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10AU841

Eighth Semester B.E. Degree Examination, Aug./Sept. 2020
Hybrid Vehicles

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. With a neat sketch and example explain the typical fuel economy characteristics of gasoline engine. (10 Marks)
- b. If you are planning to purchase a vehicle of gasoline engine powdered with four gears. How would you do its performance characteristic analysis? (10 Marks)
- 2 a. Explain in brief the PM Synchronous motors with a neat sketch. (10 Marks)
- b. Considering the EVs and HEVs, explain with equations the basic criteria to initialize the design process of SRM (Switched Reluctance Motor). (10 Marks)
- 3 a. Explain series DC motor with an equivalent circuit. (10 Marks)
- b. With a block diagram, explain the torque control of the BLDC motor. (10 Marks)
- 4 a. With a neat sketch, explain the architecture of switchable series – parallel hybrid power train. (10 Marks)
- b. Suggest a transmission configuration of single shaft torque combination of wild hybrid drive train. With a neat sketch, justify your answer. (10 Marks)

PART – B

- 5 a. Explain the electrical burden and customer usage requirements of the hybrid power plant. (10 Marks)
- b. Analyse and explain the importance to implement active brake controls on rear wheel drive versus front wheel drive HV when regenerative braking is employed. Explain in brief the parallel RBS. (10 Marks)
- 6 a. With a schematic, explain the operation of Wilson type stepped automatic transmission. (10 Marks)
- b. With a neat sketch, explain the epicyclic gear set with its governing equation and input / output relationship. (10 Marks)
- 7 a. Explain and compare lithium – polymer to lead acid battery, considering attributes like power (w/kg) at 50% SOC, W/ltr at 50% SOC, Energy (Wh/kg) at 2h rate and Wh/ltr at 2h rate. (10 Marks)
- b. Compare and explain the following types of Evs and Hvs batteries for vehicle propulsion considering its specific power, specific energy and DOD.
(i) VRLA (ii) TMF (iii) NiMH (iv) Lithium ion (v) Li-Pol (10 Marks)
- 8 a. With anode and cathode chemical reaction in DMFC, explain why methanol can be directly used as fuel cell for vehicle application. (10 Marks)
- b. Explain the causes and effect of the, (i) gyroscopic forces (ii) damages, problems in the flywheel. Suggest simplest way to reduce them. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.