ELECTRIC VEHICLE

EE / EEE

SEMESTER – FIFTH

These important questions have been prepared using your previous exam papers (PYQs), verified concepts, and additional reference from trusted online academic sources.
For deeper understanding, please refer your class notes as well.

1️⃣ SECTION A: LONG & HIGH WEIGHTAGE QUESTIONS

1. **Compare** Electric Vehicles (EV) and Internal Combustion Engine (ICE) vehicles on the following parameters:
   - Initial Cost & Running Cost
   - Environmental Impact
   - Maintenance & Noise Level
2. **Draw and Explain** the general **Block Diagram of an Electric Vehicle (EV)**. Describe the function of the **Energy Source Subsystem**, **Propulsion Subsystem**, and **Auxiliary Subsystem**.
3. **Classify** Electric Vehicles (BEV, HEV, PHEV, FCEV). Explain the working principle of any **two** types with their advantages.
4. What is a **Brushless DC (BLDC) Motor**? Explain its construction and working principle. Why is it preferred over brushed DC motors in EVs?
5. Explain the **Selection Criteria** for electric motors used in Electric Vehicles. Compare **Induction Motors** and **PMSM** based on EV requirements.
6. **Explain** the construction and chemical working principle of a **Lithium-Ion Battery**. List its major advantages and disadvantages.
7. **What is a Battery Management System (BMS)?** Draw its block diagram and explain the functions of each block (like Cell Balancing, Temperature Monitoring).
8. **Define Fuel Cell.** Explain the working principle of a **Proton Exchange Membrane Fuel Cell (PEMFC)** with a neat diagram. How does it differ from a battery?

9. **Draw the Block Diagram** of an EV Power Electronics system showing the **DC-DC Converter**, **Inverter**, and **On-board Charger**. Explain the function of the DC-to-DC converter in detail.
10. Write a detailed note on the **National Electric Mobility Mission Plan (NEMMP) 2020**. Explain its objectives and the strategies for implementation.

2️⃣ SECTION B: SHORT & CONCEPTUAL QUESTIONS

1. **Differentiate** between **Battery Electric Vehicles (BEV)** and **Hybrid Electric Vehicles (HEV)**.
2. Define the following **Battery Parameters**:
    - Specific Energy vs. Energy Density
    - State of Charge (SoC) vs. Depth of Discharge (DoD)
    - C-Rating
3. **Compare** AC Drives and DC Drives used in electric vehicle applications.
4. Write a short note on **Supercapacitors** and their application in Regenerative Braking.
5. Explain the **"3R" Process** (Reduce, Reuse, Recycle) for EV batteries.
6. **Classify EV Charging Methods.** Explain the difference between **AC Charging (Slow)** and **DC Fast Charging**.
7. Explain the concept of **V2G (Vehicle-to-Grid)** and **V2H (Vehicle-to-Home)** technology.
8. What are the key components required to set up a **Public Charging Station**?
9. List the major **Barriers** (challenges) to the adoption of Electric Vehicles in India.
10. State the main incentives provided under the **Maharashtra Electric Vehicle Policy, 2021**.

3️⃣ SECTION C: "AA BHI SAKTA HAI" (CRITICAL THINKING)

1. Briefly discuss the **History and Evolution** of Electric Vehicles.
2. Write a short note on the **Axial Flux Ironless Permanent Magnet Motor**. Why is it considered for high-performance EVs?

3. Compare **Alkaline Fuel Cells (AFC)** and **Solid Oxide Fuel Cells (SOFC)**.
4. Explain the concept of **Battery Swapping**. What are the advantages of swapping over charging?
5. What is **Wireless (Inductive) Charging**? Draw a simple diagram to show how it works.
6. What is the **EV30@30 Campaign**? What are its global goals?

📝 **Exam Strategy for Students BY DIPLOMA WALLAH :**

- **Focus on Block Diagrams:** Questions 2, 7, and 9 in Section A *must* have diagrams.
- **Don't skip Unit 5:** The policy questions (NEMMP) are purely theoretical and easy to score.
- **Abbreviations:** Learn full forms like **BEV, PHEV, BMS, PEMFC, NEMMP**.

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