GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**AUTOMOTIVE MECHANIC**
Course Code	ME/2020/037
Course Duration	75 Hours
Minimum Eligibility Criteria	ITI/10th/+2/Diploma/Graduates
Pre-requisites (if any)	-
Course Objectives	Training module has been designed to provide the participants to • Aware of the different types of engines. • Develop knowledge on the working principles of petrol and diesel engine. • Be aware of the functions of the main components of motor vehicles • Develop skills in carrying out engine maintenance. • Gain awareness knowledge the cooling system and its maintenance. • Gain awareness knowledge of the lubrication system and its maintenance • Recognize all components in the fuel supply system and able to diagnosis the faults • Develop knowledge and skills in carrying out clutch, gear box, propeller shaft and differential unit maintenance. • Develop knowledge and skills in carrying out steering, suspension, brake, wheels and tyre maintenance. • Develop skills in wheel alignment and wheel balancing • Acquire knowledge and fault diagnosis on charging, ignition, starting and wiring system
Course Outcomes	At the end of training, the trainees will be able to • Diagnose and service the engine. • Diagnose and service of fuel (Petrol, Diesel, E.F.I., and C.N.G.), lubricating, cooling, ignition, emission and exhaust systems. • Diagnose and service the power train components as clutch, transmission, drive shaft, differential and axles. • Diagnose and service the suspension, steering and brake systems. • Replace battery, self-starter and alternator. • Do minor repair work of car wiring such as replacing fuses and bulbs etc.
Expected Job Roles	Technician for Car Workshops, Car Dealerships, Heavy Duty Workshops, Private fleets and garages, Assembly plants, Generator workshops.

TEACHING AND SCHEME OF ASSESSMENT						
Course Code	Course Name	Hours		Assessment Marks		Duration of the Examination
				Min	Max	
ME/2020/037	**Automotive Mechanic**	Theory	35	10	20	3 Hours
		Practical	40	40	80	
		Total	75	50	100	

ME/2020/037- AUTOMOTIVE MECHANIC

DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	**Practical**
I	**Engine System**	**15 Hours**	
1.1	Introduction - Working of petrol engine and diesel engine	07	
1.2	Engine components: construction and function		
1.3	Air and fuel supply system functioning		
1.4	Cooling system purpose and functioning – lubrication system purpose and functioning		
1.5	Exhaust system working – Introduction to MPFI, CRDI and GDI.		
1.6	**Practical** ➢ Checking and adjusting the tension of timing belt ➢ Checking and changing the air filter and fuel filter ➢ Checking and changing the radiator coolant ➢ Checking and changing the engine oil and oil filter ➢ Checking and adjusting the valve clearance		08
II	**Transmission system**	**18 Hours**	
2.1	Requirements of Clutch - Types of clutches - clutch operation - comparison between wet clutch and dry clutch.	08	
2.2	Purpose of Gear box - Types of gear boxes - Construction and working principle of Constant mesh and Synchromesh gear boxes Transfer case - Automatic transmission - over drive		
2.3	Purpose of Propeller Shaft and its types - Construction and working of differential unit -		
2.4	Types of Rear Axles - Full floating, Semi-floating, Three quarter floating.		
2.5	**Practical:** ➢ Overhaul of clutch assembly and adjusting the clutch free play ➢ Overhaul of gear box and changing the gear box oil ➢ Overhaul of propeller shaft ➢ Overhaul and Backlash adjustment in differential unit ➢ Overhaul of rear axles		10

