

Curriculum for
Diploma Programme in
AUTOMOBILE ENGINEERING

PURAN MURTI
CAMPUS

FIFTH SEMESTER (AUTOMOBILE ENGINEERING)

Sr. No.	SUBJECTS	STUDY SCHEME HOURS / WEEK		Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		Th	Pr		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
					Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
	Industrial Training	-	-	5	-	100	100	-	-	100	-	100	200
5.1	Auto Engine-II	3	2	4	25	25	50	100	3	50	3	150	200
5.2	Chassis, Body and Transmission-II	3	3	4	25	25	50	100	3	50	3	150	200
5.3	Garage Equipment	3	-	3	25	-	25	100	3	-	-	100	125
5.4	Auto Electrical and Electronic Systems	3	2	4	25	25	50	100	3	50	3	150	200
5.5	Advanced Manufacturing Processes	3	-	3	25	-	25	100	3	-	-	100	125
5.6	Mechanical Workshop Practices-III	-	3	1	-	50	50	-	-	50	3	50	100
5.7	Auto Professional Practice-I	-	4	2	-	50	50	-	-	50	3	50	100
5.8	Driving Practice-I	-	4	2	-	50	50	-	-	50	3	50	100
	Soft Skills-III	-	2	-	-	25	25	-	-	-	-	-	25
	Total	15	20	28	125	350	475	500	-	400	-	900	1375

CAMPUS



FIFTH SEMESTER



5.1 AUTO ENGINE - II

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RATIONALE

This subject is in continuation to Auto Engine –I. It covers diesel engines and other types of engines. It also includes combustion and troubleshooting of I.C engine. Brief description of engines of modern vehicles has also been included in this subject.

LEARNING OUTCOMES :

At the end of this course, the students will be able to:

- Explain the phenomenon of combustion in I.C engine.
- Explain the working of fuel supply system in diesel engine
- Identify and select various components of fuel supply system in diesel engine.
- Diagnose various engine faults and their remedies.
- Comprehend effect of automobile pollution on humans and methods to control pollution
- Measure engine pollution
- Explain the concept involved in specialized engine.



DETAILED CONTENTS

1. Combustion in I.C. Engines (10 Periods)

Phenomenon of combustion in S.I. engine : phases of combustion – Ignition lag, flame propagation and after burning; Turbulence, Abnormal combustion, Pre ignition and Detonation; Octane rating

Phenomenon of combustion in C.I. engines : phases of combustion – Ignition delay, uncontrolled combustion, controlled combustion, after burning

Methods of producing air movements namely squish and swirl

Various types of combustion chambers for diesel engine,

Diesel knock, cetane rating.

2. Fuel Supply System in Diesel Engine (14 Periods)

Layout of fuel supply system in diesel engine and their types, Modern common rail direct injection (CRDI) system and individual pump system

Fuel filters – primary and secondary,

Fuel feed pumps; priming.

Fuel injection pumps – plunger and barrel type, distributor type.

Fuel injectors and their working

Governing and types of governors.

Supercharging of engines – function, advantages and disadvantages; types and location of superchargers,

Turbochargers – types, function, working and advantages

3. Specialized Types of Engine (8 Periods)

Wankel engine

Electrical / hybrid system/plug-in hybrid system

Fuel cell engine

Homogeneous Charge Compression Ignition (HCCI) engine

Wheel motors

CNG/LPG engine.

4. Engine faults and their rectifications (5 Periods)

Causes and rectification of:

High oil consumption

High fuel consumption

Engine starting troubles

Engine overheating

5. Emission Control (6 Periods)

Exhaust pollutants from petrol and diesel engines and their effects on human beings and other materials

Sources of automotive emission

Methods of emission control : improvement in engine design, exhaust gas

Treatment, positive crankcase ventilation, exhaust gas recirculation, catalytic converters for petrol and diesel engines, particulate filter, selective catalytic reduction technique, NOX absorbers.

Emission norms (Bharat Stage).

