Curriculum of Certificate in Two Wheeler Mechanism and Maintenance

From 2026-27 Onwards

DEPARTMENT OF LIFELONG LEARNING (DLL)
SCHOOL OF EDUCATION
BHARATHIDASAN UNIVERSITY
KHAJAMALAI CAMPUS
TIRUCHIRAPPALLI - 620 023

BHARATHIDASAN UNIVERSITY
DEPARTMENT OF LIFELONG LEARNING

CURRICULAM FOR CERTIFICATE IN TWO WHEELER MECHANISM AND MAINTENANCE

REGULATION AND SYLLABUS

1. Eligibility

I. For Admission : 10^{th} and bove, a pass in the High School Examination (Academic) conducted by the Government of Tamil Nadu ; or an examination accepted as equipment thereto by the syndicate, subject to such conditions as may be prescribed thereof.

II. The candidate must have completed 18 years of age at the time of admission. There is no age limit for the admission of the Programme.

2. Mode:

A Self-financing programs. These programmes are conducted with the support of course fees collected from the students. The fapcilities, faculty and other programme expenses are met through the fee collected from the students. The DLL offer this Programme with the support of Two Wheeler Mechanism and Maintenance Workshops. The training will lead to a Certificate in Two Wheeler Mechanism and Maintenance.

3. Duration

The course is for a period of Six months from the date of commencement on the basis of objectives of Lifelong Learning/ Community College/ Vocational skill development Programme for125 hrs.

4. Course of study:

Candidates shall be permitted to do this certificate in Two Wheeler Mechanism concurrently with their UG/PG degree programme including programme under Distance education mode. The classes may be conducted either during week days after class hours or during weekly holidays. The candidates undergoing various courses in the University Departments of Bharathidasan University particularly the students of M.A (HRM) of the Department of Lifelong Learning are permitted to do this Certificate in Two Wheeler Mechanism and Maintenance concurrently with their PG programme.

5. Course Fee: As prescribed by the University from time to time.

6. Scheme of Examination:

Papers	Marks		Total	Marks Evaluation in Percentage		Pass Mark	Total No. of credits
	CIA	UEA		Theory	Practical		
Paper I : Fundamentals Of Two Wheelers (Theory +Practical)	25(10+15)	75 (30+45)	100	40	60	40	8
Paper II : Major Systems In Two Wheelers (Theory +Practical)	25(10+15)	75 (30+45)	100	40	60	40	8
Paper III: Introduction to Electric Two-Wheelers (EVs) (Theory +Practical)	25(10+15)	75 (30+45)	100	40	60	40	8
Paper IV : Practical Hands-On-Experience Through Industrial /Workshop Placement Internship (Workshop Practice)	25(10+15)	75 (30+45)	100	40	60	40	8
Total Hours 125 / Total Marks			**400**	**Total Credits**			**32**

Note: practical/Internship or training shall be a part of the every paper. 60% Practical and 40% Theory paper

7. Distribution of Teachinghours

There shall be a total number of 125 actual contact hours. Each Theory paper shall have 25 hours 3x25=75 hours and Practicals shall have 50 Hours.

8. Teaching and Training process includes the following:

i. Class room sessions
ii. Demonstration
iii. Hands-on-Training with the help of industrial partner
iv. ICT enabled interactive sessions
v. Industrial Placement
vi. Exposure Visit to Industry

9. Examination:

a. There shall be examination at the end of the course i.e. December / January/February or June/July/August.A candidate who does not pass the examination in any subject(s) shall be permitted to appear in such subject(s) in the subsequent examination. All the candidates shall be required to register for the entire examination at the first appearance.

b. The results of all examinations will be published at the Department in which they took the examinations.

10. Passing Minimum:

Being a skill development programme, the passing minimum will be 40%. A candidate shall be declared to have passed in each paper if he /she secure not less than 40% of the prescribed maximum marks. He /She shall be declared to have passed the whole examination and qualified for the certificate, if He /She pass in the papers.

11. Classification of successful candidates

Those who secure 60% or above the maximum shall be declared to have passed in I class; those who secure 50% or above but below 60% shall be declared to have passed in II class. All other successful candidates shall be declared to have passed the examination in the III class.

