SHORT TERM VOCATIONAL CERTIFICATE COURSE

THREE WHEELER TECHNICIAN COURSE

(6 months Duration)

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NAME OF THE COURSE: **THREE WHEELER TECHNICIAN COURSE**

SECTOR : Engineering

COURSE CODE : TWT

ENTRY QUALIFICATION: 8th Class (above 18 years)

DURATION: 6 Months (40 Hours: English + Course: 200 Hours)

PRE-REQUISITES: Basic Knowledge in English reading and writing.

TERMINAL COMPETENCE: After completing this course, student will be able to work as a technician for maintaining, diagnosing, and repairing three wheeler vehicles.

INTRODUCTION OF THE COURSE: The Three-Wheeler Technician Course is designed to provide individuals with the necessary knowledge and skills to become proficient in servicing, repairing, and maintaining three-wheeler vehicles such as auto and electric vehicles. This course equips students with a comprehensive understanding of the mechanical, electrical, and technical aspects of three-wheelers, preparing them for a career as skilled technicians in the automotive industry.

OBJECTIVES: The course aims to provide students with both theoretical knowledge and practical skills encompassing three-wheeler systems, components, and technologies, enabling them to comprehensively understand and proficiently diagnose, maintain, and repair auto and electric vehicles.

SKILLS: Students undertaking a Three-Wheeler Technician Course gain a diverse set of skills that prepare them for a career in the automotive industry, particularly in the servicing and maintenance of three-wheeler vehicles such as auto and electric vehicles. Here are some of the key skills are Mechanical Skills, Electrical Skills, Diagnostic Skills, Problem-Solving Skills, Technical Skills, Safety Practices, Communication Skills, Customer Service Skills.

CAREER OPPORTUNITIES: Upon completion of the Three-Wheeler Technician Course, student can pursue various career opportunities in the automotive industry, including three-wheeler service technician at authorized service centers or independent repair shops.

SCHEME OF INSTRUCTION/MODULE:

1. **Communicative English: 40 hours (per module)**
2. **Course: 200 hours (6 months)**

Duration of Course	Theory		On the Job Training		Total	
	Hours	weightage	Hours	weightage	Hours	weightage
1 Module (06 months)	60	30%	140	70%	200	100%

COURSE SYLLABUS

THEORY (60Hrs) **Total Marks: 80**

S. No	THEORY SYLLABUS	Hours	Marks			TOTAL MARKS
			LAQ	SAQ	MCQ	
1	**INTRODUCTION:** Overview of different types of auto and electric vehicles. Basic components and systems of a three-wheeler. Introduction to tools and equipment used in three-wheeler maintenance.	4 Hrs	-	1Q (5M)	2Q (2M)	7
2	**ENGINE:** Introduction to three wheeler engine. Definition of I.C Engine and Classification of I.C engines. Difference between C.I and S.I Engine. Parts of Single cylinder Engine. Construction and working of 4-stroke Petrol and diesel engine (3-Wheeler). Overhead valve mechanism.	16 Hrs	2Q (20 M)	2Q (10 M)	2Q (2M)	32

	Construction and working of Simple carburetor. Working of Fuel Injector, Direct injection system. Cooling system: 1. Air cooling system 2. Oil cooling system. Lubrication System: 1. Petrol-oil lubrication system 2. Splash lubrication system. Engine tuning and troubleshooting.					
3	**POWER TRANSMISSION:** Construction and working of Multiplate wet Clutch, Constant mesh gear box, Belt drive and chain drive, disc wheel, Rim, Tube tyre, Tubeless tyre. Tyre inflation and causes of tyre wear. Tyre rotation. Wheel alignment and balancing Construction and working of hydraulic shock absorbers. Construction and working of mechanical and hydraulic brakes. Anti-lock braking system (ABS) and its advantages.	14Hrs	2Q (20 M)	2Q (10 M)	2Q (2M)	32
4	**ELECTRICAL SYSTEM:** Battery (Dry and Lead acid), Starter motor, Alternator/Generator, Lights and signals, Instrument cluster, Mobile phone Chargers, GPS navigation, Horn. Construction and working of Battery coil ignition system, Ignition coil, Spark plug, Ignition switch.	14 Hrs	1Q (10 M)	2Q (5M)	2Q (2M)	22
5	**THREE WHEELER ELECTRIC VEHICLES:** Introduction about e-vehicle. Construction and working of	12Hrs	1Q (10 M)	1Q (5M)	2Q (2M)	17

	Battery pack, Electric motor, Controller and charging system. Benefits of riding electric motor three wheeler.					

