



B.E DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Third Semester

AUTOMOBILE ENGINEERING

U18AU13201: Automotive Chassis and Transmission

COURSE OUTCOMES

- CO1:** Outline the construction details of various automotive Chassis Frame layouts.
CO2: Explain the functions of steering system and components.
CO3: Select the appropriate transmission system for various automobiles.
CO4: Demonstrate the working principle of final drive system.
CO5: Choose suitable axles, wheels and tyres for a vehicle.
CO6: Distinguish various types of suspension system & brakes.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match the following transmission components with their functions.

CO3 [K₂]

Components	Function
A. Clutch	i. Allows wheels to rotate at different speeds while transmitting power evenly to both wheels
B. Gearbox	ii. Transfers power from the transmission to the vehicle's axles and wheels
C. Driveshaft	iii. Engages and disengages power flow between the engine and the transmission
D. Differential	iv. Selects and changes gear ratios to control the speed and power sent to the wheels

- | | A | B | C | D |
|----|-----|----|-----|----|
| a) | ii | i | iii | iv |
| b) | iii | iv | ii | i |
| c) | ii | iv | iii | i |
| d) | iii | i | ii | iv |

20. Explain the purpose and advantages of using tubeless tires in modern vehicles. CO5 [K₃]
21. Explain the differences between a sliding mesh gearbox, a constant mesh gearbox, and a synchromesh gearbox in manual transmissions. CO3 [K₂]
22. Explain the principle of operation of an exhaust braking system in a vehicle. List the advantages of this system and in what types of vehicles it is commonly used. CO6 [K₅]

Answer any FIVE Questions:-

PART C (5 x 10 = 50 Marks)

(Answer not more than 250 words)

23. Explain the critical steering geometries such as caster, camber, toe-in, and toe-out in detail. Discuss the effects of these geometries on vehicle handling, tire wear, and stability. Include labelled diagrams to illustrate your explanations. CO2 [K₄]
24. Illustrate the schematic of a Continuously Variable Transmission (CVT) and describe its operation in detail. Discuss the advantages and disadvantages of CVTs compared to traditional automatic and manual transmissions. Provide examples of how CVTs are used in modern vehicles and how they impact fuel efficiency and driving experience. CO3 [K₄]
25. Explain the fundamental principles of a differential in an automotive drivetrain. List the different types of differentials, discuss each type's advantages and disadvantages, and provide examples of where they are used. Include diagrams to illustrate how each type functions. CO4 [K₃]
26. List and explain various types of loads that drive axles encounter in automotive drive axles. Explain the specific mechanisms by which these loads are generated and their impact on axle design, material selection, and overall performance. Discuss how these challenges can be addressed to optimize drive axle durability and efficiency. CO1 [K₄]
27. Explain why the Hotchkiss drive is well-suited for durability, load-carrying capability, and traction in off-road vehicles. Discuss the specific design features and characteristics of the Hotchkiss drive that contribute to these advantages. CO4 [K₄]
28. Explain the principles, components, and functions of Anti-lock Braking Systems (ABS) in modern automobiles. Describe how ABS works in real-world emergency braking situations. CO6 [K₄]