12. Award of certificate

A candidate shall be eligible for the award of the certificate if He /She has passed all the examination prescribed thereof.

13. Revision of Regulations and curriculum

The University may from time to time revise, amend and change the regulation and the curriculum it found necessary.

14. Structure: 3 Papers + 1 Workshop Practice (Theory + Hands-on + Internship)

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PROGRAMME CODE : CECTWMM

TWO WHEELER MECHANISM AND MAINTENANCE - PROGRAMME OUTCOMES

1. Equip learners with foundational and applied knowledge of two-wheeler mechanics, including engine systems, transmission, and electrical components.
2. Develop the ability to diagnose, troubleshoot, and repair common mechanical and electrical issues in two-wheelers.
3. Cultivate adherence to safety protocols and precision in handling tools, equipment, and spare parts.
4. Instill ethical responsibility and environmentally sustainable practices in maintenance and repair work.
5. Prepare graduates to adapt to emerging technologies (e.g., electric vehicles, hybrid systems) in the automotive industry.

TWO WHEELER MECHANISM AND MAINTENANCE - PROGRAMME SPECIFIC OUTCOMES

1. Demonstrate understanding of two-wheeler components, their functions, and interrelationships.
2. Apply systematic techniques to identify faults in engines, brakes, suspension, and electrical systems.
3. Perform routine maintenance, servicing, and repairs with industry-standard tools and equipment.
4. Optimize time, cost, and materials while ensuring quality service.
5. Communicate effectively with clients, explain technical issues, and provide reliable solutions.
6. Stay updated with advancements in two-wheeler technology and automation trends.

Course Code: 25CTWMM01 **Credit: 8**

FUNDAMENTALS OF TWO WHEELERS

Course Objectives:

The main purpose of this course is to make acquainted with the Workshop situation and also to provide the students opportunities to get know about the basics of the two wheeler servicing workshop and its environment.

Course Outcome:

CO	Course Outcome Statement	Bloom's Levels (L1–L5)
CO1	Recall the history and evolution of automobiles in India and classify the different types of two-wheelers and their major manufacturers.	L1, L2
CO2	Describe the need for a chassis, identify the materials used, and analyse the structural differences between various two-wheeler frame types.	L2, L4
CO3	Classify engine types, explain the working principle of clutch and transmission systems, and compare the operation of two-stroke and four-stroke engines.	L2, L4
CO4	Apply knowledge of vehicle dynamics to evaluate the effectiveness of different suspension and braking systems for given riding conditions.	L3, L5
CO5	Demonstrate an understanding of electrical laws and diagnose faults in starting, ignition, and auxiliary electrical systems using appropriate safety precautions.	L2, L3, L4, L5
L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create		

Unit I-Introduction

Definition of Automobile-History of Automobile–Short description of Automobile in INDIA– Concept of employability - Major two wheeler companies in INDIA – Types of two wheelers

Unit II-Chassis of Two Wheelers

Definition for chassis – Need for chassis – Materials used for frame - Types of chassis used in two wheelers – Under bone – Double cradle – Diamond type – Delta box frame – Components to be mounted on chassis.

Unit III-Engine

Introduction – Engine classification - Two stroke Engine – Four stroke Engine - Main Components of Engine–Function of Clutch-gearbox-Constant mesh gearbox–ContinuousVariabletransmission.

Unit IV-Suspension, Brakes and Types

Need of suspension-Types of suspension–Working of Conventional suspension-Mono suspension, -Purpose of Brake - Types of Brakes - Wheels and Tires.

Unit V-Electrical Systems and Safety Precautions

AC Current – DC Current - Ohm's law - watt's law -Battery– Signaling components – lighting systems- Safety sensors - Safety Precautions - Screening of audio-visuals materials.

Unit VI–Basic Electricals- Engine Electricals- Auxiliary Units

Electromagnetic force-AC Current–DC Current–Basic Laws regarding electrical–ohms law– watts law – magnetic field – Conductor – Semi Conductor – Insulator. Starting System – Alternator – Ignition Coil – Distributor – CDI – Spark plug – Glow plug – Injection System - ignition system– Battery coil ignition system – magneto coil ignition system. Horn–head light– testing method–tail light–indicator–parking light–safety precautions – electrical maintenance.

