Printed Page:- 03 **Subject Code:- AMTME0222**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: II - THEORY EXAMINATION (2022-2023)

Subject: Hybrid Vehicle Technology

Time: 3 Hours **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **15**

1. Attempt all parts:-

1-a. Combination of cells is known as the battery. (CO1) 1

(a) TRUE

(b) FALSE

(c) sdsds

(d) fdsfdas

1-b. The alternators are normally designed for the torque angle of the order of (CO2) 1

(a) 3° to 5°

(b) 2 rad to 3 rad

(c) 15° to 30°

(d) 1° to 3°

1-c. The speed of an engine varies from 210 rad/s to 190 rad/s. During the cycle the change in kinetic energy is found to be 400 Nm. The inertia of the flywheel in kg/m2 is (CO3) 1

(a) 0.1

(b) 0.2

(c) 0.3

(d) 0.4

1-d. The electric machine is physically sized by its _____ specification. (CO4) 1

(a) force

(b) torque

(c) pressure

(d) wear

1-e. Energy consumption per unit of GDP is called as: (CO5) 1

(a) Energy Ratio

(b) Energy intensity

(c) Per capita consumption

(d) None

2. Attempt all parts:-

2.a. Define the term Under steer and over steer. (CO1) 2

2.b. Define dead weight, adhesive weight. (CO2) 2

2.c. Differentiate between constant current discharge approach and power density approach (CO3) 2

2.d. What is coefficient of rolling resistance? (CO4) 2

2.e. What is the need for energy management? (CO5) 2

SECTION B **20**

3. Answer any <u>five</u> of the following:-

3-a. What types of resistances are offered to a vehicle? Explain with diagram. (CO1) 4

3-b. Classify an automobile based on transmission system and wheel drive system. (CO1) 4

3-c. Why does curving the pole faces in a DC machines contributes to a smoother DC output voltage from it? (CO2) 4

3-d. What are the advantages of electric traction? (CO2) 4

3.e. Describe the solid oxide fuel cell. (CO3) 4

3.f. Name and explain the two main components of an Electro Hydraulic Brakes (EHB). (CO4) 4

3.g. Explain the benefits of EMS? (CO5) 4

SECTION C **35**

.

4. Answer any <u>one</u> of the following:-

4-a.	Why a gear system is needed for an ICE? Explain with relevant characteristic curves. (CO1)	7
4-b.	With the help of proper diagram explain Micro Hybrid Electric Vehicles. (CO1)	7

5. Answer any <u>one</u> of the following:-

5-a.	Explain contols in motors. Factor that has to be considered while choosing the resistor? (CO2)	7
5-b.	Explain the working principle of 3 phase motor. With what material the rotor of 3 phase motor is made? (CO2)	7

6. Answer any <u>one</u> of the following:-

6-a.	Explain in detail the operational principle of Flywheel. (CO3)	7
6-b.	Explain in detail the Hybrid Flywheel ESS. (CO3)	7

7. Answer any <u>one</u> of the following:-

7-a.	What is rotor burst condition for an electric machine? (CO4)	7
7-b.	Explain in detail Hydraulic Electronic Control Unit (HECU). (CO4)	7

8. Answer any <u>one</u> of the following:-

8-a.	Write future scope of energy management in an HEV. (CO5)	7
8-b.	State the procedures to Design a Battery electric vehicle (CO5)	7