Electric Vehicle Interview Questions

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Top Answers to Electric Vehicle Interview Questions

An electric vehicle is energized only by the energy stored in batteries and connected to electric motors. Electric vehicles are quieter and emit no pollutants when compared to vehicles powered by internal combustion engines.

Owning an electric car is far less expensive in most industrialized nations than an internal combustion engine car. Lower maintenance and fuel expenses are the key causes. Through charging stations, electric vehicles can be recharged. These charging stations are simple to install in both private and public locations.

Following are the different categories into which these electric vehicle interview questions are divided:

Did You Know:

- In 2020, EV car sales spiked above 10 million around the globe.
- According to EU rules, all EV cars are legally required to emit noise so that pedestrians and cyclists can hear and avoid crashes.
- CATL is the world's largest EV battery creator, with a 34% market share in Tesla, BMW, Volkswagen, etc.

- The Lunar Rover Vehicle was the first electric vehicle designed to run on the moon.

Click here to watch the Introduction video of the Electric Vehicle Course and learn more about electric vehicles!

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Basic Level Electric Vehicles Interview Questions

1. What is the Full form of EV?

The full form of EV is electric vehicle.

2. What are the top ten electric vehicles in the World?

The top ten electric vehicles in the world are as follows:

- Hyundai Ioniq Electric
- BMW i3
- Tesla Model X
- Volkswagon e-Golf
- Renault Zoe
- Tesla Model S
- Nissan Leaf
- Hyundai Kona Electric
- Jaguar I-pace
- Kia e-Niro

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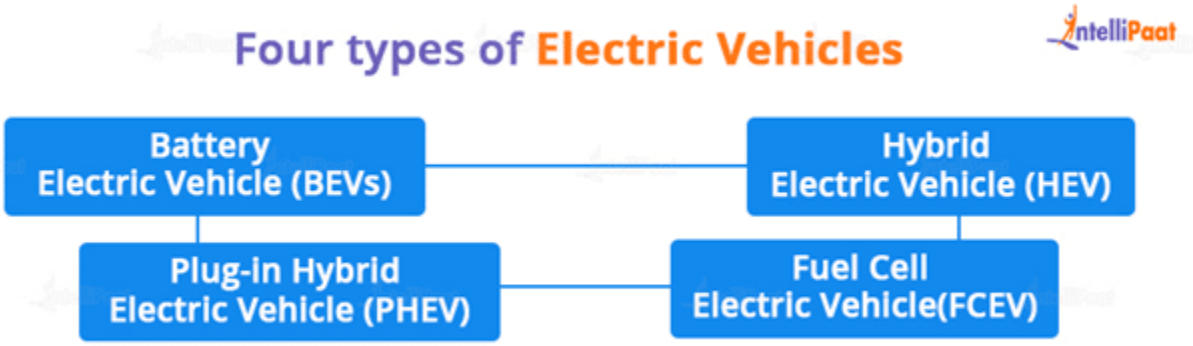
3. How many types of electric vehicles are there and name them?

There are four types of electric vehicles and they are



- Battery Electric Vehicles (BEVs)
- Hybrid Electric Vehicles (HEVs)
- Plug-in Hybrid Electric Vehicles (PHEVs)
- Fuel Cell Electric Vehicles (FCEVs)

4. Who invented the first electric vehicle?

Anyos Jedlik, a Hungarian inventor, invented the first electric vehicle in 1828. He built the motor to operate an electric train using the electric current from a battery.

5. What is battery electric vehicle?

Battery Electric Vehicle operates only on electricity. It is made by a high voltage battery that transforms the alternating current into the direct current to handle the power electronics.

6. What is a fuel cell electric vehicle?

The Fuel cell Electric Vehicle operates on electricity that comes from oxygen and compressed hydrogen and it does not emit emissions; it only releases water and heat.

7. When did electric vehicles see their first decline?

The market demand for electric vehicles increased as they gained popularity. This expansion, however, came to an end in 1979 when the producers of electric vehicles were unable to meet the rising customer demand.

