




PURAN MURTI
CAMPUS

A Unit of Puran Murti Educational Society

Approved by AICTE

Affiliated to Haryana State Board of Technical Education, Panchkula



Curriculum for
Diploma Programme in
AUTOMOBILE ENGINEERING
CAMPUS

FOURTH 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	
4.1	*Computer Aided Drafting	-	3	1	-	50	50	-	-	50	3	50	100
4.2	*Materials and Metallurgy	4	2	5	25	25	50	100	3	50	2	150	200
4.3	Automobile Engineering Drawing	-	6	3	-	50	50	100	3	25	2	125	175
										(Viva)			
4.4	Auto Engine -I	3	2	4	25	25	50	100	3	50	3	150	200
4.5	Chassis, Body and Transmission-I	3	3	4	25	25	50	100	2	50	3	150	200
4.6	*Workshop Technology –II	4	-	4	25	-	25	100	3	-	-	100	125
4.7	Mechanical Workshop Practice-II	-	3	1	-	50	50	-	-	50	3	50	100
Soft Skills -II		-	2	-	-	25	25	-	-	-	-	-	25
Total		14	21	22	100	250	350	500	-	275	-	775	1125

*Common with diploma programme in Mechanical Engineering

Industrial Training After examination of 4th Semester, the students shall go for training in a relevant industry/field organization for a minimum period of 8 weeks and will prepare a diary. It shall be evaluated during 5th semester by his/her teacher for 100 marks. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated for another 100 marks. This evaluation will be done by HOD and lecturer in charge – training in the presence of one representative from Industry/Sector Skill Council/Training and Placement Officer/Subject Expert from other institution.



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FOURTH SEMESTER



4.1

COMPUTER AIDED DRAFTING

L T P

2 - 4

RATIONALE

A diploma holder is expected to prepare and interpret CAD Drawings. Hence this subject.

LEARNING OUTCOMES

On completion of this course, students will be able to :

- know the advantages of using CAD in comparison with conventional method.
- draw and interpret CAD drawings using drawing, editing and viewing in CAD software.
- create easy and complex solids and assemblies using various tools in CAD software.
- Assemble various mechanisms using CAD software.





DETAILED CONTENTS

1. Introduction to Computer Aided Drafting (2D) commands of any one software (Auto CAD, ProE, Solid works, Unigraphics etc.) (6 drawing sheets)

Concept of AutoCAD, Tool bars in CAD software, coordinate system, snap, grid, and ortho mode (Absolute, Relative and Polar), setting of units and layout.

Drawing commands – point, line, arc, circle, ellipse,

Editing commands – scale, erase, copy, stretch, lengthen and explode.

Dimensioning and placing text in drawing area

Sectioning and hatching

Inquiry for different parameters of drawing entity

Create layers within a drawing

Specifying Geometrical Dimensioning & tolerancing (GD&T) parameters in drawing

2. Detail and assembly drawing of the following using Drafting Software (2D) (4 sheets)

Plummer Block

Wall Bracket

Stepped pulley, V-belt pulley

Flanged coupling

Machine tool Holder (Three views)

Screw jack, joints, crank shaft and piston.

3. Isometric Drawing by CAD using any part modeling Software (3D) (one sheet)

Drawings of following on computer:

- Cone
- Cylinder
- Cube
- Spring
- Isometric view of objects

4. Introduction to any part modeling software(ProE, Solid works, AutoCAD, Uni Graphic , Catia etc.)

5. Introduction to Sketcher: Sketch Entities, Sketch Tools, Blocks, Dimensioning Part modeling (4 models) Part Modeling Tools:-

Creating reference planes

Creating Extrude features Creating Revolve Creating Swept features Creating Loft features

Creating Reference - points, axis, coordinates Creating curves Creating Fillet features

Inserting Hole types Creating Chamfer Creating Shell Creating Rib

Environment & Utilities - Working with views and manipulating views.

Create parts e.g. Piston, Pin, Bolts and Nuts, Fixture, Jig parts, Washer, Rings, Gaskets, Machine parts etc.