6. Miscellaneous Topics (5 periods)

Technologies to improve engine economy and output,

Alternative automotive fuels

Camless engine

Opposed piston opposed cylinder (OPOC) engine

Engine specifications of an Indian car

LIST OF PRACTICALS

1. Study & servicing of fuel feed system of diesel engine – replacing fuel filter, inspection of fuel feed pump.

2. Study & sketching of common rail direct injection (CRDI) fuel system.
3. Phasing and calibration of fuel injection pump.
4. Cleaning and testing fuel injectors used in petrol and diesel engines.
5. Servicing of air cleaner – wet type and dry type.
6. Study of turbochargers.
7. Analysis of exhaust gases of diesel engine using smoke meter.
8. Analysis of exhaust gases of petrol engine using exhaust gas analyser.

Note: Safety precautions and cleanliness must be practiced in each practical.

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis in making the students conversant with the principles and practices related to various types of engines. Audio visual aids should be used to show engine features and working.

Demonstrations should be made in automobile shop to explain various engine components.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

- 1 Automobile Engineering Vol. II by Dr. Kirpal Singh., Standard Publishers, Delhi
- 2 A to Z of Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors, Delhi
- 3 Automobile Engineering by RB Gupta, Satya Parkashan, New Delhi
- 4 IC Engines by ML Mathur and Sharma, Dhanpat Rai and Sons, Delhi
- 5 Automobiles- Theory and Assignment Test (Solved) by G.S.Sethi, Asian Publisher New Delhi.
- 6 Automobile Engineer by Dr. Kirpal Singh.(in Hindi), Standard Publishers, Delhi
- 7 Automotive Engine by Srinivasan, TMH, Delhi rs,
- 8 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	10	22
2	14	30
3	8	16
4	5	10

5	6	12
6	5	10
Total	48	100



5.2 CHASSIS, BODY AND TRANSMISSION-II

RATIONALE

L T P

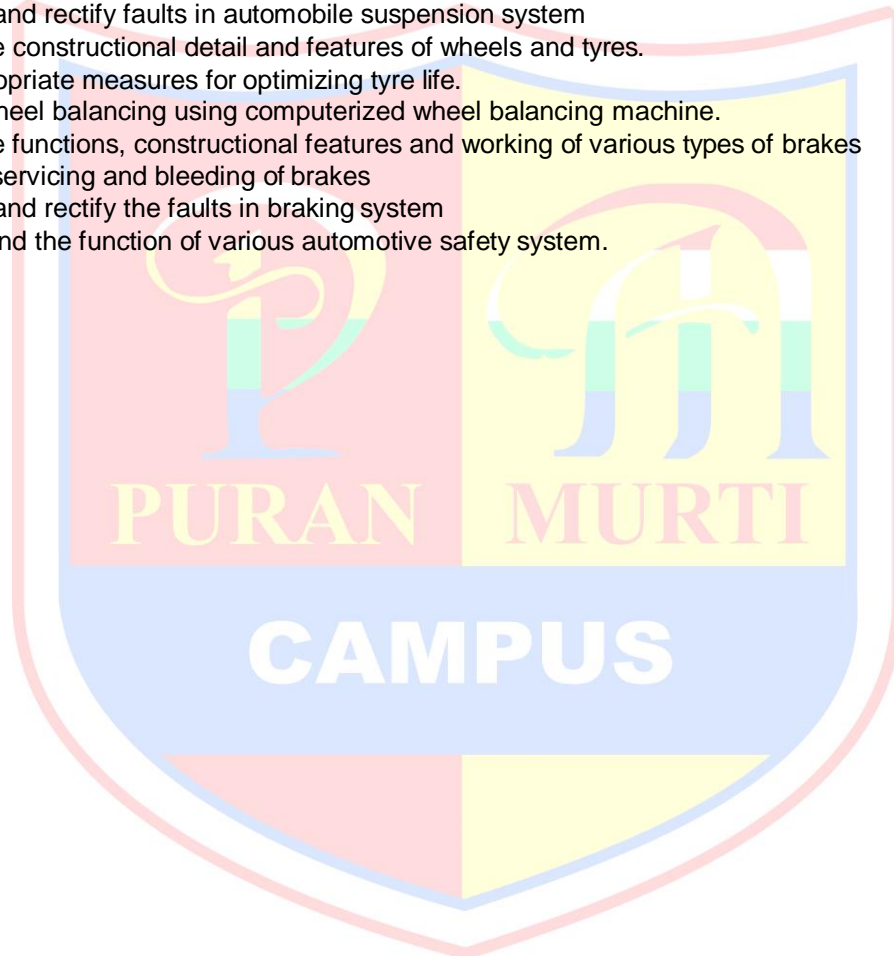
3 - 3

Chassis, body and transmission form the core of automobile engineering. The subject aims at imparting knowledge and skills regarding chassis and body viz, clutch suspension system, wheel and tyre, braking system and safety of vehicles

