**SUBJECT: REPAIR AND MAINTENANCE OF TWO WHEELER (RMTW)**

**CLASS XII**
**SEMESTER - III**

**THEORY**

**FULL MARKS – 20**

**(MCQ Type Question)**

| UNIT | Topic | No of periods assigned | Marks |
|---|---|---|---|
| 1 | **Safety in the Workplace** | 6 | 3 |
| 2 | **Measuring Instruments** | 12 | 5 |
| 3 | **Introduction to IC Engine** | 15 | 7 |
| 4 | **Basics of Electrical system** | 12 | 5 |

**DETAIL SYLLABUS**

| UNIT | Topic / Sub Topic | No of periods assigned |
|---|---|---|
| 1 | Safety in the Workplace:<br>1.1. General safety precautions and procedures in workshop.<br>1.2. Importance of maintenance and cleanliness in workshop.<br>1.3. Procedure of safe handling of lifting equipment.<br>1.4. Procedure of safely disposal of used engine oil or other lubricants.<br>1.5. Knowledge of safe working environment | 6 |
| 2 | Measuring Instruments:<br>2.1 Use of different measuring instruments (Vernier Caliper, Micrometer, Feeler gauge, Multimeter, Tachometer, Torque wrench)<br>2.2 Different hand tools use & specification - Hammer, mallet, wrench, torque wrench, spanner, screw driver, pneumatic wrench, extension bar, pliers, piston ring expander, adjustable wrench and oil change tool, grease gun and oil can.<br>2.3 Different components of a two-wheeler, such as the engine, frame, suspension, brakes, electrical system, and exhaust system. | 12 |
| 3 | Components of engine & chassis:<br>3.1 I.C. engine and its classification<br>3.2 Working of two stoke engine & four stroke engine.<br>3.3. Engine components of two wheeler engine.<br>3.4. Function, working & construction of two wheeler fuel supply systems (Carburetor & Fuel injection both), lubrication system (Petrol-oil, Splash & forced), cooling system (Air & Oil cooled, water cooled), exhaust systems.<br>3.5. Different type chassis frame use in two wheeler with example – Single cradle, Double Cradle, Backbone frame, Perimeter frame, Trellis frame. | 15 |
| 4 | Basics of Electrical system:<br>4.1 Basics of the electrical system of two wheeler - the battery, charging system, ignition system, starter motor, lights, switches and wiring diagrams.<br>4.2 Troubleshooting of common electrical faults in two wheeler – starting problem, ignition system.<br>4.3 Procedure of - headlight removal, headlight bulb replacement and installation, head light focus, speedometer, indicator lamp replacement, horn tuning, wiring harness removal and installation. | 12 |
| **Total** | | **45** |

**SEMESTER -IV**

**THEORY**

**FULL MARKS – 30**

**(SAQ AND LAQ Type Question)**

| UNIT | Topic | No of periods assigned | Marks |
|---|---|---|---|
| 1 | **Transmission and its maintenance** | 15 | 2 SAQ & 5 LAQ |
| 2 | **Maintenance of Brake** | 15 | 2 SAQ & 5 LAQ |
| 3 | **Suspension system and its maintenance** | 12 | 2 SAQ & 3 LAQ |
| 4 | **Maintenance of tyre** | 12 | 2 SAQ & 4 LAQ |
| 5 | **Laws and regulations** | 9 | 2 SAQ & 3 LAQ |

**DETAIL SYLLABUS**

| UNIT | Topic / Sub Topic | No of periods assigned |
|---|---|---|
| 1 | Transmission and its maintenance:<br><br>1.1 Types of clutch use in two wheeler and its construction & working.<br>1.2. Construction & working of different types of transmission use in two wheeler (Constant mesh, Synchromesh, CVT etc.)<br>1.3. Function of Slipper clutch in two wheeler.<br>1.3. Maintenance procedure of chain sprocket.<br>1.4. Troubleshooting of two wheeler transmission system. | 15 |
| 2 | Maintenance of Brake:<br><br>2.1 Braking systems used in two-wheelers - Drum brakes, Disc brakes<br>2.2 Different components of braking system & its function - calipers, pads, shoes, master cylinders and brake fluid.<br>2.3 Combi-brake system (CBS) in two wheeler.<br>2.4 Anti-lock braking system in two wheeler.<br>2.3 Troubleshooting of braking system in two wheeler. | 15 |
| 3 | Suspension system and its maintenance:<br><br>3.1 Construction and working of Telescopic shock absorber.<br>3.3 Height adjustment procedure of shock absorber in two wheeler<br>3.2 Troubleshooting of suspension system in two wheeler. | 12 |
| 4 | Maintenance of tyre:<br><br>4.1 Types of tyre, factors affecting tyre life.<br>4.2 Tyre pressure of various types of two wheelers<br>4.3 Maintenance & repairing of various tyres<br>4.4 Different types of wheels and tires used in two-wheelers, their construction, tyre maintenance<br>4.5 Procedure to change tires and balance wheels. | 12 |
| 5 | Laws and regulations:<br><br>5.1 Local laws, regulations and emission standards (BS-II, BS-III, BS-IV & BS VI) related to two-wheelers.<br>5.2 Highlight the importance of adhering to legal requirements during repairs and modifications. | 9 |
| **Total** | | **63** |

