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Printed Page:-4 **Subject Code:- BME0612**

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: Automotive Transmission & Suspension Systems

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 component replaces clutch in automatic transmission? (CO1,K1) 1

(a) Flywheel
(b) Torque converter
(c) Gearbox
(d) Differential

(1.2) Which clutch provides higher torque transmission capacity? (CO1,K1) 1

(a) Single plate clutch
(b) Multi-plate clutch
(c) Cone clutch
(d) Centrifugal clutch

(1.3) What is the main advantage of CVT? (CO2,K1) 1

(a) Fixed gear ratios
(b) High noise
(c) Infinite gear ratios
(d) Manual control only

(1.4) Dual Clutch Transmission (DCT) mainly improves: (CO2,K1) 1

(a) Fuel tank capacity
(b) Gear shifting speed
(c) Vehicle weight
(d) Engine cooling

(1.5) What is the purpose of a slip joint? (CO3,K1) 1

(a) Allow axial movement
(b) Reduce torque
(c) Increase speed
(d) Prevent rotation

(1.6) Which system distributes torque to all four wheels automatically? (CO3,K1) 1

(a) 2WD
(b) 4WD
(c) AWD
(d) FWD

(1.7) Which type of spring consists of several flat steel plates of varying lengths? (CO4,K1) 1

(a) Coil Spring
(b) Torsion Bar
(c) Leaf Spring
(d) Air Spring

(1.8) In an independent suspension system: (CO4,K1) 1

(a) Both wheels are mounted on a single axle
(b) Movement of one wheel does not affect the other
(c) There is no use of shock absorbers
(d) The unsprung weight is very high

(1.9) Which suspension component allows the wheel to move independently while maintaining precise camber control using multiple control arms? (CO5,K1) 1

(a) Rigid Axle
(b) Hotchkiss Drive
(c) Leaf Spring
(d) Multi-link Suspension

(1.10) What is the primary medium used for leveling and damping in a hydro-pneumatic suspension system? (CO5,K1) 1

(a) Compressed air only
(b) Inert gas and hydraulic fluid
(c) Electrical magnets
(d) Mechanical linkages only

2. Attempt all parts:-

(2.1) What is a torque converter? (CO1,K2) 2

(2.2) List types of gearboxes used in automobiles. (CO2,K1) 2

(2.3) Define differential and its purpose. (CO3,K1) 2

(2.4) Explain the basic function of a Torsion Bar spring. (CO4,K1) 2

(2.5) Identify two types of actuators used in electronically controlled suspension systems. (CO5,K1) 2

SECTION-B 30

Answer any one of the following:-

(3.1)	Compare manual and automatic transmission systems. (CO1,K3)	6
(3.2)	Explain the working of a centrifugal clutch. (CO1,K3)	6

Answer any one of the following:-

(3.3)	Explain torque multiplication using gear ratio with example. (CO2,K2)	6
(3.4)	Describe the working of epicyclic gear train. (CO2,K2)	6

Answer any one of the following:-

(3.5)	Explain the working of an open differential. (CO3,K2)	6
(3.6)	Describe rear and front axle layouts. (CO3,K3)	6

Answer any one of the following:-

(3.7)	Compare Dependent and Independent suspension systems based on their performance and application. (CO4,K3)	6
(3.8)	Describe the working principle of a Telescopic Hydraulic Shock Absorber. (CO4,K2)	6

Answer any one of the following:-

(3.9)	Apply your knowledge of sensors to explain how position sensors and accelerometers cooperate to manage vehicle leveling. (CO5,K3)	6
(3.10)	Discuss the advantages and limitations of Multi-link suspension systems in modern passenger cars. (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

(4.1)	Explain the working of torque converter and fluid coupling with diagrams. (CO1,K2)	10
(4.2)	Discuss clutch lining materials, friction considerations, and heat dissipation. (CO1,K2)	10

5. Answer any one of the following:-

(5.1)	Discuss construction and working of automatic transmission. (CO2,K2)	10
(5.2)	Compare manual and automatic transmissions in terms of performance, efficiency, and control. (CO2,K2)	10

6. Answer any one of the following:-

(6.1)	Discuss the working of 4WD and AWD systems with diagrams. (CO3,K2)	10
(6.2)	Discuss transfer case, torque split control, and cross-axle locking in detail. (CO3,K2)	10

7. Answer any one of the following:-

(7.1)	Explain the working of an Air Suspension system. Discuss its advantages over conventional steel spring systems in heavy commercial vehicles. (CO4,K2)	10
(7.2)	Compare Twin-tube and Mono-tube gas-charged shock absorbers. Detail their construction, heat dissipation characteristics, and damping effectiveness. (CO4,K3)	10

8. Answer any one of the following:-

(8.1)	Analyze the importance of ride and handling simulation in the development phase of a vehicle. Describe two common suspension testing methods used in the industry. (CO5,K3)	10

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(8.2) Evaluate the differences between Electro-pneumatic and Hydro-pneumatic systems. In which specific vehicle segments are they most effective and why? (CO5,K3) 10