III	**Steering and Suspension system**	**12 Hours**	
3.1	Steering system - Ackerman principle of steering - Steering geometry -	06	
3.2	Types of steering gear box Constructional details and working principle of Cam and Roller,		
3.3	Re circulating ball, Rack and Pinion type - Hydraulic power steering - Electronic power steering.		
3.4	Functions of suspension - Types of suspension springs - construction details of Leaf spring, coil spring, torsion bar - telescopic type shock absorber		
3.5	Independent suspension - wishbone type, Mac pherson strut type -antiroll bar- layout of air suspension.		
3.6	**Practical:** ➢ Overhaul of Re-circulating ball type steering gear box ➢ Overhaul of rack and pinion type steering gear box ➢ Overhaul of leaf spring ➢ Overhaul of telescopic type shock absorber ➢ Overhaul of Mac Pherson strut type shock absorber		06
IV	**Brakes, Wheels and Tires**	**16 Hours**	
4.1	Function of Brakes - Mechanical, Hydraulic, Air brake system	06	
4.2	Construction and operation of Drum and Disc brakes		
4.3	Master cylinder - Wheel cylinders – bleeding of hydraulic brakes- Introduction to Antilock Braking System (ABS)		
4.4	Types of wheels- disc, wire and alloy wheel - Wheel dimension - Tyres - tube tyres and tubeless tyres		
4.5	**Practical:** ➢ Overhaul of brakes and adjusting the brake pedal free play ➢ Air bleeding in hydraulic brakes ➢ Wheel alignment ➢ Wheel balancing ➢ Repairing a punctured tube and tubeless tyre		10
V	**Auto Electrical System**	**14 Hours**	
5.1	Battery Charging – Battery Testing - Hydrometer test - Open Voltmeter test - High rate discharge test. Battery Troubles and maintenance	08	
5.2	Alternator – purpose – construction Starting motor –working principle – starting motor drive mechanism		
5.3	Ignition system - Battery coil ignition system –Magneto ignition system – Electronic ignition system – Wiring system		

5.4	Sensors - pressure sensor, throttle position sensor, fuel flow sensor, thermistor sensor, oxygen sensor, speed sensors, knock detecting sensors, lambda sensor		
5.5	Electronic Control Unit (ECU) – principle and working of ECU		
5.6	Electronic dashboard instruments - security and warning system – Onboard diagnosis system		
5.7	**Practical:** ➢ Battery testing and charging ➢ Cleaning, inspecting and adjusting the electrode gap of spark plug. ➢ Servicing of starter motor ➢ Servicing of alternator ➢ Servicing and tuning of horn.		06
	Total Theory and Practical hours	**35**	**40**
	Total hours	**75**	

HARDWARE REQUIREMENTS

S. No.	LIST OF TOOLS / EQUIPMENTS
1	Auto garage tools and equipment
2	Car 2 Nos.
3	Two-wheeler 2 Nos.
4	Computerized Wheel Aligner
5	Wheel balancer
6	Auto electrical tools and equipment

REFERENCE BOOKS

S. No.	Name of the Book	Author	Publisher & Year
1	Automobile Engineering - Vol 1	Kirpal Singh	Standard Publishers Distributors, 2013
2	Automobile Engineering - Vol 2	Kirpal Singh	Standard Publishers Distributors, 2013
3	Fundamentals of Automobile Engineering	Ramalingam K K	Scitech Publications (India) Pvt. Ltd., Chennai,2015.
4	Automotive Electrical Equipment	Kholi P L	Tata McGraw Hill Company, Ltd., New Delhi, 2010.

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/2020/037 – AUTOMOTIVE MECHANIC

(Maximum Marks: 20)

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

1. What is meant by 4-stroke engine?
2. Name any two functions of flywheel.
3. Name the material used for producing Engine block.
4. Write any two purpose of lubrication.
5. Write the abbreviations of MPFi.
6. What are the two types of clutches used in vehicles?
7. Name the types of gear boxes used in transmission system.
8. What is the purpose of transfer case?
9. What is the use of propeller shaft?
10. Write any two functions of differential unit.
11. What is the purpose of steering system?
12. Name the different type of steering gear boxes used.
13. Mention any two functions of suspension system.
14. In front and rear axles, what type of suspension will be provided?
15. What are the advantages of air suspension system?
16. What is the purpose of a brake?
17. Write any two advantages disk brake over drum brake.
18. Define ABS?
19. Name the types of wheels used in vehicles.
20. Write any two advantages of tubeless tyres.
21. What is the purpose of battery in a vehicle?
22. State the purpose of alternator in a vehicle.
23. Name the types of ignition system used in vehicle.
24. What is sensor?
25. What are all the security and warning systems available in OBD?