UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Course Structure
(Common for all branches)

First Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DAP 1001	Basic Physics	3	0	0	3
DAC 1001	Basic Chemistry	3	1	0	4
DAM 1001	Basic Mathematics	3	1	0	4
DHE 1001	Technical English	3	0	0	3
DCS 1001	Fundamentals of Computer	3	0	0	3
DMM 1002	Engineering Graphics-I	0	1	2	2
DAP 1002	Basic Physics Lab.	0	0	2	1
DAC 1002	Basic Chemistry Lab.	0	0	2	1
DCS 1002	Computer Lab.	0	0	2	1
DME 1004	Workshop Practice-I	0	0	2	1
DGA1002/04/06/08	PT and Games/NSS/NCC/CA	0	0	2	1
	Periods per week	**15**	**3**	**12**	**-**
	Total credits	**-**	**-**	**-**	**24**
	Total Periods per week	-	-	-	**30**

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

SYLLABUS

SEMESTER-I

Diploma in Engineering

(Common for all branches)

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Diploma in Engineering (Semester-I)

SUBJECT: DAP 1001 **BASIC PHYSICS**

Objective:
The Student will be able to understand:

1. Measurement of Physical Quantities & Dimensions
2. Force and Motion.
3. Gravity and Planetary Motion.
4. Mechanical Properties of Matter.
5. Heat and Thermodynamics.

Module I:

Measurement of Physical Quantities & Dimensions:
Classification of Physical quantities (Fundamental & Derived with their Units), Scalar & Vector quantities, System of units (M.K.S., C.G.S., F.P.S. & SI), Dimensions of the physical quantities, Principle of homogeneity of dimensions, Order of magnitude, Significant figures, Error in measurement- Systematic error and Random Error, Estimation of errors- Absolute error, Relative error and Percentage error, Simple Problem, Differential & Integral calculus (Introduction only).

Module II:

Force and Motion:
Definitions of Distance, Displacement, Velocity, Speed and Acceleration, Momentum, Force, Torque, Moment of Inertia, Motion in straight line, Circular motion, Equations of Motions- $\boldsymbol{v = u + at,\ S = ut + \frac{1}{2}at^2,\ v^2 = u^2 + 2as,}$ Distance traveled by particle in n^{th} second, Equations of motion for motion under gravity. Statements of Newton's laws of motion, Motion of lift, Projectile motion-Time of flight, Vertical height and Horizontal range, Simple problems.

Module III:

Gravity and Planetary Motion:
Newton's law of gravitation, Variation of acceleration due to gravity 'g' (On the Earth Surface , inside the earth and Above the earth), Gravitational Potential Energy, Escape Velocity, Planets and Satellites, Kepler's laws of Planetary motion, Simple Problem.

Work, Energy and Power:
Definitions of work, energy and power with their units and mathematical expressions, kinetic energy and potential energy, Simple problems.

Module IV:

Mechanical Properties of Matter:
***Elasticity*:** Stress, Strain, Hooke's law, Modulus of elasticity (Young's Modulus, Bulk's Modulus and Modulus of rigidity).

Surface Tension: Surface Tension, Surface energy, Relation between Surface Tension and Surface energy, Angle of contact, Shape of Meniscus, Capillarity, Determination of surface tension by capillary rise method, Simple Problem.

Fluids (At rest and motion):

Density and Pressure, Fluid at rest (Pascal Principle, Archimedes's Principle), Bernoulli's Theorem (Without Proof)

***Viscosity*:** Newton's law of viscosity, Coefficient of viscosity, Streamline and turbulent flow, Critical velocity and Reynold's number, Stoke's law, Poiseiulle's formula for steady flow (Without proof), Simple Problem.

Module V:

Heat and Thermodynamics:

Three modes of transmission of heat (Conduction, Convection and Radiation), good and bad conductor with examples, expansion of solid –linear, aerial and cubical and relation between them. Boyle's Law, Charles's law and Gay-Lussac's law, Avogadro's Number, Ideal Gas equation, Isothermal, Isobaric, Isochoric and Adiabatic processes, Zeroth law of Thermodynamics, First law of Thermodynamics, Simple Problem.

