

**ANNEXURE 1 - AUTOMOBILE ENGINEERING - MODEL CURRICULUM**

**Qualification Title: Certificate in Automobile Engineering**

NSQF Level: 4							Total Hours - 2880	
Subject Name and Code	Topics/Module	Theory Hours	Practical Hours	Objective of module	Outcome of module	Methodology	Tools Required	
<b>Basic Mathematics &amp; Science (1001)</b>	<b>Module M1</b> Basic Mathematics calculations & Algebra	40	0	OB 1.1 To understand principles of basic mathematics and calculation including Fraction, Ratio & Proportions, Basic Algebra	<b>Will be able to:</b> MO-1.1 Perform basic mathematical calculations in Fraction, Ratio & Proportions, Basic Algebra	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents	
	<b>Module M2</b> Mensuration and Trigonometry	40	0	OB 2.1 To understand principles of Mensuration and Trigonometry	MO-2.1 Perform basic mathematical calculations and solve sample problems related to Mensuration and Trigonometry	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents	
	<b>Module M3</b> Basic Science	40	0	OB 3.1 To understand principles of basic Science including System of units, Unit Conversion Mass/weight/volume/density, Work/power/energy, Velocity/Speed, elasticity	MO-3.1 Understand the concepts of basic science including : System of units, Unit Conversion MO-3.2 Define - Mass/weight/volume/density, Work/power/energy, Velocity/Speed, elasticity	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents	
	<b>Module M4</b> Basic Science	40	0	OB 4.1 To understand principles of basic Science including Heat, Pressure & Temperature and their applications. OB 4.2 To Understand the concepts of Basic electricity - AC/DC/Voltage, Current , Resistance, Ohms law	MO-4.1 Define - Heat, Pressure & Temperature and their applications MO-4.2 Explain - AC/DC/Voltage, Current , Resistance, Ohms law	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents	

<b>Engineering Drawing (1002)</b>	<b>Module M1</b> Introduction to Engineering Drawing Practice	8	0	OB 1.1 To understand different instruments used in engineering drawing	MO-1.1 List various instruments used in engineering drawing MO-1.2 State uses of various drawing instruments MO-1.3 Use various instruments to draw sample exercises	- Lecture - Demonstration	- Scales, Compass, Drawing board, Clips, Mini drafter, Pencils, Drawing sheets, Stencils, Instrument box  - Laptop & Projector
		10	0	OB 1.2 To understand freehand sketching, lettering and dimensioning	MO-1.4 Understand the application of freehand sketching, lettering and dimensioning, Layouting and title block MO-1.5 List various dimensioning methods MO-1.6 Solve problems based on different dimensioning methods	- Lecture - Demonstration	
	<b>Module M2</b> Geometrical Drawing	20	0	OB 2.1 To understand Geometric constructions and drawings of various objects and shapes	MO-2.1 Draw lines, angles, triangles, squares, polygons, threads, fasteners based on sample exercises	- Lecture - Demonstration	
	<b>Module M3</b> Orthographic Projection	20	0	OB 3.1 To draw orthographic projections of various objects	MO-3.1 State the concept of quadrants in engineering drawing MO-3.2 Differentiate first angle and third angle projection MO-3.3 Prepare orthographic projection of given sample objects	- Lecture - Demonstration	
<b>Module M4</b> Shop floor drawing	22	0	OB 4.1 To understand and draw shop floor drawings	MO-4.1 State the importance of shop floor drawing in industry MO-4.2 Prepare isometric drawings of given sample objects MO-4.3 Prepare assembly drawing of given sample products	- Lecture		

**AUTOMOBILE ENGINEERING I- (TRADE THEORY) (1051)**

MODULE 1

Automobile tools and equipment	Workshop Safety	15		To be familiarize with safety precautions	list the safety rules in automobile workshop	Lecturing Visual media	Safety equipment, Smart class room
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Introduction to Automobile engineering	General tools	5	To understand various general tools used in automobile workshop	List the tools used in automobile workshop	Lecturing Visual media	Smart class room, Spanners,socket set,Screw drivers,pliers hammers,files,chiseis, etc
	Special Tools		to familiarize with the special tools	Outline the function of special tools	Lecturing Visual media	Piston ring compressor,Piston ring remover,Valve spring compressor,bearing puller,Piston ring groove cleaner, ring file.magneto puller, etc,
	Measuring tools		To understand various measuring tools used in automobile workshop	Measure various dimensions related to automobile such as : Engine bore,taper, ovality, spark plug gap, piston ring end gap, valve tappet clearance,diameters of crankshaft main journal, crank pin, cam lobe height	Lecturing, Visual media	Smart class room, Micrometers,vernier caliper,dial gauge,bore gauge,multimeter,pressure gauge, vacuum gauge,compression gauge tachometer, etc,
	Equipments		To understand various equipments used in automobile workshop	classify the equipments . Describe the function	Lecture, Visual media	Smart class room, Vehicle hoisting equipment,jacks,safety stnds,drilling m/c,air compressor,pneumatic tools,Tyre chager,Car washer,etc,
	Introduction	5	To understand the importance of automobile engineering	Explain the importance of automobile engineering	Lecture.Visual media,	Smart class room,
	Definition		To understand the definition of automobile	Define automobile		
	Classification of vehicles		To classify automobile	List the types on the basis of load		
				List the types on the basis of number of wheels		
				List the types on the basis of fuel used		
		List the types on the basis of body				
		List the types on the basis of transmission				
		List the types on the basis of position of engine				

	Major Components of automobile		To understand the major components of automobile	List the major components		
Engine	Engine	10	To understand the definition of engine	Define engine	Lecturing Visual media	Smart class room  Instruction models
			To classify engine	List the classification		
	Basic engine terminology		To understand the terms related to engine	List the terms related to engine		
	Classification of I C Engine		To classify the I C Engine	List the classification of I C engine		
	Four stroke petrol engine		To understand the working principle of four stroke petrol engine	Outline the working principle of four stroke petrol engine		
	Four stroke diesel engine		To understand the working principle of four stroke diesel engine	Outline the working principle of four stroke diesel engine		
	Two stroke petrol engine		To understand the working principle of two stroke petrol engine	Outline the working principle of two stroke petrol engine		
	Two stroke diesel engine		To understand the working principle of two stroke diesel engine	Outline the working principle of two stroke diesel engine		
	Comparison of four stroke and two stroke engines		To compare four stroke and two stroke engines	Show a comparison table		
	Comparison of petrol and diesel engines		To compare petrol and diesel engines	Show a comparison table		
Construction Details of Engine	Main parts of an engine	30	To know about different parts of an engine	List the main parts of the engine	Lecturing Visual media	Smart class room Instruction models, Dismantled engine
	Cylinder block and crankcase		To study about the function and constructional details of cylinder block and crank case	Explain the function and constructional details of cylinder block and crank case		
	Cylinder head		To study about the function and constructional details of cylinder head	Explain the function and constructional details of cylinder head		
	Oil sump		To study about the function and constructional details of oil sump	Explain the function and constructional details of oil sump		
	Manifolds		To study about the function and constructional details of manifolds	Explain the function and constructional details of manifolds		
	Gaskets		To study about the function and constructional details of gaskets	Explain the function and constructional details of gaskets		
	Cylinder liners		To study about the function and constructional details of cylinder liners	Explain the function and constructional details of cylinder liners		
	Piston		To study about the function and constructional details of piston	Explain the function and constructional details of piston		
	Piston rings		To study about the function and constructional details of piston rings	Summarize the function and constructional details of piston rings		
	piston pin		To study about the function and constructional details of piston pin	Summarize the function and constructional details of piston pin		
	Flywheel		To study about the function and constructional details of flywheel	Summarize the function and constructional details of flywheel		
	Valves		To study about the function and constructional details of valves	Summarize the function and constructional details of valves		
	Valve operating mechanisms		To study about the valve operating mechanism	Summarize the working of the engine valve mechanism		

