

Faculty of Engineering & Technology

P.K. University

Shivpuri (MP)



Evaluation Scheme & Syllabus for

Diploma-(Mechanical Engg.)

(II Semester)

(Effective from Session 2025-26)

EVALUATION SCHEME

DIPLOMA MECHANICAL ENGG. (II SEMESTER)

Study And Evaluation Scheme For Diploma Mechanical Engineering												
SEMESTER-II												
SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME						Total Marks of internal & External
		Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DAPPLME201	Applied Mathematics-II	3	1	0	4	30	-	30	70	-	70	100
DAPPLME202	Applied Physics-II	2	1	0	3	30	-	30	70	-	70	100
DAPPLME203	Applied Mechanics	3	1	0	4	30	-	30	70	-	70	100
DBASIME204	Basics of Mechanical & Civil Engg	3	0	0	3	30	-	30	70	-	70	100
DELEMME205	Elementary Workshop Technology	3	0	0	3	30	-	30	70	-	70	100
DAPPLME206	Applied Mechanics Lab	0	0	2	1		25	25		25	25	50
DAPPLEME207	Applied Physics-II Lab	0	0	2	1	-	25	25	-	25	25	50
DELEMME208	Elementary Workshop Technology Lab	0	0	4	2	-	25	25	-	25	25	50
Total		14	3	8	21	150	75	225	350	75	425	650

Department Of Mechanical Engineering
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I Year II Semester

DAPPLME201
APPLIED MATHEMATICS -II
(Common to all branch of Diploma engineering)

L	T	P
3	1	0

1. INTEGRAL CALCULUS - I : Methods of Indefinite Integration :-1.1

Integration by substitution.

- 1.2 Integration by rational function.
- 1.3 Integration by partial fraction.
- 1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :

- 2.1 Meaning and properties of definite integrals, Evaluation definite integrals. Integration of special function.
- 2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.
- 2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):

- 3.1 CIRCLE: Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.
- 3.2 Standard form and simple properties
Parabola $x^2=4ay$, $y^2=4ax$,
Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):

- 4.1 Straight lines and planes in space - Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),
- 4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz = d$ (Radius, Centre and General Equation)

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DAPPLME202
APPLIED PHYSICS-II
(Common to all branch of Diploma engineering)

L	T	P
2	1	0

1. Optics :

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus and Polaroid's.

2. Introduction To Fibre Optics :

Critical angle, Total internal reflection, Principle of fiber optics, Optical fiber, Pulse dispersion in step-index fibers, Graded index fiber, Single mode fiber, Optical sensor.

3. Lasers and its Applications :

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor Energy of a charged capacitor, Effect of dielectric on capacitors.

5. D.C. Circuits :

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties:

Dia, Para and Ferro-magnetism, Ferrites, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics :

Concept of Energy bands in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister :

Majority and Minority charge carriers P-N junction reverse biasing of a junction diode, P-N junction transistor, transistor-action, Base, emitter and collector currents and their relationship LED's. formation, barrier voltage, Forward and device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics :

Concept of binary numbers, Inter conversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources:

- (a) Wind energy : Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill.
- (b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

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I Year II Semester

DAPPLME203
APPLIED MECHANICS

L	T	P
3	1	0

1. Introduction:

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2. (A). System of Forces :

Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.

(B). General Condition of Equilibrium:

General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

Types of friction: statical, limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine. Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphere and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon; calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections.(simple problems only)

Department Of Mechanical Engineering

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[Common to three years Diploma Course in Mechanical Engineering]

DBASIME204

BASICS OF MECHANICAL & CIVIL ENGG.

L	T	P
3	0	0

DETAILED CONTENTS

1. Thermal Engg.

A. SOURCES OF ENERGY:

Definition, Concept of thermodynamic system and surroundings, Closed system, Open system, Isolated system, Thermodynamics definition of work. Zeroth law of

Thermodynamics Basic ideas, conventional and nonconventional forms-Thermal, Hyde, Tidal, wind, So

B. FUELS & COMBUSTION:

Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels-their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion. Combustion analysis on mass basis and on volume basis. Concept of excess air in a boiler furnace combustion. Heat carried away by flue gases. Analysis of flue gases by Orsat apparatus. Simple numerical problems Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.