Assembly and Simulation

(2 sheets)

Assembly Modeling Tools:-

Introduction to Assembly Modeling & Approaches – Top down and Bottom up approach, Applying Standard Mates- Coincident, Parallel, Perpendicular, Tangent, Concentric, Lock, Distance, Angle. Assemble of any two Mechanism e.g. Crank slider mechanism, Piston and Cylinder assembly, Quick Return Mechanism (QRM), Machine vices, Crank Shaft, Bearing assembly, any other mechanism.

INSTRUCTIONAL STRATEGY

1. Teachers should show model or realia of the component/part whose drawing is to be made.
2. Emphasis should be given on cleanliness, dimensioning, & layout of sheet.
3. Teachers should ensure use of IS codes related to drawing.

MEANS OF ASSESSMENT

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

LIST OF RECOMMENDED BOOKS

1. Engineering Drawing with AutoCAD 2000 by T. Jeyapooran; Vikas Publishing House, Delhi.
2. AutoCAD for Engineering Drawing Made Easy by P. NageswaraRao; Tata McGraw Hill, New Delhi.
3. AutoCAD 2000 for you by UmeshShettigar and Abdul Khader; Janatha Publishers, Udupi.
4. Auto CAD 2000 by Ajit Singh, TMH, New Delhi.
5. Instruction Manual of the software used (AutoCAD, ProE, Solidwors, etc.) Unigraphic
- 6 E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

MATERIALS AND METALLURGY**LTP****4 - 2****RATIONALE**

Lot of development has taken place in the field of materials. New materials are being developed and it has become possible to change the properties of materials to suit the requirements. Diploma holders in this course are required to make use of different materials for various applications. For this purpose, it is necessary to teach them basics of metal structure, properties, usage and testing of various ferrous and non ferrous materials and various heat treatment processes. This subject aims at developing knowledge about the characteristics, testing and usage of various types of materials used in industries.

LEARNING OUTCOMES

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

- Distinguish between metals and non metals and ferrous and non ferrous materials.
- Analyze microstructure and changes in microstructure due to heat treatment.
- Carryout various heat treatment processes such as annealing, normalizing, tempering and hardening.
- Draw and interpret iron-carbon diagram.
- Classify various types of plastics and rubber.
- Explain properties and applications of composites, ceramics and smart materials.
- Select suitable material to be used for various engineering applications.



DETAILED CONTENTS

1. Introduction (08 periods)

Material, Engineering materials, History/Timeline of Material Origin, Scope of Material Science, Overview of different engineering materials and applications, Importance, Classification of materials, Difference between metals and non-metals, Physical and Mechanical properties of various materials, Present and future needs of materials, Various issues of Material Usage-Economical, Environment and Social, Overview of Biomaterials and semi-conducting materials.

2. Crystallography (08 periods)

Fundamentals: Crystalline solid and amorphous solid, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor, coordination number (without derivation), Defects/Imperfections, types and effects in Solid materials.

Deformation: Overview of deformation behaviour and its mechanisms, Elastic and Plastic deformation, behaviour of material under load and stress-strain curve.

Failure Mechanisms: Overview of failure modes, fracture, fatigue and creep.

3. Metallurgy: (03 periods)

Introduction, Cooling curves of pure metals, dendritic solidification of metals, effect of grain size on mechanical properties, Binary alloys, Thermal equilibrium diagrams, Lever rule, Solid Solution alloys

4. Metals And Alloys (18 periods)

Ferrous Metals: Different iron ores, Flow diagram for production of iron and steel, allotropic forms of iron- Alpha, Delta, Gamma. Basic process of manufacturing of pig iron and steel-making.

Cast Iron: Properties, types of Cast Iron, manufacture and their use.

