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 (2024 - 2025)
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 of the following is the correct advantage of a hybrid electric vehicle? (CO1,K1) 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-b. What factor is/are considered while selection of a motor for an electric vehicle? (CO1,K1) 1

(a) Size, weight
(b) Power rating
(c) Torque
(d) All of the above

1-c. Which of the following is NOT the type of Hybrid Vehicle? (CO2,K1) 1

(a) Plug-in Hybrid
(b) Parallel Hybrid
(c) Natural Gas for Vehicles
(d) Series Hybrid

1-d. The Hybrid Electric Vehicle consists of: (CO2,K1) 1

(a) Internal Combustion Engine +Electric Motor

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(b) Motor Electric 1 + Motor electric 2

(c) NGV engine + Gasoline engine

(d) None of the above

1-e. What kind of quantity is an Electric potential? (CO3,K1) 1

(a) a) Vector quantity

(b) b) Tensor quantity

(c) c) Scalar quantity

(d) d) Dimensionless quantity

1-f. Reduced voltage starter can be used with. (CO3,K1) 1

(a) (A) Slip ring motor only but not with squirrel cage induction motor

(b) (B) Squirrel cage induction motor only but not with slip ring motor

(c) (C) Squirrel cage as well as slip ring induction motor

(d) (D) None of the above

1-g. Size of a high speed motor as compared to low speed motor for the same H.P. will be (CO4,K1) 1

(a) (A) Bigger

(b) (B) Smaller

(c) (C) Same

(d) (D) Any of the above

1-h. The speed characteristics of an induction motor closely resemble the speed-load characteristics of which of the following machines. (CO4,K1) 1

(a) (A) D.C. series motor

(b) (B) D.C. shunt motor

(c) (C)Universal motor

(d) (D) None of the above

1-i. The ratio of starting torque to running torque in a synchronous motor is. (CO5,K1) 1

(a) (A) Zero

(b) (B) One

(c) (C) Two

(d) (D) Infinity

1-j. The torque angle, in a synchronous motor, is the angle between. (CO5,K1) 1

(a) (A) The supply voltage and the back e.m.f.

(b) (B) Magnetizing current and back e.m.f.

(c) (C) The rotating stator flux and rotor poles

(d) (D) None of the above

2. Attempt all parts:-

2.a. Define the term Camber angle. (CO1,K1) 2

2.b. Define propeller shaft. (CO2,K1) 2

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2.c.	What is electric flux? (CO3,K1)	2
2.d.	What is coefficient of drag? (CO4,K1)	2
2.e.	What is thermal protection in battery? (CO5,K1)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	What is regenerative braking? Explain in detail. (CO1,K2)	6
3-b.	With the help of block diagram, explain the major component of Hybrid Electric Vehicles. (CO1,K2)	6
3-c.	Define the various electrical losses in electric car. (CO2,K1)	6
3-d.	Explain the energy saving potential for hybrid drive trains. (CO2,K2)	6
3.e.	Briefly explain Induction Machine (IM). (CO3.K2)	6
3.f.	Explain Torque and Power Capability of an electric machine. (CO4,K2)	6
3.g.	Discuss the environmental importance of EV and their social impacts. (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the working mechanism of a differential in detail. (CO1,K2)	10
4-b.	What is PSD in a HEV? Explain its role and function in detail. (CO1,K2)	10

5. Answer any one of the following:-

5-a.	Draw and explain architecture and power flow control of series hybrid electric vehicle. (CO2,K2)	10
5-b.	Explain the speed coupling in detain with examples why we use that? (CO2,K2)	10

6. Answer any one of the following:-

6-a.	Explain construction and working principle of three-phase Induction motor. (CO3,K2)	10
6-b.	What do you understand by battery management systems? Discuss in detail. (CO3,K2)	10

7. Answer any one of the following:-

7-a.	Describe in brief, all supporting subsystems used in sizing of motors used in hybrid electric vehicle. (CO4,K2)	10
7-b.	What are the various storage devices that we use in EV. Explain any two in detail. (CO4,K2)	10

8. Answer any one of the following:-

8-a.	Discuss the relationship between a good energy accounting system and an effective energy management program. (CO5,K2)	10
8-b.	Classify and Explain the different energy management strategies (CO5,K2)	10