



B.Tech VII Semester Regular/Supplementary Examinations, November 2022

HYBRID ELECTRICAL VEHICLES

† Professional Elective

(Electrical and Electronics Engineering)

Maximum Marks: 70

Date: 03.12.2022 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define Skin friction.
- 2 Discuss the advantages and disadvantages of conventional vehicles.
- 3 Why don't electric cars use regenerative braking?
- 4 What are the various hybrid drive train topologies?
- 5 List the major advantages of Permanent Magnet motors.
- 6 What is meant by Field Oriented Control (FOC)?
- 7 What are the targets for a potential EV battery?
- 8 What is meant by specific energy?
- 9 Classify the hybrid Electronic Control Unit.
- 10 Why is an energy management control system required in an HEV?

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Describe the mathematical models to determine conventional vehicle performance. 10M
OR
- 12 Explain the followings:
i) Manual gear transmission 5M
ii) Hydrodynamic transmission. 5M
- 13 Explain the different modes of power flow control in a typical parallel hybrid system with block diagrams. 10M
OR
- 14 Discuss the followings:
i) impact of modern drive trains on energy supplies. 5M
ii) Social and environmental importance of hybrid and electric vehicles 5M
- 15 Draw six different configurations of drivetrains in electric vehicles. Briefly explain each configuration. 10M

OR

- 16 A. How do you measure the drive system efficiency. 3M
B. Comment on the suitability of DC and AC machines for electric and hybrid electric vehicle applications. 7M
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- 17 Explain fuel cell and flywheel as energy source elements in electric and hybrid electric vehicles. 10M
- OR
- 18 Explain the electrical and mechanical constraints to be considered while sizing an electrical machine for an Electric Vehicle. 10M
- 19 Elaborate the term "Energy Management System" and issues of Energy Management Strategies (EMS) in EHV. 10M
- OR
- 20 A. What are the advantages of fuzzy logic based energy management control strategy in electric hybrid vehicles. 6M
B. Write short notes on Battery Electric Vehicle (BEV). 4M