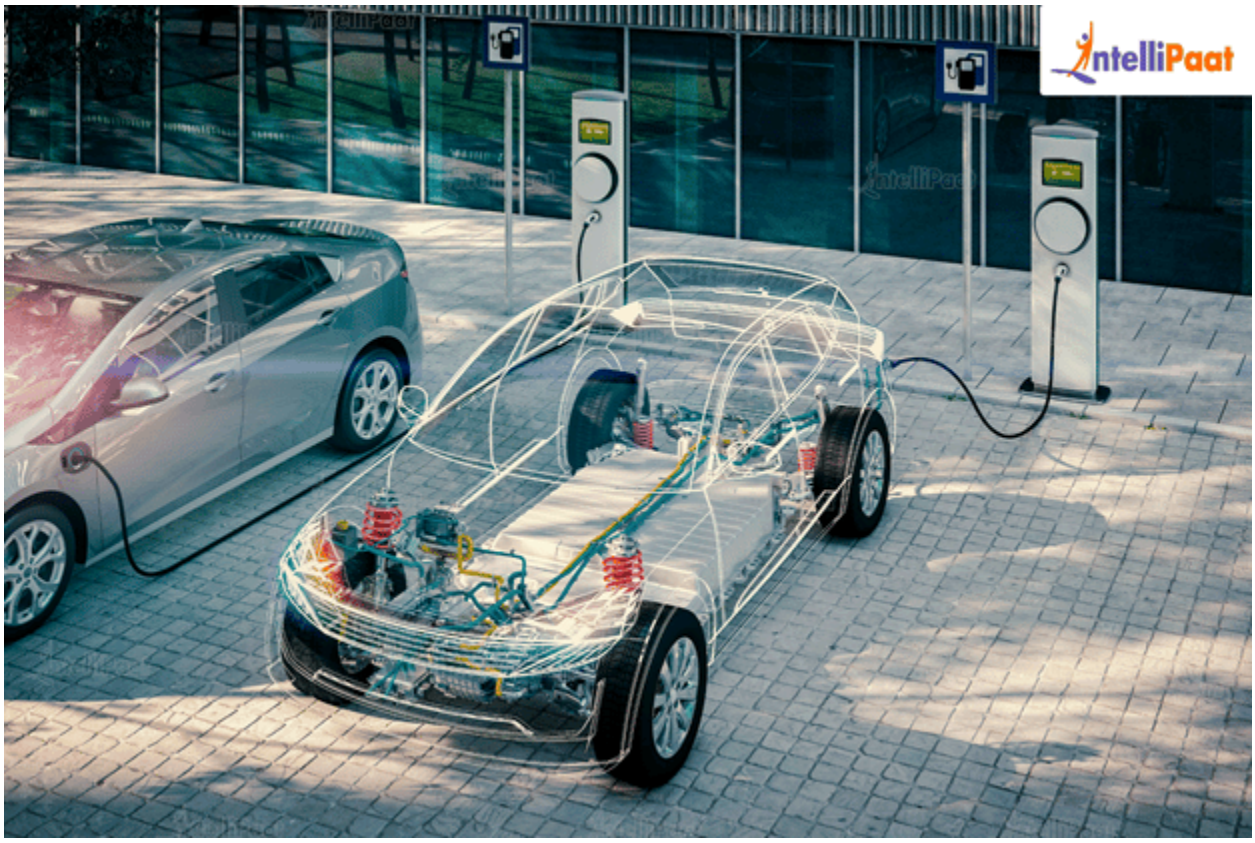
Furthermore, fuel prices fell, making electric cars less cheap compared to gasoline-powered vehicles.

8. Define a brushless DC motor.

Brushless DC electric motors (BLDC) are electric motors that are supplied by a direct current voltage source and commutated electronically rather than using brushes as in normal DC motors.

9. What are the main components of an Electric Vehicle?

The components of an Electric Vehicle are:



- Auxiliary Battery
- DC-DC converter
- Thermal System(Cooling)
- Power Electronics Controller
- On board-charger
- Transmission
- Electric Motor
- Hydrogen Tanks

10. What is a DC-DC Converter?

A DC-DC converter, as the name indicates, transforms DC voltage into another device. It transforms the high-frequency direct current into a lower-frequency direct current and this power is used to hold the vehicle accessories.

Intermediate Electric Vehicle Interview Questions

11. What is a Hybrid Electric Vehicle (HEV)?

Hybrid Electric Vehicles (HEVs) are run by an I.C. (internal combustion) engine in coexistence with electric motors, which receive power from electric batteries.

