

**UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI**

SYLLABUS

SEMESTER-I

Diploma in Engineering

(Common for all branches)

**UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI**

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 1101	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

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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- $v = u + at$, $S = ut + \frac{1}{2}at^2$, $v^2 = u^2 + 2as$, 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):

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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, Poiseuille'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

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

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.

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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 BIT MESRA, RANCHI

Diploma in Engineering(Semester-I)

SUBJECT: DAM 1101

BASIC MATHEMATICS

Objective:

Students will understand mathematical terminologies, concepts, principles, and different mathematical methods prerequisite for studying engineering mathematics, physics, and other engineering subjects. Students are going to learn following topics:

- Basic 2-D co-ordinate geometry.
- Idea of trigonometric and circular functions.
- Basic algebraic method includes: progressions, complex numbers, and Binomial Theorem.
- Vector Algebra.
- Elementary concepts of Differential Calculus.

Module-I:

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 properties of ellipse, parabola, and hyperbola.

Module-II:

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 sub-multiple angles with related identities.

Module-III:

Basic Algebra:

Definition of complex numbers, Argand diagram, conjugate, modulus, and polar form of complex numbers. Definition of factorial notation, formula of permutation and combinations. Binomial theorem for positive index. General term and related problems.

Nature of roots of quadratic equations. Solution of quadratic equations in the complex number system.

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

Module-IV:

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-V:

Elementary Calculus: Derivatives

Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions; trigonometric, exponential and logarithmic functions. Definition of derivative relate to slope of tangent of the curve, derivative of sum, difference, product, and quotient of functions. Derivatives of polynomial and trigonometric functions.

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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.

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

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)

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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-IV:

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.

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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.

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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 AgNO_3 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"

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

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. Create 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.

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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. Create 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

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

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 planing, 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.

**UNIVERSITY POLYTECHNIC
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SYLLABUS

SEMESTER-II

(Common for all branches)

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Course Structure Second Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DHE 2001	Communication Skill	2	1	0	3
DAM 2101	Engineering Mathematics	3	1	0	4
DAC 2001	Engineering Chemistry	3	0	0	3
DAP 2001	Engineering Physics	3	0	0	3
DEC 2101	Fundamentals of Electrical and Electronics	3	0	0	3
DAS 2102	Applied Science Lab.	0	0	2	1
DEC 2002	Electrical and Electronics Lab.	0	0	2	1
DMM 2002	Engineering Graphics-II	0	1	2	2
DHU 2002	Development of Life Skills-I	0	0	2	1
DHU 2004	Professional Practices-I	0	0	2	1
DME 2004	Workshop Practice-II	0	0	2	1
DGA 2002/04/06/08	PT and Games/NSS/NCC/CA	0	0	2	1
	Periods per week	14	3	14	-
	Total credits	-	-	-	24
	Total Periods per week	-	-	-	31

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

Diploma in Engineering(Semester-II)

SUBJECT: DHU 2001

COMMUNICATION SKILLS

Objective:

1. Introduction to various Communication skills
2. To improve Students Personality
3. To motivate students to work in challenging situation with positive attitude

Module I:

Introduction to communication:

The concept of Communication. Definition of communication process.
Characteristics of communication

Module II:

Types of communication

Formal- informal and Verbal-Non-Verbal Communication

Module III:

Principals of effective communication:

Definition of effective communication. Communication barriers & how to overcome them.

Module IV:

Soft Skills:

Definition of soft skills. Importance of soft skills.

Module V:

Presentation Skills:

Structuring a presentation. Types and techniques of delivering presentation.

Body language during presentation

Assignments:

1. Communication Situations (List of 5 Communication situations stating the type of communication)
3. Barriers That Hinder a Particular Communication Situation. (State the type of barrier, and how to overcome them).

Reference Books:

1. Effective Technical Communication: M.A. Rizvi (2007), Tata McGraw-Hill.

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

Diploma in Engineering (Semester-II)

SUBJECT: DAM 2101

ENGINEERING MATHEMATICS

Objective:

Students will perceive mathematical concepts, principles, and different mathematical methods prerequisite for studying other subjects in engineering fields. Students are going to learn the following topics:

- Circular Trigonometric and Complex functions.
- Little deeper idea of continuity and differentiability.
- Basic geometric and physical applications of calculus.
- Detailed idea of Integral Calculus.
- Basic three-dimensional geometry of straight line and plane.

