

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**AUTOMOBILE ENGINEERING (02)**  
**Subject Name: TWO AND THREE WHEELER TECHNOLOGY**  
**Subject Code: 2170207 (Draft Syllabus)**  
**B.E 7<sup>th</sup> SEMESTER**

**Type of Course:** - Advanced / Application

**Pre-requisite:**- Automobile System

**Course Objective:** The course is designed to understand different types of two and three wheelers types, construction and working. Students will also be able to learn about different functions of two and three wheelers.

**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)		
				PA	ALA	ESE	OEP			
<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>70</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>150</b>

L: Lectures; T: Tutorial; P: Practical; C: Credits; ESE: End Semester Examination; PA: Progressive Assessment.

Sr. No.	Course Contents	Total Hrs	% Weightage
<b>1.</b>	<b>Introduction:</b> Development and history of two & three wheeler vehicles. Classification & layouts of two wheelers (motorcycles, scooters, mopeds) and Three wheeler vehicles (by applications – passengers & goods carriage, capacity etc.). Study of technical specification of Two & Three wheeler vehicles.	<b>03</b>	<b>10</b>
<b>2.</b>	<b>Power Plant :</b> Selection criteria and Design considerations for two wheeler & three wheeler power plants (Engine). Systems requirements for Engine lubrication, cooling & starting (Kick starter mechanism, Moped cranking mechanism & Button Start mechanism). Recent developments in engine (2 stroke/4 stroke engines, Fuel used – Gasoline, CNG, Diesel AND high powered engine), Electric Vehicles. Valve timing and port timing diagram, scavenging,	<b>05</b>	<b>15</b>

	<p>types of scavenging and relative merits and demerits with one another. Study of different Exhaust system layouts, it's routing and elevation.</p> <p>Starting Mechanism / Procedure of three wheelers – Hand Lever &amp; Rope drive types in particular, its construction and design criteria.</p>		
<b>3.</b>	<p><b>Chassis &amp; Sub Systems:</b></p> <p>Main frame and its types, Diamond frame, Cradle frame, Back bone frame, Under bone frame. Study of Parking stand types and its design criteria.</p> <p>Chain and shaft drive, Clutch, purpose, types, single plate, multiple plates, centrifugal clutches working principle, merits and demerits, CVT-Continuously Variable Transmission, gear box, purpose, Sliding mesh gear box, constant mesh gear box – construction and working principle - gear controls &amp; shifting mechanism.</p>	<b>05</b>	<b>20</b>
<b>4.</b>	<p><b>Suspension &amp; Steering Handle bar:</b></p> <p>Front suspension system – shock absorber construction and working principle.</p> <p>Rear suspension system – Mono type suspension.</p> <p>Steering Handle bar on two wheeler / three wheeler vehicles.</p> <p>Instrumentation &amp; Controls: Two wheeler / three wheeler panel meters &amp; controls. All types Switches, Indicators, warnings indicators / buzzers &amp; actuating levers on steering handle bar.</p> <p>Starting / Ignition and steering lock key switch on Steering Handle Shaft.</p>	<b>03</b>	<b>20</b>
<b>4.</b>	<p><b>Brakes and Wheels:</b></p> <p>Brake types – Drum brakes, Disc brakes – construction and working principle / purpose. Hand Brake and Paddle brake and its actuating mechanism. Design criteria actuating mechanism components selection considerations.</p> <p>Brake circuit Layout for two wheeler and three wheeler vehicles.</p> <p>Wheels - Front and Rear – Wheel rim types – construction of spokes wheel - construction of cast wheel – construction of Alloy wheels.</p> <p>Tyre – functions – materials – types – construction of tube type tyre and tubeless tyres, it's advantages &amp; comparison – methods vulcanizing of Tubes &amp; Tyres for Tubeless tyres.</p>	<b>08</b>	<b>20</b>
<b>5.</b>	<p>Road Performance: Handling characteristics, road holding &amp; vehicle stability, riding characteristics. Driver &amp; pillion seating arrangement, seat height adjustment, ergonomics, seating posture &amp; comfort. Various Safety measures &amp; arrangements.</p> <p>Special requirements for Racing bikes. Maximum speed, Turning Circle diameter, Brake performance.</p>	<b>04</b>	<b>10</b>
<b>6.</b>	Two & three wheeler Maintenance:	<b>10</b>	<b>20</b>

	Importance of maintenance – general maintenance, scheduled maintenance, Servicing of two wheeler vehicles, periodic checkups. Comparative study of specifications & maintenance of different types of two Wheelers – Motor Cycles – Scooter - Moped – race vehicles. Trouble shooting causes and remedies. Comparative study of specifications & maintenance of different types of Three wheeler vehicles – auto rickshaw – pick up van – delivery van – trailer. Schedule of service by the different manufacturer. General maintenance servicing manuals – periodic checkups for three wheeler vehicle		
7.	Electrical Systems & Instruments: Battery specifications, Charging system, Lighting (front & rear), Ignition key switch, Horn, Side Signaling, Instruments & Indicators.	04	05
8.	Helmets: Types & purpose. Safety standards related to helmets.	1	05

#### List of experiments (any ten):

1. Dismantling & assembling of a two wheeler engine
2. Study of motorcycle & scooter carburetors & petrol injection system.
3. Dismantling & assembling of two wheeler gear box
4. Study of i) Kick starter mechanism ii) Moped cranking mechanism iii) Button Start mechanism
5. Study of three wheeler drive line & chassis
6. Rear & front brake overhauling & adjustments
7. Study of handle bar controls & adjustments
8. Dismantling & assembling of flywheel magneto & setting ignition timing
9. Study of wiring diagram & electrical systems
10. Dismantling & assembling of the suspension system

#### Reference Books:

1. Newton Steed, "The Motor Vehicle", McGraw Hill Book Co. Ltd., New Delhi
2. Siegfried Herrmann, "The Motor Vehicle", Asia Publishing House, Bombay.
3. "Two stroke Motor Cycles", Staff & Motor Cycles, London Iife Books.
4. G.B.S. Narang, "Automobile Engineering", 5th Edition, Khanna Publishers, Delhi.
5. Service Manuals of Manufacturers of Indian Two & Three wheelers.
6. Service Manual, Jeep Utility Vehicles, Villys Motors, Ioc., USA.

#### Course Outcomes:

1. Learning of different types of two and three wheelers.
2. Learning of special parts and their importance and working in two and three wheelers.
3. Learning of maintenance of two and three wheelers.

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.