Register No.:

1843

October 2025

Time – Two Hours
(Maximum Marks: 60)

N.B.

1. Answer all questions under Part-A. Each question carries 1 mark.
2. Answer any 5 questions under Part-B. Each question carries 2 marks.
3. Answer all questions under Part-C. Each question carries 10 marks.

PART – A

1. What is the primary need for using electric vehicles (EVs)?
   a) To increase fuel consumption
   b) To reduce air pollution and dependence on fossil fuels
   c)To make vehicles heavier
   d) To reduce vehicle cost only

2. Which component stores electrical energy in EV?
   a) Motor
   b) Battery
   c) Controller
   d) Converter

3. Which charging method uses no physical connector?
   a) Fast charging
   b) Plug-in charging
   c) Wireless charging
   d) Solar charging

4. What does “battery plug-in” refer to?
   a) Plugging battery to motor
   b) Plugging charger into the battery for charging
   c) Connecting fuel pipe
   d) Refilling battery acid

5. Which motor is commonly used in Electric Vehicles?
   a) DC motor
   b) BLDC motor
   c) Stepper motor
   d) Synchronous motor

6. In a hybrid electric drive train, torque coupling occurs in:
   a) Parallel hybrid
   b) Series hybrid
   c) Plug-in hybrid
   d) Series-parallel hybrid

7. The rotor of an SRM has:
   a) Permanent magnets
   b) Field windings
   c) No windings or magnets
   d) Carbon brushes

8. The rotor in an induction motor rotates due to:
   a) Permanent magnets
   b) External excitation
   c) Magnetic induction from the stator
   d) DC current supply

9. Hazard management in EVs includes:
   a) Increasing speed
   b) Replacing sensors
   c) Identifying, assessing, and controlling risks
   d) Using only DC supply

10. Which semiconductor device is most suitable for EV power control?
   a) BJT
   b) MOSFET
   c) Diode
   d) SCR

11. In Modulated Signal Injection, what is injected into the motor?
    a) Water
    b) DC current
    c) High-frequency signals
    d) Compressed air

12. Sensor-less control eliminates the use of:
    a) Motors
    b) Physical sensors
    c) Converters
    d) Relays

13. Which of the following is a major component in hybrid vehicle propulsion systems?
    a) Fuel cell
    b) Electric motor
    c) Hydraulic pump
    d) Turbocharger

14. Which hybrid layout uses both series and parallel features?
    a) Series
    b) Parallel
    c) Series-Parallel
    d) Plug-in

15. Regenerative braking converts:
    a) Kinetic energy to electrical energy
    b) Electrical to mechanical
    c) Thermal to chemical
    d) Mechanical to chemical

16. Micro hybrid vehicles typically feature:
    a) Electric propulsion only
    b) Start-stop system and regenerative braking
    c) Large electric motor assist
    d) Plug-in charging capability

17. Fuel cells convert:
    a) Mechanical energy to electrical
    b) Chemical energy to electrical
    c) Thermal energy to mechanical
    d) Solar to heat

18. The efficiency of a fuel cell mainly depends on:
    a) Temperature and fuel type
    b) Color of electrodes
    c) Coolant used
    d) Battery capacity

19. Specific power of a fuel cell is defined as:
    a) Power output per unit volume or weight
    b) Total power output
    c) Fuel consumed per hour
    d) Voltage output per cell

20. What does the I-V curve of a fuel cell represent?
    a) Current vs temperature
    b) Voltage vs current
    c) Power vs voltage
    d) Fuel consumption vs time

PART – B

21. What are the main types of EV layouts?
22. List any two batteries used in Electric Vehicles (EV).
23. What are the two main components of an Electric Drive Train (EDT)?
24. Write a short note on Switched Reluctance Motor (SRM) drives.
25. Name two key precautions when working with high-voltage systems in electric vehicles.
26. Write a note on self - drive cars.
27. What is the purpose of hybrid vehicle control systems?
28. What are the main obstacles to the widespread adoption of fuel cell vehicles?

PART – C

29. Discuss the components of an Electric Vehicle (EV) .
30. With a neat diagram explain the parallel hybrid electric drive trains(HEDT).
31. Write short notes on the following sensor less control methods:
    i) Phase Inductance Based method (5)
    ii) Mutually Induced Voltage-Based (5)
32. Draw and explain the layout of EV.
33. Explain the fuel cell characteristics. Also explain what factors affect these characteristics?