	Side valve mechanism		To study about the working of side valve mechanism	Summarize the working of side valve mechanism		
	Overhead valve mechanisms		Summarize overhead valve mechanism	Summarize the working of overhead valve mechanism		
	Overhead camshaft system		To study about the working of overhead camshaft system	Explain the working of overhead camshaft mechanism		
	Single overhead camshaft engine		To study about the working of single overhead camshaft engine	Explain the working of single overhead camshaft engine		
	double overhead camshaft engine		To study about the working of double overhead camshaft engine	Summarize the working of double overhead camshaft engine		
	Valve tappet clearance		To study about valve tappet clearance	Explain the need of valve tappet clearance		
	Valve timing		To understand valve timing diagram	Illustrate a valve timing diagram of two stroke and four stroke engines		
MODULE 2						
Petrol Fuel System	Introduction	25	To understand fuels , desirable properties and classifications	Define fuel List the desirable properties of fuel Classify the fuels	Lecturing Visual media	Smart class room
	Types of Petrol fuel feed systems		To study about various petrol fuel feed systems	List the various petrol fuel feed systems		
	Gravity feed system		To study about gravity feed system	Illustrate the layout of gravity feed system		
	Pump feed system		To study about pump feed system	Sketch the layout of pump feed system List various components of pump feed system		
	Electrical fuel pump		To study about electrical fuel pump	Illustrate electrical fuel pump		
	Fuel filters		To understand about fuel filters	List various fuel filters Illustrate fuel filter		
	Air cleaners		To understand about air cleaners	List various air cleaners		
	Air fuel mixture		To understand about air fuel mixture	Illustrate air cleaners Describe about air fuel mixture		
	Carburettor		To understand about carburettor	Explain the functions of carburettor		
	Simple carburettor		To understand about simple carburettor	Summarize simple carburettor		
	MPFI system		To study about MPFI system	Illustrate MPFI system		
	Diesel Fuel System		Solid injection	20		
Individual pump system		To study about individual pump system	Describe and layout individual pump system. List components of individual pump system.			
Common rail direct injection		To understand about common rail direct injection	Illustrate common rail direct injection			
		To understand the components of CRDI	List components of CRDI Explain the functions of each components of CRDI			
Cooling System	Introduction	15	To understand the necessity of cooling system	Explain the necessity of cooling system	Lecturing Visual media	Smart class room
	Types of cooling system		To understand the types of cooling system	List different types of cooling system		
	Air cooling system		To understand about air cooling system	Sketch and describe about air cooling list the advantage and disadvantage of air cooling system		
	Water cooling system		To understand about water cooling system	classify water cooling system		

Thermosyphon system	To understand about thermosyphon system	Illustrate about thermosyphon system
Pump circulation system	To understand about pump circulation system	Illustrate pump circulation system List the advantages of pump circulation system
Components of pump circulation system	To study about the components of pump circulation system	List the components of pump circulation system
Radiator	To understand about radiator	Explain about radiator
Water pump	To understand about water pump	Illustrate about water pump
Cooling fan	To understand about cooling fan	Explain about cooling fan
Thermostat valve	To understand about thermostat valve	Summarize about thermostat valve
Pressure cap & Expansion reservoir	To understand about pressure cap & Expansion reservoir	Explain the working of pressure cap & Expansion reservoir
Anti freeze solutions	To understand about Anti freeze solution	Summarize the functions of Anti freeze solution List various Anti freeze solution
Engine temperature warning gauge	To understand about engine temperature warning gauge	Illustrate engine temperature warning gauge

**MODULE 3**

Lubrication System	Introduction	15	To understand about the necessity of lubrication system	Explain the necessity of lubrication system	Lecturing Visual media	Multi media calss room
	Properties of lubricants		To understand about the purpose of lubrication system	List the purposes of lubrication		
	Types pf lubricants		To understand about the properties of lubricants	List the properties of lubricants		
	Lubrication systems		To understand different types of lubricants	List different type of lubricants		
	Petroil system		To understand about different types of lubrication systems	List different types of lubrication systems		
	Splash system		To understand about petroil lubrication system	illustrate about petroil lubrication system		
	Pressure system		To understand about splash lubrication system	Illustrate about splash lubrication system		
	Oil pumps		To understand about pressure lubrication system	Illustrate about pressure lubrication system		
	Gear pump		To understand about oil pumps	classify oil pumps and also give explanation		
	Rotor pump		To understand about gear pump	Illustrate gear pump		
	Oil filters		To understand about rotor pump	Illustrate rotor pump		
	Oil pressure warning light		To understand about oil filters	Describe and classify oil filters		
	Chassis lubrication		To understand about oil pressure warning lamp	Illustrate its working		
Clutch	Introduction	20	To understand about chassis lubrication	Explain about chassis lubrication	Lecturing Visual media	Smart class room
	Components of transmission system		To understand the transmission system	Summarize the transmission system		
			To know the power train	Illustrate the layout of transmission system		
	Clutch		To locate and identify the components of transmission system	List the components of transmission system		
	To familiarize the clutch	Define clutch				

	Functions of clutch Requirements of clutch Types of clutch Principle of friction clutch Single plate friction clutch Components of single plate friction clutch Multi plate clutch Comparison between single plate and multi plate clutch Centrifugal clutch Clutch adjustments Floor board clearance adjustment Clutch pedal travel adjustment Clutch free pedal play adjustment Clutch release lever adjustments Torque Converter		To study the functions of clutch To understand the requirements of clutch To classify the clutch To understand the principle friction clutch To understand the working single plate friction clutch To identify the components single plate friction clutch to understand the working of multiplate clutch To know the differences between single plate and multiplate clutches To understand the working of centrifugal clutch To understand clutch adjustments To understand floor board clearance adjustment To understand clutch pedal travel adjustment To understand clutch free pedal play adjustment to understand the clutch release lever adjustment To understand the working of torque converter	Explain the functions of clutch List the requirements clutch List the types of clutches Explain the principle Illustrate the working single plate friction clutch List the components of single plate friction clutch Illustrate the working of multiplate clutch Show the comparison table Illustrate the working of centrifugal clutch List the clutch adjustments Explain floor board clearance adjustment Summarize clutch pedal travel adjustment Summarize clutch free pedal play adjustment Explain the clutch release lever adjustments Illustrate the working of torque converter		
Gear Box	Introduction Functions of gear box Types of gear box Sliding mesh gear box Constant mesh gear box Synchro mesh gear box Progressive(2 wheeler) gear box Continuously variable transmission(CVT) Gear selector mechanism Automatic Gear box Electronic gear box	25	To understand the need of gear box To understand the functions of gear box To understand the types of gear box To understand the working of sliding mesh gear box To understand the working of constant mesh gear box To understand the working of synchromesh gear box To understand the working of progressive(two wheeler) gear box To understand the working of continuously variable transmission(CVT) To understand the working selector mechanism To understand the working of automatic gear box To understand the working of electronic gear box	Explain the need of gear box List the functions Classify the types of gear box Illustrate sliding mesh gear box Explain constant mesh gear box Explain synchromesh gear box Explain progressive(two wheeler) gear box Illustrate continuously variable transmission(CVT) Illustrate gear selector mechanism Illustrate automatic gear box Illustrate electronic gear box	Lecturing Visual media	Multimedia classroom