**Practical -40marks**
**Project -10marks**

**Practical : 144 classes**

| SL NO | CONTENT (Any Eight) | DETAILS |
|---|---|---|
| 1. | Safety in the workplaces<br>( 9 classes) | 1.1 Identification to safety equipment and their use etc. Importance of maintenance and cleanliness of Workshop. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of used engine oil.<br>1.2 Energy saving Tips of electricity Usage.<br>1.3 Do & Don't in fire hazards. |
| 2 | Tools used for repair<br>( 9 classes) | 2.1 The various tools used in two-wheeler repair, such as wrenches, pliers, screwdrivers, sockets, torque wrenches, and specialized tools. Procedure how to correctly use, handle, and maintain these tools. |
| 3 | Inspect and diagnose<br>( 24 classes) | 3.1 Inspecting and diagnosing engine-related issues. Procedure to check for compression, identify fuel and ignition system problems, and diagnose common engine performance issues.-<br>3.2 Demonstrate procedures for cleaning or rebuilding carburetors, adjusting fuel injection systems, and addressing fuel system leaks |

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|---|---|---|
| 4 | Diagnose the electrical system<br><br>( 18 classes) | 4.1 Diagnosing and repairing electrical system problems. This can include testing the battery, checking the charging system, replacing fuses, troubleshooting wiring issues and repairing or replacing faulty electrical components. |
| 5 | Maintenance of Brake<br><br>( 12 classes) | 5.1. Inspect and service braking components, including brake pads, calipers, drums, discs, and brake lines. Practical training on brake bleeding, adjustment |
| 6. | Maintenance of Suspension components<br><br>(12 classes) | 6.1 Servicing suspension components such as forks, shock absorbers.<br>6.2 Procedure for routine maintenance tasks, replace worn-out parts, and diagnose suspension-related issues. |
| 7 | Maintenance of Tyre<br><br>(12 classes) | 7.1 Removing and installing wheels, changing tires, balancing wheels, and inspecting rims for damage.<br>7.2 Procedure to properly inflate and maintain tires. |
| 8 | Routine maintenance<br><br>(15 classes) | 8.1 Performing routine maintenance tasks like oil changes, filter replacements, spark plug maintenance, chain cleaning and lubrication, and adjusting controls and cables.<br>8.2 Diagnostic tools and equipment commonly used in two-wheeler repair, such as multimeters, compression testers, vacuum gauges, and scan tools. |
| 9 | Calculation of cost of repair and Customer handling<br><br>(15 classes) | 9.1 Provide a detailed breakdown of the estimated costs for repairs, including labor, parts, and any additional charges to the customer.<br>9.2 Follow up with the customer to ensure their satisfaction and address any additional questions or concerns they may have. Provide after-sales support and be available to assist them if they encounter any issues or require further assistance.<br>9.3 Collect all necessary details from the customer, including their name, contact information, two-wheeler make and model, registration number and a description of the problem or requested services.<br>9.4 Create a job card or work order that includes the customer's information, two-wheeler details, and a comprehensive description of the requested services or repairs. Include any special instructions or customer preferences |
| 10 | Inventory management<br><br>(9 classes) | 10.1 Set up an inventory management system to track and monitor the stock of parts, consumables and other materials required for two-wheeler repair.<br>10.2 Utilize inventory management software or manual records to keep track of quantities and item details.<br>10.3 Decide on the optimal reorder quantity for each item. Consider factors such as demand, lead time for procurement, storage space and any discounts or bulk purchase options available. |
| 11 | Project I<br><br>( 9 classes) | Troubleshooting and repairing electrical issues in two wheelers (Cover topics such as battery maintenance, wiring inspections and fixing common electrical problems) |
| **Total 144 classes** | | |