Steels: Plain carbon Steels and alloy steel, Classification of plain carbon steels, Properties and

application of different types of Plain Carbon Steels, Effect of various alloying elements on properties of steel, Uses of alloy steels (high speed steel, stainless steel, silicon steel, spring steel)

Non Ferrous Materials: Properties and uses of Copper, Aluminium and their alloys

5. Heat Treatment (09 periods)

Definition and objectives of heat treatment, Iron carbon equilibrium diagram, different microstructures of iron and steel .. Formation and decomposition of Austenite, Martensitic Transformation. Various heat treatment processes- hardening, tempering, annealing, normalizing, surface hardening, carburizing, nitriding, cyaniding. Hardenability of Steels, Types of heat treatment furnaces (only basic idea), measurement of temperature of furnaces.

6. Plastics (06 periods)

Importance of plastics, Classification-thermoplastic and thermoset, plastic and their uses, Various trade names of plastics, Plastic coatings, food grade plastics. Applications of plastics in automobile and domestic use.

Rubber classification - Natural and synthetic. Selection of rubber

7. Advanced Materials (12 periods)

Heat Insulating materials- Asbestos, glasswool, thermocole. Ceramics-

Classification, properties, applications

Refractory materials –Dolomite, porcelain. Glass – Soda lime, borosil.



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Joining materials/Adhesives – Classification, properties and applications Abrasive aterials
Composites-Classification, properties, applications Materials for
bearing metalsMaterials for Nuclear EnergySmart materials-
properties and applications.





LIST OF PRACTICALS

1. Classification of about 25 specimens of materials/machine parts into
 - (i) Metals and non metals
 - (ii) Metals and alloys
 - (iii) Ferrous and non ferrous metals
 - (iv) Ferrous and non ferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminium, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
3. a) Study of heat treatment furnace.
- b) Study of a thermocouple/pyrometer.
4. Study of a metallurgical microscope and a specimen polishing machine.
5. To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials At least two)
 - i) Brass ii) Copper iii) Cast Iron, iv) Mild Steel v) HSS, vi) Aluminium
6. To anneal a given specimen and find out difference in hardness as a result of annealing.
7. To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
8. To harden and temper a specimen and to find out the difference in hardness due to tempering.

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Heat Treatment Processes in the industry.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Text book of Material Science by R.K. Rajput; Katson Pubs, Ludhiana
2. Text book of Material Science by V.K. Manchanda and GBS Narang; Khanna Publishers, New Delhi
3. Introduction to Material Science by A.R. Gupta, Satya Prakashan, New Delhi.
4. Material Science by Hazra, Chaudhary
5. 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.	08	12
2.	08	12
3.	03	05
4.	18	30
5.	09	15
6.	06	10
7.	12	16
Total	64	100

AUTOMOBILE ENGINEERING DRAWING

RATIONALE

L T P
- - 6

An Automobile Engineering diploma holder, irrespective of his field of operation in an industry or transport undertaking, is expected to possess a thorough understanding of engineering drawing, which includes clear spatial visualization of the subject and the proficiency in reading and interpreting a wide variety of drawings. Besides this, he is also expected to have a certain degree of drafting skills depending upon his job functions to perform his day-to-day activities e.g. communicating and discussing the ideas with his superiors and passing on instructions to his subordinates in an unambiguous way. The teachers are recommended to lay emphasis on showing automobile components to students..

LEARNING OUTCOMES:

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

- Prepare drawings of automotive components
- Interpret various drawing used in automobile engineering
- Compare hole basis system with shaft basis system and choose fits and tolerances for various mating parts.

DETAILED CONTENTS

1. Limits and Fits (01 sheet)

Limit, tolerance, Geometrical Tolerance, deviation, allowance, fits: clearance, interference, transition fit, Hole and shaft basis system.

2. Freehand Drawings of the following automotive components:

Joints and Bearings (04 sheets)

- Universal joint,
- Slip joint
- Bush bearing
- Plummer block or pedestal bearing
- Ball bearing
- Roller bearing

3. Drawing the layout of the following automotive components:

Engine Components (06 sheets)

- Four Stroke Petrol Engine Piston
- Diesel Engine Piston
- Connecting rod
- Fuel injector
- Crank shaft – 4 cylinder Engine
- Cam shaft
- Spark Plug

4. Drawing layout of the following components:

Chassis components (05 sheets)

- Shock absorber

- Wheel cylinder
- Master Cylinder
- Brake drum (assembly)
- Single plate clutch

5.

