Swami Vivekananda Rural Community College (SVRCC)

Name of the Programme–Vocational Diploma in Four Wheeler Mechanism - Syllabus (Flexible Skill Training Mode)

Course Title	Automobile Engine & Electrical System
Course Code	VDFWM-1
Course Credit	4

Course Objectives

While studying the **Automobile Engine and Electrical system**, the student shall be able to:

- Describe the construction and Principle of operation of Internal Combustion Engine
- Summarize the different types of combustion of Diesel Engine
- Identify the fuel inlet and exhaust system of automobile
- Gain knowledge about engine sub-system like Cooling and Lubricating system
- Illustrate the various maintenance process of engine
- Explain about the electric circuits, lighting system and dash board gauges of a automobile

Course Outcomes

After completion of the **Course Automobile Engine and Electrical system**, the student will be able to:

- Identify the various parts of the engine
- Compare and contrast the SI and CI engine of automobile
- State the components and working of cooling and lubricating system
- Demonstrate the execute the general procedure of vehicle maintenance and repairing

Block- 1: Automotive Engine, Inlet & Exhaust Manifold

Unit-1: Car Engines

Historical Overview - Internal Combustion Engine - Engine and its Construction - Principles of Operation of IC Engines - Comparison of CI and SI Engines - Advantages and Disadvantages of 2-stroke cycle over 4-stroke cycle - Classification of IC Engines - Firing Order - Different Cycles of Engine

Unit-2: Fuel Supply and Exhaust System

Air – Fuel Ratio - Fuel Supply System – Carburetor - Diesel Fuel Injection – Governor - Exhaust System

Block -2: Fuel Combustion and Performance of Engine

Unit-3: Combustion

Diesel Engine and its Terminologies - Combustion and its stages - Combustion Chamber - Comparison of Direct Injection and Indirect Injection - Turbulence and Combustion in Diesel Engines – Turbo charging - Supercharging

Unit-4: Engine Performance and Testing

Dynamometers - Engine Testing - Characteristics of IC Engines – Friction - Engine performance: Basic Measurements - Measurement of Exhaust emission - Measurement of Brake Power - Measurement of Friction Horse Power.

Block-3: Engine Sub-Systems and Maintenance

Unit-5: Cooling and Lubrication System

Cooling System and its Need - Air Cooling System - Water Cooling System - Components of Cooling System - Engine Lubricating System - Lubricating (Oil) System Components - Types of Lubricating (Oil) Systems - Properties of Good Lubricants.

Unit-6: Car Servicing and Maintenance

Garage, Service Station and Repair Shop - Tools and Equipments - Major Equipments of Service Station - Engine Reconditioning Equipments - General Procedure for servicing and Maintenance of Motor Vehicles - Overhauling

Block-4: Car Electrical Systems and Circuits

Unit-7: Basic Electrical Circuits of Automobile

Electrical System of Automobile - Charging Circuit - Starting Circuit

Unit-8: Vehicle Lighting and Dash Board Instruments

DC Generators – Alternators - Lighting Circuit - Head Light and Head Light Switch - Blackout Lights - Turn Signal, Stop Light and Emergency Light System - Dash Board Instruments.

Name of the Programme– Vocational Diploma in Four Wheeler Mechanism - Syllabus (Flexible Skill Training Mode)

Course Title	**Chassis and Transmission System**
Course Code	**VDFWM-2**
Course Credit	**4**

Course Objectives

While studying the **Chassis and Transmission System**, the student shall be able to:

- Describe construction and working of clutches and manual transmission
- Perform the servicing and trouble shooting of transaxles
- Explain the working of automatic transmission
- Diagnose the trouble and service the universal joint, viscous coupling, differential and drive axle
- Summarize about suspension system, brakes, tires and wheels of automobile

Course Outcomes

After completion of the **Course Chassis and Transmission System**, the student will be able to:

- State the function and purpose of clutch, manual and automatic transmission, universal joint, four wheel drive, differential and transaxle
- Identify the various braking systems of the automobile
- Explain the construction of tiers and its types
- Perform wheel balancing of vehicles

Block-1: Clutches and Manual Transmission

Unit-1: Automotive Clutches

Purpose and Function of Clutch - Construction and Operation of Clutch - Clutch Linkage - Clutch troubles and its Diagnosis - Servicing the Clutch - Clutch removal and Installation.

