Automobile Technology (AT)  
Paper-I  

Theory – 40  
Practical - 60

Unit.I

- General health & Safety precautions to be observed in the workshop/garage
- Overview on 5S technic (Sort, Set in order, Shine, Standardise & Sustain) – advantages in Implementation of 5S
- Nomenclature of different parts of vehicle and their locations
- Working principle of 4 stroke petrol & diesel engines
- Differences between petrol & diesel engines
- Lubrication and cooling system and types of lubricants
- Lay out of greasing points
- Torqueing & detouring technique/procedures
- Fuel supply layouts in both petrol & diesel engines
- Layouts of power flow from engine to wheels
- Ignition system circuit & components
- Brief introduction on ignition & injection systems
- Brief introduction on injectors
- Purpose of clutch, gear box & differential
- General defects in clutch, manual gearbox
- Types of brake & steering systems – working principle of drum and disc brakes
- General defects in brake systems
- Brief introduction on battery and its maintenance
- Tyre designation (size), reasons for general tyre defects
- Procedure for repairing the punctured tube
- Need & procedure for tyre rotation

Unit.II

- Knowledge on health & safety
- Procedure for checking compression pressure
- Procedure for dismantling engine
- Valve/port timing diagram of 2 stroke engine
- Air-fuel ratio at different conditions,
- Knowledge on micrometer, feeler gauge & dial gauges
- Procedure for dismantling, inspecting/component checks, assembling, engine & transmission system (overhauling of an engine & transmission)
- Do & don’t during over hauling of engine
- Procedure for dismantling, checking, assembling & adjustments of carburetor
- Procedure for overhauling transmission, brake & suspension systems
- Emission norms, emission control components & their working principles
• Procedure for handling & using multi-meter
• Fundamental electrical principal
  o Ohm's Law
  o Series & Parallel resistances circuits
  o induction
• Working principle of Ignition system
• Procedure for checking & overhauling starting system
• Procedure of checking & overhauling charging system
• Procedure for checking & overhauling suspension system
• Procedure for testing the engine

• TOOLS USAGE
  • 3 WHEELERS ENGINE DISMANTLING FROM VEHICLE (AUR206)
  • 3 WHEELER ROUTINE MAINTENANCE CHECKS (AUR 206)

Unit.III
• Knowledge on safety practices
• Reading of workshop manual
• Procedure for checking compression pressure
• Do’s & don’ts during dismantling & assembling the engine
• Valve timing of 4 stroke petrol engine & single
• Cylinder diesel engine
• Working principle of diesel injection pump and injector of a single cylinder engine
• Procedure for reading micrometer & dial gauges
• Procedure for overhauling of an engine & transmission
• Usage of the multimeter

Unit.IV
• Fundamental electrical principles
  - Ohm’s Law
  - Series & Parallel resistances circuits
  - Working principle, application & checking of transistors,
• Wiring colour-code,
• Fault finding procedure in ignition system
• Working principle of starter motor & alternator
• Working principle of constant mesh gear box
• Electronic ignition system
• Charging system circuit, system components overhauling & testing
• Working principle & procedure for overhauling of brakes
• Bearing-types (available in 3 wheelers cycles), procedure for handling, assembling & dismantling
• Purpose & function of shock absorber
• Procedure for overhauling a shock absorber
• Latest emission norms
• Latest emission controls available to meet the norms & their working principle

Practical
• Practice Health & Safety – familiarize, select, use, maintain & store tools, equipments, consumables & clothing safely
- Practice 5S technic
- Identify/familiarize with the tools & equipments
- Water wash – before & after servicing
- Check/replenish/top up — lubricating oil, brake fluid, engine coolant, power steering, hydraulic oil, wind screen wiper water, battery electrolyte and transmission oil
- Clean/replace – air cleaner, oil filter & fuel filter
- Apply grease to parts/through greasing points
- Remove & refit vehicle body parts ( bonnet, front bumper & door)
- Remove and refit head lamp assembly
- Check power plug and inspect H.T. cables
- Clean, check and adjust spark plug
- Adjust hand brake and replace hand brake cable
- Adjust clutch and brake pedal plays
- Replace propeller shaft, wheel hub bearings & brake pads
- Charge the battery
- Check tyre pressure & for defects, tread depth, inflate, rotate the tyres
- Practice Health & Safety — select, use, maintain & store tools, equipments & clothing safely. Handle fuels, oils, lubricants, acids & asbestos safely
- Identification of tools, measuring instruments & equipments used for the trade
- Measure any components by using the micrometer & dial gauge (practice)
- Remove broken stud
- Dismantle, clean, check, assemble and adjust carburetor
- Clean intake and exhaust system
- Test ignition system, find faults & rectify
- Check compression pressure & take decision for next action
- Dismantle, inspect components, rectify/replace and assemble engine & transmission
- Measure cylinder bore-ovality, taper, wear & take decision for next action
- Check valve leak, valve bend and valve lapping
- Overhaul brake & suspension system
- Replace chain/links, sprocket & adjust chain tension
- Dismantle, check & assemble wheel bearings & steering column bearing
- Check & repair self-starter and starting system
- Check & repair charging system components
- Check voltage, continuity and resistance in electrical systems
- Rectify defects in lightning system
- Check battery condition, prepare electrolyte, top up & maintain battery
- Check speedometer & rectify the defect
- Fine tune the engine and road test the vehicle
- Practice health & safety — select, use, maintain & store — tools, equipments & clothing safely. Handle fuels, oils, lubricants, acids, alkalis, adhesives, seals, solvents, gases & asbestos safely
- Water wash & clean the vehicle
- Remove broken stud
- Check compression pressure
- Clean fuel tank
- Dismantle, clean, check engine components & assemble
- Dismantle, clean, reset, fit & fine tune carburetor
- Overhaul and test fuel injection pump
- Test injector & repair the defect
- Set valve timing
- Set ignition/injection timing
- Dismantle, clean, check, repair and refit clutch & gear box
- Lubricate and grease the vehicle
- Prepare electrolyte & charge the battery
- Check voltage, resistance, continuity and find fault in electrical circuits & rectify
- Dismantle, clean, check, repair and assemble starter motor & starting system
- Dismantle, clean, check, repair and reassemble alternator/charging system
- Check voltage regulator
- Dismantle wheel bearing, steering stem & ball race, inspect & assemble
- Overhaul disc & drum brakes systems
- Replace front fork oil/oil seals
- Check the working condition of emission control devices
- Do fine tuning, test, rectify the vehicle defects
Paper-II