2. MACHINE COMPONENTS:

Brief Idea of loading on machine components.

- (i) Pins, Cottor and Knuckle Joints.
- (ii) Keys, Key ways and spline on the shaft.
- (iii) Shafts, Collars, Cranks, Eccentric

(iv) Couplings and Clutches.

(v) Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications. Selection of ball bearing and roller bearing for given application using design data book.

(vi) *Gears*

Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, Mitre wheel, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module.

(vii) *Springs:*

Compression, Tension, Helical springs, Torsion springs, Leaf and Laminated springs. Their use and material. Selection of spring by design data book, simple numerical problem.

3. LUBRICATION:

Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication. (Explain with simple line diagram). Selection of lubricant based on different application (Requirement with the help of manufacturer catalogue).

5. Civil Engineering Materials:

General idea of raw materials, manufacturing process, properties and uses of Bricks, lime, cement and Timber.

6. Foundation

- (i) Bearing capacity of soil and its importance, need of foundation for electrical machines.
- (ii) Foundations for heavy, light and vibrating machines.
- (iii) Concrete proportion, mixing w/c ratio, workability RCC and its use.

6. Surveying

- (i) Basics of chaining and leveling
- (ii) Description of Instruments used

NOTE: While teaching theory it is important to bring and show the machine components to the students.

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DELEMME205
ELEMENTARY WORKSHOP TECHNOLOGY

DETAILED CONTENTS

L	T	P
3	0	0

GENERAL INTRODUCTION:

- (a) Scope of subject "Workshop Technology" in engineering.
- (b) Different shop activities and broad division of the shops on the basis of nature of work done such as
 - (i) Wooden Fabrication (Carpentry)
 - (ii) Metal Fabrication (shaping and Forming, Smithy, Sheet-metal and Joining-welding, Riveting, Fitting and Plumbing.
- (c) Organization and layout of workshop.
- (d) General safety precaution in workshop

1. CARPENTRY :

- (a) Types of wood and timber, Cutting and seasoning of wood, Decaying of wooden component.
- (b) Fundamental of wood working operations:
 - Marking & Measuring. - Holding & Supporting.
 - Cutting & Sawing. - Drilling & Boring.
 - Turning. - Jointing.
- (c) Common Carpentry Tools:
Their classification, size, specification (name of the parts and use only).
 - (1) *Marking and measuring tools:*
Rules, try square, Bevel Square, Marking gauge, Mortise gauge, Scribe (marking knife). Combination set
 - (2) *Holding and supporting Tools:*
Carpentary vice, Bench hold fast, Bar clamp, Bench hook, Hand clamp C and G clamp.
 - (3) *Cutting and Sawing Tools:*
Saws:(Grip or Hand, panel, cross cut, Tenon, dove tail, compass, key hole and bow saw),
Chisel: (Firmer, dovetail, mortise and gauge), Planes: Wooden & Iron plane. Jack plane, Smoothing plane).
 - (4) *Drilling and Boring tools:*
Auger, Gimlet, Hand drill, Brace and bits.

- (5) **Striking Tools:** Mallet and Claw hammer.
- (6) **Turning Tools & Equipments:** Wood working lathe and lathe tools.
- (7) *Miscellaneous Tools:*
Screw driver, Rasp, Pincer, Oil stone, Triangular file and Saw set.
- (d) *Joining of Timber Components For Fabrication Works:*

Assembly of joints (Preparation steps and tools used only) Mortise, Tenon, Rivet, Groove, Tongue, Dowel, operations in assembly-Simple lap and butt, Mortise, Tenon, Dovetail, Mitre & bridle joints. Uses of glue, dowelpin and screw in preparation of joints. Common defects likely to occur during and after joining, defects due to wrong use of tools, defects due to wrong operation, defects due to improper seasoning of timber- their identification and remedy. Safety (personal and equipment) to be observed.

