

L_All_Vocational_Ed_Auto

Sector: Automobile

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NATIONAL VOCATIONAL EDUCATION QUALIFICATION FRAMEWORK

SECTOR: AUTOMOBILE

SPECIALIZATION: AUTOMOBILE

S.No.	Certificate Level	Vocational Hours
1.	Level-I	200 hrs
2.	Level-II	250 hrs
3.	Level-III	350 hrs
4.	Level-IV	350 hrs
5.	Level-V	500 hrs
6.	Level-VI	550 hrs
7.	Level-VII	750 hrs

Certificate Level – I

1. TOOLS : TOOLS USAGE
2. 2 WHEELER ENGINE: DISMANTLING FROM VEHICLE
(AUR102)
3. 2 WHEELER: ROUTINE MAINTENANCE CHECKS
(AUR102, AUR203)

(AUR 102)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> ➤ Practice Health & Safety – select, use, maintain & store tools, equipments & 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, 	<ul style="list-style-type: none"> ➤ General health & Safety precautions to be observed in the workshop / garage ➤ Over view 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 & types of lubricants ➤ Lay out of greasing points

<p>front bumper & door)</p> <ul style="list-style-type: none"> ➤ 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 	<ul style="list-style-type: none"> ➤ Torquing & detorquing technique / procedures ➤ Fuel supply layouts in both petrol & diesel engines ➤ Layout 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
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(AUR 203)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> ➤ 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 	<ul style="list-style-type: none"> ➤ 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,

<ul style="list-style-type: none"> ➤ 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 	<p>brake & suspension systems</p> <ul style="list-style-type: none"> ➤ Emission norms, emission control components & their working principles ➤ Procedure for handling & using multi-meter ➤ Fundamental electrical principle <ul style="list-style-type: none"> - Ohm's Law - Series & Parallel resistance circuits. - Induction ➤ Working principle of Ignition system ➤ Procedure for checking & over hauling starting system ➤ Procedure for checking & over hauling charging system ➤ Procedure for checking & over hauling suspension system ➤ Procedure for testing the engine
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Certificate Level – II

1. TOOLS USAGE
2. 3 WHEELER ENGINE:DISMANTLING FROM VEHICLE
(AUR206)
3. 3 WHEELER:ROUTINE MAINTENANCE CHECKS
(AUR206)

(AUR 206)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> ➤ 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 	<ul style="list-style-type: none"> ➤ 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 ➤ Fundamental electrical principle <ul style="list-style-type: none"> - 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,

<ul style="list-style-type: none"> ➤ 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 	<ul style="list-style-type: none"> 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
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Certificate Level – III

1. TOOLS USAGE
2. 4 WHEELER ENGINE: DISMANTLING FROM VEHICLE
(AUR101)
3. ENGINE CONTROLS: FUEL INJ EQPT, SENSORS
(AUR101)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> ➤ Practice Health & Safety – select, use, maintain & store tools, equipments & 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 	<ul style="list-style-type: none"> ➤ General health & Safety precautions to be observed in the workshop / garage ➤ Over view 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 & types of lubricants ➤ Lay out of greasing points ➤ Torquing & detorquing technique / procedures ➤ Fuel supply layouts in both petrol & diesel engines ➤ Layout 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

Certificate Level – IV

1. TOOLS USAGE

2. LIGHT VEHICLE ENGINE: DISMANTLING FROM VEHICLE
(AUR208)

3. ENGINE CONTROLS: FUEL INJ EQPT, SENSORS
(AUR208)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> • 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, Dismantle, 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 	<ul style="list-style-type: none"> ➤ Knowledge on health & safety precautions to be observed in the workshop / garage (health hazard of asbestos dust to be emphasized) ➤ Familiarization of workshop manual ➤ TRANSMISSION - 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 ➤ BRAKE – Forces & moments acting on vehicle, brake slip, braking force co-efficient, time element of braking operation

