in the pack
 b) Sum of voltage readings only
 c) Total energy capacity of the entire battery pack
 d) Energy required to cool the battery
44. Which factor does not directly affects the energy estimation of battery pack?
 a) State of Health (SOH) b) Temperature
 c) Discharge rate d) Motor RPM
45. What is the typical unit used to express power in EV battery diagnostics?
 a) Joules b) Kilowatts (KW) c) Watt - seconds d) Volt per cell
46. What is the purpose of a diagnostics system in a battery pack?
 a) Detect faults and monitor performance b) Increase charging time
 c) Reduce battery test d) Charge all cell simultaneously
47. A sudden drop in pack power may indicate
 a) Strong cell balancing b) Fault in one (or) more cells
 c) Low charging efficiency d) Correctly working cooling system
48. Which tool is commonly used for diagnostics in BMS system?
 a) Oscilloscope b) Voltmeter
 c) Diagnostic software with CAN interface d) Screw driver
49. Energy estimation helps in
 a) Determining tire wear
 b) Forecasting vehicles range and efficiency
 c) Speed control
 d) Suspension adjustment
50. A decrease in pack total energy overtime is most likely due to
 a) Increased regenerative braking b) Aging & degradation of cells
 c) A stronger alternator d) High tire pressure