MODULE 4

Propeller shaft	Introduction	15		To understand the need of propeller shaft and chain drive	State the need of propeller shaft and chain drive	Lecturing	Smart class room
	Propeller shaft			To study the constructional details of propeller shaft	Explain the functions and constructional details of propeller shaft	Visual media	
	Universal joint			To study the function and constructional details of universal joint	Explain the functions and constructional details		
	Types of universal joints			To understand the types of propeller shaft	List the types propeller shaft		
	Slip joint			To understand the function and constructional details of slip joint	Summarize the functions and constructional details of slip joint		
Differential and Rear Axle	Final drive	20		To understand final drive	Illustrate final drive	Lecturing	Smart class room
	Differential				State the necessity of differential	Visual media	
	Functions of differential			To understand the necessity of differential			
				To understand the functions of differential	List the functions of differential		
	Functions of rear axle			To understand the construction and working of differential	Illustrate the constructional and working details		
	Types of rear axles			To understand the functions	List the functions of rear axle		
	Semi floating axle			To classify the axles	List the types of differential		
	Three quarter floating axle			To understand semi floating axle	Illustrate the semi floating axle		
	Full floating axle			To understand three quarter floating axle	Illustrate the three quarter floating axle		
	wheel hub			To understand full floating axle	Illustrate the full floating axle		
15. Front axle and steering	Introduction	25		To understand about wheel hub	Illustrate wheel components. To list the components of wheel hub	Lecturing	Smart class room
	Functions of front axle			To understand the importance of front axle and steering	Explain the importance of front axle and steering	Visual media	
	Types of front axles			To understand the functions of front axle	List the functions of front axle		
	Dead Front Axle			To classify the front axle	List the types of front axle		
	Line front axle			To understand the dead front axle	Explain dead front axle		
	Stub axle				List the part of dead front axle		
	Types of stub axles			To understand the line Front Axle	Explain line front axle		
	Steering			To understand stub axle	Explain stub axle		
	Steering geometry			To classify stub axles	List types of stub axles		
	Camber			To understand steering	Explain steering		
	King pin inclination			To understand the steering geometry	Explain steering geometry		
	Caster			To understand camber	Explain camber		
	Toe-in and toe-out			To understand king pin inclination	Summarize king pin inclination		
	Steering gear box			To understand caster	Explain caster		
	Types of steering gear box			To understand toe-in and toe-out	Illustrate toe-in and toe-out		
	Worm and sector			To understand the steering gear box	List the functions of steering gear box		
	Worm and roller			To understand the classification of steering gear box	List the types of steering gear box		
				To understand the worm and sector steering gear box	Explain the construction and working of worm and sector steering gear box		
	To understand the worm and roller steering gear box	Explain the construction and working of worm and roller steering gear box					



	Recirculating ball nut			To understand the recirculating ball nut steering gear box	Explain the construction and working of recirculating ball nut steering gear box		
	Rack & Pinion			To understand the rack & Pinion steering gear box	Explain the construction and working of rack & Pinion steering gear box		
	Steering linkages			To understand the steering linkages	Explain steering linkages		
	Steering linkage for conventional rigid axle suspension			To understand the steering linkage for conventional rigid axle suspension	Explain the Steering linkage for conventional rigid axle suspension		
	Steering linkage for independent front suspension			To understand the steering linkage for independent front suspension	Explain the steering linkage for independent front suspension		
<b>AUTOMOBILE ENGINEERING PRACTICAL -I (TRADE PRACTICAL) (1059)</b>							
<b>Basic Workshop</b>	Filing practice		50	To practice surface filing	Demonstrate surface filing	Demonstration Practice	
	Threading			To practice tap and die	Demonstrate tap and die		
	Removing Broken Studs			To practice the removal of Broken studs	Demonstrate the removal of broken studs.		
<b>Measuring Instruments</b>	Measurement with micrometers, vernier caliper, and dial gauge		30	To measure the dimensions of engine parts	Measure the dimensions of engine parts	Demonstration Practice	Micrometers Vernier caliper Dial gauge
				To measure the dimensions of engine parts	Measure the dimensions of engine parts		
				To measure clearances, run out, back lash	Measure the clearances, run out, back lash		
<b>Dismantling and assembling of engine</b>	Removal and dismantling of engine, cleaning, inspection and checking of engine parts, assembling of engine and refitting of engine to the vehicle		200	To Prepare the list of tools and equipment required	Make use of the tools and equipment required	Demonstration, Practice	Spanner set, socket set, Screw driver, hammer, mallet, plastic hammer, combination pliers, circlip pliers, feeler gauge, torque wrench, oil can, piston ring expander, piston ring compressor, etc,
				To Prepare the list of materials required	List the materials required		
				To prepare the procedure	List the procedure		
				To remove the engine from the vehicle	Demonstrate the removal of engine from vehicle		
				To dismantle the engine	Demonstrate the dismantling of engine		
				To clean and inspect the dismantled parts	Demonstrate the cleaning and inspection of dismantled parts		
				To detect the wear and tear of parts	Identify the wear and tear of parts		
				To rectify the worn out parts	Demonstrate the rectification of worn out parts		
				To assemble the engine	Demonstrate the assembling of engine		
	To refit the engine to the vehicle	Demonstrate the refitting of engine to the vehicle					
<b>Clutch Dismantling and Assembling</b>	Removal and dismantling of clutch, cleaning, inspection and checking of clutch parts, assembling of engine and refitting of clutch to the vehicle		100	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set, socket set, Screw driver, hammer, Arbor press, clutch aligning tool, steel rule, etc,
				To Prepare the list of materials required	List the materials required		
				To prepare the procedure	List the procedure		
				To remove the clutch from vehicle	Demonstrate the removal of clutch from vehicle		
				To dismantle the clutch	Demonstrate the dismantling of clutch		
				To clean the clutch parts	Demonstrate the cleaning of clutch parts		
				To check the wear and tear of clutch parts	Demonstrate the checking wear and tear of clutch parts		
				To assemble the dismantled parts	Demonstrate the assembling of dismantled parts		
				To adjust the release lever	Demonstrate the release lever adjustments		
	To refit the clutch assembling	Demonstrate the refitting of clutch assembling					
	To adjust the free play	Utilize the free play adjustment					

<b>Gear Box Dismantling and Assembling</b>	Removal, Dismantling, cleaning, Inspection & Checking, assembling and refitting of gear box	100	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, practice	Spanner set, socket set, screw driver, hammer, Circlip pliers, nose pliers, Oil can, Bearing puller, etc
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To drain gear oil	Demonstrate how to drain gear oil		
			To remove the gear box from vehicle	Demonstrate the removal of gear box from vehicle		
			To dismantle the gear box	Demonstrate the dismantling of gear box		
			To clean the dismantled parts	Demonstrate the cleaning of dismantled parts of gear box		
			To inspect the wear and tear and damage	Demonstrate how to inspect of wear and tear and damage		
			To assemble the gear box	Demonstrate the assembling of gear box		
			To refit the gear box to the vehicle	Demonstrate the refitting of gear box to the vehicle		
To refill gear oil up to the specified level	Demonstrate how to refill gear oil					
<b>Automatic Gear box dismantling &amp; Assembling</b>	Removal, Dismantling, cleaning, Inspection & Checking, assembling and refitting of automatic gear box	80	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, practice	Spanner set, socket set, screw driver, hammer, Circlip pliers, nose pliers, Oil can, Bearing puller, etc
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove automatic gear box from the vehicle	Demonstrate the removal of automatic gear box from the vehicle		
			To dismantle the automatic gear box	Demonstrate the dismantling of automatic gear box		
			To clean the dismantled automatic gear box parts	Demonstrate the cleaning of automatic gear box parts		
			To inspect the dismantled parts for wear and tear	Demonstrate Inspection procedure		
			To assemble the automatic gear box	Demonstrate the assembling of automatic gear box		
To refit the automatic gear to the vehicle	Demonstrate the refitting of automatic gear to the vehicle					
<b>Servicing of Petrol Fuel System</b>	Removal, inspection, cleaning and refitting of air filter and fuel filter	120	To remove the air filter	Demonstrate the removal of air filter from the vehicle	Demonstration, Practice	Spanner set, screw driver set, Nose pliers, Combination pliers, etc,
			To clean the air filter	Demonstrate the cleaning of air filter		
			To inspect the air cleaner	Demonstrate the inspection of air filter		
			To replace/refit air cleaner	Demonstrate the replacement/refitting of air filter		
			To remove the fuel filter	Demonstrate the removal of fuel filter from the vehicle		
			To clean the fuel filter	Demonstrate the cleaning of fuel filter		
			To inspect the fuel filter	Demonstrate the inspection of fuel filter		
	To replace/refit fuel filter	Demonstrate the replacement/refitting of fuel filter				
	Removal, inspection and refitting of Fuel Feed Pump	120	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set, screw driver set, Nose pliers, Combination pliers, etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the fuel pump from the vehicle	Demonstrate the removal of fuel pump from the vehicle		
			To inspect the fuel pump	Demonstrate the inspection of fuel pump		