Text and reference books:

1. V. Rajendran, "Physics-I", Tata McGraw- Hill raw- Hill publication, New Delhi
2. Arthur Beiser, "Applied physics", Tata McGraw- Hill raw- Hill publication, New Delhi
3. R.K.Gaur and S.L.Gupta, "Engineering Physics", Dhanpat Rai Publication,New Delhi.
4. Resnick and Halliday, "Fundamentals of Physics", Wiley India Pvt. Ltd.
5. Question bank, "Physics-I", Tata McGraw- Hill raw- Hill publication, New Delhi
6. H.C Verma, "Concepts of Physics", Volume-I

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Diploma in Engineering(Semester-I)

SUBJECT: DAC 1001 BASIC CHEMISTRY

Objective:

Keeping in view the continuous development in science & technology and the present need of industries as well as research organizations, the curriculum of Basic Chemistry has been designed so that

- The students will be able to develop knowledge; skill and scientific attitude w.r.t. distinguish, differentiate, analyze and solve basic problems of chemical sciences.
- The students may have better knowledge of Basic chemistry and its applications in the various fields of engineering and allied industries.
- A new chapter on Environmental Chemistry has been introduced to make the students acquainted with various types of pollution hazards, which are becoming more critical every day.
- Fundamental knowledge of measurement; related to different types of solutions.

Structure and chemical properties of an atom & molecules, periodic trends, chemical bonding, concepts of acids & bases.

Module I:

Basic concepts of Chemistry:

Atomic weight, molecular weight, Atomic mass unit (a.m.u.), Avogadro's number. Mole concept, relation with mass, volume and number of atoms, molecules. Equivalent weight, Concentration terms (Molarity, Normality and molality) with numerical. Oxidation number, calculation of oxidation number of an element in any compound

Module II:

Atomic structure:

Concept of atom and molecules, Orbit and orbital, Atomic number, mass number. Bohr's atomic model and its drawback. Hund's rule, Aufbau's rule, Electronic configuration (upto atomic no. 30), Dual nature of matter (de Broglie relationship).

Module III:

Periodic table and Chemical bonding

Modern periodic table, Law and structure of periodic table. Periodic properties (Atomic radius, Ionization energy, Electron affinity and Electronegativity) and its periodic trends. Chemical Bond: Electrovalent bond and covalent bond with suitable examples and Lewis dot structure.

Module IV:

Concepts of acids and bases & Ionic Equilibrium

Various concepts of acids and bases(Arrhenius, Bronsted - Lowery and Lewis theory). Law of chemical equilibrium, Ionic product of water, pH (related numerical). Solubility product, Ostwald's dilution law, common ion effect, Buffer solution

Module V:

Environmental Chemistry

Elementary idea of air, water and soil pollution. Effect of pollution on human health and vegetation. Brief idea of pollution effects like Acid rain, Greenhouse effect, Role of CFC in Ozone layer depletion.

Text Books:

1. "Chemistry class XI", NCERT

Reference Books:

1. "Comprehensive Chemistry XI", Laxmi Publications
2. "Modern abc of Chemistry XI", Modern Publishers
3. O. P. Agrawal, "Engineering Chemistry",
4. Jain and Jain, "Engineering Chemistry",
5. A. K. Dey, "Environmental Chemistry",

UNIVERSITY POLYTECHNIC
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Diploma in Engineering(Semester-I)

SUBJECT: DAM 1001 BASIC MATHEMATICS

Objective:

1. Apply Mathematical term, concept, principles and different methods prerequisite for studying engineering subjects.
2. Acquire sufficient mathematical techniques necessary for understanding higher engineering mathematics.

Module-I:

Basic Algebra:

A.P., G.P. and H.P. Sum to n terms of A.P. and G.P., sum of natural numbers.

Definition of complex numbers, Argand diagram, conjugate, modulus and polar form of complex numbers, De-Moiver's theorem (without proof) and related problems. Euler's Formula.

Nature of roots of quadratic equations. Solution of quadratic equations in the complex number system. Definition of factorial notation, definition of permutation and combinations with formula. Binomial theorem for positive index. General term and related problems.

Module-II

Vector Algebra:

Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication). Dot (Scalar) product with properties. Vector (Cross) product with properties.