LEARNING OUTCOMES:

At the end of this course, the students will be able to:

- Explain functions and constructional features of various types of automotive suspension system
- Diagnose and rectify faults in automobile suspension system
- Explain the constructional detail and features of wheels and tyres.
- Take appropriate measures for optimizing tyre life.
- Perform wheel balancing using computerized wheel balancing machine.
- Explain the functions, constructional features and working of various types of brakes
- Carry out servicing and bleeding of brakes
- Diagnose and rectify the faults in braking system
- Comprehend the function of various automotive safety system.



DETAILED CONTENTS

1. Suspension System

(10 Periods)

Functions of suspension system,
Definition of sprung weight, unsprung weight, spring rate
Types of suspension springs – coil spring, leaf spring, torsion bar, air spring
Constructional details of leaf spring, silent block bushing
Function and construction of variable rate spring and helper spring
Spring materials and their characteristics
Function of shock absorber, Principle, construction and working of telescopic shock absorber, concept of gas filled shock absorber.
Types of suspension systems – Rigid axle & Independent suspension system
Independent suspension system – types and advantages.
Camber grading and nipling spring seats, Stabilizer bar
Pneumatic suspension system
Diagnosis of common faults and their rectifications

2. Wheels and Tyres

(12 Periods)

Introduction to wheel assembly
Wheels – function, requirement and types
Constructional details of various types of wheels; wheel materials
Types of rim
Wheel specification
Tyre – purpose & classification of tyres
Constructional details of tubed tyre and tubeless tyre & their comparison
Types of carcass – Cross ply, Radial ply and Mixed ply; Comparison of cross- ply and radial- ply tyres Run flat tyres Tyre materials, tyre dimension & specification,
Inflation pressure, under – inflation & over – inflation Factors affecting excessive tyre wear
Tyre care & maintenance, Concept of balancing; Wheel balancing - Static and dynamic.
Retreading of tyres.

3. Braking System - I

(10 Periods)

Purpose of Brakes; Principle of braking; stopping time & stopping distance
Requirements of good braking system
Classification of brakes
Drum brakes - Construction & working, leading & trailing shoes
Disc brakes – Construction & working
Materials of brake shoe, brake drum, brake pad & brake lining
Mechanical braking system – Layout & working
Hydraulic brakes – Principle, layout & working; Constructional details of master cylinder and wheel cylinder; Tandem master cylinder
Brake fluid – specification and characteristics
Bleeding of brakes
Hand brake or parking brake – Purpose, layout & working
Pedal travel; Heat generation and dissipation; brake fade

4. Braking System - II

(8 Periods)

Power brakes – definition, requirement & classification
Vacuum Brakes – Principle, layout & working
Air Brakes – layout, components & working

Air Hydraulic brakes – Layout, components & working
Anti-skid & anti-lock devices
Brake tests
Common braking system faults, their causes & rectification

5. Automotive Safety

(8 Periods)

Meaning of automotive safety,

Active safety systems - Preventive design, Antilock Brake System (ABS), Electronic brake force distribution (EBD), Electronic vehicle stability (EVS), Traction Control System (TCS), Smart cruise control, Pedestrian protection system, Rear detection system, Night vision system

Passive safety systems – Design of vehicle for minimum injury, Seat belt & Air bag

Crash test for safety,

Burglar alarm & Immobilizer system for vehicle theft control.

LIST OF PRACTICALS

1. Study and sketching of independent suspension system.
2. Checking and servicing of telescopic shock absorber.
3. Removal, dismantling, servicing, assembling and refitting of leaf spring assembly.
4. Wheel balancing using computerised wheel balancing machine and tyre rotation.
5. Replacement of brake shoe and adjustment of brake shoe clearance.
6. Servicing of mechanical brakes, adjustment of brake pedal freeplay.
7. Servicing and repair of hydraulic brake system, bleeding of brakes.
8. Study of mechanical hand brake system and required adjustments.
9. Visit to local motor market to learn retreading of tyres.
10. Study of various safety systems i.e. seat belt, air bag etc. of a vehicle.

