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Printed Page:-3 **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 (2025 - 2026)
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:-

(1.1) Which of the following vehicle is most efficient? (CO1, K1) 1

(a) Hybrid electric vehicle
(b) Fuel vehicle
(c) Electric vehicle
(d) none

(1.2) 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

(1.3) The energy strategies of companies have the principle of (CO2, K1) 1

(a) restoring and preserving the environment
(b) reducing wastes and pollutants
(c) educating the people about energy conservation
(d) all of these

(1.4) Full form of ICV is _____ (CO2,K1) 1

(a) Internal combustion vehicles
(b) Internet combustion vehicles
(c) Internally combined vehicles
(d) Internet combined vehicles

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(1.5) What is the direction of the electric field at a point? (CO3,K1) 1

(a) Along the line perpendicular to the electric field
(b) Along the line tangent to the electric field
(c) Electric field has no direction
(d) Electric field has a random direction

(1.6) Which of the following is correct about direct current? (CO3,K1) 1

(a) Magnitude is constant
(b) Frequency is zero
(c) Can be transported to larger distances with less loss in power
(d) Flows in one direction

(1.7) Which Battery are preferred for EV (CO4,K1) 1

(a) Sodium-sulphur (NaS)
(b) Nickel-cadmium (NiCd)
(c) Lead-acid (Pb-acid)
(d) Lithium-ion (Li-ion)

(1.8) The torque of an induction motor is. (CO4,K1) 1

(a) Directly proportional to slip
(b) Inversely proportional to slip
(c) Proportional to the square of the slip
(d) None of the above

(1.9) Energy manger should be well versed with (CO5,K1) 1

(a) Technical and marketing skills
(b) Managerial and technical skills
(c) Managerial and commercial skills
(d) Manufacturing and processing skills

(1.10) An induction motor is identical to. (CO5,K1) 1

(a) D.C. compound motor
(b) D.C. series motor
(c) Synchronous motor
(d) Asynchronous motor

2. Attempt all parts:-

(2.1) What is Bettary Electric Vehicle? (CO1,K1) 2

(2.2) What is final drive. (CO2,K1) 2

(2.3) Explain the term " in wheel drives". (CO3,K2) 2

(2.4) What is the role of the ratio of load inertia to motors inertia? (CO4,K2) 2

(2.5) What is the objective of energy management? (CO5,K2) 2

SECTION-B 30

Answer any one of the following:-

(3.1) Classify an automobile based on transmission system and wheel drive system.(CO1,K2) 6

(3.2)	Explain general configuration of an automobile with necessary diagrams. (CO1,K2)	6

Answer any one of the following:-

(3.3)	Draw Traction force vs. speed map of an internal combustion engine with gearbox. (CO2,K3)	6
(3.4)	Show with figure of tractive effort of an electric motor powered vehicle with a single speed transmission and its resistance. (CO2,K3)	6

Answer any one of the following:-

(3.5)	What is reluctance or alignment torque, explain in brief .(CO3,K3)	6
(3.6)	How to create a rotating magnetic field? (CO3,K2)	6

Answer any one of the following:-

(3.7)	Explain in detail the Actuator Control Unit (ACU). (CO4,K2)	6
(3.8)	Compare various types of DC and AC machines used for EV applications. (CO4,K2)	6

Answer any one of the following:-

(3.9)	Discuss the environmental importance of EV and their social impacts. (CO5,K2)	6
(3.10)	Explain the use of EMS during transportation.(CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

(4.1)	Explain the working mechanism of a differential in detail. (CO1,K2)	10
(4.2)	Explain with the help of line diagram, the historical development of an electric vehicle. (CO1,K2)	10

5. Answer any one of the following:-

(5.1)	Explain the power flow control in Series-Parallel Hybrid with neat sketch. (CO2,K2)	10
(5.2)	What are the various operating modes of ICE dominated system.(CO2,K2)	10

6. Answer any one of the following:-

(6.1)	Compare and contrast the different methods of DC motor speed control (e.g., voltage control, field weakening, armature resistance control). (CO3, K2)	10
(6.2)	What are the factors that control the speed of DC motor. (CO3,K2)	10

7. Answer any one of the following:-

(7.1)	Explain the energy storage requirements in Hybrid vehicles. (CO4,K2)	10
(7.2)	What do you understand by battery based energy storage give examples. (CO4,K2)	10

8. Answer any one of the following:-

(8.1)	Explain the different uses of energy in our daily lives. (CO5,K2)	10
(8.2)	Explain the functions of energy action committee with help of flow diagram.(CO5,K2)	10