PAPER ID-410423

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Subject Code: KEN071

Roll No: | | | | | | | | | | | | | |

B.TECH
(SEM VII) THEORY EXAMINATION 2021-22
ELECTRIC AND HYBRID VEHICLES

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. What is the impact of electric vehicles on environmental.
b. Explain the term grading resistance in vehicles.
c. What is the advantage of regenerative braking for battery operated vehicles?
d. Explain the term Continuously Variable Transmission (CVT)?
e. How can we improve the Vehicle Fuel Economy?
f. Draw fuel cell characteristics.
g. Write down chemical reaction equation for Lithium–Ion Battery.
h. Explain supporting subsystems of electric vehicle.
i. Why hybrid electric vehicles (HEV) require energy management strategies?
j. What are the various types of battery energy management strategies?

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Draw the typical torque vs speed envelope curves of drive train motors and show the continuous, intermittent and peak overload ratings
b. Draw and explain the block diagram of switched reluctance motor drive system.
c. Explain the basic principle of Super Capacitor based energy storage and also explain method to measure its performance.
d. Write a short node on matching electric drive & internal combustion engine.
e. Why an energy management control system is required in hybrid electric vehicles (HEV)? Do you think an elaborate energy management system similar to that applied to a hybrid vehicle, is required in an electric vehicle? Explain.

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

(a) Write a short note on fuel efficiency analysis in hybrid electric drive-trains.
(b) Draw the Configurations of Electric Vehicles of electric vehicle with the help of block diagram also explain Primary electric vehicle power train.

4. Attempt any *one* part of the following: **10 x 1 = 10**

(a) Explain the configuration and control of series hybrid electric drive used in Electric Propulsion unit.
(b) Explain in detail the Basic Principles of BLDC Motor Drives & Performance Analysis and Control of BLDC Machines..

5. Attempt any *one* part of the following: **10 x 1 = 10**

(a) Explain the following battery Parameter - Amp- hr, state-of-charge (SOC), cut off voltage, thermodynamic voltage, Specific Energy, Energy Efficiency.
(b) Explain the Operation Principles of Flywheels based energy storage and also draw torque and voltage profile vs. rotational speed curve.

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6. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Explain in detail the sizing the propulsion Motor &sizing the power electronics concept of power electronics in electric vehicles.

(b) What is the need of communication in an electric vehicle? Also describe Electric Vehicle (EV) charging management.

7. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Classify and Explain the different energy management strategies.

(b) What are technical issues occurs while implementing energy management strategies.