<b>Servicing of Diesel Fuel System</b>	Removal, Inspection and refitting of fuel injectors		To refit/replace the fuel pump	Demonstrate the refitting/replacement of fuel pump	Demonstration. Practice	Spanner set,screw driver set,Nose pliers,Combination pliers,etc,	
			To Prepare the list of tools and equipment required	List the tools and equipment required			
			To Prepare the list of materials required	List the materials required			
			To prepare the procedure	List the procedure			
			To remove the fuel injectors from the engine	Demonstrate the removal of fuel injectors from the engine			
			To clean the injectors	Demonstrate the cleaning of fuel injectors			
			To inspect the fuel injectors	Demonstrate the inspection of fuel injectors			
			To refit/replace the fuel injectors	Demonstrate the refitting/replacement of fuel injectors			
	Removal, inspection and refitting of Fuel Pressure Regulators		To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration. Practice	Spanner set,socket set,nose pliers,screw drivers,etc,	
			To Prepare the list of materials required	List the materials required			
			To prepare the procedure	List the procedure			
			To remove the fuel pressure regulators from the vehicle	Demonstrate the removal of fuel pressure regulators from the vehicle			
			To inspect the fuel pressure regulators	Demonstrate the inspection of fuel pressure regulators			
			To refit/replace the fuel pressure regulators	Demonstrate the refitting/replacement of fuel pressure regulators			
	Removal, inspection and refitting of Fuel Feed Pump	120	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,Screw drivers,Combination pliers	
				To Prepare the list of materials required			List the materials required
				To prepare the procedure			List the procedure
				To remove the fuel pump from the vehicle			Demonstrate the removal of fuel pump from the vehicle
				To inspect the fuel pump			Demonstrate the inspection of fuel pump
				To refit/replace the fuel pump			Demonstrate the refitting/replacement of fuel pump
	Removal, Inspection and refitting of fuel injectors		To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,screw drivers, combination pliers,nose pliers,	
		To Prepare the list of materials required	List the materials required				
		To prepare the procedure	List the procedure				
		To remove the fuel injectors from the engine	Demonstrate the removal of fuel injectors from the engine				
		To clean the injectors	Demonstrate the cleaning of fuel injectors				
		To inspect the fuel injectors	Demonstrate the inspection of fuel injectors				
		To refit/replace the fuel injectors	Demonstrate the refitting/replacement of fuel injectors				
Removal, inspection and refitting of Fuel Pressure Regulators		To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set, screw driver set,etc,		
		To Prepare the list of materials required	List the materials required				
		To prepare the procedure	List the procedure				
		To remove the fuel pressure regulators from the vehicle	Demonstrate the removal of fuel pressure regulators from the vehicle				
		To inspect the fuel pressure regulators	Demonstrate the inspection of fuel pressure regulators				
		To refit/replace the fuel pressure regulators	Demonstrate the refitting/replacement of fuel pressure regulators				

<b>Servicing of Cooling System</b>	Removing , Dismantling , Cleaning , Inspection & refitting of water pump	80	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,Socket set,Screw driver,Livers,Nose pliersetc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove water pump from the engine	Demonstrate the removal of water pump from the engine		
			To dismantle the water pump	Demonstrate the dismantling of water pump		
			To clean the water pump	Demonstrate the cleaning of water pump		
			To inspect the parts of water pump	Demonstrate the inspection of water pump parts		
			To assemble the water pump	Demonstrate the assembling of water pump		
			To refit the water pump	Demonstrate the refitting of water pump		
	Removal , Cleaning , Inspection & refitting of Radiator	80	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set, socket set,screw drivers,Combination pliers, nose pliers,etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To drain the coolant	Demonstrate how to drain the coolant		
			To remove the radiator	Demenstrate the the removal of radiator		
			To clean the radiator core	Demonstrate the cleaning of radiator core		
			To reverse flush the radiator	Demonstrate the reverse flushing of radiator		
			To refit the radiator	Demonstrate the refitting of radiator		
			To refill the radiator	Make use of the procedure to refill the radiator		
			To check and adjust the tension of cooling fan belt	Demonstrate adjustment of cooling fan belt tension		
<b>Lubrication System</b>	Servicing of lubrication system	80	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,hammer,Screw drivers,combination pliers,circlip pliers,nose pliers,filter wrench,etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To drain oil	Demonstrate how to drain engine oil		
				Demonstare how to fill oil and maintain the oil level		
			To remove oil filter	Demonstrate the removal the oil filter		
			To inspect the oil filter	Demonstrate the removal the oil filter		
			To refit/replace the oil filter	Demonstare how to inspect the oil filter		
			To remove the oil pump	Demonstrate the removal of oil pump from engine		
			To dismantle the oil pump	Demonstrate the dismantling of oil pump		
			To clean and inspect the dismantled parts	Demonstrate the cleaning and inspection of dismantled parts		
			To detect the wear and tear of parts	Identify the wear and tear of parts		
			To rectify the worn out parts	Demonstrate the rectification of worn out parts		
			To assemble the oil pump	Demonstrate the assembling of oil pump		
			To refit the oil pump	Demonstrate the refitting of oilpump the engine		

YEAR - 2

<b>Employability Skills &amp; Entrepreneurship (2001)</b>	<b>Module M1</b> English & Communication	5	10	OB 1.1 To understand communication and self management skills  OB 1.2 To understand English Literacy - functional English, reading & writing	MO-1.1 Demonstrate knowledge of various methods of communication - verbal, non-verbal-visual; Greetings & self introduction, Asking & responding to question, formal & informal communication  MO-1.2 Demonstration of writing sentences and paragraphs on topics related to the subject, discussions on current happenings	- Lecture - Demonstration - Use of smart class rooms - Mock discussions, Interviews	- Laptop & Projector
	<b>Module M2</b> Communication & Behavioral Skills	5	10	OB 2.1 To understand Behavioral skills - Personal strength analysis, social responsibility, role modeling	MO-2.1 Identify specific do's and don'ts for avoiding common body language mistakes MO-2.2 Execute time management and planning skills, Skills to crack interviews MO-2.3 Demonstration of impressive appearance and groomed personality, ability to self- explore MO-2.4 Display professionalism at the institute and workplace	- Lecture - Demonstration - Use of smart class rooms - Mock discussions, Interviews	- Laptop & Projector
	<b>Module M3</b> Information Technology	20	40	OB 3.1 To understand Information and communication technology skills  OB 3.2 To be familiar with internet and its applications	MO-3.1 Understand the basics of computers, Operating system, MS-Word, MS-Excel software's MO-3.2 Create simple documents like - resume, letter writing, job application etc., MO-3.3 Printing document, Familiar with usage of shortcuts, Creating and Editing of Text, Formatting the Text. MO-3.4 Use Web browsers and search engines, Creating & using e-mail id for communication	- Lecture - Demonstration - Use of smart class rooms	- Laptop & Projector
	<b>Module M4</b> Entrepreneurship	25	5	OB 4.1 To understand Entrepreneurial skills	MO-4.1 Describe the significance of entrepreneurial values and attitude. MO-4.2 Demonstrate the knowledge of attitudinal changes required to become an entrepreneur MO-4.3 Explain the ways to set up an enterprise and different aspects involved viz., legal, compliances, Marketing aspect, Budgeting, etc	- Lecture - Demonstration - Use of smart class rooms	- Laptop & Projector