Note: Safety, precautions and cleanliness must be practised in each practical.

INSTRUCTIONAL STRATEGY

Teacher should make use of audio visual aids to show features of chassis, body and transmission. Demonstration should be made in the automobile shop to explain various aspects of chassis, body and transmission.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

1. Automobile Engineering, Vol. I – II by Dr. Kirpal Singh, Standard Publishers, Delhi
2. A to Z of Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors, Delhi
3. Automobile Engineering by GBS Narang, Khanna Publishers, Delhi
4. Chassis, Body and Transmission by Vijay Singh & Raj Kumar, Ishan Publications,

Jalandhar.

- 5 Chassis, Body and Transmission-II by G.S.Aulakh, Eagle Prakashan, Jalandhar.
- 6 Automobile Engineering by R.B. Gupta, Satya Prakashan, New Delhi.
- 7 Automobiles- Theory and Assignment/Test (Solved) by G.S.Sethi, Asian Publishers, New Delhi.
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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SUGGESTED DISTRIBUTION OF MARKS

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2	12	22
3	10	22
4	8	18
5	8	16
Total	48	100



GARAGE EQUIPMENT

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RATIONALE

Management of garage forms an important function of automobile technicians. To perform such functions, knowledge of service station equipment, tuning equipment, engine repair tools, electrical repair equipment and reconditioning and fabrication of equipment is very essential. Hence the subject.

LEARNING OUTCOMES:

On completion of this course, a learner should be able to:

- Use general tools for required application.
- Use appropriate tuning and testing equipment for given situation.
- Use engine repair tools.
- Use Electrical Repair equipment.
- Use reconditioning/testing equipment for chassis and body.

DETAILED CONTENTS

1. General Tools Specifications, types and applications of (10 periods)

- Screw drivers
- Spanners and wrenches
- Pliers
- Hammers
- Chisels
- Files
- Hacksaw
- Tools for tubes flaring
- Taps and dies
- Reamers
- Soldering tools
- Measuring tools- vernier calipers, inside and outside micrometers, least count
- Feeler gauge
- Tommy bar
- Cleaning tools

2. General Equipment Specifications, working principle and uses of (08 periods)

- Drilling machine (portable) along with set of drills
- Bench grinder
- Air compressor and pneumatic gun
- Hydraulic and electric hoists
- High pressure washing equipment (Car washer, Car vacuum cleaner, Buffing tool)
- Oil sprayers
- Grease Guns-manual, pneumatic type
- Tyre inflation gauge (Manual and Digital type automatic)
- Tyre Changer (Manual and Automatic)
- Creepers
- Fire extinguisher
- First aid box

3. Tuning and Testing Equipment Specifications, working principle and applications of (06 periods)

- Vacuum Gauge
- Compression Gauge (Pressure Gauge)
- Distributor Tester, cam (dwell) angle tester, r.p.m. tester.
- Spark plug cleaner and tester
- Ignition timing light
- Fuel injector tester
- Fuel consumption tester

4. Engine Repair Tools/Measuring and Testing Equipment Specifications, working principle and applications of (08 Periods)

- Torque wrench, pneumatic wrench
- Piston ring compressor
- Valve lifter and valve spring tester
- Piston ring files, groove cleaner
- Scrappers
- Piston ring remover
- Cylinder Dial gauge
- Smoke meter
- Exhaust gas analyzer
- Engine Scanner
- Part degreasing tank

5. Electrical Repair Equipment Specifications, working principle and uses of (04 periods)

- Electrical Test Bench
- Battery Charger
- Head Lights Beam Aligner and Tester (Electronic and Digital type)
- Growler
- Battery Tester

6. Reconditioning/Testing Equipment for Chassis and Body (06 periods)

- Uses/applications, working principle of
- Brake Efficiency Tester (Chassis Dynamometer) or brake testing equipment
 - Clutch Fixtures and Brake Line Rivetters
 - Jacks – mechanical, hydraulic, trolley type
 - Paint chamber
 - Paint Spray Gun
 - Paint Drying Equipment
 - Axle/chassis stands
 - Computerized wheel balancer –static and dynamic
 - Computerized wheel alignment equipment

7. Engine Reconditioning and Testing Equipment Specifications, working principle and use of (06 periods)

- Cylinder Boring Machine and Honing Machine
- Camshaft Grinding Machine
- Connecting Rod Aligner
- Arbor Press
- Fuel Injection Pump Calibrating Machine
- Valve Refacer, Valve Seat Cutting and Grinding
- Radiator Tester