HEVs have great fuel efficiency, power, and range compared to traditional vehicles.

12. What do you mean by electric vehicle engine?

The standard gasoline engine is replaced by an electric motor that is powered by electricity stored in rechargeable batteries.

A gasoline engine resembles a plumbing process with fuel, whereas an electric vehicle resembles a cabling operation with an electric motor.

13. What is a Plug-i Hybrid Electric Vehicle (PHEV)?

Plug-in Hybrid Electric Vehicles are run by both I.C.(Internal Combustion) engines and use batteries to power up the electric motor. The vehicle will operate on electricity untill the power ends, and next it switches to ICE power.

14. What Sort of electric motors are used in Electric Vehicles?

The following are the most common motors used in Electric Vehicles by various manufacturers:

- The Induction Motor

- Brushless DC
- Permanent Magnet Synchronous Motor

15. Why are lithium-ion batteries used in Electric Vehicles?

Lithium-ion batteries are now used in the majority of EVs or electric automobiles due to their greater energy per unit mass when compared to alternative electrical energy storage systems.

They also have a higher power-to-weight ratio, appropriate high-temperature performance, higher energy efficiency, and reduced self-discharge.

16. What is an electric vehicle's battery management system?

The BMS, or Battery Management System, plays a crucial role in Electric Vehicles. A BMS is required to monitor and maintain the battery pack for appropriate usage. The key responsibilities of BMS are as follows:

- Cell balancing is the process of balancing the Soc and voltage of each cell.
- The battery pack is protected against overcurrent, overvoltage, and Undervoltage circumstances.
- Monitoring the temperature and isolating the BMS if it rises beyond a certain threshold.
- Monitoring current, voltage, SoC (state of charge), and SoH (state of health) (state of health).
- Effective charging and discharging.

17. Why are Electric Vehicles more expensive than fuel engines?

While Electric Vehicles have more moving components than diesel or gasoline vehicles, lithium-ion batteries are the most expensive component.

The lithium-ion battery pack accounts for more than half of the vehicle's cost. Replacing or repairing batteries is costly, which is one of the reasons insurance payouts are greater.

18. Do Electric Vehicles harm the environment?

No, EVs often achieve MPGe (miles per gallon of gasoline-equivalent), and electric motors are more efficient than the finest engines, which means less energy is wasted (exhaust and heat) and more energy is utilized to propel the vehicle.

19. However, some EVs still emit emissions, right?

In a way, yes. Pure Electric Vehicles (EVs) only produce pollutants when charged from an unsustainable power source. And, sure, Electric Vehicles emit more pollution during production than gasoline-powered vehicles due to the use of mined minerals and other manufacturing concerns.

20. What type of motor control approach will be used in EVs?

At present, BLDC, induction, and Permanent Magnet Synchronous Motors (PMSM) are particularly common for electric cars, with Direct Torque Control (DTC) and Field-Oriented Control (FOC) techniques being utilized.

Advanced Electric Vehicle Interview Questions

21. How long will it take to charge the EV battery pack?

The main problem is that charging EVs is time-consuming. While drivers nowadays are accustomed to filling their gas tank or fuel tank in five minutes or less, EVs, depending on the scope and specifications of the battery, often take at least 30-40 minutes to charge to 80 percent at the fastest charging stations available.

Still, some research is being conducted on fast-charging stations and solar EVs.

22. What is the C rating of the battery in the Electric Vehicle?

A C-rate is a measurement of how quickly a battery may be depleted of its full capacity. A 1C rate means that the discharged current will completely deplete the battery in one hour.

This corresponds to a discharge of 100 Amps of electricity for a battery with a capacity of 100 Ah.

This battery has a 5C rate of 500 Amps and a C/2 rate of 50 Amps. Similarly, an E-rate reflects discharge power. A 1E rate is the discharge power required to completely drain a battery in one hour.

23. What are DTC and FOC in EVs?

Direct torque control (DTC) is a method used in variable-frequency drives to regulate the torque (and hence, eventually, the speed) of motors such as BLDC, PMSM, induction motors, and so on. This involves estimating the motor's torque and magnetic flux based on the motor's recorded current and voltage.

Field-Oriented Control (FOC), also known as vector control, is an approach for dealing with AC Induction Motors (ACIM) and Permanent Magnet Synchronous Motors (PMSM). Field-Oriented Control (FOC) provides effective management of maximum torque and speed ranges.