**AUTOMOBILE ENGINEERING II- (TRADE THEORY) (2051)**

<b>MODULE 1</b>							
<b>Brake System</b>	Introduction	25		To understand the need of braking system	Explain the need of brake system		

	<p>Functions of Brake</p> <p>Classification of brakes</p> <p>Mechanical brake</p> <p>Hydraulic brake</p> <p>Construction and working of hydraulic brake</p> <p>Master cylinder</p> <p>Tandem master cylinder</p> <p>Wheel cylinder</p> <p>Disc brake</p> <p>Advantages and disadvantages of disc brake</p> <p>Brake fluid</p> <p>Bleeding of hydraulic brake system</p> <p>Air brake</p> <p>Vacuum brake booster</p> <p>Antilock braking system</p>		<p>To study the functions of brake</p> <p>To understand different types of brakes</p> <p>To understand the construction and working of mechanical brake</p> <p>To understand hydraulic brake</p> <p>To understand the construction and working of hydraulic brake</p> <p>To understand the construction and working of master cylinder</p> <p>To understand the construction and working of tandem master cylinder</p> <p>To understand the construction and working of wheel cylinder</p> <p>To understand the construction and working of disc brake</p> <p>To study the advantages and disadvantages of disc brake</p> <p>To understand brake fluid</p> <p>To know the requirements of brake fluid</p> <p>To understand bleeding of hydraulic brake system</p> <p>To understand the working of air brake</p> <p>To understand vacuum brake booster</p> <p>To understand antilock braking system</p>	<p>Explain the functions of brake</p> <p>List different types of brakes</p> <p>show the diagram</p> <p>List the parts</p> <p>Explain the working</p> <p>Define hydraulic brake</p> <p>State the working principle of hydraulic brake</p> <p>Illustrate the lay out of hydraulic brake system</p> <p>List the parts of hydraulic brake system</p> <p>Explain the working hydraulic brake system</p> <p>List the parts of master cylinder</p> <p>Explain the working of master cylinder</p> <p>State the advantage of tandem master cylinder</p> <p>List the parts of tandem master cylinder</p> <p>Explain the working of tandem master cylinder</p> <p>List the parts</p> <p>Explain the working</p> <p>List the parts</p> <p>Explain the working</p> <p>List the advantages of disc brake</p> <p>List the disadvantages of disc brake</p> <p>Define brake fluid</p> <p>List brake fluid</p> <p>List the requirements of brake fluids</p> <p>State the need of bleeding of hydraulic brake system</p> <p>Explain the procedue of bleeding of hydraulic brake system</p> <p>Sketch the lay out of air brake system</p> <p>List the components of air brake system</p> <p>Explain the working of air brake system</p> <p>Sketch vacuum brake booster</p> <p>Explain the working of vacuum booster</p> <p>State the advantage of anti lock braking system</p> <p>Explain the working of anti locking brake system</p>	<p>Lecturing</p> <p>Visual media</p>	<p>Smart class room</p>
<p><b>Chassis and Suspension</b></p>	<p>Introduction</p> <p>Functions of suspension system</p>	<p>25</p>	<p>To understand th necessity of suspension system</p> <p>To understand the functions of suspension system</p>	<p>State the necessity of suspension system</p> <p>List the main parts of suspension system</p> <p>List the functions of suspension system</p>	<p>Lecturing</p> <p>Visual media</p>	<p>Smart class room</p>

Classification of suspension system
Function of suspension springs
Types of suspension spring
Leaf spring
Coil spring
Torsion bar
Shock Absorber
Function of Shock Absorber
Telescopic type Shock Absorber
Pneumatic shock absorber
Chassis
Frame
Types of frames
Conventional frame
Semi-integral frame
Integral frame or frame-less construction
Types of sections used in frames
Wheels
Type of Tyres
Tyre Specification

To classify the suspension system	List the types of suspension systems
To understand the function of suspension spring	State the functions of suspension spring
To understand various types of suspension springs	List the suspension springs
To study about the construction and working of leaf spring	List the components of leaf spring suspension Explain the construction and working of leaf spring suspension
To understand coil spring	Explain coil springs List the advantages of coil spring
To understand torsion bar	List the components of torsion bar suspension Explain the construction and working of torsion bar suspension
To understand the necessity of shock absorber	State the necessity of shock absorber
To understand the function of shock absorber	List the function of shock absorber
To understand the construction and working of telescopic type shock absorber	List the components of telescopic type shock absorber Explain the construction and working of pneumatic shock absorber
To understand the construction and working of telescopic type shock absorber	List the components of pneumatic shock absorber Explain the construction and working of telescopic type shock absorber
To understand chassis	Define chassis List the components of chassis
To understand frame	Explain about frame
To understand the types of frames	List the types of frames
To understand conventional frame	Explain about conventional frame
To understand semi-integral frame	Explain about semi-integral frame
To understand integral frame or frame-less construction	Explain about integral frame or frame-less construction
To know the types of section used in frames	List the types of section used in frames
To understand about wheel	Explain about wheel List different types of wheels
To understand the classification of tyre	List the types of tyre
To understand the tubed tyre	Explain the tubed tyre
To understand tubeless tyre	Explain the tubeless tyre
Explain	Describe bias ply or cross ply tyre
To understand the radial ply tyre	Illustrate radial ply tyre
To understand the belted bias ply tyre	Explain belted bias ply tyre
To know the specification of tyre	Explain tyre specification