- Fuel injector tester
- Nozzle cleaning equipment
- Crankshaft grinder

INSTRUCTIONAL STRATEGY

Teacher should lay emphasis on proper handling and use of garage equipment Demonstration should be made in the workshop for clarity of ideas. Visits to garage should also be planned.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making and viva-voce

RECOMMENDED BOOKS

1. Automotive Mechanics by Srinivasan; TMH, Delhi
2. Automobile Engineering Vol. I and II by Dr. Kirpal Singh; Standard Publishers, Delhi.
3. Automotive Mechanics by WH Crouse and Donald Anglin; Tata Mc Graw Hill Publishing Co. Ltd., Delhi.
4. Garage Equipment by G.S. Aulakh, Eagle Prakashan, Jalandhar.
5. Garage Equipment by Raj kumar Chauhan, North Publication
6. A to Z of Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors, Delh
7. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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1	10	18
2	08	15
3	06	14
4	08	15
5	04	10
6	06	14
7	06	14
Total	48	100

AUTO ELECTRICAL AND ELECTRONIC SYSTEMS

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3 - 2

RATIONALE

Diploma holders in Automobile Engineering have to deal with different types of batteries, their charging and testing, regulators, lighting system and various other electrical accessories used in Automobile Engineering. Hence the subject of automotive electric equipment is very essential for these technicians.

LEARNING OUTCOMES :

After undergoing this course, the students will be able to

- Identify various auto-electrical faults/troubles and their causes.
- Analyse and rectify various auto-electrical troubles with the help of troubleshooting charts
- Use suitable instruments and tools for diagnosis and testing of automotive electrical system
- Explain the use of censoring units, ECM etc.
- Explain the applications of different type of accessories in automobile
- Explain features of electrical and electronics components in modern vehicles.
- Explain working of Electrically driven vehicles.

DETAILED CONTENTS**1. Introduction (02 Periods)**

Various Electrical and Electronics equipment components/systems in automobile, their functions and demands, earth return system, types of earthing, 6V, 12V and 48 V systems.

2. Batteries (12 Periods)

Lead Acid Batteries: Construction, working, elements, materials used, electrolyte and its strength, effect of added plate area and temperature, rating, capacity, efficiency, temperature characteristics, terminal voltages, charging and discharging.

Battery Testing: Electrolyte testing by hydrometer, voltage test, high rate discharge and cadmium test.

Battery Charging: Constant potential and constant current, initial charging, normal charging, trickle charging, intermittent charging, boost charging.

Battery Defects: Sulphation, plates decay, erosion, cracking, sedimentation, separator defects, short circuits, overcharging failure.

Alkaline Batteries: Basic description, types, merits and demerits.

2.6 Lithium ion battery: Construction and working

Concept of less maintenance and maintenance-free batteries

Fuel cells- Principle of working and types of fuel cell

3. Charging System (05 Periods)

Circuits, function and various components, dynamo and alternator, types, construction, working, advantages and disadvantages of dynamo and alternators, drives, cut out relay.

Regulation: Functions of various components of two unit, three unit and heavy duty Regulators, Regulators for alternators.

4. Starting System (05 Periods)

Function of various components, torque terms, principle and constructional details of starter motor, switches, types, starter to engine drive and their types, integrated starter generator.

5. Lighting System (05 Periods)

Various lighting circuits, head lamp, type and constructional details, sealed beam, double filaments, vertical and side control of lamps, fog light, side light, brake light, instrument light, indicator lights, reversing light, warning light, interior lights, LED lights.

Wiring: HT and LT, their specifications, cable colour codes, wiring Harness, Cable connections, Wiring diagrams of cars and two wheeler, Fuses, faults and rectification.