24. What exactly is cell balance and why is it necessary?

To maintain battery performance throughout a long service life in a large-format battery system, a charge-balancing strategy is usually necessary to account for variances in cell performance. An effective cell balancing system maintains the intended amount of battery output with an appropriate safety margin throughout the battery's life without adding excessive expense, weight, or complexity.

Balancing is the process of equalizing the charge level in lithium-ion batteries cell by cell. Cell balancing may be accomplished in two ways: active cell balancing and passive cell balancing.

25. What is an Electric Vehicle's pyro switch?

It is a high-voltage positive battery terminal fuse that explodes and permanently disconnects the electrical connection in the case of a vehicle accident or crash, preventing a short circuit or fire. At the same moment, the positive terminal of the battery is disconnected, causing the car to crash.

26. What exactly is an ECU in an Electric Vehicle?

In transportation technology, an Electronic Control Unit (ECU), sometimes known as an Electronic Control Module (ECM), is an embedded system that governs one or more electrical systems or subsystems of a vehicle.

An ECU receives data from various portions of the vehicle depending on its job. A door lock ECU takes input when a passenger hits the door lock/unlock button on a car door or a wireless key.

for example. Crash sensors and sensors that identify when someone is sitting in a certain seat would supply information to an airbag ECU. Furthermore, forward-facing radars that identify when the vehicle is approaching a barrier too rapidly would provide information to an automated emergency braking ECU.

27. How far can a normal EV go when it's fully charged?

Currently, Electric Vehicles go roughly 250 miles on a charge, while certain Electric Vehicles, such as Teslas, can travel over 350 miles on a full charge. Several automakers have announced strategies to increase demand for Electric Vehicles that promise more range and faster charging.

Tata Motors has just introduced the Nexon EV Max, a revamped long-range configuration of the Nexon EV. It is available in XZ+ and XZ+ Lux models and has a licensed maximum driving range of 437 kilometers.

28. Is it true that all-Electric Vehicles use the same charger?

No, similar to how rival VHS and Betamax formats fought for dominance in the home video cassette market in the 1970s and 1980s, electric car charging outlets are presently available in a variety of shapes and sizes.

Because EVs are still in their early stages, what's popular now may be obsolete in the future. Far from being a universal one-size-fits-all solution, there are three separate charging levels as well as four competing plug standards, the majority of which are incompatible with one another.

29. Do Electric Vehicles consume gasoline?

No, because strictly EVs lack an Internal Combustion Engine (ICE), they also lack a fuel tank, hence no gas is required.

30. Can solar panels be used to charge an Electric Vehicle?

Yes, but the viability of charging an EV with solar panels is dependent on a variety of parameters, including average daily sunshine and solar panel configuration.

A house rooftop solar panel arrangement with proper charging equipment is one alternative for individuals who have enough sunshine and are ready to make the initial expenditure.

Unfortunately, solar panels do not currently provide enough energy to be put on an EV and used to charge it continually.

31. How can you determine how much battery power you still have?

An EV, like a fuel gauge warning light, will inform you how much charge is remaining on its battery and will alert you long before the next charge is required. Many EVs also have applications that may keep you aware of charging levels even when you're not near your vehicle.

32. How much time does it take an EV to charge?

This is determined by the type of charging station you use, the amount of your EV's battery, and how much you drive.

Regardless of the charging station, the maximum amount of electricity that an EV battery can handle always limits the rate at which it charges.

An EV with a 350 kW charger will charge faster at a DC fast charging station than a car with a 50 kW charger.

33. Don't EV batteries degrade quite quickly?

Actually, no, not anymore.

In fact, some electric car batteries are guaranteed to last up to ten years or 150,000 miles.

In laboratory tests, the most recent battery technology has pushed 300,000 kilometers. That's more than two decades of (usually) emission-free riding.

34. Are Electric Vehicles superior to conventional ones?

Despite popular belief, Electric Vehicles frequently outperform gasoline vehicles in a variety of ways.

While EV performance varies by make and model, all EVs benefit from drivetrains that are relatively basic in comparison to fuel-powered cars.

Furthermore, because EVs use battery-powered motors rather than gas-powered engines, they are substantially quieter in operation.

