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 - THEORY EXAMINATION (2022-2023)

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. Which factors affect the range of electric vehicle? (CO1) 1

(a) Driving style

(b) Battery capacity

(c) Vehicle loading

(d) All of the above

1-b. What is advantage of Controller Area Network in vehicle? (CO1) 1

(a) Reduction the number of electrical lines

(b) Improve data exchange between sensors

(c) Increase data amount between control unit.

(d) All of the above statements are correct.

1-c. Select the features of Hybrid Electric Vehicles (CO2) 1

(a) Idle Stop

(b) EV Drive

(c) Motor Assist

(d) Regenerative Braking

1-d. Battery charging equipment is generally installed (CO2) 1

(a) In well ventilated location

(b) In clean and dry place

(c) As near as practical to the battery being charged

(d) In location having all above features

1-e. The number of slip rings on a squirrel cage induction motor is usually (CO3) 1

(a) Two

(b) Three

(c) Four

(d) None

1-f. The starting torque of a three phase induction motor can be increased by (CO3) 1

(a) Increasing slip

(b) Increasing current

(c) Both and

(d) None of the above

1-g. Which Battery are preferred for EV (CO4) 1

(a) Sodium-sulphur (NaS)

(b) Nickel-cadmium (NiCd)

(c) Lead-acid (Pb-acid)

(d) Lithium-ion (Li-ion)

1-h. High specific energy, high specific power, long cycle life, high-energy efficiency, quick recharge, maintenance free characteristics, cost effectiveness, and environmental friendliness are the features of_____ (CO4) 1

(a) battery

(b) fuel cell

(c) ultracapacitor

(d) flywheel

1-i. Energy manger should be well versed with (CO5) 1

(a) Technical and marketing skills

(b) Managerial and technical skills

(c) Managerial and commercial skills

(d) Manufacturing and processing skills

1-j.	Which of the following is not part of energy monitoring (CO5) (a) data recording (b) data analysis (c) energy efficiency equipment financing (d) data reporting	1

2. Attempt all parts:-

2.a.	What is BEV? (CO1)	2
2.b.	Can IC engine produce torque at zero speeds (CO2)	2
2.c.	Define traction motor (CO3)	2
2.d.	Explain the role of vehicle peak power to vehicle mass ratio? (CO4)	2
2.e.	Define 'energy management'. (CO5)	2

SECTION B **30**

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

3-a.	What are factors affecting the performance of batteries used in EVs? (CO1)	6
3-b.	Explain the fuel economic characteristics of an Internal combustion engine. (CO1)	6
3-c.	Draw Traction force vs. speed map of an internal combustion engine with gearbox (CO2)	6
3-d.	Explain the energy saving potential for hybrid drive trains (CO2)	6
3.e.	How to create a rotating magnetic field? (CO3)	6
3.f.	In the supporting subsystems explain the braking system. (CO4)	6
3.g.	Explain the elements of energy management in detail. (CO5)	6

SECTION C **50**

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

4-a.	Explain with the help of line diagram, the historical development of an electric vehicle. (CO1)	10
4-b.	Describe in brief the conventional vehicle power source characterization with help of diagram. (CO1)	10

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

5-a.	Illustrate the different between the Generic Hybrid Drivetrain and Parallel hybrid drive train. (CO2)	10
5-b.	Describe the Electric Vehicle (EV) Drivetrain Alternatives Based on Drivetrain with help of configuration diagram. (CO2)	10

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

6-a.	Describe the switched reluctance motor drives with help of any field oriented control system (FOC). (CO3)	10
6-b.	With help neat diagram, Explain the basic principle of induction motor used in electric hybrid vehicle. (CO3)	10

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

7-a.	Define the ultra high speed flywheel. Also describe the flywheel technologies used in hybrid electric vehicle with help of diagram. (CO4)	10
7-b.	Describe in brief, all supporting subsystems used in sizing of motors used in hybrid electric vehicle. (CO4)	10

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

8-a.	Explain the functions of energy action committee with help of flow diagram.(CO5)	10
8-b.	Illustrate the comparison of different energy management strategies in hybrid electric vehicle. (CO5)	10