Exam.Code:0937
Sub. Code: 33784

2124

B.E. (Electrical and Electronics Engineering)
Seventh Semester
PE-EE-702: Electrical and Hybrid Vehicles

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

a) Explain the importance of torque and power curves in characterizing vehicle power sources.

b) What are the main factors that influence the fuel efficiency of a hybrid vehicle?

c) Explain why field oriented control is preferred for high-performance applications?

d) Describe the key challenges in implementing fuel cell technology in EVs.

e) Discuss the tradeoffs between centralized and decentralized energy management system in HEVs. (5x2)

UNIT - I

II. a) What are the traction motor characteristics of electric vehicle? Explain briefly.

b) What is series and parallel hybrid electric drive train and explain with neat sketch. (2x5)

III. a) Explain the combined armature and field control method for DC motor drives.

b) Discuss the configuration and operation of permanent magnet synchronous motor (PMSMs) in electric vehicles. (2x5)

IV. a) A vehicle with power plants power output at the drive train considering all losses is 100kW. The maximum total resistance the vehicle experiences is 3.6 kN. Calculate the velocity the vehicle can achieve in km/h under this condition.

b) Discuss the control strategies in switched reluctance motors (SRMs). (2x5)

P.T.O.

UNIT - II

V. Explain the Amp-hr measurement and direct measurement in SOC in battery. Also discuss the importance of energy density, power density and cycle life in selecting an energy storage system for EVs. (10)

VI. a) Explain the concept of operation principles of flywheels.

b) Explain the concept of hybridizing energy storage devices in EVs. How does combining batteries, super capacitors and fuel cells benefits the vehicle's performance. (2x5)

VII. a) Explain the importance of energy management in a battery Electric Vehicle. How does battery capacity impact vehicle range, cost and weight?

b) An HEV with an ICE has a fuel consumption rate of 0.2 litres per kilometer when using only the ICE at 50kM. If an energy management strategy uses the electric motor to provide 20% of the required power during acceleration phases. Calculate the expected reduction in fuel consumption over a 100km drive. (2x5)

x-x-x