Gears

(2 sheets)

- Nomenclature of gears
- Profile of spur gear by 'Approximate method'
- Profile of spur gear by "Unwin's Method"

Cam Profile

(3 sheets)

- Different types of cams and followers
- Drawing of cam profile for following motion of follower
 - (a) Uniform velocity motion
 - (b) Simple harmonic motion (SHM)
 - (c) Uniformly accelerated and retarded motion.

6. **Free hand sketching**

(2 sheet)

- Battery ignition system
- Magneto ignition system
- Lighting system
- Leaf spring suspension
- Overhead and side valve mechanism

INSTRUCTIONAL STRATEGY

Teacher should make use of models while explaining the details of drawing of various automobile parts and components. Emphasis should be laid on cleanliness and quality of drawings.

MEANS OF ASSESSMENT

- Drawing
- Sketching

RECOMMENDED BOOKS

1. Auto Engineering Drawing by RB Gupta; Satya Parkashan, New Delhi
2. Automobile Engg. Drawing by Raj Kumar, North Publication, Jalandhar
3. Machine Drawing by PS Gill; BD Kataria and Sons, Ludhiana
4. Machine Drawing by Lakshminarayan; Jain Brothers, New Delhi
5. Automobile Engineering- Vol. I and II by Dr. Kirpal Singh, Standard Publishers Distributors, Delhi
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>



AUTO ENGINE - I

L T P
3 - 2

RATIONALE

Engine forms the base of Automobile Engineering. As the scope of auto engines is very wide, it has been divided into two subjects, Auto Engine –I and Auto Engine-II. This subject deals with engine terminology basic concept of 2 stroke and 4 stroke engine, classification of engines, constructional details of petrol engine, fuel system, cooling system, lubrication system and ignition system,.

LEARNING OUTCOMES :

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

- Explain the principles of operation of an internal combustion engine
- Classify various types of engine
- Explain the principles of operation of fuel supply systems
- Explain the principles of operation of engine cooling and lubrication systems
- Carryout servicing of lubrication and cooling system
- Test I.C. engine.

DETAILED CONTENTS

1. Introduction

(08 Periods)

- Engines; internal and external combustion Engines; Engine terminology including Bore, Stroke, dead centres, swept volume, clearance volume, compression ratio, Engine capacity, Engine torque, Indicated power, Brake power, Friction power,
- Classification of engines as per stroke, cycle, fuel, ignition, cooling, speed, number and arrangement of cylinders, governing, reciprocating and rotary.

a. Concept of 2-stroke and 4- stroke engines and their comparison. b. Concept of S.I. and C.I. engine and their comparison.

2. Engine Components

(08 Periods)

c. Construction details, specifications, functions and working of components : cylinder block, head, cylinder liner, piston, piston rings, wrist pin, connecting rod, crankshaft bearing, camshaft, valves and valves mechanisms, flywheel and dampers; d. Valve timing diagrams.

3. IC Engine Testing

(06 Periods)

e. Testing of I.C. engine and determination of Indicated Power, Brake Power. Mechanical Efficiency, Volumetric efficiency, Thermal Efficiency, Relative Efficiency, Mean Effective Pressure and Specific fuel consumption.

- f. Heat balance sheet, Morse Test, vacuum test and compression test.

4. Fuel System in spark Ignition Engine

(10 Periods)

- g. Fuel System: types of fuel feed system : gravity and pump feed system Fuel injection system,
- h. Fuel tank, fuel lines, fuel filters,
- i. Carburetion; working of simple carburetor, its function and limitations;
- j. Working of AC Mechanical fuel pump and electrical fuel pump.
- k. Fuel gauges – working of balanced coil and bi-metallic type,
- l. Air cleaners : construction, working and use of dry and wet type.
- m. Intake and exhaust manifold; mufflers.

- n. Petrol Injection: Introduction, comparison with carburetor method
- o. Description and working of multipoint fuel injection (MPFI) system,
- p. Advantages and disadvantages of MPFI,
- q. Various sensors used in MPFI.

