GOVERNMENT OF TAMILNADU
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI
STATE PROJECT COORDINATION UNIT
(Established under Canada India Institutional Cooperation Project)
CURRICULUM

Course Name	**AUTOMOBILE ENGINEERING – LEVEL 1**
Course Code	ME /2020/022
Course Duration	360 Hours
Minimum Eligibility Criteria	8th Std
Pre-requisites (if any)	-
Course Objectives	Training module has been designed for the participants to • Understand the constructional details of an Automobile engine including cooling and lubrication system. • Understand fuel feed system for petrol and diesel engines. • Understand the construction and functional features of power transmission systems, • Understand the functions of different types of Steering, Suspension and Braking systems. • Understand the different types of Chassis and their functions. • Familiarize Electrical and Electronic equipment's.
Course Outcomes	At the end of training, the participants will be able to • Inspect and service the Fuel feed system for petrol and diesel engines. • Inspect and service the power transmission systems. • Inspect and service the Steering, Suspension and Braking systems.
Expected Job Roles	• Motor Mechanic in two-wheeler/four-wheeler authorized service centers • Self-employment- as a motor mechanic.

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
ME /2020/022	**AUTOMOBILE ENGINEERING - LEVEL 1**	Theory	120	10	20	3 Hours
		Practical	240	40	80	
		Total	360	50	100	

ME /2020/022 - AUTOMOBILE ENGINEERING - LEVEL 1

DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	**AUTOMOBILE ENGINES**	**90 Hours**	
1.1	**Basic Engine Components** - Functions - types, materials and construction of— Cylinder block — Crankcase — oil pan - Cylinder head — Gaskets — cylinder liners — Comparison of liners — pistons — piston rings — types of compression rings and oil control rings — piston pin — Connecting rod - methods of connecting piston and Connecting rod — Crankshaft— flywheel — Cam shaft — Valve and Valve mechanism — L-I-F-T.	30	
1.2	**Cooling systems** — purpose — types — air and water cooling systems — merits and demerits — thermo syphon system - pump assisted water cooling systems — components — water pump - fan -thermostat — types -radiator — types — pressure cap — vapour recovery cooling system — merits — temperature sensors -troubles in cooling system — loss of coolant, overheating and over cooling — causes.		
1.3	**Lubrication systems** — purpose — types of lubricants — types of lubricating systems - Full pressure system — techniques of cylinder and piston lubrication- oil pumps - oil filters — full flow and bypass filter systems - Troubles in lubrication system — oil leakage low oil pressure, high oil pressure and excessive oil consumption — causes.		
1.4	**Practical:** Dismantling, cleaning, servicing and assembling of the following: Engine components, water cooling systems, lubricating systems.		60

II	FUEL AND FUEL FEED SYSTEMS	75 Hours	
2.1	Requirements of an ideal petrol —properties of a good diesel fuel— Diesel knock--fuel additives — Alternate fuel for petrol and diesel engines. Layout of fuel feed system of petrol engine — types of fuel feed systems — AC. Mechanical fuel pump — S.U. Electrical fuel pump — fuel filter —Air cleaners - types — Carburetion — Classification of Carburetors — Simple carburetor — defects - Carburetor circuits — Solex Carburetor- Construction and operation — petrol injection — merits and demerits— DTSI — VTI — CCVTI — PGMFI — MPFI system.	25	
2.2	Layout of diesel fuel feed system — single acting fuel feed pump — fuel injection pumps — Construction and working of distributor type pump — CRDI system - fuel injectors — types — Single & Multi hole — pintle and pintaux - governors — Mechanical and Pneumatic governors - fuel filters — primary and secondary filters. Trouble shooting in fuel feed systems-causes-remedies &maintenance.		
2.3	**Practical:** Dismantling, cleaning, servicing and assembling of the following: Petrol feed system, Diesel feed system.		50
III	TRANSMISSION AND POWER TRAINS	60 Hours	
3.1	General arrangement of power transmission system —applications — clutch — function — Components — Types - Single plate, multi plate and diaphragm spring clutch— Clutch troubles and their causes, Gear box — purpose — types of gear boxes — sliding mesh , constant mesh and synchromesh — floor shift gear changer — gear box- troubles and causes.	20	
3.2	Drive line — propeller shaft — Universal joint — Cross type only - slip joint— , final drive — function —types of gear arrangement — straight & spiral Bevel, Hypoid, Worm and Worm Wheel—merits demerits and application — Hotchkiss drive — Torque tube drive —radius rod — purpose—Construction and operation—Self-locking and non-slipdifferential — Differential troubles and their Causes — forces in the rear axles —— Axle housing — types.		
3.3	**Practical:** Dismantling, cleaning, servicing and assembling of the following: Clutch, Gear box, propeller shaft, final drive, Differential, Axle housing.		40
IV	AUTOMOBILE CHASSIS	60 Hours	
4.1	Front axle -Stub axle- Steering system— Wheel alignment — Factors Camber , Caster , King pin inclination , Toe in and Toe out on turns -Steering linkages — Steering gears — Cam and double roller re circulating ball type, Rack and Pinion — Steering troubles and causes — power steering.		

