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10AU841

Eighth Semester B.E. Degree Examination, Jan./Feb.2021
Hybrid Vehicles

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Enlist the factors that describe the vehicle performance. Explain any two. **(10 Marks)**

b. How do you compute vehicle fuel economy? Explain. **(10 Marks)**

2 a. With suitable graph, explain Torque – Speed characteristics of Switched Reluctance Motor. **(06 Marks)**

b. List out the advantages and disadvantages of Switched Reluctance Motor (SRM). **(04 Marks)**

c. The phase voltage magnitude of Three phase AC machines at time $W_t = 0$ are $V_a = 240V$, $V_b = -120V$ and $V_c = -120$. Calculate the resulting space vector voltage. Also recalculate the space vector at different time when Va = 207.8V, $V_b = 0V$ and $V_c = -207.8V$. Plot the space vector distribution in the air gap in the above two cases. **(10 Marks)**

3 a. Explain the construction and working of a induction motor with torque-speed characteristics. **(10 Marks)**

b. Write a short note on:
(i) Induction machines advantages and disadvantages.
(ii) Regenerative braking. **(10 Marks)**

4 a. Explain the configuration of series hybrid electric drive train with a block diagram. **(10 Marks)**

b. What are the operating modes and control strategy of parallel mild hybrid electric drive train? Explain with a sketch. **(10 Marks)**

PART – B

5 a. With suitable graph, explain the series and parallel RBS (Regenerative Braking System). **(10 Marks)**

b. Explain the different data required to assess the performance of Hybrid vehicles. **(10 Marks)**

6 a. Explain the epicyclic gear set used in matching. The electric drive and IC engines with sketches. **(10 Marks)**

b. Briefly discuss the sizing the power electronics. **(10 Marks)**

7 a. Explain the cell construction and working of a lead acid buttery with a neat sketch. **(10 Marks)**

b. Explain labium-ion buttery used in hybrid vehicles with sketches. **(10 Marks)**

8 a. List out the types of Fuel cells available and also mention the Fuel and Electrolyte used in Fuel cells. **(06 Marks)**

b. Briefly explain the following :
i) Hydrogen storage system ii) Reforms. **(06 Marks)**

c. With block diagram, explain Fuel cell based electric vehicle. **(08 Marks)**

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