Module-III

Determinant and Matrices:

Definition of a matrix of order m X n and types of matrices. Algebra of matrices such as equality, addition, subtraction, scalar multiplication and transpose of a matrix.

Definition and expansion of determinants of order 2 and 3. Minor, cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method. Solution of simultaneous equations containing 2 and 3 unknowns.

Module-IV:

Co-ordinate Geometry:

Cartesian Co-ordinates, Distance formulae, section formulae, midpoint, centroid of triangle area of a triangle. General equation of a straight line and its standard forms. Length of perpendicular.

Conic sections: Equation of circle, circle through three points, circle with a given diameter. Standard equations and simple properties of ellipse, parabola and hyperbola.

Module-V:

Trigonometry:

Measurements of angles. Trigonometric or Circular functions. Use of Sin(A+B), Cos(A+B), Tan(A+B), Cot(A+B), trigonometric ratios of multiple angles and related identities.

Text books:

1. R. S. Agarwal, "Senior Secondary School Mathematics for Class 11", Bharati Bhavan Publishers & Distributers.
2. R. S. Agarwal, "Senior Secondary School Mathematics for Class 12", Bharati Bhavan Publishers & Distributers.
3. N.P. Bali and Manish Goyal, "A Textbook of Engineering Mathematics", Laxmi Publications Pvt. Ltd.

UNIVERSITY POLYTECHNIC
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Diploma in Engineering(Semester-I)

SUBJECT: DHE 1001 TECHNICAL ENGLISH

Objectives:

1. Communication Development of the students who lack confidence in communicating in English.
2. Developing the Writing, Listening and speaking skill in the students.
3. To improve their Personality and Communication Networks.

Module I:

Text (Prose)

"*The Last Lesson*"- Alphonse Daudet

- Vocabulary - Understanding meaning of new words from text
- Comprehension – Responding to the questions from text
- Identifying parts of speech

Module II:

Applied Grammar

- Verb-Subject Agreement
- Tenses

Module III:

Common Errors

- Common Errors in the use of Articles and Prepositions.
- Conjunction, Affirmative/Negative/Assertive, remove too, use of article.

Module IV:

Paragraph Writing

- Comprehension: Reading the passage and answering the questions related to the paragraph given.
- Précis writing: summarizing the paragraph.
- Vocabulary Building: Synonyms, Antonyms

Module V:

Professional Writing

- Notice Writing
- Application writing : Job Application and Leave application
- Letter Writing : Formal (Business letters, Complaint letter) and Informal letter (Friendly letter)

The team work will consist of 2 assignments: The assignments should be written in A4 size note books (100 pages ruled)

List of Assignments:

i) Building of Vocabulary
Technical Jargons: Identify 10 technical words from the respective branches. Resource -- (Encyclopedia/Subject Books)

ii) Grammar
- Insert correct parts of speech in the sentences given by the teachers. (16 sentences-- Two each, from the different parts of speech)
- Punctuate the sentences given by the teachers. (10 sentences)

iii) Conversational skills: Role plays
Students are going to perform the role on any 6 situations, by the teacher.

iv) Writing Skills
- Write any two events from the newspaper as it is
- Write any two events on the situation given by the teacher.

List of Laboratory Experiments:

1. Exercise for making the Sentences and their conversions.
2. Exercise for use of Parts of Speech.
3. Use of Vowels, Articles, Verbs.

List of Assignments/Tutorial:

1. Correct use of Tenses
2. Formation of words

Reference Books:

1. FLAMINGO, NCERT
2. P.C.Wren & H.Martin, “High School English & Composition”
3. Dr. Sunita Mishra & Dr. C. Muralikrishna, “Communication Skills for Engineers”
4. “Oxford Dictionary”, Oxford University

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Diploma in Engineering (Semester-I)

SUBJECT: DCS 1001 FUNDAMENTALS OF COMPUTER

Objective:

The subject aims to provide the students with an understanding of:

1. Basic components of computers.
2. Various types of application software and system software.
3. Concept of database
4. Basic concepts of computer programming.
5. The Cyber world.