3. METAL FABRICATION:

(A) *Metal Shaping :*

Smithy:

- (1) Operations involved (concept only)-Preparation of fire, Supporting and holding the metal, cutting the metal in size, heating, drawing down or fullering, upsetting, swaging, bending, punching, blanking, drifting and forge welding,
- (2) Tools and equipment used (Names, size, specification for identification only).
- (3) Heating and fuel handling equipment-Smithy Forge, Blower, Shovel, Poker.
- (4) Holding and supporting tools-Common tongs, anvil, swage block.
- (5) Striking Tools-Ball pein, cross pein, Straight pein double face and sledge hammers (6) Cutting tools - Hot and cold chisel and shear set.
- (7) Punching & Drifting Tools - Punch & Drift.
- (8) Bending Tools and fixture.
- (9) Forming & Finishing Tools - Fullers, Swage Flatters, Set hammers.
- (10) Defects likely to Occur during and after operations their Identification and Remedy. Defects due to wrong operation, wrong tool and wrong heating.
- (11) Safety of Personnel, Equipment & Tools to be observed.
- (12) Study of forge hammers and power presses.

(2) *Sheet metal working:*

(I) Tools and Operation:

- (1) Operations involved (Names and concept only) Laying out, marking and measuring, cutting, Shearing and blanking, Straightening bending and seaming, Punching and piercing, burring and stamping,
- (2) Sheet metal joints - Lap, seam, Locked seam, hemp, wired edge, cup or circular, Flange, angular and cap.
- (3) Tools and equipments used (Name, size, specification for identification only).
- (4) Marking Tools- Scriber, Divider and Trammel, Protractor, Trysquare, Dot punch, Steel

Rule, Steel tape, Sheet metal gauge.

(5) Cutting and shearing Tools-hand Shear and lever, Snips, Chisels.

(6) Straightening tool-Straight edge.

(7) Striking Tools-Mallet, Hammer.

(8) Holding Tools-Vice, Plier, C or G clamps, Tongs.

(9) Supporting Tools-Stakes and Anvil

(10) Bending Tools-Crimpers, Form dies, Round nose plier, Rails.

(11) Punching-Piercing and Drifting tools.

(12) Burring Tools-Files.

(13) Common defects likely to occur during and after operation-Their identification and remedy.

Defects due to wrong operation or wrong tool.

(14) Safety of Personnel, Equipment & Tools to be observed.

(15) Development and estimation of sheet for simple articles.

(B) Metal Joining During Fabrication:

(1) Permanent Joining:

(a) (1) Welding methods- Forge welding, gas welding (high and low pressure- oxyacetylene welding, types of flames.

(2) Electric welding- D.C. & A.C., Connected tools, operation, materials and safety measures.

(b) Soldering & Brazing:

For black Galvanised and Tincoated Iron sheet, brass and copper sheets only.

(1) Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering.

(2) Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering.

(3) Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and Discription (For Identification Only), for gas soldering bits.

(4) Electric soldering iron.

(5) Common defects likely to occurs during and after soldering.

(6) Safety of Personnel, Equipment & Tools to be observed.

(c) Rivetting:

(1) Its comparison with welding as joining method.

(2) Rivets and Materials.

(3) Operation involved- Marking from given data, edge preparation, drilling and punching arrangements of joint elements (Lap, Butt with single cover plate and double cover plate) upsetting of rievet tail, shaping head and caulking.

(4) Tools and equipments used- (Names, Size, Specification and uses)-Supporting and holding tools (Stakes and Tonqs)-Striking tools-Ball pien, Straight pien and Cross pien hammers and head forming tools (Shapes), drills punches and solid punches, drift, elementary knowledge about working of pneumatic, hydraulic and electric rivetor.