35. What is Nuclear Diamond Battery?

The nuclear diamond battery concept was presented by the University of Bristol Cabot Institute during its annual lecture on November 25, 2016; at the Wills Memorial Building.

This battery is designed to create modest quantities of power for thousands of years by utilizing the radioactivity of scrap graphite blocks (formerly used as neutron moderator material in graphite-moderated reactors).

The battery is a betavoltaic cell that uses diamond-like carbon (DLC) to store carbon-14 (14C) and create the requisite semiconductor junction. Additional normal-carbon DLC is used to produce the semiconductor junction.

36. How long can a Nuclear Diamond Battery Last?

The Nuclear Diamond Battery is said to be capable of lasting up to 28,000 years and uses nuclear waste as its primary power source and diamonds as its primary heat-conducting material.

37. What are the Drawbacks of lithium-ion batteries?

The downsides of Lithium Ion Batteries are as follows::

- It is susceptible to high temperatures.
- When a battery is entirely depleted, it cannot be recharged.
- It costs a fair amount of money.
- If the “separator” is damaged, it might catch fire.

38. Working Principle of Lithium-ion Batteries?

Lithium-ion Batteries are part of a class of batteries that transform chemical energy into electrical energy through redox processes on the active components, such as the negative (anode) and positive electrodes (cathode), in one or more electrically linked electrochemical cells.

Depending on whether or not Lithium-ion Batteries can be recharged using an electric current, they can be further classified as primary (non-rechargeable) and secondary (rechargeable) batteries.

According to the “rocking chair” concept, Li-ions are transferred between the positive electrode, which is typically made of layered transition metal oxide, and a negative electrode made of graphite in traditional lithium-ion batteries.

Step 1: The positive electrode substance contains Li-ions at the time of discharge. As a result, the positive electrode provides the Li* ions required for the conversion of electrical energy to chemical energy.

The electrolyte is additionally enriched with Li-ions to allow Li-ions to migrate from the positive electrode to the negative electrode.

Step 2: Beginning with the initial charging phase, electrons go from the positive electrode material (oxidation) into the negative electrode material through an external conductor (reduction).

Li-ions migrate through the electrolyte to the negative electrode material for later storage after the deintercalation of the positive electrode material into the electrolyte to guarantee charge neutrality.

At the interfaces between the electrolyte and the negative electrode surface and the positive electrode surface, respectively, boundary phases known as the SEI and CEI are created as a result of these processes.

These interphases are formed by the insoluble electrochemically induced breakdown products of electrolyte components and Li-ions emerging from the positive electrode and allowing the battery to be cycled reversibly.

More Li-ions de-intercalate from the positive electrode material into the electrolyte following the creation of the SEI and CEI, and they then migrate through it to the negative electrode material where they are subsequently absorbed into the latter.

Step 3: Additional Li* ions de-penetrate deep from the positive electrode material into the electrolyte following the development of the SEI and CEI, and they then migrate through it to the negative electrode material where they are subsequently absorbed into the latter.

Positive electrode:

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LIMO2 → Li̇(1−x)MO2 + x·e¯ + x·Li*
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Negative electrode:

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C6+ xe¯ + x·Li* → LixC6
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Overall cell reaction:

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C6+ LIMO2 → Li,C6 + Li(1-x) MO₂
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Step 4: It changes color from black to red (early SOC) to gold (100% SOC) based on the quantity of Li-ions contained in the negative electrode (depending on the state of charge, SOC).

Step 5: The opposite reactions are occurring during discharge. The electrode responses are as follows:

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Positive electrode = "cathode" (reduction)
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Li(1-x)
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MO2 + x·e¯ + x·Li* → LIMO₂
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Negative electrode = “anode” (oxidation)

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LixC6 → C6+ xe¯ + x·Li*
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Step 6: The Li-ions are returned to the positive electrode material they originally came from after discharge (SOC 0%). The “rocking chair principle” got its name because the way Li-ions rock back and forth is similar to how a rocking chair rocks.

Li-ion loss in the SEI and CEI as well as the negative electrode material is irreversible, especially during the first cycle (charge and discharge). As a result, fewer Li*-ions may now be stored in the negative electrode during the subsequent charge cycle, which lowers the battery’s capacity.