Module-I:

Basics of Computer:

Introduction, Generation of Computers, Characteristics of computer, Classification of computer; Computer hardware and software; Applications of computers.

Module-II:

Components of Computer System: Central Processing Unit (CPU), input/output Devices, computer Memory: primary and secondary memory, magnetic and optical storage devices, Concepts of Hardware and Software.

Module-III:

Computer Software:

Starting up the Computer, Software Types, System Software, Applications Software, Software Creation and Programming Languages, Operating System, User Interface, Loader and Linker, Compiler, Assembler and Interpreter, Types of Operating Systems.

Module-VI:

Introduction to Database:

Drawbacks of File Processing System, Features of database, Data and information, Database, Database management system, Data model, Applications of Database.

Module-V:

Computer Networks & Internet:

Computer Network and its advantages, Brief history of internet, Introduction to internet and its application/services. requirement to access internet, How to get connected to internet.

Service on Internet: WWW and web-sites, web browser, Electronic mails.

Text Books:

1. V. Rajaraman, "Fundamental of Computers", PHI

Reference Books:

1. Jaiswal. S., "Information Technology Today", Galgotia Publication.

UNIVERSITY POLYTECHNIC
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Diploma in Engineering(Semester-I)

SUBJECT: DMM 1002 ENGINEERING GRAPHICS

Objectives:

The student should be able to:-

1) Draw different engineering curves and know their applications.
2) Draw orthographic projections of different objects.
3) Visualize three dimensional objects and draw Isometric Projections.
4) Use the techniques and able to interpret the drawing in Engineering field.
5) Use computer aided drafting packages.

Details of Practical Contents:

1. Drawing Instruments and their uses:
   a) Letters and numbers (single stroke vertical)
   b) Convention of lines and their applications.
   c) Scale (reduced, enlarged & full size) plain scale and diagonal scale.
   d) Sheet layout.
   e) Introduction to AutoCAD (Basic draw and modify Command).
   f) Geometrical constructions.
2. Engineering curves & Loci of Points:
   a) To draw an ellipse by: Directrix and focus method, Arcs of circle method, Concentric circles method,
   b) To draw a parabola by: Directrix and focus method, Rectangle method.
   c) To draw a hyperbola by: Directrix and focus method, passing through given points with reference to asymptotes, Transverse Axis and focus method.
   d) To draw involutes of circle & polygon (up to octagon)
   e) To draw a cycloid, epicycloid, hypocycloid
   f) To draw Helix & spiral.
3. Loci of Points:
   a) Loci of points with given conditions and examples related to simple mechanisms.
4. Orthographic projections:
   a) Introduction to Orthographic projections.
   b) Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only)
   c) Dimensioning technique as per SP-46
5. Isometric projection
   a) Isometric scale
   b) Conversion of orthographic views into isometric View / projection (Simple objects)
   c) Projection of Point, Straight Lines and Planes. (First Angle Projection Method only)
   d) Lines inclined to one reference plane only and limited to both ends in one quadrant.
   e) Projection of simple planes of circular, square, rectangular,
   f) Pentagonal, and hexagonal, inclined to one reference plane and perpendicular to the other.

Learning Resources:

1. N. D. Bhatt, "Engineering Drawing", Charotar Publishing House
2. K. Venugopal, "Engineering Drawing and Graphics + AutoCAD", New Age Publication
3. R. K. Dhawan, "Engineering Drawing", S. Chand Co.
4. P. J. Shah, "Engineering Drawing"
5. K. R. Mohan, "Engineering Graphics", Dhanpat Rai and Publication Co.

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Diploma in Engineering(Semester-I)

SUBJECT: DAP 1002 **BASIC PHYSICS LAB.**

LIST OF EXPERIMENTS

1. To find the diameter and volume of a given wire using a Screw Gauge.
2. To find the side and volume of a given wooden cube using a Vernier Caliper.
3. To find the length, diameter and volume of a given wooden cylinder using a Vernier Caliper.
4. To Verify Ohm's Law by using an Ammeter & Voltmeter.
5. To determine the value of 'g' (accelerator due to gravity) by using a simple Pendulum.
6. To determine the given carbon resistance using a Multimeter and to compare it with measured value with the written in Colour Code.
7. To find the angle of minimum deviation of a given glass prism.
8. To determine the value of modulus of rigidity for the material of rod by static method.
9. To convert a Weston type Galvanometer into an Ammeter of a given range.
10. To study the relation between frequency and length of a stretch string using a Sonometer.
11. To convert a Weston type galvanometer into a Voltmeter of given range.
12. To determine the thermal conductivity of a bad conductor by Lee's method.