**MODULE 2**

<b>Automobile</b>	Sources and Controls	10	To understand the necessity of emission	Explain the necessity of emission control
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<b>Pollution</b>			To understand the sources of automotive emission	Explain sources of automotive emission	Visual media	
			To understand the EURO and Bharath stage norms of petrol and diesel vehicles and the implementation year in India	Summarize EURO and Bharath norms of petrol and diesel vehicles and the implementation year in India		
			To explain the working of positive crankcase ventilation	Explain the working of positive crankcase ventilation		
			To Explain the working of vapour recovery system	Explain the working of vapour recovery system		
			Explain exhaust gas recirculation system.	Describe the working of Exhaust gas recirculation system		
			To Explain the working of air injection system	Explain the working of air injection system		
			To Explain the working of pulse air injection reactor (PAIR) system	Explain the working of pulse air injection reactor (PAIR) system		
			To Explain the working of two way and three way catalytic converter	Illustrate the working of two way and three way catalytic converter		
<b>Basic Electrical &amp; Electronic</b>	Theory and laws of electricity, Ohms Law, Series and Parallel circuits	10	Familiarize the Ohms laws, Series and Parallel circuit and use of instrument to test components of series, parallel and series parallel circuits to determine causes of malfunctions in an electrical circuit	Interpret electrical principles using ohms law to calculate volts, ohms and amperes. Demonstrate the differences in series, parallel and series parallel circuits	Lecturing Visual media	Smart class room
	Symbols and schematics - common automotive symbols		Familiarize electrical symbols and schematic diagrams	Illustrate schematics/wiring diagrams and analyze the circuits diagrams		
	Basic components of Electronic Circuits, identification of components		Familiarize the use and application of Capacitor, Resister, diode, Trip switches, Rectifiers, Voltage regulators, Transistor	Explain the use and application of Capacitor, Resister, diode, Trip switches, Rectifiers, Voltage regulators, Transistor		
Battery	Introduction	15	To understand various electrical systems used in automobiles	List various electrical systems	Lecturing	Smart class room
	Battery		To understand the role of battery in an automobile	Explain about automobile battery		
	Types of battery		To understand the classification of battery	List the types of batteries		
	Lithium ion battery		Lithium ion battery	Explain about lithium ion battery		
				List the components of lithium battery		
				List the components of lithium ion battery		
	Lead acid battery		To understand about lead acid battery	Explain lead acid battery		
				List the components of lead acid battery		
	Chemical action during charging	To understand the chemical action takeplace during charging	Show the chemical equation of charging			
			Explain the chemical action takeplace during charging			
	Chemical action during discharging	To understand the chemical action takeplace during discharging	Show the chemical equation of discharging			



				Explain the chemical action takeplace during discharging		
	Cell voltage		To understand the cell voltage	Outline cell voltage		
	Battery capacity		To understand the battery rating	Outline battery rating		
	Battery testings		To understand the battery testings	List the battery testing methods		
	Specific gravity test		To understand the specific gravity test	Explain the specific gravity test		
	Open volt test		To understand the open volt test	Explain the open volt test		
<b>Ignition System</b>	Introduction	15	To understand the need of ignition system	State the need of ignition system	Lecturing	
	Types of ignition system		To familiarize different ignition systems	List the types	Visual media	
	battery coil ignition system		To study battery coil ignition system	sketch and describe battery coil ignition syatem		
	Components of Battery coil ignition system		To study about components of battery coil ignition system	List the components of bttery coil ignition system		
	Magneto ignition system		To understand magneto ignition system	Explain magneto ignition system List types of magneto ignition system		
	Capacitor discharge ignition system		To understand capacitor discharge ignition system	Illustrate capacitor discharge ignition system		Smart class room
	Electronic ignition system		To familiarize with electronic ignition system	Illustrate electronic ignition system		
	Ignition timing		To understand the necessity of ignition timing	State the necessity of ignition timing		
	Advance mechanism		To understand necessity of ignition advance mechanism system	Explain the necessity of ignition advance mechanism		
			To understand the classification of ignition advance mechanism	List the different types of advance mechanism		
<b>MODULE 3</b>						
<b>Starting System</b>	Starting system	15	To understand the role of starting systems in an automobile	State the necessity of starting system	Lecturing	Smart class room
			To study about components of starting system	Sketch starting system circuit List the components of starting system Describe the working of starting system	Visual media	
	Starter motor		To understand the working of starter motor	List the components of starter motor Describe the working of starter motor		
	Starter motor drive mechanism		To classify the drive mechanism	List various drive mechanism		
	Bendix drive		To understand bendix drive	Explain the working of bendix drive		
	Solenoid switch		To understand solenoid switch	State the necessity of solenoid switch Sketch solenoid switch Explain the working of solenoid switch		
	Electronic starter control		To understand electronic starter control	List the functions of electronic starter control		
<b>Charging System</b>	Charging System	10	To understand the role of charging systems in an automobile	State the necessity of charging system	Lecturing	
			To study about components of charging system	Sketch charging system circuit List the components of charging system	Visual media	

	Alternator		To understand the construction and working of alternator	State the function of alternator List the components of alternator Explain the working of alternator		Smart class room
	Rectifier		To understand the function of rectifier in alternator	State the function of rectifier		
	Regulator		To understand the electronic regulator used in alternator	List the functions of regulator		
<b>Lighting systems and accessories</b>	Classification of Wires based on gauges and its application	25	To understand various types of wires used for automobile wiring	List the wires on the basis of strands and gauge	Lecturing Visual media	Smart class room
	Common Colour code of Wires		To understand the importance of colour coding of wires	List the colour codes of v wires used in various circuits		
	Lighting system		To understand various lighting system	List various lighting system		
	Head lamp circuit		To understand head lamp circuit	Show head lamp circuit List the parts of head lamp circuit		
	Park , tail , Instrument panel lights circuit		To understand Park , tail , Instrument panel lights circuit	Show the circuit diagram List the parts		
	Stop light circuit		To understand Stop light circuit	Show the circuit diagram List the parts		
	Reverse light circuit		To understand reverse light circuit	Show the circuit diagram List the parts		
	Electric horn		To understand electric horn	Explain the working List the parts State the function of horn relay		
	Wind shield wiper motor		To understand wiper motor	Explain the working List the parts State the function of wiper motor		
	Keyless entry system			To understand about keyless entry system		
Power lock system		To understand power lock system	Describe power lock system List the components of power lock system State the functions of each components of power lock system			
Power window system		To understand power window system	Describe power window system List the components of power window system State the functions of power window system components			
<b>MODULE 4</b>						
<b>Electric and Hybrid Vehicles</b>	Electric vehicle	15	To understand about electric vehicle	Explain about electric vehicle	Lecturing Visual media	Smart class room
			To understand the need of electric vehicle	Explain the need of electric vehicle		
			To understand the classification of electric vehicles	List different types of electric vehicles		
			To understand the advantages of electric vehicles	List the advantages of electric vehicles		

	Battery electric vehicle		To understand about battery electric vehicle	Explain battery electric vehicle. List the components of battery electric vehicle		
	Plug in hybrid electric vehicle		To understand about plug in hybrid electric vehicle	Explain plug in hybrid electric vehicle. List the components of plug in hybrid electric vehicle		
	Hybrid vehicle		To understand about hybrid vehicle	Explain hybrid vehicle. List the components of hybrid vehicle		
Automatic Climate Controls	Air Conditioning System	15	To understand the components of air conditioning system	List the components	Lecturing Visual media	Smart class room
			To understand the functions of each components of air conditioning system	List the functions		
			To understand air-conditioning electrical circuit diagram	Sketch A C Circuit diagram List the parts		
			To understand AC compressor Clutch	State the function of AC Clutch		
			To understand refrigerant	Explain about refrigerant		
			To understand Refrigerant pressure switch	State the function of AC pressure Switch		
Fault Diagnostic system	Introduction	20	To understand On Board Diagnostic System	Locate the connection sockets and list types of sockets		
	Sensors		To understand working of Mass airflow sensor, Engine Speed Sensor, Oxygen Sensor Spark Knock Sensor, Coolant Sensor, Manifold Absolute Pressure (MAF) Sensor, Fuel Temperature Sensor, Voltage sensor, Camshaft Position Sensor, Throttle Position Sensor, Vehicle Speed Sensor Flow, and Oil Pressure Sensor	Locate the position of listed sensors on Automobiles and understand its working	Visual media	
	Actuators & Controllers		To understand the working of Actuators such as Electromotive Throttle valve, Electronic Throttle valve, Idle speed controllers, Air control valves, Exhaust gas recirculation valves, Air flap actuators	State the function of Engine actuators		
	Fault Codes		To understand and interpret fault codes appears on the Dashboard	State the reason for each fault codes and pinpoint corresponding components		
<b>AUTOMOBILE ENGINEERING-II (TRADE PRACTICAL) (2059)</b>						
<b>Propeller shaft Servicing</b>	Removal of propeller shaft from vehicle, servicing of universal joint, servicing of slip Joint and refitting of propeller shaft	60	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, practice	
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		