Unit-2: Manual Transmission and Transaxles

Transmission and Transaxle - Gears and Gearing - Manual Transmission - Manual Transaxle - Dual range Transaxle - Gear shifting and Shift Linkage.

Unit-3: Diagnosis and Service of Transaxles

Trouble diagnosis of Manual Transmission and Transaxle - Manual Transmission – Trouble diagnosis - Manual Transaxle – Trouble diagnosis - Service and maintenance of Manual Transmission - Service and maintenance of Manual Transaxle.

Block-2: Power Transmission Systems

Unit-4: Drive Shafts, Universal Joints, Differentials and Drive Axles

Drive Lines - Rear Drive Axles - Differentials - Driveshaft and Universal joint diagnosis and service - Diagnosis and Servicing of CV-Joint and Halfshaft - Diagnosis and Servicing of Drive axle - Servicing of Differential assembly - Servicing Limited Slip differentials.

Unit-5: Four Wheel Drive, Transfer Case and Viscous Couplings

Four-Wheel and All-Wheel Drive - Transfer case and its Purpose - Auxiliary Front-Drive Axles - Locking Hubs - Viscous Coupling - All Wheel Drive Systems - Electronic Control of Transfer Case and Drive Trains - Diagnosis and Service of Four Wheel Drive.

Block-3: Automatic Transmission and Transaxles

Unit-6: Automatic Transmission and Transaxles

Construction and Operation of Automatic Transmission and Transaxles - Torque Converters - Planetary Gear Trains - Hydraulic System - Electronic Control System.

Unit-7: Diagnosis and Servicing Automatic Transmission and Transaxles

Types of Servicing - Normal Maintenance - Diagnosis of Automatic Transmission and Transaxle - Electronic Shift Control Diagnosis - Servicing of Automatic Transmission and Transaxle - Transmission and Transaxle removal and installation - Overhauling of Transmission and Transaxle.

Block-4: Suspension System, Brakes and Tires

Unit-8: Automotive Suspension Systems

Purpose and components of the Suspension system - Automotive Springs - Shock Absorbers - Rear Suspension - Front Suspension - Electronic Suspension and Ride Control

Unit-9: Automotive Brakes

Brake System - Friction and Braking – Hydraulics - Brakes and Braking - Drum Brakes - Disc Brakes - Parking Brakes - Brake system valves - Master Cylinder - Power Brakes - Servicing of Drum Brakes - Servicing of Disc Brakes.

Unit-10: Tires and Wheels

Purpose of Tires - Tire Construction - Tire Grading - Wheel Construction - Servicing of Tires - Tire and Wheel balance - Tire and Wheel repair.

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Name of the Programme– Vocational Diploma in Four Wheeler Mechanism - Syllabus (Flexible Skill Training Mode)

Course Title	**Automobile Electronics**
Course Code	**VDFWM-3**
Course Credit	**4**

Course Objectives

While studying the **Automotive Electronics**, the student shall be able to:

- Define the basic terminologies of automobile electronics and digital electronics
- Explain about the various fuel ignition and injection systems
- Recognize the various sensor and actuators of the vehicle
- Summarize about the locking and safety systems of vehicle
- Perform the fault diagnosis of all electronic system of the automobile

Course Outcomes

After completion of the **Course Automotive Electronics**, the student will be able to:

- Understand about the basic terms of automobile electronics
- Describe about the electronic fuel ignition and injection system
- Demonstrate the use and applicability of sensors and actuators
- Explain about Anti-lock braking system and automatic transmission
- Conduct the Repair and maintenance of electronic system of automobile