5. Ignition system

(06 Periods)

- r. Concept of ignition system, ignition timing,
- s. types of ignition systems : Battery/coil and magneto ignition system,
- t. Function and working of ignition coil, distributors, condenser,
- u. Contact breaker Point and gap,
- v. Spark plugs and gaps pertaining to Indian vehicles
- w. Distributor less Ignition System and electronic ignition system.

6. Cooling System

(05 Periods)

- x. Cooling system: necessity, types (air, water),
- y. Pump circulation cooling
- z. Advantages & disadvantages of air cooling & water cooling,
 - aa. Components of water cooling system : radiators, thermostat, water pump, fan, pressure cap, temperature gauge, water jackets,
 - Bb. Anti-freeze solution,
 - cc. Trouble shooting and remedies.

7. Lubrication System

(05 Periods)

- dd. Necessity of lubrication
- ee. Types of Lubrication system: Splash type & Pressure type, wet & dry sump
- ff. Components of lubrication system : oil pump, oil lines, oil filters, oil coolers,
- gg. Crankcase ventilation,
- hh. Characteristics, classification and service ratings of lubricating oil,
- ii. Additives for lubricants, Properties of lubricants.

LIST OF PRACTICALS

1. Study of an engine block and its basic components like cylinder block, cylinder head, piston, connecting rod and crankshaft.
2. To study the working of two stroke engine on a working cut section model.
3. To study the working of four stroke engine on a working cut section model.
4. Study of conventional and MPFI fuel feed systems.
5. Study of valve mechanisms and identification of various parts.
6. To find IHP, BHP and mechanical efficiency of multi-cylinder petrol engine using Morse Test Rig.
7. Testing of mechanical fuel feed pump.
8. Servicing of water cooling system – removal, flushing & testing of radiator; replacement of water hoses
9. Servicing of lubrication system, changing engine oil and oil filter.

Note: Safety precautions and cleanliness must be practised 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. A to Z of Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors, Delhi
2. Automobile Engineering – Vol. II by Dr. Kirpal Singh; Standard Publishers Distributors. Delh
3. Automobile Engineering by R.B. Gupta; Satya Prakashan, New Delh
4. Automotive Engines by Srinivasan, TMH, Delhi
5. Automobile Engineering by Chikara, Dhanpat Rai and Sons, New Delh
6. Automobile Engineering by KM Gupta, Umesh Publishers, Delhi
7. Auto Engine –I by G.S. Aulakh, Eagle Prakashan, Jalandhar.
8. Automobiles- Theory and Assignment Test (Solved) by G.S. Sethi, Asian Publishers, New Delhi.
9. 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	08	18
2	08	18
3	06	14
4	10	18
5	06	12
6	05	10
7	05	10
Total	48	100

CHASSIS, BODY AND TRANSMISSION - I

L T P
3 - 3

RATIONALE

Chassis, body and transmission form the core of automobile engineering. The subject focuses at imparting knowledge and skills regarding chassis and body viz. clutch system, transmission system, final drive, front axle, steering mechanism.

LEARNING OUTCOMES:

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

- Classify the vehicle
- Identify major components of vehicles
- Explain the function and working of clutch
- Explain the function and working of transmission
- Service the transmission system
- Dismantle and assemble major assemblies of transmission
- Describe the functional and constructional features of final drive and its components
- Describe the functional and constructional features of front axles
- Comprehend steering geometry and explain the working and constructional features of steering system
- Perform wheel alignment

DETAILED CONTENTS

1. Introduction (03 Periods)

Definition of automobile
Necessity of automobiles
Classification of automobiles
Brief history of Automobiles
Leading manufacturers of scooter, motor-cycle, cars, buses & trucks in India

2. Chassis and Body (08 Periods)

Vehicle identification number (VIN)
Layout of chassis & function of its major assemblies
Types of drives - rear wheel drive, front wheel drive & 4-wheel drive; their merits and demerits
Chassis frame & its types, frame materials
Automobile body & its types, requirement of body, types of car body
Constructional details of car body, body streamlining, body materials
Interior fittings, instrument panel, car accessories, , body upholstery
Materials for frame and body, protective coatings for body
Vehicle air-conditioning – construction and working principle.

