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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2025 - 2026)

Subject: Automotive Engineering

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 these is not a system in automobile layout? (CO1, K1) | 1 |
| | (a) Suspension system | |
| | (b) Cooling system | |
| | (c) Nervous system | |
| | (d) Powertrain | |
| (1.2) | A mid-engine layout provides: (CO1, K1) | 1 |
| | (a) High-speed stability and balanced weight distribution | |
| | (b) Increased passenger space | |
| | (c) Lower manufacturing cost | |
| | (d) More luggage capacity | |
| (1.3) | The piston is connected to crankshaft through: (CO2, K1) | 1 |
| | (a) Camshaft | |
| | (b) Connecting rod | |
| | (c) Flywheel | |
| | (d) Push rod | |
| (1.4) | The function of the crankshaft is to: (CO2, K1) | 1 |
| | (a) Convert linear motion of piston into rotary motion | |
| | (b) Control fuel injection | |
| | (c) Open and close valves | |
| | (d) Store energy | |
| (1.5) | Lead-acid batteries are (CO3, K1) | 1 |

- (a) Lightweight and high energy density
 - (b) Low cost but heavy and less efficient
 - (c) High performance for EVs
 - (d) Dominant in modern EVs
- (1.6) NiMH batteries are (CO3, K1) 1
- (a) Cheaper and heavier than Li-ion
 - (b) Used in early hybrid vehicles
 - (c) Environmentally safer but lower energy density
 - (d) All of the above
- (1.7) The differential allows (CO4, K1) 1
- (a) Equal torque to both wheels while cornering
 - (b) Wheels to rotate at the same speed always
 - (c) Power to only one wheel
 - (d) Vehicle to stop without braking
- (1.8) Which component transmits power to wheels in FWD cars? (CO4, K1) 1
- (a) Rear differential
 - (b) Front differential and shafts
 - (c) Transmission only
 - (d) Driveshaft
- (1.9) The actuator in an Electronic Throttle Control system controls (CO5, K1) 1
- (a) Fuel injector
 - (b) Throttle valve opening
 - (c) Piston stroke
 - (d) Brake fluid
- (1.10) The key advantage of ADAS technologies is (CO5, K1) 1
- (a) Reduced steering effort only
 - (b) Enhanced safety and driver assistance
 - (c) Increased emissions
 - (d) Manual gear shifting

2. Attempt all parts:-

- (2.1) Explain the role of the chassis in an automobile. (CO1, K1) 2
- (2.2) Describe the working of a spark plug. (CO2, K1) 2
- (2.3) State one advantage and one limitation of lithium-ion batteries. (CO3, K1) 2
- (2.4) What is a final drive in a vehicle? (CO4, K1) 2
- (2.5) Explain the function of Integrated Circuit Modules (ICMs) in vehicles. (CO5, K1) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Differentiate between AWD and 4WD systems. (CO1, K2) 6
- (3.2) Explain the terms “approach angle” and “departure angle” in relation to off-road mobility. (List and briefly explain the major systems in the general layout of an 6

automobile. (CO1, K2)

Answer any one of the following:-

(3.3) Compare SI and CI engines in terms of fuel, efficiency, and application. (CO2, K2) 6

(3.4) Explain the 4-stroke engine cycle with a diagram. (CO2, K2) 6

Answer any one of the following:-

(3.5) Explain parallel hybrid powertrain operation with examples. (CO3, K1) 6

(3.6) Describe series-parallel hybrid architecture and power flow. (CO3, K2) 6

Answer any one of the following:-

(3.7) Describe the working principle of a centrifugal clutch with suitable diagram. (CO4, K2) 6

(3.8) Explain the working of a diaphragm clutch in automobiles with suitable diagram. (CO4, K1) 6

Answer any one of the following:-

(3.9) Explain how Integrated Circuit Modules (ICMs) contribute to safety features also state its advantages. (CO5, K2) 6

(3.10) Describe the function and role of sensors in monitoring vehicle systems. (CO5, K2) 6

SECTION-C 50

4. Answer any one of the following:-

(4.1) Discuss the vehicle classifications based on drive type (FWD, RWD, AWD/4WD) with advantages and limitations. (CO1, K2) 10

(4.2) Explain in detail the classification of vehicles based on body style (hatchback, sedan, SUV, pickup, etc.) with examples. (CO1, K2) 10

5. Answer any one of the following:-

(5.1) Discuss the differences between SI and CI engines in terms of fuel, compression ratio, efficiency, and applications. (CO2, K3) 10

(5.2) Describe the 4-stroke engine cycle in detail with sketches for intake, compression, power, and exhaust strokes. (CO2, K3) 10

6. Answer any one of the following:-

(6.1) Explain the evolution of electric vehicles from early prototypes to modern BEVs. (CO3, K2) 10

(6.2) How does regenerative braking work across the different types of electric vehicles? (CO3, K2) 10

7. Answer any one of the following:-

(7.1) Explain multi-plate clutch operation and why it is used in motorcycles or high-performance cars. (CO4, K2) 10

(7.2) List and explain the materials being widely used in manufacturing of clutches, including their advantages and applications. (CO4, K2) 10

8. Answer any one of the following:-

(8.1) Discussing the role ICMs in powertrain management, safety, and Advanced Driver-Assistance Systems. (ADAS). (CO5, K2) 10

(8.2) Discuss the role of sensors in monitoring and controlling vehicle 10

performance. (CO5,K2)

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