Block-1: Electronic Terminologies and Electronic Fuel Injection System

Unit-1 – Basic Terminologies

What is Automotive Electronics? - Basic Electrical Terms - Basic Electronics Terminologies - Digital Electronics

Unit-2: Ignition and Fuel Injection System

Ignition System - Electronic Ignition System - Induction ignition or TCI - Capacitive Discharge Ignition (CDI) - Advantages and disadvantages of Electronic ignition - Advanced Ignition System - Electronic Fuel Injection System

Block-2: Sensors and Actuators

Unit-3: Sensors

What is sensor? - Types of Sensors - Oxygen Sensor - Parking Sensor

Unit-4: Actuators and Testing of Sensors & Actuators

Actuators - Various Actuators in Automobile - Testing of Sensors and Actuators

Block-3: Microprocessors, Vehicle Comfort and Safety Systems

Unit-5: Microprocessors and Microcontrollers

Microprocessor – Microcontrollers - Windscreen Wipers and Washers - Digital Displays - Lightings

Unit-6: Comfort, Safety systems of Vehicle

Driver Information - Car Air-Conditioning - Central Locking System and Power Windows - Air Bags and Belt Tensioners - Vehicle Security System

Block-4: ABS and Servicing of Electronic Components of Vehicle

Unit-7: Anti-Lock Brakes and Automatic Transmission system

Introduction to ABS - Anti-Lock Brake System (ABS) - Automatic Transmission - Electric Power Steering - Other Electronic systems - Cruise control

Unit-8: Repairing and Servicing of Electronic Components of Vehicle

Safe working practices - Circuits and Systems - Tools and Test Equipments – Multimeters - Special equipments - Diagnostics of Electronic Sensors and Actuators - Diagnosing charging system faults - Diagnosing ignition system faults - Diagnosing fuel control system faults - Diagnosing Lighting and Auxiliary system faults - Diagnosing Air-Conditioning and Chassis Electrical system faults - Diagnosing comfort and safety system faults.

Name of the Programme–Vocational Diploma in Four Wheeler Mechanism - Syllabus (Flexible Skill Training Mode)

Course Title	Automobile Engine & Electrical System (Practical)
Course Code	VDFWM-P1
Course Credit	4

The following ten experiments are to be carried out on six different types of engines components including modern engines components and perform their servicing/ replacing procedures of the components.

1. Dismantling and Study of Multi-Cylinder Petrol Engine.
2. Assembling of Multi-Cylinder Petrol Engine.
3. Dismantling and study of Multi-Cylinder Diesel Engine.
4. Assembling of Multi-Cylinder Diesel Engine.
5. Dismantling, Study and Assembling of Petrol Engine Fuel System.
6. Dismantling, Study and assembling of diesel engine fuel system.
7. Dismantling, Study and assembling of petrol engine cooling and lubrication system.
8. Dismantling, Study and assembling of diesel engine cooling and lubrication system.
9. Dismantling, Study and assembling of petrol engine ignition system.
10. Measurement of Cylinder bore, Stroke, Ovality, Tapperness, Main bearing dimensions and all other Engine components.

Name of the Programme–Vocational Diploma in Four Wheeler Mechanism - Syllabus (Flexible Skill Training Mode)

Course Title	Chassis and Transmission System (Practical)
Course Code	VDFWM-P2
Course Credit	4

The following experiments are to be carried out on six different types of vehicles components including modern vehicles and perform their servicing/replacing procedures of the components.

1. Study and Measurement of Light and Heavy Commercial Vehicle Frame and Chassis.
2. Study, Dismantling and Assembling of Clutch.
3. Study, Dismantling and Assembling of Gear Box.
4. Study, Dismantling and Assembling of Propeller shaft.
5. Study, Dismantling and Assembling of Differential.
6. Study, Dismantling and Assembling of Front axles.
7. Study, Dismantling and Assembling of Rear axles.
8. Study, Dismantling and Assembling of Braking system.
9. Study, Dismantling and Assembling of Suspension system.
10. Study, Dismantling and Assembling of Steering system.