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2022/22

2021

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B.Tech. 7th Semester End-Term Examination

EE

ELECTRICAL AND HYBRID VEHICLES

New Regulation (w.e.f. 2017-18) &

New Syllabus (w.e.f. 2018-19)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer the following.

1. (a) Write down the general descriptions of vehicle movement with special emphasis on Rolling Resistance, Aero-dynamic Drag and Grading Resistance. Also write the dynamic equations of vehicle movement. (20)

Or

- (b) Write a brief note about the different electric motors used in Hybrid Electric Vehicles. Also write a brief note on the history of Hybrid Electric Vehicle. (20)
2. Describe briefly about the energy management strategies in Hybrid Electric Vehicle. (10)
3. Find the approximate rating of an Electric Vehicle Power Train with a vehicle weight of 1400 kg. Determine the forces needed to accelerate at 4.81 m/s^2 , assuming that aero-dynamic drag, rolling resistance and hill climbing force accounts for an extra 10% of the needed acceleration force. Time required for the vehicle to accelerate from 0 to 96.5 km/h is 6 sec. (10)

[Turn over

4. Write short notes on (any four) :

(5 × 4 = 20)

- (a) Fuel Cell
- (b) Fly Wheel
- (c) Lithium Ion Battery Pack
- (d) Super Capacitor
- (e) Energy Storage Requirement in Hybrid Electric Vehicle
- (f) Electric Traction

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5. (a) Compute the energy required in bringing a 1450 kg vehicle to a halt from a speed of 60 miles per hour in 10 seconds. Also calculate the energy that can be recovered (Regenerative Braking) assuming the average speed of the vehicle to be 30 miles per hour while travelling a distance of 440 ft in 10 seconds. Assume an average drag force of 100 lbf. (10)

Or

(b) Describe briefly about Battery Electric Vehicle. (10)