4.2	Suspension system — Functions — Type of springs— Leaf, coil and Torsion bar — Front suspension systems — independent front suspension — merits and demerits — types — rear end suspension — Air suspension - shock absorber — purpose —telescopic type — construction and working. Brake system — functions — classification of brakes — drum brakes — leading shoe and trailing shoe — Self energizing action — hydraulic brake — brake bleeding - Air assisted hydraulic brakes — Air brake — layout, functions of each component and application only — disc brakes — construction and working — comparison of disc and drum type —— anti-lock brake system. Wheels — types of wheels - tyres — function — construction of tyres — cross and radial ply tyres — comparison— properties of tyres —tubeless tyre -tyre wear and tyre service.	20	
4.3	**Practical:** Dismantling, cleaning, servicing and assembling of the following: Steering system, Front and rear Suspension systems, Brakes, wheels and tyres.		40
V	**AUTOMOBILE ELECTRICAL EQUIPMENT & POLLUTION CONTROL**	**75 Hours**	
5.1	Battery — lead acid battery — construction —— charging - testing — starting circuit - Construction and operation of starter motor — starting motor drives- over running clutch and Bendix drive — construction and operation- solenoid switch - Charging circuit — alternator construction and operation — regulators — Dynamo.	25	
5.2	Ignition system — Types — battery coil ignition system —-high tension magneto — electronic ignition — Ignition system troubles and remedies, Lighting system — circuit — Head light — Aiming and adjustment— sealed beam head lights — directional signal circuits- Fluorescent lamp - Horn circuits — Wind screen wiper.		
5.3	Pollution — Pollutants — source of pollutants — pollution control techniques for petrol and diesel engines emissions — controlling crank case emission (PCV) — controlling evaporative mission (VRS , VSS ,VVR, ECS and EEC) — Treatment of exhaust gas (Catalytic converter EGR) — Introduction to automobile electronics.		
5.4	**Practical:** ➢ Battery charging method-battery testing ➢ Ignition- Dismantling, inspecting, servicing and assembling ➢ Starting motor- Dismantling, inspecting, servicing and assembling ➢ Electrical circuits- Checking, servicing and assembling		50
	Total Theory and Practical hours	**120**	**240**
	Total hours	**360**	

HARDWARE REQUIREMENT

S. NO.	LIST OF TOOLS / EQUIPMENTS
1.	Automobile mechanic tools-complete set, 4-stroke petrol and diesel engines with all accessories
2.	Fuel pumps for petrol and diesel engines, CRDI system MPFI system, fuel injectors
3.	Clutch assembly, Gear box assembly, Differential unit
4.	Steering arrangement, braking system, Suspension system
5.	Battery, ignition system, starting motor, Lighting circuit, horn circuit, wiper circuit.

REFERENCE BOOKS

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
01	Motor vehicle basic principles	V.A.W.Hillier	Nelson Thornes Ltd, UK
02	Automobile engineering Vol I & II	Dr. Kirpalsingh	Standard Publishers Distributors, New Delhi
03	Mechanic (Motor vehicle) trade- theory and practicals	------	National Instructional media Institute, Chennai

ASSESSMENT AND CERTIFICATION

S. No.	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max.Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Aim and Procedure	20
	b)Demonstration / Execution	25
	c) Result & Viva Voce	15
	d)Record	20
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

ME/2020/022 -AUTOMOBILE ENGINEERING - LEVEL 1

(Maximum Marks :20)

(N.B: Answer any **twenty** questions) (20x1 $= 20Marks$)

1. Name Four Strokes of an Engine.
2. Name the Components which Connects Piston and Crankshaft.
3. How many Valves used in the basic 4 Cylinder Petrol Engine?
4. What is TDC & BDC?
5. What is the Purpose of Carburetor?
6. What is the Expansion of MPFI?
7. Write the types of Gear Box.
8. Write the Principle of Turbo Charger.
9. Name Main components in the Cooling system.
10. What is the function of Clutch?
11. What is EGR?
12. Write the Purpose Catalytic Converter.
13. Write any 2 Components in Lubrication System.
14. Write the types of Brakes.
15. What is the Purpose of Suspension?
16. What is Ignition System?
17. What is Caster & Camber Angle in Wheel Alignment?
18. What is Tandem Master Cylinder?
19. Write the Expansion of PCV.
20. What is the Battery Voltage of an Automobile Vehicle?
21. Write the types of Steerings.
22. Write any Two components of Lubrication system.
23. Write the types of Valve Mechanism.
24. What is the purpose of Slip Joint?
25. What is the function of a Differential?