

610608

Roll No. _____

Total No. of Pages: 2

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B. Tech. VI - Sem. (Main) Exam., (Academic Session 2021- 2022)

Electrical Engineering

6EE5 – 13 Electrical and Hybrid Vehicles

Time: 2½ Hours

Maximum Marks: 120

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 6×3 marks = 18 marks.
Candidates have to answer six questions out of ten.

Part – B: Analytical/Problem solving questions 3×10 marks = 30 marks.
Candidates have to answer three questions out of seven.

Part – C: Descriptive/Analytical/Problem Solving questions 3×24 marks = 72 marks.
Candidates have to answer three questions out of five.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART – A

- ~~Q.1~~ What are the advantages of electric vehicles?
~~Q.2~~ Name the energy storage devices used in hybrid vehicles.
Q.3 Why hybrid electric vehicles?
Q.4 What do you mean by sizing the propulsion motor?
~~Q.5~~ Why energy management strategies required in electric vehicles?
Q.6 Explain the drive system efficiency in brief.
~~Q.7~~ What are the forces required to move the vehicle?
Q.8 Show the hybrid electric vehicle drive train in block diagram.

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- Q.9 What are the implementation issues of energy management strategies?
Q.10 What are the factors that should be used in selection of energy storage devices?

PART – B

- Q.1 Explain in detail, the electric propulsion systems used in different kind of hybrid/battery vehicles.
Q.2 What are the energy storage technology used for hybrid/battery electric vehicles? Explain in brief.
Q.3 Explain the difference between conventional and hybrid electric vehicles with respect to energy used.
Q.4 Show the comparison of different energy management strategies used in hybrid electric vehicles.
Q.5 Explain the hybridization of different energy storage devices. Show one of them of your choice.
Q.6 Explain the matching of electric machine and internal combustion engine to make a hybrid drive train. Use suitable electric machine of your choice.
Q.7 Write short notes on -
(a) Fuel cells
(b) Super capacitors

PART – C

- Q.1 Explain the working and architecture of fly wheels. Also, explain their modeling for energy storage in hybrid/battery electric vehicles.
Q.2 Explain the basic architecture and concept of hybrid drive train. Also, state and analyze the series hybrid electric drive train in detail.
Q.3 Explain the following configuration and their operation modes in hybrid electric vehicles –
(a) Series configuration
(b) Parallel configuration
Q.4 Derive the required parameters for sizing the propulsion motor for drive train. Explain with one motor of your choice.
Q.5 How sizing the power electronics based on switch technology and switching frequency is used for design the hybrid/battery operated electric vehicles. Explain your answer with suitable example.