Printed Page:- 04 **Subject Code**:- **AME0611**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM:VI CARRY OVER THEORY EXAMINATION-AUGUST 2023

Subject: Hybrid Vehicles and Propulsion

Time: 3 Hours **Max. Marks: 100**

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 **20**

1. Attempt all parts:-

1-a. The electric machine is physically sized by its _____ specification. (CO1) 1

(a) Force

(b) Torque

(c) Pressure

(d) Wear

1-b. The electric motor in a hybrid car can also act as (CO1) 1

(a) Cooling fan

(b) Fuel pump

(c) Generator

(d) None of the above

1-c. Select the cycle use in a Hybrid Engine. (CO2) 1

(a) Otto

(b) Diesel

(c) Atkinson

(d) Isentropic

1-d. One unit of electricity is equivalent to kcal heat units. (CO2) 1

(a) 800

(b) 860

(c) 400

(d) 680

1-e. 5 H.P., 50Hz, 3-phase, 440 V, induction motors are available for the following r.p.m. Which motor will be the costliest? (CO3) 1

(a) 730 r.p.m.

(b) 960 r.p.m.

(c) 1440 r.p.m.

(d) 2880 r.p.m.

1-f. The torque developed in the cage induction motor with auto-starter is (CO3) 1

(a) k/torque with direct switching

(b) K × torque with direct switching

(c) K2 × torque with direct switching

(d) k2/torque with direct switching

1-g. Which of the following material is used in the positive plate of a lead-acid battery? (CO4) 1

(a) Lead peroxide

(b) Sulphuric acid

(c) Spongy lead

(d) Water

1-h. Flywheel stores energy in (CO4) 1

(a) Chemical form

(b) Static form

(c) Electrical form

(d) Mechanical Form

1-i. "The judicious and effective use of energy to maximise profits and enhance competitive positions". This can be the definition of: (CO5) 1

(a) Energy conservation

(b) Energy policy

(c) Energy Audit

(d) Energy management

1-j. An energy policy does not include (CO5) 1

(a) Future production projection

(b) Time period for reduction

(c) Target energy consumption reduction

(d) Declaration of top management commitment

2. Attempt all parts:-

2.a. What is FCEV? (CO1) 2

2.b. Define traction hyperbola (CO2) 2

2.c. What do yuo mean by desired run time (CO3) 2

2.d. What high inertia ratio indicates in sizing the drive system? (CO4) 2

2.e. What is the objective of energy management? (CO5) 2

SECTION B **30**

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

3-a. Classify the electric motors drives for EV and HEV application. (CO1) 6

3-b. Explain general configuration of an automobile with necessary diagrams. (CO1) 6

3-c. Show with figure Tractive effort of an electric motor powered vehicle with a single speed transmission and its resistance (CO2) 6

3-d. Show with diagram Translation of fuel energy into work in a vehicle (CO2) 6

3.e. Draw Permanent Magnet Synchronous Machine with sinusoidal back e.m.f curve (CO3) 6

3.f. Explain the Wilson type architecture in an automatic transmission ? (CO4) 6

3.g. Explain the meaning of Fuel and Energy substitution with examples. (CO5) 6

SECTION C **50**

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

4-a. Describe the working principle of Fuel cell electric vehicle with help of line diagram. (CO1) 10

4-b. Summarize the Social, Environmental impact and analysis of hybrid electric vehicle. (CO1) 10

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

5-a. Discuss the electric power flow. How the power flow to be control with in electric vehicle? (CO2) 10

5-b. Explain in detailed configuration of series hybrid vehicle with neat 10

diagram.(CO2)

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

6-a.	Describe the working principle, advantages and applications of Permanent Magnet motor. (CO3)	10
6-b.	Classify with help of line diagram the types of DC motor used in hybrid vehicle system. (CO3)	10

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

7-a.	Explain the parameters used for charging and discharging the lead acid battery with suitable chemical reaction. (CO4)	10
7-b.	What do you understand by Fuel cell based energy storage system? Also classify all storage system with help of suitable examples. (CO4)	10

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

8-a.	Explain the classification of hybrid engine control unit used in hybrid vehicle system. (CO5)	10
8-b.	Classify and Explain the different energy management strategies (CO5)	10