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Seventh Semester B.E. Degree Examination, June/July 2023 Introduction to Electrical Vehicles

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the need of electric drive. (06 Marks)
b. Explain the historical development of electric vehicles. (08 Marks)
c. Write the engineering philosophy of electric vehicle. (06 Marks)

OR

- 2 a. Write short notes on EV concept and key EV technologies. (10 Marks)
b. Briefly explain recent development and development trends in Electric Vehicle technology. (06 Marks)
c. Explain major issues of electric vehicles at present. (04 Marks)

Module-2

- 3 a. Explain the following terms :
(i) Conductors
(ii) Insulators.
(iii) Resistors
(iv) Relays.
(v) Capacitors
(vi) Solenoids (12 Marks)
b. Explain construction and working principle of DC motor with sketch. (08 Marks)

OR

- 4 a. With neat sketch, explain working of AC motor. (10 Marks)
b. Explain construction and working of DC generator with neat diagram. (10 Marks)

Module-3

- 5 a. Briefly explain the major components of battery operated electric vehicle with layout. (12 Marks)
b. What is the function of flywheel? Describe how energy is stored using a flywheel. (08 Marks)

OR

- 6 a. Explain regenerative braking and energy flow during starting, driving and braking. (12 Marks)
b. Discuss the basic diagnosis and precautions of the battery operated electric vehicle to carry out. (08 Marks)

Module-4

- 7 a. Explain the construction and working of lead acid battery with neat sketch. (10 Marks)
b. What are the battery parameters? Explain briefly. (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.

OR

- 8 a. Sketch and explain the working of Lithium Ion and nickel metal hydride battery. (12 Marks)
- b. Explain briefly the following methods of battery rating:
- (i) Cold Cranking Amps (CCA)
 - (ii) Cranking Amps (CA)
 - (iii) Watt-hour (Wh)
 - (iv) Ampere-hour (Ah)
- (08 Marks)

Module-5

- 9 a. With neat block diagram, explain fuel cell EV system. (10 Marks)
- b. With neat sketch, explain alkaline fuel cell, clearly stating the chemical reactions. (10 Marks)

OR

- 10 a. Write short notes on :
- (i) Proton exchange membrane fuel cell.
 - (ii) Solid oxide fuel cell.
- (10 Marks)
- b. Explain hydrogen storage systems and reformers. (06 Marks)
- c. Mention the challenges and solutions for hydrogen storage systems. (04 Marks)