3. Clutch (09 Periods)

Clutch - Function and Necessity; Requirements of a good clutch Classification of clutch, working principle of friction clutch Single plate clutch - construction and working, construction details of clutch plate, Multi plate clutch – construction and working Semi-centrifugal clutch - construction and working Centrifugal clutch - construction and working Fluid flywheel - construction and working riction lining materials Clutch operating

system – mechanical and hydraulic, clutch pedal freeplay Wet and dry clutch Common faults, their causes & remedies in clutch.

4. Transmission

(12 Periods)

Introduction to transmission, its necessity and functions Concept of gear drive – simple, compound and planetary; gear ratio Classification of gear box. Sliding mesh gear box - Construction and working. Constant mesh gear box- Construction and working Synchromesh gear box - Construction and working, principle, construction & working of synchronizing unit Gear selector mechanism, Epicyclic gear box - Construction and working; over drive, Torque converter - Construction and working Over running clutch – Necessity, construction and working, its applications Transfer gear box - construction and working Automated Manual Transmission, Continuously variable transmission, Common faults in transmission, their causes and remedies.

5. Final Drive

(06 Periods)

Universal joint – Function, types and constructional details, constant velocity joints Propeller shaft – Function and constructional details, necessity of slip joint.
Differential – principle, functions, construction and working, Types of final drive – hotchkiss drive, torque tube drive.
Rear axles – semi floating, three quarter floating and fully floating, axle housing.

6. Front Axle

(02 Periods)

Types of front axles – Dead axle, live axle Function and constructional details of front axle
Types of Stub axle – Elliot and reverse Elliot, Lamoine and reversed Lamoine type

7. Steering system

(08 Periods)

Purpose and principle of steering
Definition of link and mechanism, steering system linkages Ackermann's steering mechanism,
Steering gear box – types, construction and working
Steering geometry – camber, castor, king pin inclination, toe-in, toe-out Wheel alignment – Necessity and Procedure
Concepts of steering ratio, turning radius, cornering force, cornering power, self righting torque, over steering and under steering
Power steering – necessity & types, construction and working of Hydraulic power steering & Electronic power steering,
Common faults, their causes and remedies in steering system.



LIST OF PRACTICALS

1. Identification and sketching of major components in the layout of chassis of a scooter/motor cycle/3 wheeler
2. Identification and sketching of major components in layout of chassis of a car/jeep, truck/bus
3. Dismantling, inspection and reassembling of single plate clutch.
4. Dismantling, inspection and reassembling of multi plate clutch.
5. Servicing of clutch linkages, and clutch pedal freeplay adjustment.
6. Servicing of transmission system – gear box, universal joints, propeller shaft, slip joint, differential and axles.
7. Removal of gear box from vehicle and refitting, study of gear shifting mechanism.
8. Dismantling and reassembling of gear box, study of synchronizing unit.
9. Servicing of steering system and steering wheel freeplay adjustment.
10. Wheel alignment using computerised wheel alignment machine.
11. Study of hydraulic power steering system.

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. Charts should be prepared by the students showing specification of various 2-wheeler & 4-wheeler vehicle.

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
 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-I by G.S.Aulakh, Eagle Prakashan, Jalandhar.
 5. Automobile Engineering by R.B. Gupta, Satya Prakashan, New Delhi.
 6. Chassis, Body and Transmission by Ishan Publications, Jalandhar.
1. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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5	06	12
6	02	06
7	08	16
Total	48	100



WORKSHOP TECHNOLOGY-II

L T P

4 - -

RATIONALE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various machining processes, modern machining methods, tools, jigs and fixtures is required to be imparted. Hence the subject of workshop technology.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Perform turning, step turning, taper turning, threading and knurling operation on lathe machine.
- Resharpen/grind single point tool.
- Select material and tool geometry for cutting tools on lathe.
- Perform drilling, reaming, counter boring, counter sinking and tapping operations on drilling machine.
- Explain the nomenclature of a drill
- Perform filing, cutting, fitting and die tapping operations
- Perform keyway cutting and angular/step surface shaping on shaper.
- Explain geometry of single point tools, various types of lathe tools and tool materials.
- Explain uses of lathe accessories and different types of lathes.
- Explain boring operation, features of boring machine and boring tool.
- Explain the uses and features of jigs, fixtures, locating devices and clamping devices.
- Select cutting fluid for different materials and operations.
- Describe the features of various types of broaching machines.