39. Are Electric Vehicles greener?

The answer is yes, but it will be a while before they reach their full environmental potential.

The majority of experts concur that, throughout their lifespan, Electric Vehicles leave a smaller carbon footprint than automobiles and trucks powered by conventional internal combustion engines.

Electric Vehicles (EVs) rely on this energy to be charged because the majority of the world's electricity systems are still run on fossil fuels like coal or oil. Separately, making EV batteries is still an energy-consuming procedure.

40. Why do Electric Vehicles slow down in snowy areas?

When it comes to transferring electrons into a battery, cold weather is detrimental in two ways. It restricts regenerative braking, so the automobile recovers less power and drivers are unable to drive on one pedal.

Furthermore, charging, particularly quick charging, will be restricted to safeguard the battery. Experienced EV drivers are used to these peculiarities, but forums reveal that new EV purchasers are still having difficulty with them.

Modern vehicles are built with battery temperature management devices that warm or cool the battery.

However, since an internal combustion engine creates its heat, which heats the engine and the passengers, an Electric Vehicle must find warmth somewhere, either by scavenging the limited amount of heat produced by motors and inverters or by using a heater.

41. Do Electric Vehicles have alternators?

No, an Electric Vehicle does not require an alternator to convert mechanical energy to electricity, as a gasoline-powered vehicle does.

In an EV, however, a basic DC-DC converter serves its purpose.

42. Compared to Electric Vehicles, how much does a gasoline-powered car emit emissions on average during the same drive?

However, when driving along the road, EVs emit no pollutants, whereas gasoline-powered automobiles can produce 6 tonnes of pollution during the same drive.

43. Name some hybrid Electric Vehicle models.

- Toyota Camry Hybrid
- Honda Accord Hybrid
- Mahindra e2o Plus
- Volvo XC90 T8 Hybrid
- Mahindra eVerito

44. Explain the market percentage of Electric Vehicles in India.

The Indian Electric Vehicle market was estimated to be worth USD 7,005.56 million in 2021, and by 2026, it is anticipated to have grown to be worth USD 30,414.83 million, showing a CAGR report of 29.93% in terms of revenue (2022–2026).

Salary Trends

Professionals in the electric vehicle (EV) sector witness a rising global salary trend, hitting an average of $107,000 with an hourly wage of $52 in the US. It has been noted that the average salary, according to 6figr.com, High-voltage engineers earn

17.5 LPA. The top 10% of employees are mostly earning more than 22.2 LPA in India.

Experience	Average Salary in India	Average Salary in the USA
0 to 9 years	13 LPA – 17LPA	$150,000
High Voltage Engineer	17 LPA – 47.1LPA	$125,000

These trends reflect the sector's growth, rewarding expertise and innovation in the dynamic Electric Vehicle industry.

Roles and Responsibilities

Job	Responsibilities
Embedded Systems Engineer	They are responsible for developing the embedded software and control systems in the EV mechanism, including the electrical vehicle management systems, motor control algorithms, and battery management system.
Manufacturing Engineer	Responsible for planning and optimizing manufacturing processes for EV components and assemblies.
Battery Engineer	Responsible for researching battery technologies for EV components.

R & D Scientist	Responsible for innovating and researching the pre-existing EV technologies, materials and processes.

According to Hero MotoCorp Ltd., the responsibilities of a CATIA engineer for EV are:

- Manage PLM releases and 2D and 3D drawings.
- Providing support to the electronic design team
- Specializing in the design of electronic components.
- Providing support for prototype activities.
- Manage complete packaging, functional, and technical designs.

Job Trends

According to Financial Express, we expect about 30% of cars, 70% of commercial vehicles, and 80% of two- and three-wheelers to be electric by 2030.

- Global Demand: LinkedIn has listed 17000+ jobs in EV.
- Regional Trends: According to LinkedIn, in India, there are over 660 jobs in the EV domain.
- Projected Growth: The electric vehicle market will account for 62% to 86% of sales globally by 2030. Whereas alone, China is expected to reach 90% by 2030.

Conclusion

I hope reviewing these commonly asked EV interview questions gives you a solid foundation to prepare and build confidence. Intellipaat offers a well-rounded EV Course in collaboration with IIT Roorkee.

Reach out to members of Intellipaat's Community to further prepare and get helpful tips and insights. Best of luck for your interview!