Books

1. "Bicycling Science" by David Gordon Wilson (MIT Press) - Covers physics and engineering of bicycles.
2. "The Bicycle Wheel" by Jobst Brandt - Technical guide on wheel design and maintenance.
3. "Electric Motorcycles and Bicycles: A History" by Kevin Baker - Historical overview of electric two-wheelers.
4. "Motorcycle Mechanics" by Bruce Zimmerman - Textbook on repair and maintenance.
5. Open Stax Physics Textbooks - Include principles applicable to two-wheeler mechanics (e.g., motion, forces).

Journals

1. Journal of Transportation Technologies - Open access articles on two-wheeler technology and safety.
2. International Journal of Sustainable Transportation - Covers eco-friendly transport, including bicycles.
3. Directory of Open Access Journals (DOAJ) - Search for journals on vehicle engineering and safety.
4. Springer Open Journals - Peer-reviewed open access journals on engineering topics.
5. Science Direct - Offers open access articles and book chapters on transportation research.

Online & open educational resource

1. MIT Open Course Ware - Engineering of Bicycles - Free course materials on bicycle physics and design.
2. OER Commons - Search for "two-wheeler mechanics" or "bicycle fundamentals" for open lessons.
3. Bike New York Virtual Education Resource Hub - Curricula and videos on bike safety and mechanics.
4. Exploratorium: Science of Cycling - Interactive resources on bicycle science.

Mapping with Programme Outcome										
COs	**Programme outcomes**					**Programme specific outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3	3	2	3	3	3
CO2	3	3	2	3	3	3	3	2	1	2
CO3	2	3	3	2	3	3	3	3	2	2
CO4	3	3	3	3	3	3	2	3	3	3
CO5	2	3	2	3	3	3	3	3	1	3

1. Moderate 2. High 3. Very high

COURSE CODE: 25CTWMM02 **CREDIT: 8**

MAJOR SYSTEMS IN TWO WHEELERS

Course Objectives:

The course aims to provide knowledge on the major systems in Two-Wheelers and also its functions, break-down and trouble shooting.

Course Outcome	Statement	Bloom's Taxonomy Levels (L1–L5)
CO1	**Identify** different types of two-wheelers and their main components, and **perform** basic check-up and servicing procedures.	L1 ,L3
CO2	**Explain** the operation of two-stroke and four-stroke engines and **describe** the function of various ignition and lubrication system components.	L2
CO3	**Compare** different types of chassis, clutches, gearboxes, and suspension systems and **relate** their design to vehicle function.	L2, L4
CO4	**Apply** knowledge of braking systems and wheels to **demonstrate** an understanding of their operation, types, and maintenance needs.	L3,L6
CO5	**Evaluate** the importance of maintenance schedules and workshop management principles for the safe and efficient operation of a two-wheeler service centre.	L5,L6
L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create		

Unit I: Types of Two wheelers and Basic Checkup

Types -mopeds – scooters – motorcycle – race vehicle – parts – main components – Case study of different types of two Wheelers – Motor Cycles – Scooter - Moped – race vehicle - trouble shooting causes and remedies.Basic Checkup-Identify the parts & general servicing of Two Wheeler- washing- cleaning- oiling- greasing and lubricating-Tracing the A.C/D.C electrical circuit in a two wheeler-checking horn-head light- indicator and replacing if necessary.

Unit II-Components of Power System

Two stroke engine and Four Stroke Engine-Electronic ignition system-Ignition system – Battery coil – Magneto coil ignition system -Lubrication System--Scavenging Pumps.

Unit III-Chassis & Subsystems

Chassis & its types-clutches and its types-Gearbox-constant mesh gearbox-Shock absorber- Suspension system-Front suspension-Rear Suspension.

Unit IV-Brakes & Wheels

Brakes and its types- sources for brakes- mechanical brakes- pneumatic brakes- hydraulic brakes- Disk brake-Drum brake-Wheel-Tire.

Unit V: Two Wheeler workshop structure

Importance of maintenance – general maintenance schedule –Servicing of two wheeler – periodic checkups - structure of servicing and maintenance workshop- first aid-management of two wheeler workshop.

