

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology				Branch/Spec.	Automobile Engineering			
Semester	VII				Version	1.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in		July 2017		
Subject code	2AE702		Subject Name		AUTOMOBILE TESTING AND HOMOLOGATION				
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	30	20	50
Pre-requisites:									
Fundamentals of Automobile Engines and Automobile Systems									
Objectives of the Course:									
<ol style="list-style-type: none"> <li>1. To illustrate the Automotive Testing and Certification of passenger cars.</li> <li>2. To understand the need of vehicle testing and certification</li> <li>3. To understand testing of vehicle for noise, emission and performance</li> <li>4. To understand procedure for active and passive safety tests of vehicle</li> </ol>									
Theory syllabus									
<b>Unit</b>	<b>Content</b>								<b>Hrs.</b>
1	<b>Introduction:</b> Need of vehicle testing and homologation, Vehicle testing organizations, Hierarchy of testing: Individual component approval, System level approval and Whole vehicle approval. Type Approval & Conformity of Production tests.								2
2	<b>Engine, Fuel systems and Emissions Testing:</b> Laboratory testing of basic engine parameters: Measurement of BHP, IHP, Engine testing on dynamometers, different types of dynamometers hydraulic, eddy current etc., engine analysers- for petrol and diesel engines, FIP calibrating and testing, Emission test for CO, HC, NO <sub>x</sub> , CO <sub>2</sub> , PM, etc. using exhaust gas analysers, their types. Orsat apparatus, infrared gas analysers, smoke meter.								7
3	<b>Noise vibration and Harshness Testing:</b> Review of vibration fundamentals, vibration control, fundamentals of acoustics, human response to sound, automotive noise criteria, Standard noise measurement methods, Noise inside and outside the vehicle, sources of vehicle noise- intake and exhaust noise, combustion noise, mechanical noise, noise from auxiliaries, wind noises, transmission noises, brake squeal, structure noise, noise control methods. Pass by Noise testing method								7
4	<b>Vehicle Performance Testing:</b> Methods for evaluating vehicle performance- energy consumption in conventional automobiles, performance, emission and fuel economy, Operation of full load and part load conditions, effect of vehicle condition, tyre and road condition and traffic condition and driving habits on fuel economy, Gradeability test, Turning circle diameter test, Steering Impact test, Steering effort test.								6
5	<b>Road and track testing:</b> Initial inspection, PDI, engine running in and durability, intensive driving, maximum speed and acceleration, brake testing on the road, hill climbing, handling and ride characteristics, safety, mechanism of corrosion, three chamber corrosion testing, wind tunnel testing, road testing, test tracks.								5
6	<b>Vehicle testing on chassis dynamometers:</b> Two wheel & four wheel dynamometers, vehicle testing lanes - side slip testers, wheel alignment testing, wheel balancing, brake test, head light alignment and light intensity testing.								6

7	<b>Active and Passive Safety testing:</b> Wheel rim testing for cornering and radial fatigue, Fire resistance test, bumper test, crash test, side impact test, rollover test, safety belt test, Airbag test, Safety belt anchorages, Seat anchorages & head restraints, Occupant protection Impact test, Side door intrusion test.	6
8	<b>Automobile testing standards:</b> Introduction, overview and study of testing standards like; AIS testing standards, Euro Standards, SAE standards. ISO26262 standards for functional safety of electrical and/or electronic systems in automobiles. Understanding of some AIS Standards: AIS-008 (Installation requirements of lighting and light-signaling devices for motor vehicles having more than three wheels, trailer and semi-Trailer excluding agricultural tractor and special purpose vehicles), AIS-018:2001 (Automotive Vehicles - Speed limitation Devices – Specifications), AIS-037 (Procedure for Type Approval and establishing conformity of production for safety of critical components), AIS- 093 (Code of practice for construction and approval of truck cabs & truck bodies), AIS-003 (Automotive Vehicles - Starting Gradeability - Method of Measurement and Requirements), AIS-038 (Battery Operated Vehicles – Requirements for Construction and Functional Safety).	6
<b>Practical content</b>		
Practical assignments and tutorials are based on above syllabus.		
<b>Text Books</b>		
1	Automotive technology, Dr. N.K.Giri, Khanna publishers	
2	Motor vehicle inspection, W. H. Crouse and L. Anglin, McGraw Hill Book Co	
<b>Reference Books</b>		
1	Vehicle Accident Analysis and Reconstruction Methods, Raymond M. Brach and R. Matthew Brach, SAE International	
2	Vehicle operation and performance, J. G. Giles, Wildlife Publications	
3	Automotive Safety Handbook, Ulrich Seiffert and Lothar Wech, SAE International	
4	ISO Standards	
<b>ICT/ MOOCs references</b>		
1	<a href="https://nptel.ac.in/courses/10710600/">https://nptel.ac.in/courses/10710600/</a>	
2	<a href="https://nptel.ac.in/courses/112106225/">https://nptel.ac.in/courses/112106225/</a>	
<b>Course Outcomes:</b>		
After completion of this course, student will be able to understand		
<ol style="list-style-type: none"> <li>1. The number of rules and norms applying to automobiles has increased globally due to increased emphasis on safety and environmental protection.</li> <li>2. Newly designed automobiles or automobile models are to be tested thoroughly for its performance and safety before it reaches to the users.</li> <li>3. This subject will give preliminary idea regarding some of the practices and standards followed in automobile industry for their testing and homologation.</li> </ol>		