

Course code	Course Name	L-T-P – Credits	Year of Introduction
AU307	VEHICLE BODY ENGINEERING	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives <ul style="list-style-type: none"> To impart knowledge on the design of vehicle body to give maximum comfort for the passengers To discuss the methods of stream lining vehicle body to minimize drag 			
Syllabus Classification of coach work types, vehicle aerodynamics, vehicle body design parameters, vehicle body design terms, vehicle ergonomics, body structure types, vehicle stability, and load distribution in vehicles.			
Expected outcome. <ul style="list-style-type: none"> The students will be able to do vehicle body design giving maximum passenger comfort and producing minimum drag. 			
Text Book: <ol style="list-style-type: none"> Giles J Pawlowski, Vehicle body engineering Business books limited, 1989 Sydney F Page, “Body Engineering” Chapman & Hall Ltd, London, 1956 			
References: <ol style="list-style-type: none"> Pope , “Wind tunnel testing” , John Wiley & Sons , 2nd edition, New York, 1974 Braithwaite,J.B., Vehicle Body building and drawing, Heinemann Educational Books Ltd., London 1977 Dieler Anselm., The passenger car body, SAE International, 2000 Giles,G.J., Body construction and design, Illiffe Books Butterworth & Co., 1971. John Fenton, “Vehicle body layout and analysis”, Mechanical Engg. Publication ltd, London. Paul Browne – Auto care manual. Redesign of bus bodies – Part 1 and Part 2 C. I. R. T., Pune. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Classification of coachwork type: styling forms, coach and bus body style, layout of cars, buses and coach with different seating and loading capacity, commercial vehicle types, Vans and Pickups. Terms used in body building construction - Angle of approach, Angle of departure, Ground clearance, Cross bearers, Floor longitudes, posts, seat rail, waist rail, cant rail, Roof stick, Roof longitude, Rub rail, skirt rail, truss panel, wheel arch structure, wheel arch, post diagonals, gussets. Basic dimension: Regulations as per ARAI, driver’s seat, passengers seat, visibility.	7	15%
II	Aerodynamics: Basics, Vehicle drag and types, Various types of forces and moments, effects of forces and moments, various body optimization techniques for minimum drag, Principle of wind tunnel technology, flow visualization techniques, tests with scale models, aerodynamic study for heavy vehicles Interior Ergonomics: Introduction, ergonomics system design, Seating dimensions ,seat comfort, suspension seats, split frame seating, back passion reducers, dash board instruments, electronic displays, commercial vehicle cabin ergonomics, mechanical package layout, goods vehicle layout.	7	15%

FIRST INTERNAL EXAMINATION			
III	Vehicle Body Materials: Aluminium alloys, Steel, alloy steels, plastics, Metal matrix composites, structural timbers - properties, glass reinforced plastics and high strength composites, thermoplastics, ABS and styrenes, load bearing plastics, semi rigid PUR foams and sandwich panel construction. Paints adhesives and their properties, corrosion and their prevention	7	15%
IV	Load distribution: Type of body structures, Vehicle body stress analysis, vehicle weight distribution, Calculation for static, symmetrical, longitudinal & side loads, stress analysis of bus body structure under bending and torsion. Vehicle Stability: Introduction, Longitudinal, lateral stability, vehicle on a curvilinear path, critical speed for toppling and skidding. Effect of operating factors on lateral stability, steering geometry and stabilization of steerable wheels, mass distribution and engine location on stability	7	15%
SECOND INTERNAL EXAMINATION			
V	Noise and vibration: Noise characteristics, Sources of noise, noise level measurement techniques, Body structural vibrations, chassis bearing vibration, designing against fatigue, methods of noise suppression Safety: Impact protection basics, Physics of impact between deformable bodies, Design for crash worthiness, occupant and cargo restraint, passive restraint systems, side impact analysis, bumper system, energy absorbent foams, laws of mechanisms applied to safety.	7	20%
VI	Introduction to CFD technology, fluidic design considerations, effect of air dams on front bumpers, effect of projected accessories on body, wind tunnel testing of car body, parameters considered for wind tunnel testing, introduction to software simulation of car body structures. Visibility, regulations, drivers visibility, methods of improving visibility, Window winding and seat adjustment mechanisms	7	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed