

# CBCS SCHEME

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## Sixth Semester B.E. Degree Examination, Feb./Mar. 2022 Electric Vehicles Technologies

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 concept of a modern electric drive train by illustrating with a neat functional diagram. (10 Marks)
- b. With a neat diagram, explain the different EV configuration due to the variation in electric propulsion characteristics and energy sources. (10 Marks)

OR

- 2 a. Explain the concept of a hybrid drive train and the different power flow routes. (10 Marks)
- b. Describe in detail the configuration of a series hybrid electric drive train with the neat block diagram and also state its advantages and disadvantages. (10 Marks)

### Module-2

- 3 a. Explain the basic principle of operation of electrochemical battery with chemical reaction equation ruling charging and discharging of it. (10 Marks)
- b. What are the various available battery technologies? Explain in detail about the lithium – Ion battery and Nickel-Metal-Hydrate battery technologies. (10 Marks)

OR

- 4 a. Explain the working principle of fuel cell. (05 Marks)
- b. Describe the terms state – of – charge and Depth of Discharge as applied to batteries. (05 Marks)
- c. List out Various parameters that are specified in batteries. Explain four of them in detail. (10 Marks)

### Module-3

- 5 a. Why chopper are used for the control of DC motor and explain with neat circuit diagram and waveform the principle of operation of a step down chopper. (10 Marks)
- b. Explain the Torque – slip characteristics of an induction motor with fixed stator frequency and voltage. (10 Marks)

OR

- 6 a. Explain with neat circuit diagram the construction of BLDC motor and classify the stator winding and PM motor. (10 Marks)
- b. With a neat block diagram, explain the conventional SRM drive system. (06 Marks)
- c. Classify the PMS currently used of electric motor and explain any one of them. (04 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.

**Module-4**

- 7 a. Define control strategy that is employed in a drive train. Name two different control strategies of drive train for vehicles. Explain any one of them. (10 Marks)
- b. Explain power capacity of PPS and Energy Capacity PPS (Peaking Power Sources). (10 Marks)

**OR**

- 8 a. With a neat block diagram, explain the drive train structure of the parallel hybrid vehicle. (10 Marks)
- b. Explain with block diagram the control scheme of the parallel torque coupling hybrid drive train. (10 Marks)

**Module-5**

- 9 a. List out the different charging method of battery and explain any two of them. (10 Marks)
- b. What are the different termination methods can be used to terminate the charging explain any two. (10 Marks)

**OR**

- 10 a. Explain the transformer less charger topology used and list out some of disadvantages. (10 Marks)
- b. With a neat correct diagram, explain the Non-isolated grid tied z-converter. (10 Marks)

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