GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3731106
Semester – III
Subject Name: Automotive Aerodynamics & Safety

Type of course: Program Elective - V

Prerequisite: Basics of Aerodynamics at under graduate level.

Rationale: Explain the concept of bluff body; Analysis of aerodynamics in automotives.Utilizing appropriate safety procedures with maintenance & service

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Course Content:

Sr. No.	Course Content	Total Hrs	% Weightage
1	The concept of bluff body; Analysis of aerodynamic drag force; types of drag force; drag coefficient of cars; strategies for aerodynamic development; low drag profiles for vehicle	**8**	**17**
2	Aerodynamic shape analysis; Front and modification; front and rear wind shield angle; boat tailing; hatch back, fast back and square back; dust flow patterns at the rear; effect of gap configuration	**08**	**17**
3	The concept of vehicle safety; Need of safety; active safety: driving safety; conditional safety; perceptibility safety; operating safety- passive safety: exterior safety, interior safety, deformation behavior of vehicle body.	**12**	**27**
4	Regulations, automatic seat belt Tightener system; Collapsible steering column; Tiltable steering wheel.	**6**	**13**
5	Electronic system for activating air bags; Bumper design for safety; antiskid braking system.	**6**	**13**
6	Speed control devices; Causes of rear end collision; Frontal object detection; Rear vehicle object detection system; Object detection system with braking system interactions.	**6**	**13**

Reference Books:

1. Hucho, W.H., Aerodynamics of Road vehicles, Butterworths Co. Ltd., 1997.
2. J.Powloski - "Vehicle Body Engineering" - Business books limited, London - 1969.
3. Ronald.K.Jurgen - "Automotive Electronics Handbook" - Second edition- McGraw-HillInc., -1999.
4. ARAI Safety standards

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Course Outcome:

Sr. No.	CO statement	Marks % weightage
CO-1	Basic understanding of vehicle aerodynamic, terms associated and profile	18
CO-2	Analysis of vehicular Aerodynamic shape, modification and effects of variation in configurations	24
CO-3	Importance of vehicular safety and deformation behavior of vehicle body	20
CO-4	Safety considerations in automobile seat belt, Collapsible steering column; and Tiltable steering wheel.	18
CO-5	Knowledge of vehicular Electronic system for safety considerations and Speed control devices;	20

List of Experiments:

1. Study of bluff body, aerodynamic drag in automobile and safety considerations while designing the automobile body
2. Study of wind tunnel and determination of drag coefficient of any model of automotive vehicles.
3. Study of dust flow patterns at the rear in automotive vehicles.
4. Study of Bumper design for safety
5. Study of advanced automobile seat belts and Air bag systems.
6. Study of advanced steering wheel and steering system.
7. Study anti-skid braking system and antilock brake system.
8. Study rear vehicle object detection system.
9. Study of central door locking systems