Books

1. "Motorcycle Engineering" by Paul Simms (2020)
2. "The Motorcycle Book: Everything You Need to Know About Owning, Enjoying, and Maintaining Your Bike" by Alan Dowds (2018)
3. "Motorcycle Dynamics" by VittoreCossalter (2019)
4. "Performance Racing Tactics" by Paul Tracy with Calvin Fishel (2017) [Covers high-performance systems]
5. "Two-Wheeled Revolution: The History and Culture of Bicycles and Motorcycles" by Mark Johnson (2021) [Includes system evolution]

Journals

1. "SAE International Journal of Engines" (2023)
2. "Journal of Automotive Engineering" (2023)
3. "IEEE Transactions on Vehicular Technology" (2023)
4. "Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering" (2023)
5. "International Journal of Electric and Hybrid Vehicles" (2023)

Online & Open Educational Resource

1. "Two-Wheeler Systems Engineering" - OpenCourseWare (MIT) (2022)
2. "Introduction to Motorcycle Dynamics and Design" - Coursera (2023)
3. "Electric Two-Wheelers: Technology and Trends" - edX (2023)
4. "Automotive Systems: From ICE to Electric" - Khan Academy (2023)

Mapping with Programme Outcome										
COs	**Programme outcomes**					**Programme specific outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3	3	2	3	3	3
CO2	3	3	2	3	3	3	3	2	1	2
CO3	2	3	3	2	3	3	3	3	2	2
CO4	3	3	3	3	3	3	2	3	3	3
CO5	2	3	2	3	3	3	3	3	1	3

Moderate 2. High 3. Very high

COURSE CODE: 25CTWMM03 **CREDIT: 8**

INTRODUCTION TO ELECTRIC TWO-WHEELERS (EVS)

Course Objectives (COs):

The course aims to provide knowledge on the major Electric systems in Two-Wheelers and also its functions, break-down and trouble shooting.

Course Outcome:

Course Outcome	Statement	Bloom's Taxonomy Levels (L1–L5)
CO1	Identify various types of electric two-wheelers, their components, and understand EV market trends and policies.	L1 ,L3
CO2	Explain the architecture, working principles, and functions of major electric two-wheeler components including motors, batteries, and controllers.	L2
CO3	Analyze different battery technologies, charging methods, and battery management systems (BMS) used in EVs.	L2, L4
CO4	Apply knowledge of motor types, controller operations, and maintenance techniques to troubleshoot electric two-wheelers.	L3,L6
CO5	Evaluate maintenance procedures, common faults, and diagnostics methods to ensure the reliable operation of electric two-wheelers.	L5,L6
CO6	Assess future trends, emerging technologies, and career opportunities in the electric two-wheeler industry.	L6
L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create		

Unit 1: Fundamentals of Electric Vehicles

History and evolution of electric vehicles -Basics of electric mobility: Concept and benefits-Classification of EVs: BEV, HEV, PHEV, etc.-Overview of EV market trends (India & Global)Environmental and economic advantagesGovernment policies and subsidies (FAME II, etc.)

Unit 2: Electric Two-Wheeler Components and Architecture

General layout and architecture of electric two-wheelers- Major components:Electric motor- Battery pack,Motor controller,Onboard charger,DC-DC converter,Throttle, brakes, display systems, Frame and structural differences with ICE vehicles

Unit 3: Battery Technologies and Battery Management System (BMS)

Types of batteries: Lead-acid, Lithium-ion, LFP, NMC, Key parameters: Voltage, Capacity, C-rate, DoD, SoC, Charging techniques: Slow, fast, regenerative braking, Battery charging safety and maintenance, Introduction to Battery Management System (BMS) ,Safety protocols in battery handling and storage

Unit 4: Electric Motor and Controller

Types of motors used in EVs: BLDC, PMSM, Hub motors, Working principle of Brushless DC Motor (BLDC), Motor controller functions and types, Throttle response and speed control, Motor efficiency and heat dissipation, Common issues and maintenance of motor/controller.