			To remove the propeller shaft from the vehicle To dismantle the slip joint To dismantle the universal joints To clean the dismantled parts To inspect the dismantled parts for wear and tear and damages To assemble the universal joints To assemble the slip joint to refit the propeller shaft to the vehicle	Demonstrate the removal of propeller shaft from the vehicle Demonstrate the dismantling of slip joint Demonstrate the dismantling of universal joints Demonstrate the cleaning of dismantled parts Demonstrate the inspection of dismantled parts Demonstrate the assembling universal joints Demonstrate assembling of the slip joint Demonstrate the refitting of propeller shaft to the vehicle		Spanner set,socket set, screw driver,hammer,Circlip pliers,nose pliers,Oil can,Bearing puller,etc
<b>Differential servicing</b>	Removal, Dismantling, cleaning, Inspection & Checking, assembling and refitting of differential	100	To Prepare the list of tools and equipment required To Prepare the list of materials required To prepare the procedure To drain the differential oil To remove the wheels To remove the axle shafts To disconnect the propeller shaft from the differential To remove the differential cover To remove the differential assembly To remove pinion from the axle case To dismantle the differential assembly To clean the dismantled parts To inspect the dismantled parts for wear and tear and damages To assemble the differential assembly with correct back lash To refit pinion to the axle case To refit the differential assembly with correct back lash To refit the differential cover To reconnect the propeller shaft to the differential To refit the axle shafts To refit the wheels To refill differential oil up to the specified level	List the tools and equipment required List the materials required List the procedure Demonstrate how to drain differential oil Demonstrate removal of wheels Demonstrate removal of axle shafts disconnection of propeller shaft from differential Demonstrate the removal differential cover Demonstrate the removal of differential assembly Demonstrate the removal pinion from axle case Demonstrate the dismantling of differential assembly Demonstrate the cleaning of dismantled parts Demonstrate the inspection of dismantled parts for wear and tear Demonstrate the assembling of differential assembly Demonstrate the refitting of pinion to the axle case Demonstrate the refitting of differential assembly Demonstrate the refitting of differential cover Demonstrate the reconnection propeller shaft to the differential Demonstrate the refitting axle shafts Demonstrate the refitting of wheels Demonstrate how to refill differential oil	Demonstration. practice	Spanner set,socket set,wheel sanner,hammer,combination plier,nose pliers,Hoisting equipment,etc,
<b>Rear axle Servicing</b>	Removal,dismantling, cleanig,inspection and checking,assembling and refitting of rear axle	70	To Prepare the list of tools and equipment required To Prepare the list of materials required To prepare the procedure To drain the differential oil To remove the wheel To remove the brake drum To remove the wheel hub	List the tools and equipment required List the materials required List the procedure Demonstrate how to drain differential oil Demonstrate the removal of wheel Demonstrate the removal of brake drum Demonstrate the removal of wheel hub	Demonstration. practice	Ring spanner set, Open ended spanner set, Hammer Oil can Combination pliers Circlip pliers, Hoisting equipment,Torque

				To remove the axle shaft To clean the parts To inspect the axle shaft and bearing for wear and tear To insert the axle shaft To refit the wheel hub To refit the brake drum To refit the wheel To refill differential oil up to the specified level To Prepare the list of tools and equipment required To Prepare the list of materials required To prepare the procedure	Demonstrate the removal of axle shaft Demonstrate the cleaning of parts Demonstrate the inspection of axle shaft and bearing for wear and tear Demonstrate insertion of axle shaft Demonstrate refitting of wheel hub Demonstrate the refitting of brake drum Demonstrate refitting wheel Demonstrate how to refill differential oil upto the specified level List the tools and equipment required List the materials required List the procedure		wrench,etc,
<b>Steering Gear Box Dismantling and Assembling</b>	Removing, Dismantling, cleaning , Inspection , Assembling and refitting of Steering Gear Box		100	To Prepare the list of tools and equipment required To Prepare the list of materials required To prepare the procedure To remove the front wheels of the vehicle To remove steering gear box from the vehicle To dismantle the steering gear box To clean the dismantled parts To check the wear and tear and damages of parts To assemble the steering gear box To refit the steering gear box in the vehicle To refit the wheels To adjust the of steering play To correct the wheel alignment	List the tools and equipment required List the materials required List the procedure Demonstrate the removal of front wheels of the vehicle Demonstrate the removal of steering gear box from the vehicle Demonstrate the dismantling of steering gear box Demonstrate the cleaning of dismantled parts Identify wear and tear and damages of parts Demonstrate the assembling of steering gear box Demonstrate the refitting of steering gear box in the vehicle Demonstrate the refitting of wheels Demonstrate the adjustment of steering play Demonstrate the wheel alignment correction	Demonstration Practice	Pnuematic wrench Ring spanner set open ended spanner set screw driver hammer allen key set socket set combinatin pliers Circlip pliers etc
<b>Servicing of Tyre</b>	Removal, Demounting, inspection and repair of Tube , mounting and Refitting of Tyre		60	To Prepare the list of tools and equipment required To Prepare the list of materials required To prepare the procedure To remove the wheel from the vehicle To remove the tyre from the disc To remove the tube from the tyre To inspect the tube for puncture To repair the puncture To insert the tube into the tyre To refit the tyre to the disc To inflate and correction of tyre pressure To refit the tyre to the vehicle	List the tools and equipment required List the materials required List the procedure Demonstrate the removal of Wheel from the vehicle Demonstrate the removal of tyre from the disc Demonstrate the removal of tube from the tyre Demonstrate the inspection of tube for puncture Demonstrate the repair of puncture Demonstrate the insertion of tube into the tyre Demonstrate the refitting of tyre to the disc Demonstrate the inflation and correction of tyre pressure Demonstrate the refitting of tyre to the vehicle	Demonstration Practice	Pnuematic wrench Spanner set socket set tyre lever valve key Tyre pressure gauge srew driver hammer etc