ON THE JOB TRAINING AND PRACTICALS: 140 Hrs

Max. Marks: 100 (External Exam: 40 Project & Viva: 10 & Internship/OJT: 50)

S. No.	Name of the topic for OJT/Practical	Time in Hrs
1.	Tools, Equipment and Safety precautions in workshop	10
2.	Engine Overhauling	40
3.	Power Transmission	30
4.	Electrical System	20
5.	Three Wheeler Electrical Vehicle	10
6.	Servicing and Maintenance of three wheeler vehicle	30

LIST OF EQUIPMENT

Setting up a three-wheeler workshop requires a variety of tools and equipment to perform maintenance, repairs, and diagnostics effectively. Here's a list of common tools and equipment used in a three-wheeler workshop:

1. Hand Tools:
   - Wrench set (combination, adjustable, socket)
   - Screwdriver set (flathead, Phillips, Torx)
   - Pliers (needle-nose, slip-joint, locking)
   - Hammer
   - Spanners
   - Allen keys
   - Pry bar
   - Wire brush
   - Chisel
2. Power Tools:
   - Electric drill
   - Angle grinder
   - Impact wrench
   - Electric screwdriver
   - Bench grinder
   - Orbital sander
   - Jigsaw

3. Diagnostic Tools:
    - Multimeter
    - Compression tester
    - Vacuum gauge
    - Timing light
    - Fuel pressure gauge
    - OBD-II scanner
4. Lifting and Handling Equipment:
    - Hydraulic floor jack
    - Jack stands
    - Vehicle ramps
    - Engine hoist or crane
    - Transmission jack
    - Wheel chocks
5. Specialized Tools:
    - Valve spring compressor
    - Bearing puller
    - Brake caliper piston tool
    - Chain breaker and riveter
    - Clutch holding tool
    - Flywheel puller
    - Oil filter wrench
6. Workshop Equipment:
    - Workbench with vice
    - Tool storage cabinets or chests
    - Parts washer
    - Oil drain pan
    - Waste oil storage container
    - Fire extinguisher
    - First aid kit
7. Safety Equipment:
    - Safety glasses
    - Gloves (mechanic's gloves, disposable gloves)
    - Hearing protection (ear plugs, earmuffs)
    - Respirator mask
    - Protective clothing (coveralls, aprons)
8. Cleaning and Maintenance Supplies:
    - Degreaser
    - Brake cleaner
    - Lubricants (penetrating oil, silicone spray, grease)
    - Shop towels
    - Cleaning brushes
    - Hand cleaner

9. Consumables:
    Brake fluid
    Engine oil and filters
    Transmission fluid
    Coolant

Qualifications of Teaching Faculty:

Engineering Graduate from Mechanical or Automobile Engineering from any recognized university with an aggregate of 55% marks.

Reference books/ Internet links:

1. Three-Wheeler Service and Repair Handbook by Pete Shoemark
2. Introduction to Three-Wheeler Technology by John Davies
3. Electric Three-Wheeler Technology Principles and Applications by Mark Watson
4. Fundamentals of Automotive Technology for Three-Wheeler Technicians by Jack Erjavec
5. Three-Wheeler Maintenance and Troubleshooting Guide by Michael Smith

Division of Marks:

Theory: 100 Max. Marks

1. Communicative English : 20 marks
2. Short Questions : 6 x5m = 30 marks
3. Long Questions : 4x10 = 40 marks
4. Multiple Choice Questions : 10x1 = 10 marks

Practical: 100 Max. Marks

1. External : 40 marks
2. Record/ Mini Project & Viva : 10 marks
3. Internship/ OJT : 50 marks

MODEL QUESTION PAPER

Time : 3hrs **Max. Marks : 100**

I. **Section – I (Language)**

(Communicative English) **20M**

Section – II (Subject)

II. Answer Six of the following: **6 x 5 = 30M**

1. What are the primary components of a three-wheeler's engine?
2. Describe the role of the spark plug in the ignition system of a three-wheeler engine.
3. Why is proper cooling essential for a three-wheeler engine?
4. What is the purpose of the transmission system in a three-wheeler?
5. Explain the function of the clutch in the transmission system of a three-wheeler.
6. What are the main components of the electrical system in a three-wheeler?

III. Answer any Four of the following: **4x 10 = 40M**

1. Explain the difference between a two-stroke and a four-stroke petrol engine.
2. What are the advantages and disadvantages of two and four stroke petrol engine?
3. Describe the function of an anti-lock braking system (ABS) and its advantages.
4. Explain about the construction and working of electric motor.
5. Explain about the construction and working of constant mesh gear box.
6. Explain the construction and working of Battery ignition system.