<ul style="list-style-type: none"> • 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. <p>Overhaul hydraulic power assisted steering system – pump, control valve & cylinder</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> ➤ 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). ➤ 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 ➤ WHEELS & TYRES-necessity, functions, designation & defects analysis ➤ Procedure for tyre rotation ➤ Fundamental electrical principles <ul style="list-style-type: none"> - 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
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Certificate Level – V

1. TOOLS USAGE
 2. LIGHT VEHICLE ENGINE: DISMANTLING FROM VEHICLE (AUR208)
 3. ENGINE CONTROLS: FUEL INJ EQPT, SENSORS (AUR208)
 4. ROUTINE MAINTAINANCE CHECK UP (AUR208)
- (AUR 208)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> • 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, Dismantle, 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 	<ul style="list-style-type: none"> ➤ Knowledge on health & safety precautions to be observed in the workshop / garage (health hazard of asbestos dust to be emphasized) ➤ Familiarization of workshop manual ➤ TRANSMISSION - 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 ➤ BRAKE - Forces & moments acting on vehicle, brake slip, braking force co-efficient, time element of braking operation

<ul style="list-style-type: none"> • 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. <p>Overhaul hydraulic power assisted steering system – pump, control valve & cylinder</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> ➤ 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). ➤ 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 ➤ WHEELS & TYRES-necessity, functions, designation & defects analysis ➤ Procedure for tyre rotation ➤ Fundamental electrical principles <ul style="list-style-type: none"> - 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
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Certificate Level - VI

1. TOOLS USAGE
2. BASIC DRIVING SKILLS, DRIVING REQUIREMENTS AND CRITICAL SITUATIONS (AUR208)
3. GENERAL DURABILITY TESTING (AUR208)
4. PERFORMANCE TESTING (AUR208)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> • 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, Dismantle, 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 	<ul style="list-style-type: none"> ➤ Knowledge on health & safety precautions to be observed in the workshop / garage (health hazard of asbestos dust to be emphasized) ➤ Familiarization of workshop manual ➤ TRANSMISSION - 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 ➤ BRAKE – 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

<p>cups and brake hoses –assemble, adjust all four-wheel brakes and test for brake concern.</p> <ul style="list-style-type: none"> ● 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. <p>Overhaul hydraulic power assisted steering system – pump, control valve & cylinder</p> <ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ➤ 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). ➤ 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 ➤ WHEELS & TYRES- necessity, functions, designation & defects analysis ➤ Procedure for tyre rotation ➤ Fundamental electrical principles <ul style="list-style-type: none"> - 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
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Certificate Level - VII

1. TOOLS USAGE
2. SPECIFIC TESTING AND EQUIPMENT: CHASSIS DYNAMOMETER (AUR208)
3. SPECIFIC TESTING AND VALIDATION: EMISSION FUEL EFFICIENCY (AUR208)
4. ADVANCED ENGINE INSTRUMENTATION (AUR208)

Practical Competencies	Underpinning Knowledge (Theory)
<ul style="list-style-type: none"> • 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, Dismantle, 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 	<ul style="list-style-type: none"> ➤ Knowledge on health & safety precautions to be observed in the workshop / garage (health hazard of asbestos dust to be emphasized) ➤ Familiarization of workshop manual ➤ TRANSMISSION - 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 ➤ BRAKE – Forces & moments acting on vehicle, brake slip, braking force co-efficient, time element of braking operation ➤ Classification of brake systems, factors affecting the

<p>brakes</p> <ul style="list-style-type: none"> • 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. <p>Overhaul hydraulic power assisted steering system – pump, control valve & cylinder</p> <ul style="list-style-type: none"> • 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 	<p>braking distance</p> <ul style="list-style-type: none"> ➤ 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). ➤ 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 ➤ WHEELS & TYRES- necessity, functions, designation & defects analysis ➤ Procedure for tyre rotation ➤ Fundamental electrical principles <ul style="list-style-type: none"> - 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
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