



- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. a) Discuss Hybrid Electric Vehicle in detail. **8**
b) State function of rolling resistance coefficient and Explain rolling resistance in detail. **8**
OR
2. a) Explain the need of gear box in conventional ICE based vehicles. **8**
b) Derive an equation for Vehicle speed. **8**
3. a) State requirements of energy storage system. And Explain operating principle of Flywheel based energy storage system. **8**
b) Explain methods of selection of energy storage technology for Hybrid Electric Vehicles. **8**
OR
4. a) Explain hybridization of energy sources of Hybrid and Electric Vehicles. **8**
b) Explain hybridization of drive trains in HEVs. **8**
5. a) Describe software architecture of Battery Management System. **8**
b) Explain in detail functionalities of BMS. **8**
OR
6. a) Describe BMS for large scale (stationary) energy storage. **8**
b) Discuss environmental and technical efficiency impact of Battery Management System. **8**
7. a) Describe energy use pattern in conventional vehicles. **8**
b) Describe modes and configuration of drive trains used in HEVs. **8**
OR
8. a) Discuss General configuration of Electric Vehicles. **8**
b) State requirements of electric motors used in Electric Vehicles. **8**
9. a) Discuss speed control of BLDC motor for Electric Vehicles. **8**
b) State brake system used in EVs and HEVs and explain any one method in detail. **8**
OR
10. a) State operating principle and discuss Switched Reluctance drive in detail. **8**
b) Explain in detail vehicle tracking through GPS. **8**