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Diploma in Engineering(Semester-I)

SUBJECT: DAC 1002 BASIC CHEMISTRY LAB

Quantitative analysis (Volumetric)

1. To prepare the solution of N/20 sodium carbonate and find the strength of HCl using N/20 sodium carbonate solution.
2. To Estimate free chlorine in given water sample.
3. To estimate % of Fe in given Ferrous alloy by standard $KMnO_4$ solution.

Quantitative analysis (Gravimetric)

4. Estimation of Barium as Barium Sulphate by Gravimetric Analysis.
5. Estimation of strength of Ag ion in the given AgNO3 solution by gravimetric analysis.
6. To estimate the amount of Mohr's salt present in the given solution using standard $KMnO_4$ solution.

Colorimetric Method

7. To estimate pH of water sample by colorimetric method & pH meter.

Qualitative analysis (salts test), containing

Basic radical: Pb^{+2}, Cu^{+2}, Al^{+3}, Fe^{+3}, Cr^{+3}, Zn^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Mg^{+2}, K^{+}, NH_4^{+}
Acid radical: Cl^{-}, Br^{-}, I^{-}, CO_3^{-2}, SO_4^{-2}, NO_3^{-}

8. Salt test for one acid and one basic radical (Salt 1).
9. Salt test for one acid and one basic radical (Salt 2).
10. Salt test for one acid and one basic radical (Salt 3).
11. Salt test for one acid and one basic radical (Salt 4).
12. Salt test for one acid and one basic radical (Salt 5).
13. Salt test for one acid and one basic radical (Salt 6).
14. Salt test for one acid and one basic radical (Salt 7).
15. To prepare a chart showing the applications of Fe, Cu, Al, Cr, Sn, Pb, Co and Ni.

Study Resources:

1. Shashi Chawla, "Essential of Experimental Engineering Chemistry"
2. S. K. Bhasin & Sudha Rani, "Laboratory Manual on Engineering Chemistry"

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Diploma in Engineering (Semester-I)

SUBJECT: DCS 1002 COMPUTER LAB.

Operating system-MS-Windows

1. Create a new folder and do the following:
    1. Create a new folder
    2. Rename folder
    3. Move folder
    4. Copy folder
    5. Delete folder
2. Implement the various well known features of Windows operating system such as Notepad, WordPad, Paint, System tools, Entertainment etc.
3. Implement various display properties.
4. Explore the taskbar of Windows.
5. Set the wall paper and screen saver.
6. Set the data/time.
7. Recycle bin

Word Processing-MS Word

1. Create a document and
    a. Put Bullets and Numbers
    b. Apply various Font parameters.
    c. Apply Left, Right, and Centre alignments.
    d. Apply hyperlinks
    e. Insert pictures
    f. Insert ClipArt
    g. Show the use of WordArt
    h. Add Borders and Shading
    i. Show the use of Find and Replace.
    j. Apply header/footers
2. Create any document and show the use of File→versions.
3. Create any document and show the difference between paste and paste special.
4. Create a document to show the use of Washout/Watermark.
5. Implement the concept of mail merge.
6. Implement the concept of macros.
7. Implement the concept of importing a file/document.
8. Implement the concept of merging the documents.
9. Crate a student table and do the following:
    a. Insert new row and fill data
    b. Delete any existing row
    c. Resize rows and columns
    d. Apply border and shading
    e. Apply merging/splitting of cells
    f. Apply sort
    g. Apply various arithmetic and logical formulas.
    h. Create your resume using General Templates.