DETAILED CONTENTS

1. Cutting Tools and Cutting Materials (08 Periods)

Cutting Tools - Various types of single point cutting tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect

1.2 Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.

2. Drilling (08 Periods)

Principle of drilling.

Classification of drilling machines and their description.

Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping.

Speeds and feeds during drilling, impact of these parameters on drilling, machining time.

Types of drills and their features, nomenclature of a drill

Drill holding devices.

Types of reamers.

3. Lathe (12 Periods)

Principle of turning

Description and function of various parts of a lathe

Classification and specification of various types of lathe

Drives and transmission

Work holding devices

Lathe tools: Parameters/Nomenclature and applications

Lathe operations :- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.

Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.

Speed ratio, preferred numbers of speed selection.

Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.

Brief description of capstan and turret lathe, comparison of capstan/Turret lathe, work holding and tool guiding devices in capstan and turret lathe.

4. Boring (06 Periods)

Principle of boring

Classification of boring machines and their brief description.

Specification of boring machines.

Boring tools, boring bars and boring heads.

Description of jig boring machine.

5. Shaping and Planing (10 Periods)

Working principle of shaper and planer

Type of shapers

Type of planers

Quick return mechanism applied to shaper and planer machine.

Work holding devices used on shaper and planer
Types of tools used and their geometry.
Specification of shaper and planer .
Speeds and feeds in above processes.

6. Broaching (06 Periods)

Introduction
Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down.
Elements of broach tool, broach tooth details – nomenclature, types, and tool material.

7. Jigs and Fixtures (08Periods)

Importance and use of jigs and fixture
Principle of location
Locating devices
Clamping devices
Types of Jigs – Drilling jigs, bushes, template jig, plate jig, channel jig, leaf jig.
Fixture for milling, turning, welding, grinding
Advantages of jigs and fixtures

8. Cutting Fluids and Lubricants (06 Periods)

Function of cutting fluid
Types of cutting fluids
Difference between cutting fluid and lubricant
Selection of cutting fluids for different materials and operations
Common methods of lubrication of machine tools.

INSTRUCTIONAL STRATEGY

1. Teachers should lay emphasis in making students conversant with concepts and principles of manufacturing processes.
2. Focus should be on preparing jobs using various machines in the workshop.
3. Foreman Instructor should conduct classes of each workshop explaining use of tools, jobs to be made and safety precautions related to each workshop prior to students being exposed to actual practicals.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
 2. Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
 3. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
- 4 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

