GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering Syllabus

Subject Code : 3716403

Subject Name : Two and Three Wheeler Technology

WEF Academic Year :	2023 - 24
Semester :	1
Category of the Course :	Program Elective I

Prerequisite : To have basic knowledge of first year subject like basic mechanical engineering.

Rationale : The course is design to provide comprehensive and logical knowledge of various systems and technologies used for modern two and three wheelers. The course offers the understanding of various constructional and operating details of components. It also includes knowledge about latest materials and design aspects.

Course Scheme :

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

Course Content :

Sr. No.	Content	Total Hrs.
1	**Introduction :** Classification, Layouts, Basic systems for two and three wheelers.	3
2	**Engine Technologies :** Two stroke and four stroke SI engine, merits and demerits, Offset piston engine, Spingless valve operating engine, Valve timing diagrams, Symmetrical and unsymmetrical port timing diagrams, Selection criteria for engine, Design considerations for engine, Types of scavenging processes merits and demerits, Scavenging pumps, Rotary valve engine, Fuel supply system, Lubrication system, Ignition system, Cranking system.	8
3	**Power Train :** Layouts, Primary reduction, Types of clutch, Clutch release mechanism, Dual clutch, Types of gearbox, CVT, Gear shifting mechanism, Final drive.	8
4	**Suspensions and Steering :** Steering geometry and effects, Handlebar—types and construction, Suspension requirements, Design considerations for suspension system, Types of front and rear suspension, Shock absorber, Dynamic damping control in suspension.	5
5	**Brakes, Wheels and Tires :** Design considerations for brakes, Types of brakes, Mechanical and hydraulic brake control system, ABS, Spoked wheel, Cast wheel. Disc wheel, Requirements of tires, Types of tires.	6

6	**Frame and Body :** Different loads on frame, Design considerations, Different types, Vibration dampers, modern materials for frame and body, Ergonomic considerations.	4
7	**Electrical Systems :** Battery, Charging system, Lighting system, Handlebar Controls, Side Stand/Ignition Interlock System, Instruments and Indicators.	5
8	**Electric Vehicles :** Different drivetrain layout of electric two and three wheeler, EV batteries and motors, Controller, BMS, High Performance Electric Two Wheelers.	6

Suggested Specification table with Marks (Theory) :

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**40**	**30**	**10**	**00**	**00**

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 Book :

1. Panchal. D, Two and Three Wheeler Technology, PHI learning Pvt. Ltd., New Delhi
2. Foale .T, Motorcycle Handling and Chassis Design, Spain
3. Zimmerman. M, The Essential Guide to Motorcycle Maintenance, Motorbooks
4. Newton Steed, "The Motor Vehicle", McGraw Hill Book Co. Ltd., New Delhi.
5. Siegfried Herrmann, "The Motor Vehicle", Asia Publishing House, Bombay.
6. "Two stroke Motor Cycles", Staff & Motor Cycles, London llefe Books.
7. G.B.S. Narang, "Automobile Engineering", Khanna Publishers, Delhi.
8. Service Manuals of Manufacturers of Indian Two & Three wheelers.
9. Service Manual, Jeep Utility Vehicles, Willy Motors, Inc., USA.

Course Outcome :

After Completion of the Course, Student will able to :

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Classify types of two and three wheeler vehicles and explain different layouts	10%
CO-2	Demonstrate working of different systems on engines.	25%
CO-3	Illustrate transmission, suspension and steering systems.	35%
CO-4	Exemplify construction and working details of different components like brakes, wheels, tires and frames.	20%
CO-5	Identify and explain different systems of electric vehicles	10%

List of Experiments :

1. To identify the major components on two and three wheeler vehicle layout.
2. To study about two stroke, four stroke engines, port timing and valve timing diagrams.
3. To study about fuel supply and lubrication system used for two and three wheeler vehicles.
4. To study about ignition systems.
5. To study construction and working of different types of clutches.
6. To demonstrate different transmission system and its components.
7. To study about steering and suspension systems of two and three wheeler vehicles.
8. To demonstrate working of different types of brakes.
9. To study about construction of different types of frames.
10. To study the different components of electric vehicle.

Major Equipment :

1. Two stroke and Four stroke Engines
2. Cut section models for Fuel supply and lubrication systems
3. Single plate, Multi-plate and Centrifugal clutch assemblies
4. Cut section of Constant mesh, Sequential, Differential and CVT gearbox assemblies
5. Cut section of Leaf springs, Telescopic suspension and Mono suspension system
6. Single and double cradle frames, Engine based frame
7. Layout of Electrical systems
8. Layout of Electric vehicles
9. Different components of EVs

List of Open Source Software/learning website :

1. http://nptel.ac.in/
2. www.learnerstv.com
3. http://auto.howstuffworks.com/
4. nptel.iitk.ac.in/

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