(3) Temporary Joining (Fastners & Their Uses):

Introduction to

(1) **Various types of Bolts** (Names of prats and specification) and various types of washers and nuts used with them and their uses, material they are made of , studs and foundation bolts.

(2) Screws, keys, pins and cottors-their material and use.

(3) Pipe connectors-Sockets, elbows, tees, cross and bends, unions, volves, glands packing and operation in use of pipe connectors-cutting, marking, threading, pipe bending, joining different pipe line fittings- (Steps of operation only).Tools and equipment used in their operations (Name, Size, Specification and Discription for Identification). Supporting and holding tools- Pipe vices (Bench, leg and hand), Pipe wrenches, Spanners. Cutting Tools- Hack saw and Pipe cutters.Threading Tools- Pipe dies and Taps. Materials Used for Joining-White lead, Cotton and Gasket.

Common defects lickely to occur during and after operation and their remedies.

(3) Familiarity with The Use of Various Tools Used In Mechanical Engineering Workshop:

Marking & Measuring:

Steel rule, surface gauge, marking block, protractor, trysquare, scribe, punches, divider and callipers, surface plate, V. block, gauges- (screw, pitch, radius, feeler), Vernier callipers, Micrometer, Vernier height and depth gauge, use of dialgauge.

Holding Tools:

Vices (Bench, leg and hand vice), clamps tongs, pliers,

Cutting Tools:

Hack saw (Fixed and Adjustable framce), chisels-flat, cross cut, diamond, round nose.

Files:

According to section-Knife edge, Flat, Triangular round, Square, Half round,
According to grade - Rough, Bastard, Second cut, Smooth and Dead smooth,

Drills and Allied Tools:

Parallel and taper shank Twist drill,

Thread Cutting Tools:

Taps and Dies,

Miscellaneous Tools:

Wrenches, Keys, Spaners, Pliers, Screw drivers their specification and many others which have not been named for use in various shops. They should be shown physically to each student for famillarity.

4. PROTECTION OF FABRICATED STRUCTURES FROM WEATHER:

1. PAINTING:

Its need, Introduction to methods of paintings (Classification only); Manual, Machine (spray) and dip painting at room temperature, operations involved- description of steps only eg. surface preparation method for old and new surface in timber and iron structure-sanding, derusting, degreasing, filling of pore and dents, paint application- manual, machine (spray and dip painting drying of paint air drying and oven drying under coat and filler material (red oxide, putty, yellow clay), surface preparation materials (sand and emery papers); tools and equipments used (Name, size specification for identification).

Brushes-

Round and flat wire brush, scraper, trowel, spray gun, compressor. Defects likely to occur in painting and their remedies

Safety of Personnel, Equipment & Tools to be observed.

2. VARNISHING & POLISHING:

Its need operation involved (description of step only), surface preparation method of old and new articles, application of polishing materials, materials used for preparation of french and spirit polish, copal varnish. Defects likely to occur. Safety of Personnel, Equipment & Tools to be observed.

3. FOUNDRY WORK:

Elementary idea of patterns, Types of moulds, sand and green sand moulds and moulding, tools and equipment used in green sand moulding.

4. MACHINE SHOP:

Introduction to machine tools viz lathe, drilling machine, shaper and planer simple line and block diagram of components and their functions. Brief concept of NC and CNC machines.

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L	T	P
0	0	2

DAPPLME206
Applied Mechanics Lab

List of Experiments

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss (King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and Efficiency of any three of the following machines:
 - (i) Simple wheel & axle
 - (ii) Differential wheel & axle
 - (iii) Differential pulley block
 - (iv) Simple Screw jack
 - (v) Simple Worm & worm wheel
 - (vi) System of Pulleys (any type).
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina.