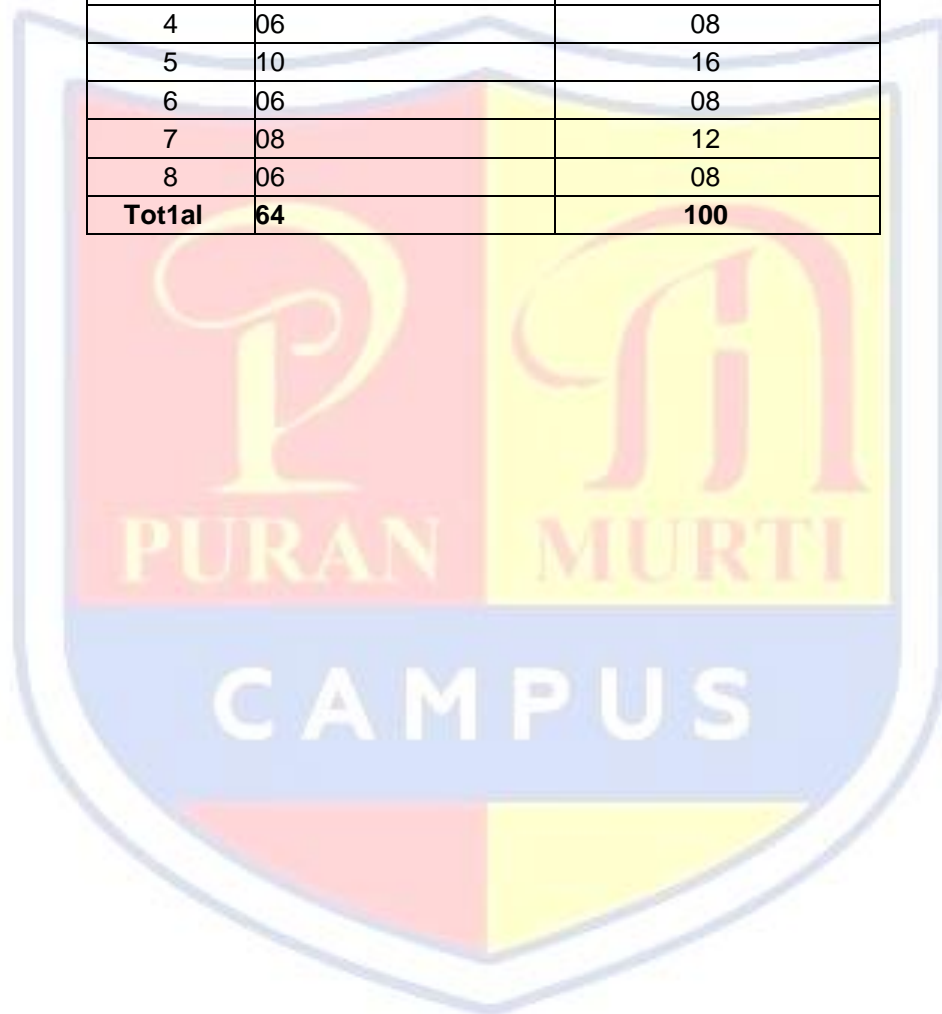
Websites for Reference:

<http://swayam.gov.in>



SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	12
2	08	14
3	12	22
4	06	08
5	10	16
6	06	08
7	08	12
8	06	08
Tot1al	64	100





MECHANICAL WORKSHOP PRACTICE-II

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.

PRACTICAL EXERCISES

Turning Shop

- Job 1. Grinding of single point turning tool with demonstration of all angles.
Job 2. Exercise of simple turning and step turning.
Job 3. A composite job involving, turning, taper turning, external thread cutting and knurling.

Advance Fitting Shop

- Job 1. Exercise on drilling, reaming, counter boring, counter sinking and tapping
Job 2. Radius fitting in mild steel
Job 3. Pipe threading with die and assemblage of same.

Machine Shop

- Job 1. Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine

INSTRUCTIONAL STRATEGY

- 1) Focus should be on preparing jobs using various machines in the workshop.
- 2) Foreman Instructor should conduct classes of each workshop explaining use of tools, jobs to be made and safety precautions related to each workshop prior to students being exposed to actual practicals.

MEANS OF ASSESSMENT

- Workshop jobs
- Report writing, presentation and viva-voce

RECOMMENDED BOOKS

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
3. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
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SOFT SKILLS – IIL T P
- - 2**RATIONALE**

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
- Work in a team
- Learn to resolve conflict by appropriate method
- Identify leadership traits and learn self motivation
- Follow ethics

DETAILED CONTENTS

- Concept of team building, behavior in a team
- Developing Interpersonal Relations- empathy, sympathy
- Communication skills-improving non-verbal communication
- Conflict Management
- Motivation
- Leadership
- Professional Ethics and Values
- Health, Hygiene, Cleanliness and Safety

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

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

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

INDUSTRIAL TRAINING

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 6 weeks upto 8 weeks duration to be organized during the semester break starting after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 100 and external assessment of 100 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry. The components of evaluation will include the following.

a) Punctuality and regularity	15%
b) Initiative in learning new things	15%
c) Relationship with workers	15%
d) Industrial training report	55%