

Register No.: ..... Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (S), FEBRUARY 2024****(2020 SCHEME)****Course Code: 20EET443****Course Name: Electric Vehicles****Max. Marks: 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Explain different electric vehicle configurations based on power source configuration.
2. Draw and explain the power plant characteristics for a hybrid electric vehicle.
3. With neat diagram, explain the concept of hybrid electric vehicle drive train.
4. Differentiate between inner rotor drive and outer rotor drive system.
5. Discuss about different motors used in electric vehicles.
6. Explain with neat sketch the electric components used in an electric vehicle drive system.
7. Differentiate between SOC and DOD.
8. Classify the energy storage technologies classified based on the type of energy.
9. Interpret the functions of energy management strategies used in electric vehicles.
10. Explain the significance of in-vehicle communication

**PART B*****(Answer one full question from each module, each question carries 14marks)*****MODULE I**

11. Derive the mathematical model to describe the vehicle dynamics equation considering all the forces acting upon it. (14)

**OR**

12. a) Describe the socio-economic importance of electric vehicle. (7)  
b) Describe the electric vehicle transmission characteristics. (7)

**MODULE II**

13. Discuss about various hybrid electric vehicle drive train topologies and its modes of operation. (14)

**OR**

14. a) Differentiate between speed coupling and torque coupling (4)  
b) Explain different modes of power flow control in series-parallel hybrid drive system. (10)

**MODULE III**

15. Explain with neat sketches different speed control techniques in DC motor which are used in electric traction. (14)

**OR**

16. a) Explain the various motor types employed in electric vehicles, highlighting their distinctive features. (10)  
b) List the speed control techniques for induction motors. (4)

**MODULE IV**

17. a) Explain Lithium ion battery technology. Discuss about its advantages, disadvantages and applications. (7)  
b) Explain fuel cell battery technology. Discuss about its advantages, disadvantages and applications. (7)

**OR**

18. a) Elaborate the concept of hybridization of different energy storage devices. (7)  
b) Explain super capacitor energy storage technology. Discuss about its advantages, disadvantages and applications. (7)

**MODULE V**

19. Discuss about the BMS used in electric vehicles with neat sketches. (14)

**OR**

20. a) Discuss about different energy management strategies used in electric vehicles. (7)  
b) Explain the CAN bus protocol system in-vehicle communication. (7)

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