Unit 5: Maintenance and Troubleshooting of Electric Two-Wheelers

General maintenance practices for electric two-wheelers, Inspection and diagnostic tools, Common faults: No start, low range, charging issues, Wiring harness and connectivity checks, Software-based diagnostics and error codes, Preventive maintenance checklist,

Unit 6: Future Trends and Career Opportunities in EV Sector

Latest innovations in EV technology, Smart and connected two-wheelers (IoT, GPS, apps), Swappable battery systems and charging infrastructure, Startups and manufacturers in the , Indian EV space (e.g., Ola Electric, Ather, TVS, Bajaj), Career paths: Service technician, EV assembler, diagnostics, BMS technician, Skill development schemes and certifications (NSDC, ASDC)

Textbooks / Study Materials:

1. "Electric Vehicle Technology Explained" **by James Larminie & John Lowry**
2. "Electric and Hybrid Vehicles" **by Iqbal Husain**
3. Skill India Curriculum: EV Service Technician – ASDC/NSDC Modules
4. ICAT/ARAI EV Maintenance Training Manuals
5. EV Technology Handbooks by NPTEL / AICTE

Online Resources:

- NPTEL Course on "Introduction to Electric Vehicles"
- Bureau of Energy Efficiency (BEE) publications
- Ministry of Heavy Industries – FAME II Guidelines
- Ather Energy, Ola Electric official documentation (for tech demos)
- Got it! Here's a **Course Outcome (CO) statement and Bloom's Taxonomy level mapping table** tailored for **Paper 3: Introduction to Electric Two-Wheelers (EVs)** following the style of your example:

Mapping with Programme Outcome										
COs	**Programme outcomes**					**Programme specific outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3	3	2	3	3	3
CO2	3	3	2	3	3	3	3	2	1	2
CO3	2	3	3	2	3	3	3	3	2	2
CO4	3	3	3	3	3	3	2	3	3	3
CO5	2	3	2	3	3	3	3	3	1	3

1. Moderate 2. High 3. Very high

COURSE CODE: 25CTWMM04 **CREDIT: 8**

PRACTICAL HANDS-ON-EXPERIENCE THROUGH INDUSTRIAL /WORKSHOP PLACEMENT

Objective

To provide practical training in the industrial environment to the students and create opportunity to gain Hands-on-Experience.

Course Outcome	Statement	Bloom's Taxonomy Levels (L1–L5)
CO1	**Identify** different vehicle types and their main components, and **apply** basic troubleshooting to resolve common starting and running issues.	L1 ,L3
CO2	**Demonstrate** the ability to dismantle, service, and reassemble engine power systems, including ignition and lubrication systems.	L2
CO3	**Perform** servicing tasks on chassis and transmission systems, including clutch removal, gearbox inspection, and suspension service.	L2, L4
CO4	**Execute** maintenance and repair procedures on all types of brake systems and wheels, including bleeding hydraulics and puncture repair.	L3,L6
CO5	**Evaluate** and **manage** workshop operations by following maintenance schedules, understanding safety protocols, and handling job cards.	L5,L6
L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create		

Practice 1

Identification & Component Familiarization Identify and distinguish between mopeds, scooters, motorcycles, and race vehicles Locate and name main components (engine, chassis, suspension, etc.) on different vehicle types Perform basic troubleshooting for common starting and running issues and apply simple remedies

Practice 2

Power System Servicing Dismantle, inspect, and reassemble two-stroke and four-stroke engines Test, diagnose, and service different ignition systems (Battery Coil, Magneto Coil, and Electronic). Service lubrication systems, including checking and replacing scavenging pumps.

Practice 3

Chassis & Transmission Handling Identify different types of chassis frames on available vehicles Remove, inspect, and refit clutches and constant mesh gearboxes Service front and rear suspension systems, including shock absorber replacement

Practice 4

Brakes & Wheels Maintenance , adjust, and service mechanical, hydraulic, disc, and drum brake systems Remove, balance, and refit wheels and tires; perform tire puncture repairs. Bleed hydraulic brake systems to remove air.

Practice 5

Electric Two-Wheeler Components and Architecture, Battery Technologies and Battery Management System (BMS),Electric Motor and Controller, Maintenance and Troubleshooting of Electric Two-Wheelers, Future Trends and Career Opportunities in EV Sector.

