

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Automobile Engineering			
Semester	VI				Version	1.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in			July 2018	
Subject code	1AU2607		Subject Name		Automotive Aerodynamics				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical/Tutorial	30	20	50

Pre-requisites:

Course Learning Outcomes:
<p>Upon completion of this course the student will be able</p> <p>CO.1 To appreciate the use of wind tunnels and the different testing techniques</p> <p>CO.2 Able to apply CFD for aerodynamic design of vehicle.</p> <p>CO.3 Develop innovative drag reducing concepts that are operationally and economically sound</p> <p>CO.4 Establish a database of experimental, computational, and conceptual design information</p> <p>CO.5 Demonstrate the potential of new drag-reduction concepts</p>

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 Fundamentals of Aerodynamics	1.1 Scope & Development trends 1.2 Flow phenomena related to vehicles External and Internal flow problems. 1.3 Performance of cars and light vans Resistance to vehicle motion 1.4 Drag, Types of drag, Flow field around car. 1.5 Aerodynamic development of cars 1.6 Optimization of car bodies for low drag.	1a. Understand requirement and benefits of aerodynamics. 1b. Describe various resistance induced in car by wind. 1c. introduce to optimise drag.	12	9
UNIT – 2 Stability, Safety and Comfort	2.3 The origin of forces and moments effects. 2.4 Vehicle dynamics under side wind Force and Moment coefficients Safety limit dirt accumulation on vehicle. 2.5 Wind noise Air flow around individual components High performance vehicles Very log drag cars. 2.6 Design alternatives High efficiency radiator arrangement Development	2a. Elaborate various forces and their effect. 2b. Identify various safety limits of vehicle. 2c. Identify various criterion of performance.	12	9

	and simulation methods.			
UNIT – 3 Wind Tunnels and Test Techniques	3.1 Principles of wind technology Limitations of simulation Scale models 3.2 Existing automobile wind tunnels Climatic tunnels. 3.3 Measuring equipment and transducers. 3.4 Pressure measurement velocity measurements Flow visualization techniques Road testing methods Wind noise measurements.	3a Study about wind technology limitation and scale models. 3b Intrudction of wind tunnel for testing and measurement of aerodynamic flow. 3c Identify various measuring equipments and transducers.	12	9
UNIT – 4 Application of CFD	4.1 Methods to solve Navies Stokes equation Forces acting in a fluid element Compressibility effects in a flow field in viscid flow. 4.2 Governing equations Irritation flow field and consequences Potential flows Boundary layer methods. 4.3 Numerical modelling of fluid flow around vehicle body.	4a Study for various mathematical equiation for design. 4b Understand about numerical modelling.	12	9
UNIT – 5 Aerodynamic Design	5.1 Development and simulation methods –cars, buses, trucks.	5a Study simulation methods for various vehicles.	12	09
		Total	60	45

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Theory and Applications of Aerodynamics for Ground Vehicles	Yomi Obidi	SAE Publications, 2014
2	Aerodynamics of Road Vehicles	W.H. Hucho	SAE Publications, 4th edition 1998
3	Flow Visualization: Techniques and Examples	Smits, Lim	2nd Edition, Imperial College, 2012
4	Boundary Layer Theory	Schlichting, H, Kirsten K.	Springer, 2000