Printed Page:-03 **Subject Code**:- **AME0611**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2023 - 2024)

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 hybrid electric vehicle is combination of (CO1) 1

(a) IC Engine + Electric Motor

(b) Only electric motor

(c) NGV + gasoline engine

(d) None of the above

1-b. What are the advantages of hybrid electric vehicle? (CO1) 1

(a) Consume less fuel and emit less CO_2

(b) Maintenance charges are less

(c) They are powerful

(d) None of the above

1-c. Which of the following is NOT the type of Hybrid Vehicle. (CO2) 1

(a) Plug-in Hybrid

(b) Parallel Hybrid

(c) Natural Gas for Vehicles

(d) Series Hybrid

1-d. An EV only needs one of the following maintenance jobs done. Which is it? (CO2) 1

(a) Oil change

(b) Belt replacement

(c) New spark plugs

(d) Brake pad inspections

1-e. Which of the following elements of electrical engineering cannot be analyzed using Ohm's law? (CO3) 1

(a) Capacitors

(b) Inductors

(c) Transistors

(d) Resistance

1-f. How many cycles will an AC signal make in 2 seconds if its frequency is 100 Hz? (CO3) 1

(a) 50

(b) 100

(c) 150

(d) 200

1-g. Slip ring motor is preferred over squirrel cage induction motor where. (CO4) 1

(a) High starting torque is required

(b) Load torque is heavy

(c) Heavy pull out torque is required

(d) All of the above

1-h. The good power factor of an induction motor can be achieved if the average flux density in the air gap is. (CO4) 1

(a) Absent

(b) Small

(c) Large

(d) Infinity

1-i. Slip ring motor is recommended where.(CO5) 1

(a) Speed control is required

(b) Frequent starting, stopping and reversing is required

(c) High starting torque is needed

(d) All above features are required

1-j. Less maintenance troubles are experienced in case of. (CO5) 1

(a) Slip ring induction motor

(b) Squirrel cage induction motor

(c) Both (a) and (b)

(d) None of the above

2. Attempt all parts:-

2.a. Define the term Camber angle. (CO1) 2

2.b. What is drive train? (CO2) 2

2.c.	What is an induction motor? (CO3)	2
2.d.	What do we understand by sizing the drive system? (CO4)	2
2.e.	What are the principles of energy management? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain rolling resistance and aerodynamic drag in vehicles. (CO1)	6
3-b.	Classify the electric motors drives for EV and HEV application. (CO1)	6
3-c.	Elaborate the energy use in conventional vehicles. (CO2)	6
3-d.	Define the various electrical losses in electric car. (CO2)	6
3.e.	Define the term PLUG-IN HYBRID. (CO3)	6
3.f.	Explain the vehicle networking system. (CO4)	6
3.g.	Write down the steps involved in 'Energy management Strategy'. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Define the following terms as related to the suspension movement of a car: (i) Bouncing (ii) Rolling (iii) Pitching. (CO1)	10
4-b.	Why is a gear system needed for an ICE? Explain with relevant characteristic curves. (CO1)	10

5. Answer any one of the following:-

5-a.	Draw and explain Series hybrid drive train. (CO2)	10
5-b.	Discuss the electric power flow. How the power flow to be control with in electric vehicle? (CO2)	10

6. Answer any one of the following:-

6-a.	Explain the control of Switch Reluctance Motor drives. (CO3)	10
6-b.	Explain the control of Permanent Magnet Motor drives. (CO3)	10

7. Answer any one of the following:-

7-a.	Explain the working of lead acid batteries. (CO4)	10
7-b.	Explain the working of Solar Photovoltaics. (CO4)	10

8. Answer any one of the following:-

8-a.	Explain state of charge & state of health of battery. (CO5)	10
8-b.	Explain the different uses of energy in our daily lives. (CO5)	10