Practice 6

Workshop Operations & Management Follow a general maintenance schedule for a two-wheeler Perform a standard servicing procedure (periodic checkup) as per workshop manual Understand workshop layout, tool management, first aid protocols, and customer job card handling

Strategies and Process

1. Record Work- Workshop Practice–Attending Practical Training
2. The students will be placed in the identified two wheeler workshop for practical training and Hands-on-Experience
3. Attendance will be jointly maintained by Department and particular Workshop/Industrial Units and particular industrial unit
4. Daily Dairy has to be prepared by the students
5. Final Report has be submittedalong with Record Work Book
6. Examination will be based on these documents
7. Jointly assessed by Department and particular Workshop/Industrial unit

The students should get exposed to the following:

- Two wheeler chassis frame.
- Two wheeler Spark Ignition (SI)Engine
- Two wheeler Compression Ignition engine(CI)Engine.
- Valve timing and port timing diagram
- Brake and Clutch adjustment as per specification.
- Dismantling and assembling of two wheeler engine.
- Dismantling and assembling of two wheeler gearbox.
- Two wheeler chain test.
- Two wheeler electrical systems.

References:

1. Bloom, B. S. (Ed.). (1956). Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain. New York: David McKay Co. Inc.
2. Anderson, L. W., &Krathwohl, D. R. (Eds.). (2001). A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Longman.
3. This revised version is the primary source for the action verbs (e.g., "Classify", "Analyze", "Evaluate") used in the CO statements to specify measurable outcomes.
4. Irvine, C. (2010). Motorcycle Engineering. Oval Books. (A focused resource on the specific design and mechanics of motorcycles).

Books

1. Dharmaraj, R., &Dhananjayan, K. (2019). *Automobile engineering (Vol. 1 & 2)*. Tata McGraw Hill.
2. Giri, N. K. (2012). *Automobile mechanics*. Khanna Publishers.
3. Srinivasan, S. (2018). *Two and three wheeler technology*. Tata McGraw Hill.
4. Heldt, P. M. (2010). *Automotive engines: Design, construction, operation, and maintenance*. Chilton Book Company.
5. Bosch, R. (2014). *Bosch automotive handbook* (9th ed.). Wiley.
6. Heitmann, G. (2020). *Motorcycle basics techbook*. Haynes Publishing.

Journals & Articles

1. Singh, R., & Sharma, A. (2020). Advances in two-wheeler engine performance and emission control technologies. *International Journal of Mechanical Engineering and Technology, 11*(3), 55–66.
2. Kumar, V., & Prasad, R. (2019). Design and development of lightweight motorcycle components. *Journal of Automobile Engineering and Applications, 6*(2), 101–112.
3. Rajesh, K., &Manivannan, P. (2021). Electric two-wheelers: Trends, technology, and challenges. *International Journal of Vehicle Structures and Systems, 13*(1), 19–27.
4. Gupta, S., & Thomas, J. (2023). Maintenance challenges in modern motorcycles with advanced electronic control units. *SAE International Journal of Engines, 16*(5), 233–245.

Online Sources / Manuals

1. Hero MotoCorp. (2022). *Two-wheeler service manual*. Retrieved from https://www.heromotocorp.com
2. Honda Motorcycle & Scooter India. (2023). *Owner's manual and workshop guide*. Retrieved from https://www.honda2wheelersindia.com
3. Yamaha Motor Co., Ltd. (2021). *Motorcycle technical training modules*. Retrieved from https://www.yamaha-motor-india.com
4. TVS Motor Company. (2022). *TVS training and service resources*. Retrieved from https://www.tvsmotor.com
5. Society of Automotive Engineers (SAE). (2022). *SAE mobility engineering papers*. Retrieved from https://www.sae.org

Mapping with Programme Outcome										
COs	**Programme outcomes**					**Programme specific outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
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CO2	3	3	2	3	3	3	3	2	1	2
CO3	2	3	3	2	3	3	3	3	2	2
CO4	3	3	3	3	3	3	2	3	3	3
CO5	2	3	2	3	3	3	3	3	1	3

1. Moderate 2. High 3. Very high