6. Electrical & Electronics Accessories (05 Periods)

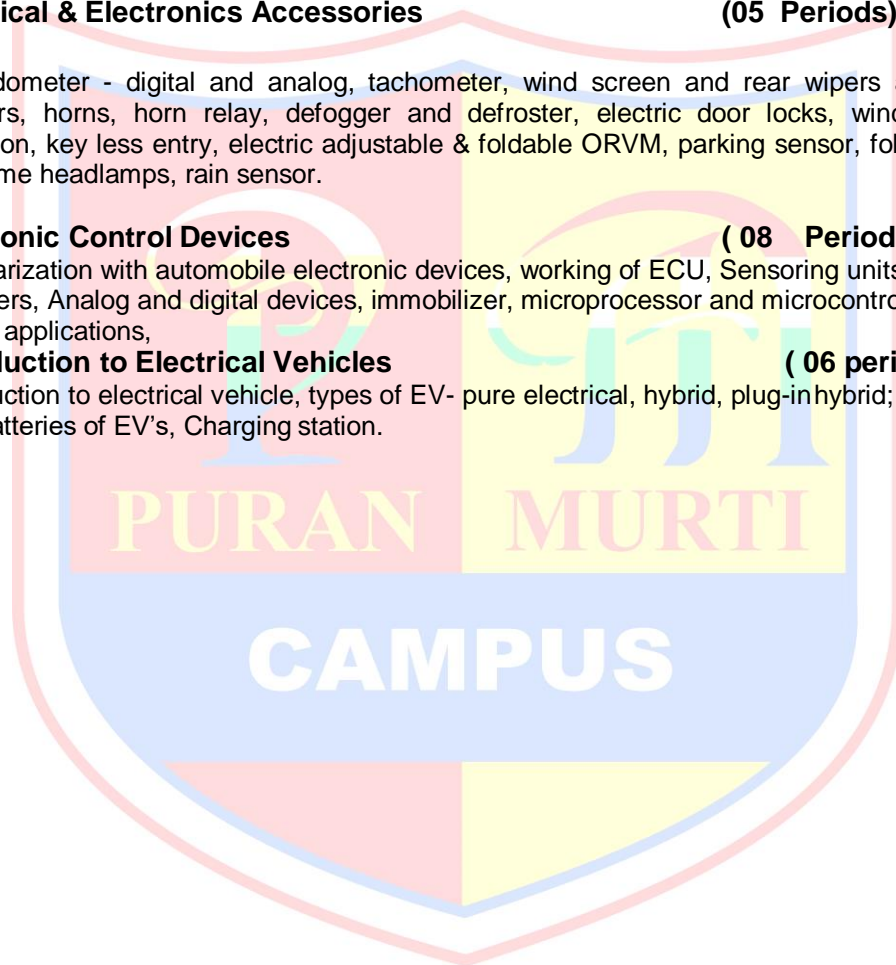
Speedometer - digital and analog, tachometer, wind screen and rear wipers and washers, horns, horn relay, defogger and defroster, electric door locks, window actuation, key less entry, electric adjustable & foldable ORVM, parking sensor, follow me home headlamps, rain sensor.

7. Electronic Control Devices (08 Periods)

Familiarization with automobile electronic devices, working of ECU, Sensing units, Rectifiers, Analog and digital devices, immobilizer, microprocessor and microcontroller – their applications,

8. Introduction to Electrical Vehicles (06 periods)

Introduction to electrical vehicle, types of EV- pure electrical, hybrid, plug-in hybrid; control of EV, Batteries of EV's, Charging station.





LIST OF PRACTICALS

1. Testing of battery - specific gravity test using hydrometer, voltage test, high rate discharge test; Charging of battery using battery charger.
2. Testing of field winding of alternator and armature of starter motor for open circuit, short circuit and earthing.
3. Study and sketching of various lighting circuits on a working model circuit board.
4. Basic electrical checks:- Battery connections, electrical bulbs and units, circuit protection devices, wiring harness connections, colour coding.
5. Replacement of head lamps, tail lamps, indicator lamps, fog lamps and lamp holders.
6. Head light beam alignment and setting
7. Testing and setting of horn and relay.
8. Servicing of windscreen wiping system; replacement of wiper blade assembly.
9. Location and identification of various types of sensors.