Spread sheet- MS-Excel

1. Compute the division of each and every student of a class.
2. Generation of Electricity Bill
3. Generation of Telephone Bill
4. Generation of Salary statement of an employee
5. Generation of Mark Sheet of a student.
6. To compute mean/median/mode.
7. Generate graph to show the production of goods in a company during the last five years.
8. Compare the cost, overheads and sales figures of a company for last three years through appropriate chart.
9. Create any worksheet and apply various mathematical, statistical and financial functions.
10. Generate the following worksheet

Roll No.	Marks
2050	67
2051	49
2052	40
2053	74
2054	61
2055	57

and do the following:

a. Crate chart of the marks.
b. Compute sum of marks using auto sum, auto calculate and sum function.
c. Compute average of marks.
d. Show pass or fail if marks are above 50 or less than 50
e. Put header and footer in the spread sheet.

Presentation software- MS-PowerPoint

1. Make a presentation of College Education System using
   a. Blank Presentation
   b. From Design Template
   c. From Auto Content Wizard
2. Make a presentation on "Wild Life" and apply the following:
   a. Add audio and video effects
   b. Apply various Color Schemes
   c. Apply various animation schemes.
   d. Apply Slide Show

Database Management System MS-Access

1. Create a Student database in Design View, by using Wizard, and by entering data.
2. Create a query on Student database in design view and by using wizard.
3. Create forms of Student database in design view and by using wizard.
4. Create reports of student database in design view and by using wizard.
5. Create data access pages of student database in design view and by using wizard.
6. Implement the concept of Macros in MS-Access.

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Computer Network and Internet:

1. Connect the Internet; open any website of your choice and save the Web Pages.
2. Search any topic related to your syllabi using any search engine and download the relevant material.
3. Send any greeting card to your friend.
4. Create your E-Mail ID on any free E-Mail Server.
5. Login through your E-Mail ID and do the following:
    a. Read your mail
    b. Compose a new Mail
    c. Send the Mail to one person
    d. Send the same Mail to various persons
    e. Forward the Mail
    f. Delete the Mail
    g. Send file as attachment
6. Surf Internet using Google to find information about your state
7. Surf Internet using Google to find Tourism information about your state
8. Surf Internet using Yahoo to find Hotels around your state
9. Surf Internet using Google to find information about educational institutes for teaching M.S in comp science in India
10. Surf Internet using Google to find information about Indian Cricket team

Books/Referenced Books:

1. Vikas Gupta, "Comdex Computer Course Kit", First, Dreamtech
2. Henry Lucas, "Information Technology for management", 7th, TMH
3. B. Ram, "Computer Fundamentals Architecture and Organisation", 3rd, New Age International Publisher

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Diploma in Engineering(Semester-I)

SUBJECT: DMA 1002 **WORKSHOP PRACTICE – I**

Objective:

The students will be able to

1. Read and interpret job drawing
2. Identify, select and use various measuring, holding, striking and cutting tools equipment
3. Operate and control different machines and equipment
4. Inspect and Make the job for specified dimensions
5. Adopt safety precaution while working on different machines

Details of Practical Contents:

1. CARPENTRY SHOP

- Demonstration of different wood working tools
- Demonstration of different wood working processes like planning, marking, chiselling, grooving, turning of wood etc.
- One simple joint involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

2. WELDING SHOP

- Demonstration of different wood welding tools / machines
- Demonstration of Arc Welding, Gas Welding rebuilding of broken parts with welding etc.
- One simple job involving butt and lap joint

3. FITTING SHOP

Demonstration of different fitting tools and drilling machine:

- Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc.
- One simple fitting job involves practice of chipping, filing, drilling, tapping, etc.

4. SHEET METAL SHOP

- Demonstration of different sheet metal tools/machines.
- Demonstration of different sheet metal operations like sheet metal operations like sheet cutting, bending, edging riveting etc.
- One simple job involving sheet metal operations and riveting.

TEXT BOOKS:

1. S.K.Hazara Choudhary, “Workshop Technology”, Media Promoters and Publishers
2. B.S.Raghuwanshi, “Workshop Technology”, Dhanpat Rai & Sons
3. R.K.Jain, “Production Technology”, Khanna Publishers
4. H.S.Bawa, “Workshop Technology”, Tata McGraw Hill Publishers
5. S.K.Garg, “Workshop Technology”, University Science press, Laxmi Publisher Pvt. Ltd.