Question on 5th Unit

1. Explain the concept of connected mobility and its significance in the context of modern transportation systems. Provide examples of how connected mobility is reshaping the automotive industry.
2. Analyze the Indian roadmap for Emobility, highlighting key milestones, challenges, and opportunities. How does this roadmap align with global trends in electric vehicle adoption?
3. Discuss the policy framework surrounding electric vehicles (EVs) in India, focusing on their integration into the infrastructure system. What measures are being taken to incentivize EV adoption and address infrastructure gaps?
4. Evaluate the role of EVs in the smart grid ecosystem. How do electric vehicles contribute to energy efficiency, demand management, and renewable energy integration within smart grid networks?
5. Compare and contrast different types of EV charging connectors used globally. What factors influence the choice of charging connector standards in different regions?
6. Discuss the challenges associated with standardizing EV charging infrastructure in India. What strategies can be implemented to overcome interoperability issues and ensure seamless charging experiences for EV owners?
7. Evaluate the environmental benefits of electric mobility compared to conventional gasoline vehicles. How do factors such as lifecycle emissions, energy efficiency, and resource depletion contribute to the sustainability of electric transportation?

Questions on 4th Unit

8. Explain the significance of energy management strategies in electric vehicles (EVs). Discuss the role of energy management systems in optimizing battery performance, range, and overall vehicle efficiency.
9. Compare and contrast different EV charging standards, highlighting their technical specifications and compatibility with existing infrastructure. What factors influence the adoption of specific charging standards in different regions?
10. Analyze the concept of Vehicle-to-Grid (V2G) technology and its potential impact on the energy grid. How can V2G systems enable bi-directional energy flow between electric vehicles and the grid, contributing to grid stability and renewable energy integration?
11. Discuss the concepts of Grid-to-Vehicle (G2V), Vehicle-to-Business (V2B), and Vehicle-to-Home (V2H) in the context of electric mobility. How do these concepts enable dynamic energy management and support grid balancing initiatives?
12. Evaluate the business opportunities and challenges in the e-mobility sector. What are the key factors influencing the growth of e-mobility businesses, and how can stakeholders navigate challenges such as infrastructure investment and market competition?
13. Examine the electrification challenges faced by traditional automotive manufacturers in transitioning towards electric mobility. How can legacy automakers overcome hurdles such as technology adoption, supply chain transformation, and consumer acceptance?
14. Explore the role of e-mobility business models in accelerating the transition to electric transportation. What innovative business models are emerging to address consumer needs, promote sustainability, and drive market growth?

15. Assess the regulatory landscape governing electric mobility businesses and infrastructure development. How do government policies and incentives impact the deployment of EV charging infrastructure and the adoption of electric vehicles?

Questions on 3rd Unit

16. Define battery capacity and discuss its significance in determining the energy storage capability of a battery.
17. Explain the concept of battery voltage and how it relates to the electrical potential difference within a battery cell.
18. Compare and contrast the energy density and power density of batteries, highlighting their respective roles in different applications.
19. Discuss the factors influencing the self-discharge rate of batteries and how it impacts their performance over time.
20. Describe the relationship between battery temperature and performance, including the effects of temperature on capacity and lifespan.
21. Explain the importance of battery cycle life and how it influences the durability and cost-effectiveness of battery systems.
22. Analyze the impact of depth of discharge (DOD) and SoC on battery lifespan and overall performance.
23. Discuss the significance of battery efficiency and how it is measured in terms of the ratio between input and output energy.
24. Explore the concept of battery safety features and their role in preventing overcharging, short circuits, and thermal runaway.
25. Discuss the significance of energy storage in hybrid and electric vehicles (EVs). Explain how energy storage systems enable vehicle electrification and enhance performance and efficiency.
26. Compare and contrast battery-based energy storage systems used in hybrid and electric vehicles. Analyze the key characteristics, such as energy density, power density, and cycle life, of different battery chemistries.
27. Evaluate the role of fuel cell-based energy storage in electric vehicles. How do fuel cells function as an alternative to traditional battery systems, and what are the advantages and limitations of fuel cell technology?
28. Examine the performance metrics used to analyze battery-based energy storage systems in hybrid and electric vehicles. What parameters are essential for evaluating battery performance, reliability, and safety?
29. Investigate the principles of hybridization involving different energy storage devices in electric vehicles. How can combining multiple energy storage technologies optimize vehicle efficiency, range, and power delivery?

Questions on 2nd Unit

30. Explain the role of electric motors in electric vehicles (EVs) and how they differ from traditional internal combustion engines.
31. Compare and contrast different types of electric motors commonly used in EVs, such as brushed DC motors, brushless DC motors, and induction motors.
32. Discuss the advantages and disadvantages of each type of electric motor in terms of efficiency, power output, and cost-effectiveness for EV applications.

33. Describe the operation of a brushless DC motor used in electric vehicles, including its main components and working principles.
34. Explain the significance of motor efficiency in electric vehicles and how it impacts factors such as range, acceleration, and overall performance.
35. Analyze the role of motor controllers in electric vehicles and their importance in regulating motor speed, torque, and energy consumption.
36. Discuss the impact of advancements in motor design and materials on the performance and efficiency of electric vehicles.
37. Evaluate the potential challenges and limitations associated with electric vehicle motors, such as overheating, maintenance, and reliability.

Questions on 1st Unit

38. Define a conventional vehicle and highlight its key components. How does it differ from other types of vehicles?
39. Explain the concept of Hybrid Electric Vehicles (HEVs) and discuss their significance in the automotive industry.
40. Compare and contrast different types of Electric Vehicles (EVs), highlighting their respective advantages and limitations.
41. Describe the hybrid electric drivetrain architecture, emphasizing its components and their functions in vehicle propulsion.
42. Discuss the role of regenerative braking in hybrid electric vehicles. How does it contribute to energy efficiency?
43. Explain the concept of tractive effort in normal driving conditions. How does it influence the performance of hybrid electric vehicles?
44. Analyze the impact of hybridization on fuel efficiency and emissions reduction in comparison to conventional vehicles.
45. Evaluate the potential challenges and barriers associated with the widespread adoption of hybrid electric vehicles in the global automotive market.
46. Discuss recent advancements in hybrid electric vehicle technology and their implications for future transportation systems.