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while imparting instructions. As far possible, subject teaching should be supplemented by demonstrations in the laboratory. During practical work, individual students should be given opportunities to perform practicals independently.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

1. Automobile Engineering by Dr. Kirpal Singh, Standard Publishers, Delhi
2. A to Z of Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors, Delhi
3. Automotive Electrical Equipment by P.L. Kohli, Tata McGraw Hill, Delhi
4. Automotive Electrical Equipment by William H. Crouse, Tata McGraw Hill, Delhi
5. Automobile Engineering by Dr. R.B. Gupta, Satya Prakashan, New Delhi
9. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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SUGGESTED DISTRIBUTION OF MARKS

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1	02	06
2	12	20
3	05	12
4	05	12
5	05	10
6	05	10
7	08	16

8	06	14
Total	48	100



ADVANCED MANUFACTURING PROCESSES

L T P
3 - -

RATIONALE

Newer manufacturing methods are being used in industry to enhance productivity and quality of the product. So it becomes necessary for the students to learn these advanced methods of manufacturing, hence the subject has been introduced.

LEARNING OUTCOMES

After undergoing through this subject, the students will be able to:

- Describe the principle of working of non-conventional machining processes
- Explain the working of CNC machines
- Make programs for CNC machines
- Introduce the concept of robotics
- Classify milling cutters and milling operations

DETAILED CONTENTS

1. Introduction to Computer Numerical Control (10 periods)

1.1. Introduction - NC, CNC, DNC; Advantages and Application of CNC.

2. 1.2. Working principle of CNC machine,

1.3. Basic components of CNC machines,

1.4. Types of CNC machines,

1.5 Motion control system - point to point, straight line, Continuous path

(Contouring)

1.6 The coordinate system in CNC – cartesian and polar,

1.7. Coordinate data input – absolute and incremental,

1.8. Axis identification

3. Part Programming (10 hours)

Introduction to Part programming,

Basic concepts of part programming, NC words,

Part programming formats,

Linear and circular interpolation

Simple programs for drilling and turning

Tool off sets, cutter radius compensation and tool wear compensation.

4. CNC Milling: (08 periods)

Working principle of milling machine

Constructional details of CNC milling machine

Milling machine accessories and attachment- Arbors, adaptors, collets, vices, indexing head, rotary table Milling methods- up milling and down milling

Types of milling cutters

Types of milling operations

Part programs for milling

4 Advanced Machining Processes

(14 hours)

- Mechanical Process - Ultrasonic machining (USM): Introduction, principle, process, advantages and limitations, applications
- Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental principle, process, applications
- Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit, Principle, metal removing rate, dielectric fluid, applications
- Laser beam machining (LBM) – Introduction, machining process and applications
- Electron beam machining (EBM)- Introduction, principle, process and applications

5. Industrial Robotics

(06 hours)

Definition
Robot configurations
Basic robot motions
Robotic sensors
Industrial applications

INSTRUCTIONAL STRATEGY

The advanced machining processes can be explained through videos. This is highly practice-based course. Efforts should be made to develop programming skills amongst the students. During practice work, it should be ensured that students get opportunity to individually perform practical tasks.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

1. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.
2. CNC Machines by M.S. Sehrawat and J.S. Narang; Dhanpat Rai and Co., New Delhi.
3. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata Mc Graw Hill, New Delhi.
4. CNC Machine by Bharaj; Satya Publications, New Delhi.
5. Modern Machining Processes by Pandey; Tata McGraw Publishers, New Delhi.
6. A Text Book of Production Engineering by P.C. Sharma; S. Chand and Company Ltd., New Delhi.
7. Workshop Technology Vol-III, by R.P. Dhiman, Ishan Publications Jalandhar
8. Fundamentals of Robotics by T.C. Manjunath, Nandu Publishers, Mumbai.
9. e-books/e-tools/relevant software to be used as recommended by CTE/HSBTE/NITTTR.

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5	06	10
Total	48	100



MECHANICAL WORKSHOP PRACTICE-III**L T P****- - 3****RATIONALE**

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, skills related to various machining processes, modern machining methods, and use of tools, jigs and fixtures are required to be developed. Hence the subject of workshop practice.

LIST OF PRACTICALS

1. Study of constructional detail of CNC lathe.
2. Study of constructional detail of CNC milling machine.
3. Preparation of work instructions for machine operator
4. Develop a part program for following lathe operations and make the job on CNC lathe.
 - Plain turning and facing operation
 - Taper turning operation
 - Circular interpolation.
5. Develop a part program for the following milling operation and make the job on CNC milling
 - Plain milling
 - Slot milling
 - Contouring
 - Pocket milling
6. Preparation of preventive maintenance schedule for CNC machine. Demonstration of advanced machining methods through industrial visits

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Actual practical work, model/prototype making, and viva-voce

AUTO PROFESSIONAL PRACTICES – I

L T P
- - 4

RATIONALE

This subject is required to inculcate the professional skills in the students by performing various repair, maintenance and testing jobs on automobile systems. After acquiring the theoretical knowledge, it becomes must to apply that in practical field in order to gain the required skill also. In this subject, the students will learn about removal, testing, inspection and repair of various engine, chassis and body assemblies.