<b>Wheel Balancing</b>	Removal, Inspection, inflate to proper pressure, wheel Balancing and Refitting of Wheel	40	To remove the wheel from the vehicle	Demonstrate the removal of wheel from the vehicle	Demonstration, Practice	Hoising equipment, Wheel spanner/pneumatic wrench, Wheel balancing machine screw drvier, etc,
			To correct the tyre pressure	Demonstrate the tyre pressure checking and correction		
			To remove the balancing weights from the wheel	Demonstrate the removal of balancing weights from the wheel		
			To balance the wheel	Demonstrate the wheel balancing procedure		
			To refit the wheel to the vehicle	Demonstrate the refitting of wheel to the vehicle		
<b>Wheel Alignment</b>	Inspection of Caster, Camber, Toe in , Toe Out , correct if necessary	50	To inspect caster, camber, toe in and toe out of vehicle	Demonstrate the inspection procedure of caster, camber, toe in and toe out	Demonstration. Practice	Sanner set, Wheel aligning tool/Whdel aligning machine
			To correct the toe in/ toe out	Demonstrate the correction of toe in/toe out		
<b>Battery</b>	Inspection, servicing and maintenance of battery	60	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration. Practice	Spanner set, Screw driver, Multimeter, hydrometer, battery charger. etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the battery from the vehicle	Demonstrate the removal of battery from the vehicle		
			To clean the battery	Demonstrate the cleaning of battery		
			To test the battery	Demonstrate the testing of battery		
			To charge the battery	Demonstrate the charging of battery		
			To test during the charging of battery	Demonstrate the testing during the charging of battery		
To refit the battery in the vehicle	Demonstrate the refitting of battery in the vehicle					
<b>Ignition System</b>	Servicing of ignition system	50	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration. practice	Spanner set, screw driver, combination pliers, nose pliers, multimeter, timing, tachmeter, dwell meter, etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the spark plugs	Demonstrate the removal of spark plugs		
			To clean the spark plugs	Demonstrate the cleaning of spark plugs		
			To inspect the spark plugs	Demonstrate the inspection of spark plugs		
			To correct the spark plug gap	Demonstrate the correction of spark piug gap		
To refit/replace of spark plugs	Demonstrate the refitting/replacement of spark plugs					
<b>Starting System</b>	Overhauling of starter motor	50	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set, Screw driver set, combination pliers, circlip pliers, multimeter, etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the starter motor from vehicle	Demonstrate the removal of starter motor from vehicle		
			To dismantle the starter motor	Demonstrate the dismantling of starter motor		
			To check the condition of parts for wear and tear	Demonstrate the checking procedure		
			To perform short circuit test	Demonstrate short circuit test		
			To assemble the starter motor	Demonstrate the assembling of starter motor		
			List the tools and equipment required	List the tools and equipment required		
<b>Charging system</b>	Overhauling of Alternator	50	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practce	Spanner set, screw driver set combination
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the alternator from vehicle	Demonstrate the removal of alternator from vehicle		
			To dismantle the alternator	Demonstrate the dismantling of alternator		

			To check the condition of parts for wear and tear	Demonstrate the checking procedure		set,combination pliers,circlip pliers,multimeter,,etc
			To perform continuity and short circuit test	Denontrate the continuity and short circuit tests		
			To assemble the alternator	Demonstrate the assembling of alternator		
			To refit the alternator to the vehicle	Demonstrate the refitting of alternator to vehicle		
			To correct the drive belt tension	Demonstrate how to correct the belt tension		
<b>Lighting systems and accessories</b>	Head lamp circuit	20	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration. Practice	Spannr set,screw driver set,multimeter,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To check and replace the fuse and bulbs	Demontrate the checking and replacements of fuse and bulbs		
	Park , tail and Instrument panel lights circuit	15	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,screw driver set,multimeter
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To check and replace the fuse and bulbs	Demontrate the checking and replacements of fuse and bulbs		
	Direction indicators light circuit	15	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstrator, Practice	Spanner set,screw driver, multimeter
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To check and replace the fuses, andbulbs and flasher	Demontrate the checking and replacements of fuses, bulbs and flasher		
	Stop light circuit	15	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,Screw driver,Multimeter, etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To check and replace the fuse and bulbs	Demontrate the checking and replacements of fuse and bulbs		
	Reverse light circuit	15	To check and adjust the brake switch	Demontrate the checking and adjustment of brake switch	Demonstraton, Practice	Spanner set,screw driver,multimeter
			To Prepare the list of tools and equipment required	List the tools and equipment required		
			To prepare the procedure	List the procedure		
			To check and replace the bulb and fuse	Demonstrate the checking and replacement of bulb and fuse		
To chek and replace the reverse switch			Demonstrate the checking and replacement of reverse switch			
Wind shield wiper motor	10	To Prepare the list of materials required	List the materials required	Demonstration, Practice	Spanner set,screw	
		To Prepare the list of tools and equipment required	List the tools and equipment required			
		To Prepare the list of materials required	List the materials required			
		To prepare the procedure	List the procedure			
		To remove he wiper arms and blades	Demonstrate the removal of wiper arms and blades			
		To remove the wiper linkages	Demonstrate the removal of wiper linkages			
To remove the wiper motor	demontrate the removal of wiper motor					

			To dismantle the wiper motor	Demonstrate the dismantling of wiper motor		Spanner set,screw driver set,multimeter
			To clean and check the components of wiper motor	Demonstrate the checking the components		
			To assemble the wiper motor	Demonstrate the assembling of wiper motor		
			To refit the wiper motor to the vehicle	Demonstrate the refitting of wiper motor		
			To refit the wiper linkages	Demonstrate the refitting of the wiper linkages		
			To refit the wiper arms and blades	Demonstrate the refitting of the wiper arms blades		
Keyless entry sysetm		10	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Screw driver set, Mutlimeter,wire striper,etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the faulty components	Demonstrate the removal		
			To replace the faulty components	Demonstrte the replacement		
Power lock system		10	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Screw driver set, Mutlimeter,wire striper,etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the faulty components	Demonstrate the removal		
			To replace the faulty components	Demonstrte the replacement		
Power window system		10	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Screw driver set, Mutlimeter,wire striper,etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the faulty components	Demonstrate the removal		
			To replace the faulty components	Demonstrte the replacement		
Air bag system		10	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Screw driver set, Mutlimeter,wire striper,etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the faulty components	Demonstrate the removal		
			To replace the faulty components	Demonstrte the replacement		
<b>Automatic Climate Controls</b>	Diagnose and repair Refrigeration system (Compressor, Clutch, Condenser, Evaporator, Blower , Expansion valve, Drier)	50	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration, Practice	Spanner set,socket set,screw driver,combination pliers,nose pliers,hammer,Mulimeter,pressure gauge,vacuum machine.etc,
			To Prepare the list of materials required	List the materials required		
			To prepare the procedure	List the procedure		
			To remove the parts of the system	Demonstrate the removal of the refrigerant system		
			To dismantle the components of each part of the system	Demonstrate the dismantling of each part of the refrigerant system		
			To clean and check all the dismantled components	Demonstrate the checking procedure of components		
			To repair and replace the dismantled components	Demonstrate the repair and replacing procedure		
			To assemble the dismantled parts	Demonstrate the assembling of		



					different parts				
				To refit the parts of the refrigeration system	Demonstrate the refitting the parts of refrigerant system				
				Charge refrigerant	Demonstrate the charging procedure of refrigerant				
<b>Fault Diagnostic system</b>	Diagnose and replace (Sensors, Gauges and Actuators)	0	60	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration. Practice	Spanner set,screw driver set,O B D scanner,etc,		
				To Prepare the list of materials required	List the materials required				
				To prepare the procedure	List the procedure				
				To understand testing and calibration of sensors, gauges and Actuators	Describe common faults of Sensors, Gauges and Actuators. Specify testing and inspection of Sensors, Gauges and Actuators				
	Fault code analysis by using fault codes ( MID, CID & FMI)			To Prepare the list of tools and equipment required	List the tools and equipment required			Demonstration. Practice	Spanner set,screw driver set,O B D scanner,etc,
				To Prepare the list of materials required	List the materials required				
				To prepare the procedure	List the procedure				
				To Understand fault codes papers on dashboard and position and location of various sensors and actuators	Describe the method of finding faults by analyzing fault codes. Locate the sensor, actuators and controllers corresponding to the fault appeared.				
<b>Pollution Testing</b>	Exhaust gas Analyzing	0	30	To Prepare the list of tools and equipment required	List the tools and equipment required	Demonstration. Practice	Screw siver set,Exhaust gas analyzing machine		
				To Prepare the list of materials required	List the materials required				
				To prepare the procedure	List the procedure				
				To understand the testing procedure of Exhaust gas analyzer and the monitoring parameters'.	Demonstrate the testing method and procedure. Explain the cause of variances appeared in the test result and its remedy.				
<b>Project Work (2008)</b>	Students Project Work	0	160	OB 1.1 To be familiar with industrial environment and production process	Employ skills acquired to solve problems of social significance or to simplifying day to day tasks.	- Demonstration - Industrial Visit			