Theory – 40
Practical - 60

• TOOLS USAGE
• 4 WHEELERS ENGINE DISMANTLING FROM VEHICLE (AUR101)
• ENGINE CONTROLS FUEL INJECT, SENSORS (AUR 101)

Unit.I
• Knowledge on health & safety precautions to be observed in the workshop / garage (health hazard of asbestos dust to be emphasized)
• Familiarization of workshop manual

Unit.II
• Power flow from engine to wheels
• Units & Definition of force, work, power, torque & pressure
• Description of single plate clutches. Functions of different parts of the clutch assembly.
  Clutch linings material. Power flow in clutch plate.
• Clutch operating mechanisms- manual & hydraulic
• Clutch faults
• Type of gears and their application-advantages and disadvantages-gear ratio
• Types of gear box
• Working principle of constant mesh, synchromesh gear boxes
• Gear selection mechanism
• Lubrication of transmission system
• Gear box faults
• Types of bearings, maintenance, their characteristics & application
• Working principle of constant velocity joints
• Working principle of differential
• Faults in differential & C.V. Joints

Unit.III
• Forces & moments acting on vehicle, brake slip, braking force co-efficient, time element of braking operation
• Classification of brake systems, factors affecting the braking distance
• Advantages of hydraulic brake system over pneumatic
• Working principle of brake components – brake booster tandem master cylinder, caliper assembly, wheel cylinder & different braking force control valves
• Brake linings, pads & fluid
• Brake faults diagnostic
• Introduction to anti-lock braking system (ABS).

Unit.IV
• STEERING – Introduction, basic types of steering, steering geometry (necessity, types & effects), steering characters (over steer, under steer & neutral steer) & steering linkage
• Types of steering gear, power assisted steering (hydraulic & electronic)
- Checks on steering system and fault diagnosis
- Suspension – Introduction, requirement, types, McPherson strut, shock absorber,
- Checks on suspension system and fault diagnosis
- Necessity, functions, designation & defects analysis
- Procedure for tyre rotation
- Fundamental electrical principles
  - Ohm’s Law
  - Series & Parallel resistances circuits
  - Working principle, types & application of – capacitors & transistors,
- Usage of multimeter
- Wiring colour-code, reading of engine electrical systems circuits
- Fault finding in electrical circuits
- Final road test procedure – observation of Noise,
- Vibration & harshness from different part of chassis – observation of transmission, brake, clutch, steering & suspension systems for their satisfactory working

**Practical:**
- Practice Health & Safety – familiarize, select, use, maintain & store – tools, equipments, consumables & clothing safely
- Identify different parts of chassis
- Remove clutch plate from vehicle, check for defects & rectify/replace & refit
- Remove gear box from vehicle, dismantle, check, rectify, fill lubricating oil & assemble
- Align gear selector fork
- Remove CV Joint, Disassemble, lubricate & refit
- Remove Crown wheel, pinion and bearings, clean parts.
- Check tooth contact in the crown and pinion and adjust backlash & Assemble rear axle assembly
- Check and adjust parking brake and service brakes.
- Dismantle wheel brake assembly– remove old lining and fit new one
- Remove and refit vacuum boosters
- Overhaul – master cylinder, Wheel cylinder & caliper pistons, wheel drum
- Bleed vacuum assisted hydraulic brakes
- Remove & clean brake drums.
- Check disc/drum run-out, Fit new cups and brake hoses – assemble, adjust all four-wheel brakes and test for brake concern.
- Check and correct the steering geometry with instruments
- Remove and refit steering boxes from vehicle, checking and top up oil in steering box.
- Check and adjust steering wheel play and backlash.
- Overhaul hydraulic power assisted steering system—pump, control valve & cylinder
- Remove and refit a leaf spring as an assembly in a vehicle, changing rubber bushes of shock absorbers and independent front suspension.
- Lubricate suspension units.
- Re-camber the leaf spring
- Remove tyre, inspect/check & assemble
- Rotate the tyres
- Remove and refit head lamp
- Check for electrical defects and rectify
- Do Final road test – observe for Noise,
  Vibration & harshness from different part of chassis – observe for problems in transmission, brake, clutch, steering & suspension systems & rectify the defect.