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DAPPLME207
APPLIED PHYSICS-II LAB
(Common to all branch of Diploma engineering)

LIST OF EXPRIMENTS:-

L	T	P
0	0	2

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T^2 verses l and using the formula $g=4\pi^2/\text{Slope of the graph line}$
3. Determine the force constant of combination of springs incase of -1. Series 2. Parallel.
- 4.To verify the series and parallel combination of Resistances with the help of meter bridge.
- 5.To determine the velocity of sound with the help of resonance tube.
- 6.Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carry Foster Bridge.
9. Determination of resistivity by P.O.Box.
- 10.Verification of Kirchhoff's Law.
- 11.To draw Characteristics of p-n Junction diode.
12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

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L	T	P
0	0	4

DELEMME208

ELEMENTARY WORKSHOP TECHNOLOGY LAB

DETAILED CONTENTS

1. Carpentry Shop :

- EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood
- EX-2 Planning and sawing practice
- EX-3 Making of lap joint
- EX-4 Making of mortise and tenon joint
- Ex-5 Making of any one utility article such as wooden- picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

- EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantage of painting, other method of surface coating i.e. electroplating etc.
- EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.
- Ex-3 To prepare metal surface for painting, apply primer and paint the same.
- EX-4 To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

*** The sequence of polishing will be as below:**

- i) Abrasive cutting by leather wheel.
- ii) Polishing with hard cotton wheel and with polishing material.
- iii) Buffing with cotton wheel or buff wheel.

3. Sheet Metal and Soldering Shop :

- EX-1 Introduction and Types of sheets, measuring of sheets
- EX-2 Study and sketch of various types of stakes/anvil.
- EX-3 Introduction & demonstration of tools used in Sheet metal working shop.
- EX-4 Cutting, shearing and bending of sheet.
- EX-5 To prepare a soap case by the metal sheet.
- EX-6 To make a funnel with thin sheet and to solder the seam of the same.
- EX-7 To make a cylinder and to solder the same.
- EX-8 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.
- EX-9 To braze small tube/conduit joints.

4. Fitting Shop, Plumbing Shop & Fastening Shop:

- EX-1 Study of materials, limits, fits and tolerances.
- EX-2 Introduction & demonstration of tools used in Fitting Shop.
- EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.
- EX-4 Making bolt & nut by tap and die set and make its joints
- EX-5 To drill a hole in M.S. Plate and tapping the same to create threads as per need.
- EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.
- EX-7 Cutting and threading practice for using socket, elbow And tee etc. and to fit it on wooden practice board.
- EX-8 Study of bib cock, cistern or stop cock, wheel valve and gate valve etc.
- EX-9 Practice of bolted joints
- EX-10 To prepare a riveted joint
- EX-11 To make a pipe joint
- EX-12 To make a threaded joint
- EX-13 Practice of sleeve joint

5. Foundry Work

- Ex-1 Study of metal and non metals
- Ex-2 Study & sketch of the foundry tools.
- Ex-3 Study & sketch of cupola & pit furnace.
- Ex-4 To prepare the green molding sand and to prepare moulds (single piece and double piece pattern sweep mold)
- Ex-5 Casting of non ferrous (lead or aluminum) as per exercise 3.

6. Smithy Shop :

- EX-1 Study & Sketch of Tools used in smithy shop.
- EX-2 To prepare square or rectangular piece by the M.S. rod.
- EX-3 To make a ring with hook for wooden doors.
- EX-4 Utility article-to prepare a ceiling fan hook.

7. Welding Shop :

- EX-1 Introduction to welding, classification of welding, types of weld joints.
- EX-2 Welding practice-gas and electric.
- EX-3 Welding for lap joint after preparing the edge.
- EX-4 Welding of Butt joint after preparation of the edge.
- EX-5 'T' joint welding after preparation of edge.
- EX-6 Spot welding, by spot welding machine.

8. Machine Shop

- EX-1 Study & sketch of lathe machine.
- EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines
- EX-2 Plain and step turning & knurling practice.
- EX-3 Study and sketch of planing/Shaping machine and to plane a Rectangle of cast iron.