Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

Course: Components of Automotive Chassis

Semester: 3rd

Program: B.Tech ADE **Time : 03 hrs.**

Course Code: MEAD2013 **Max. Marks: 100**

Instructions: N/A

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Define a vehicle suspension system and enlist its primary functions and requirements.	**4**	**CO1**
Q 2	Define the following terms with respect to vehicle chassis, (a) Ladder frame, (b) Body in white (BIW), (c) Crumple zones, (d) Bending and torsional rigidity.	**4**	**CO2**
Q 3	What are the different sections used in the rigid front axle of a commercial vehicle. Justify the usage of these sections.	**4**	**CO1**
Q 4	Distinguish between single plate and multiplate clutch.	**4**	**CO2**
Q 5	Discuss the difference between passive and active safety systems in vehicles, providing examples of each.	**4**	**CO1**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	Explain the following terms: (a) Energy equation, (b) Stiff cage structural concept, (c) Controlled progressive crush and deformation with limited intrusions.	**10**	**CO2**
Q 7	Describe the differences between ladder frame and monocoque frame construction in automobiles. What are the primary structural and functional advantages of each type?	**10**	**CO2**
Q 8	Define the terms "caster," "camber," and "toe" in the context of steering geometry. How does each angle impact vehicle handling and safety?	**10**	**CO3**
Q 9	List the different types of springs used in suspension systems and describe the characteristics of each type in terms of load-bearing capacity and durability.	**10**	**CO4**

SECTION-C (2Qx20M=40 Marks)			
Q 10	Analyze the primary functions of a vehicle suspension system and its impact on front axle stability and steering performance. Compare the double-wishbone and multilink suspension systems, discussing how each influences vehicle handling and stability, particularly in high-speed and rough terrain conditions.	**20**	**CO3**
Q 11	Evaluate the performance of a semi-elliptical spring by deriving the expressions for maximum bending stress and central deflection under a load W applied at the center. Additionally, assess the suitability of various materials used in the manufacturing of semi-elliptical springs. **OR** Discuss the function of anti-roll bars in a suspension system. How do they improve stability, and why are they important in performance vehicles?	**20**	**CO4**