LEARNING OUTCOMES

At the end of this course, the students will be able to:

- Study the service manuals of vehicles
- Test engine, ignition timing, valve timing, spark plug gap and set them
- Know various body repair techniques
- Remove and refit auto body assemblies
- Remove, service and refit chassis components
- Service and repair starter motor
- Replace drive axles

DETAILED CONTENTS

1. Study of service manual of a new vehicle (Maruti/Tata/Hyundai etc.) as per manufacturer's recommendation.
2. Testing and setting of Ignition timing, measurement and adjustment of spark plug gap.
3. Setting of valve timing and adjustment of tappet clearance.
4. Engine testing and finding out fuel consumption.
5. Removal and refitting of various auto body assemblies
6. Servicing and repair of body locks and window mechanism.
7. Demonstration of body repair techniques.
8. Replacement of tappet cover gasket and oil sump gasket
9. Removal and refitting of propeller shaft and universal joints.
10. Removal, inspection and refitting of steering wheel, steering box, pitman arm, tie rod and knuckle joint.
11. Removal, inspection and refitting of rockers and rocker shaft.
12. Removal and refitting of piston rings.
13. Service and repair of starter motor drive.
14. Replacement of drive axles.

INSTRUCTIONAL STRATEGY

Guide the students to follow safety rules.

1. Provide on hand practice to students
2. Tell the students to identify the various components and arrange them in order while dismantling/removal.
3. Use relevant tools and equipment.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

3. Car Maintenance and Repair by Arthur W. Judge
4. Automobile Engineering Vol. I & II by Dr. Kirpal Singh; Standard Publisher, Delhi.
5. A to Z of Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors, Delhi
6. Automobile Engineering by Sh. R.B. Gupta; Satya Prakashan, New Delhi.
7. Maintenance and Repair of Motor Vehicle by H.O. Geneva; Dialogue, R-686, New Rajinder Nagar, New Delhi.
8. Automotive Mechanics by William H. Crouse, Tata McGraw Hill, Delhi.
9. Auto Mechanics: Theory & Service by W.J.deKryger et al.
- 8 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

DRIVING PRACTICE – I

L T P

- - 4

RATIONALE

Driving is an essential part of learning for an Automobile Engineering Diploma holder. Testing of vehicles is not possible unless driving is known. Driving is learnt only by practice on the vehicle. The driving involves knowledge of various aspects of vehicle, safety, traffic rules and regulations. So, provision of imparting driving skill has been made.

LEARNING OUTCOMES

At the end of this subject, students will be able to:

- Identify various road signs
- Drive a four-wheeler passenger vehicle in the presence of instructor
- Check various vehicle items before start driving

DETAILED CONTENTS

1. Identification of various controls of vehicle.
2. Knowledge of general road safety and personal safety.
3. Knowledge of Traffic rules and signals
4. Pre-driving checks
5. Starting the engine and warming up.
6. Operation of engaging and disengaging the clutch.
7. Gear changing from low to high and high to low.
8. Braking and use of brakes on the road, stopping distance and following distance.
9. Driving practice on road for steering control.
10. Checking of engine oil, brake oil, coolant, tyre pressure, light and horn)

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, driving test

SOFT SKILLS – III

RATIONALE

L T P
- - 2

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. The diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Develop communication skills.
- Learn how to speak without fear and get rid of hesitation
- Use effective presentation techniques
- Understand entrepreneurial traits
- Exhibit attitudinal changes

DETAILED CONTENTS

- Communication Skills – Handling fear and phobia
- Resume Writing
- Applying for job through email/job portal
- Interview preparation : Mock Interview, Group Discussions and Extempore
- Presentation Techniques
- Developing attitude towards safety. Disaster management.

In addition, the students must participate in the following activities to be organized in the institute

- Sports
- NCC/NSS
- Camp – Entrepreneurial awareness
- Cultural Event

Note: Extension Lectures by experts may be organized. There will be no examination for this subject.