



Name:	
Enrolment No:	

UPES
End Semester Examination, December 2023

Course: Components of Automotive Chassis	Semester : III
Program: B. Tech ADE	Time : 03 hrs.
Course Code: MEAD2001	Max. Marks: 100

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.	Question	Marks	CO
Q 1	What are the design requirements of the steering systems?	4	CO1
Q 2	How do you calculate the maximum torque capacity of the friction clutch?	4	CO2
Q 3	Define the term dead axle. What are the advantages of all-wheel drive vehicles over front-wheel drive vehicles?	4	CO2
Q 4	What are the advantages of independent suspension over a rigid axle suspension system?	4	CO2
Q 5	With a sketch, briefly explain the construction and working of a single plate clutch.	4	CO3

SECTION B
(4Qx10M= 40 Marks)

Q 6	Explain different crash tests to be carried out on vehicle chassis frames.	10	CO2
Q 7	Discuss in detail the steps followed in design of the coil spring and leaf spring of the automotive system.	10	CO4
Q 8	Derive the expressions for maximum torque transmission capacity of single plate frictional clutch using Uniform Wear Theory.	10	CO3
Q 9	What are the various loads acting on the chassis frame? What are the different cross-sections used for the construction of the chassis frame? Mention their relative merits.	10	CO3

SECTION-C
(2Qx20M=40 Marks)

Q 10	Explain the following terms: (a) Energy equation, (b) Stiff cage structural concept, (c) Controlled progressive crush and deformation with limited	20	CO3
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	intrusion, and (d) Crumble Zones. Explain the desired dummy performance with respect to vehicle crashworthiness.		
Q 11	<p>Explain in detail the deceleration of the vehicle and passenger compartment on impact with a fixed barrier with appropriate graphs at speeds of 15, 20, 40, and 50 mph (miles per hour).</p> <p style="text-align: center;">OR</p> <p>A four-speed gearbox is to be constructed for providing the ratios of 1.0, 1.46, 2.28, and 3.93 to 1 as nearly as possible. The diametral pitch of each gear is 3.25 mm, and the smallest pinion is to have at least 15 teeth. Determine the suitable number of teeth of the different gears. What is then the distance between the main and lay shaft?</p>	20	CO4