



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code:3160211

AUTOMOBILE CHASSIS AND BODY ENGINEERING

6th SEMESTER

Type of course: Advanced /Application

Prerequisite: Fluid mechanics, Automobile manufacturing

Rationale:

Subject is designed to cover various aspects and considerations to be concerned over body and chassis building of different types of vehicle like car, bus and commercial vehicles with safety and ergonomic aspects, structure and aerodynamic aspects of the vehicle.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Automobile Chassis: Types, Layout with reference to Power Plant Location and Drive, Automotive Frames - Material Selection and its Constructional Details, Various types, Different Loads acting on Frame, Testing of Automotive Frames.	5
2	Car Body : Classification of vehicle based on body types, Types of car bodies, Integral body construction details: Requirements of body, Loads on the vehicle body: Static load, Acceleration and Braking, Moments and Torque due to driving conditions (torsion and bending moments), Types of materials used in body construction, Analysis and Selection of body member sections, Body sub frame and underfloor structure, car front and rear end structure, Vehicle Structure Analysis by Simple Structural Surface (SSS) Method: Saloon and simple van. Crashworthiness: features and requirements for occupant protections, crumple zones; Description of Body zones/assemblies/components, Body trims, Engine, transmission and body structure mounting;	12
3	Bus Body and Commercial Vehicle body: Classification of bus bodies – Based on distance travelled, Based on capacity of the bus and based on style & shape. Types of metal section used in the construction and regulations. Construction of conventional and integral type buses and comparison. Classification of commercial vehicle bodies. Construction of Tanker body and Tipper body. Driver cabin design for compactness Design of frames for bus and commercial vehicles.	12



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4	Vehicle Aerodynamics : External and Internal flow problems, Performance of cars and light vans, Resistance to vehicle motion, Drag, Types of drag, Flow field around car, Aerodynamic development of cars, Optimization of car bodies for low drag.	6
5	Ergonomic and Safety: Introduction of ergonomics, anthropometric dimensions of standard occupant, Concept of H-point referencing, interior design for ergonomics and comfort, seat design for ride comfort, suspension seats, split frame seating, back passion reducers, dash board instruments, pedal controls and electronic displays. Driver seat design of bus body and commercial vehicle body. Safety aspects in design, Types of safety (Active and Passive), Safety features: overview of requirement for occupant protection (frontal, side, rear and rollover impact) and pedestrian safety, Airbags and Seatbelts, Visibility: Regulation, Driver's visibility, Methods of improving visibility, Introduction of crash test, Chassis and body alignment test.	10

Suggested Specification table with Marks (Theory):

R Level	U Level	A Level	N Level	E Level	C Level
20	20	30	30	5	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. K.V James, D Halderman "Automotive Chassis Systems" 6th Edition, Prentice Hall Publisher.
2. Jnusz Pawlowski, "Vehicle Body Engineering", Business books limited.
3. J H Smith, "An Introduction to Modern Vehicle Design", Butterworth-Heinemann.
4. J Brown, A J Roberstson, S Serphento, "Motor Vehicle Structure: Concepts and Funtamentals, Butterworth-Heinemann.
5. Heinz Heizler, "Advanced Vehicle Technology", Butterworth-, London.
6. David A. Crolla, "Automobile Engineering :Power train, chassis system and vehicle body",Elsveir
7. V D Bhinse, "Ergonomics in Automotive Design", CRC Press.
8. SAE J4004
9. John Fenton, Handbook of Automotive Body and Systems Design, Wiley India.
10. ARAI / GTR for occupant and pedestrian protection.

Course Outcome: After learning the course the students will able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Choose and suggest a suitable chassis layout, frame and body construction type for different cars & bus and commercial vehicles	45
CO-2	Analyze the effects of structural forces, aerodynamic forces and moments.	20
CO-3	Develop modern safety system for car, bus and commercial vehicle	25
CO-4	Develop modern vehicle body to meet the current requirements.	10



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List of Experiments

1. Study of Layout of automobile
2. Experimental study of mechanism for air flow over different geometry of vehicles.
3. Experimental studies of measurements of drag and lift coefficient for different geometry vehicle using wind tunnel apparatus.
4. Study of agronomical considerations of automobile body.
5. Study of safety provisions in modern auto vehicle.
6. Design of chassis of auto vehicle its section and subsections.
7. Study of crash test of Auto vehicle
8. Study of Alignment of auto vehicle.

Major Equipment: Wind tunnel test rig

List of Open Source Software/learning website:

1. <http://nptel.ac.in>