Section – II (Objective)

IV. Multiple Choice Questions: **10 x 1 = 10M**

1. What is the purpose of the piston in a three-wheeler engine?

1. To compress air-fuel mixture 2. To convert heat energy into mechanical energy

3. To control fuel flow 4. To regulate engine temperature

2. Which type of engine is commonly used in three-wheelers?

1. Rotary engine 2. V6 engine
3. Single-cylinder engine 4. Inline-six engine

3. What is the function of the camshaft in an engine?
1. To regulate fuel injection timing 2. To control valve operation
3. To adjust ignition timing 4. To manage exhaust flow

4. What is the purpose of a rectifier in a three-wheeler's electrical system?
1. To regulate fuel flow 2. To convert AC to DC
3. To control engine temperature 4. To adjust valve timing

5. Which component stores electrical energy in a three-wheeler?
1. Starter motor 2. Alternator
3. Battery 4. Ignition coil

6. What type of brake system is commonly used in three-wheelers?
1. Drum brakes 2. Disc brakes
3. Hydraulic brakes 4. Mechanical brakes

7. What is the purpose of brake fluid in a hydraulic braking system?
1. To lubricate brake components 2. To cool the brakes
3. To transfer force from the brake pedal to the brake calipers
4. To absorb moisture and prevent corrosion

8. Which component converts hydraulic pressure into mechanical force in a brake system?
1. Brake rotor 2. Brake caliper
3. Brake master cylinder 4. Brake pad

9. What is the primary function of a fuel pump in a three-wheeler?
1. To regulate fuel pressure 2. To filter fuel
3. To control fuel injection timing 4. To convert fuel into vapor

10. Which component mixes air and fuel in a carburetor?
1. Throttle body 2. Float chamber
3. Venturi tube 4. Jet

11. What does EFI stand for in the context of fuel systems?
1. Electronic Fuel Injection 2. Efficient Fuel Intake
3. Engine Fuel Ignition 4. External Fuel Inlet

12. What is the purpose of a clutch in a three-wheeler's transmission system?
1. To adjust valve timing 2. To convert engine power into rotational force
3. To engage and disengage power transmission 4. To regulate fuel flow

13. Which component is responsible for transmitting power from the transmission to the wheels?
1. Drive shaft 2. Gearbox
3. Differential 4. Axle

14. What does CVT stand for in the context of transmission systems?
1. Constant Velocity Transmission 2. Continuously Variable Transmission

3. Centrifugal Viscosity Transmission 4. Controlled Valve Timing

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PRACTICAL QUESTION BANK

Time : 3Hrs Maximum Marks : 50

Section – I 2 x 10 = 20 Marks

Note: Answer any two of the following.

1. Change the engine oil and replace the oil filter on a three-wheeler vehicle.
2. Inspect and adjust the drive chain tension to ensure proper alignment and operation.
3. Check and adjust tire pressure according to manufacturer specifications.
4. Troubleshoot a faulty headlight circuit on a three-wheeler. Identify the cause of the problem and repair it.
5. Test the battery voltage using a multimeter and determine its condition (e.g., charge level, charging system output).
6. Inspect the brake pads for wear and measure the remaining thickness. Replace the pads if necessary.
7. Bleed the brake system to remove air bubbles and ensure proper brake fluid circulation and firm pedal feel.
8. Adjust the brake lever or pedal free play to ensure optimal braking performance and responsiveness.
9. Inspect and replace the fuel filter to ensure clean fuel flow and prevent engine damage.
10. Adjust the clutch cable tension to ensure smooth engagement and disengagement of the clutch.

Section – II 1 x 20 = 20 Marks

Note: Answer any one of the following.

1. Clean and inspect the carburetor or fuel injector system, ensuring proper fuel delivery and air-fuel mixture.
2. Troubleshoot a non-functioning headlight on a three-wheeler. Identify possible causes and demonstrate how to check the headlight bulb, wiring, and switch.
3. Bleed the brake system of a three-wheeler to remove air bubbles and ensure firm brake pedal feel. Describe the steps involved in the bleeding process.

4. Inspect the fuel lines and connections of a three-wheeler for leaks or damage. Demonstrate how to replace a damaged fuel line and ensure proper sealing.
5. Adjust the clutch cable tension on a three-wheeler to ensure smooth engagement and disengagement. Explain the importance of proper clutch adjustment.
6. Inspect the gearbox oil level of a three-wheeler and top up if needed. Explain the importance of regular gearbox maintenance for smooth gear shifting and longevity.

Section – III

Record / Mini Project & Viva 10 Marks