Module-I:

Trigonometric and Complex Functions

Solution of Triangles. Inverse Trigonometric Functions.

Polar form of Complex Numbers, De-Moivre's theorem and related problems. Exponential and Circular functions of Complex variables, and Euler's Theorem.

Module-II:

Continuity and Differentiability

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit functions. Concept of exponential and logarithmic functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second-order derivatives.

Module-III:

Applications of Derivatives

Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretation. Rate of change of bodies, increasing/decreasing functions, tangents and normals, use of derivatives in approximation, maxima, and minima (first derivative test motivated geometrically and second derivative test given as a provable tool).

Module-IV:

Integration

Indefinite Integral: Integration as inverse of differentiation. Integration of algebraic and trigonometric functions. Integration by substitution, partial fractions and by parts.

Definite Integral: Fundamental theorem of calculus (without proof), basic properties of definite integral and evaluation. Application of finding the area of simple curves.

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Module-V:

3-D Coordinate Geometry

Straight line in space: Direction cosines and direction ratios. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines.

The plane: Cartesian and vector equation of a plane. Angle between two lines, two planes, a line and a plane. Distance of a point from a plane.

Textbooks:

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.

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Diploma in Engineering(Semester-II)

SUBJECT: DAC 2001

ENGINEERING CHEMISTRY

Objective:

Module I:

Water Technology:

Hardness of water – temporary and permanent, action of soaps and detergents.

Water treatment- Lime soda, Zeolite and Ion exchange methods. Boiler feed water, scale formation, priming and foaming as troubles and remedial measures.

Module II:

Concepts of Polymers and plastics:

Polymers and its applications, Addition & condensation polymers, Thermosetting and thermoplastic with examples, Natural and artificial rubbers, vulcanization.

Module III:

Metallurgical operations:

Mineral, ores, gangue flux and slag. General methods of Extraction, refining of Metal from Ores, annealing. Ores extraction and properties of Fe, Al and Cu. Important alloys and its applications (Steel, Brass & Bronze).

Module IV:

Corrosion:

Corrosion – Definition, types of Corrosion - Dry or chemical Corrosion and Wet or electrochemical Corrosion, Rusting of iron, Pitting Corrosion, Waterline Corrosion and Stress Corrosion, Factor affecting Corrosion, prevention and protection.

Lubricants:

Lubricants, classification of lubricants, Characteristics of Lubricants such as (viscosity, viscosity index, oiliness, volatility, flash point and fire point, pour point & cloud point)

Mechanism of lubrication, Emulsification, selection of lubricant for various types of machines.

Module V:

Fuels:

Conventional and non-conventional source of energy, calorific value, Coal- classification, proximate and ultimate analysis, coal carbonization, Petroleum – classification, refining, fractional distillation, cracking, Gasoline and diesel fuels- their properties, knocking, octane number & cetane number. Gaseous fuels – Producer gas, water gas, L.P.G., C.N.G. & biogas

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Text and reference Books:

- Shashi Chawla, “A Text Book of Engineering Chemistry”
- Jain and Jain, “Engineering Chemistry”
- “Comprehensive Chemistry XII”, Laxmi Publications
- Dara, “Engineering Chemistry”
- O. P. Agrawal, “Engineering Chemistry”
- M. M. Uppal, “Engineering Chemistry”

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Diploma in Engineering(Semester-II)

SUBJECT: DAP 2001

ENGINEERING PHYSICS

Objective:

The Student will be able to understand concept of:

1. Waves and Sound
2. Light
3. Current Electricity & Electrostatics
4. Magnetism and Electromagnetic induction
5. Modern Physics

Module I:

Waves and Sound:

Types of waves-Electromagnetic waves & Mechanical wave, transverse waves and longitudinal waves, Terminology-Amplitude, Wave Length, Time period, frequency, crest and trough, relation between frequency & Wave length Superposition of waves, Speed of sound in a gaseous medium-Newton's Formula and Laplace's correction (Derivation), Definition of Doppler Effect, Acoustics of Buildings, Reverberation, Pitch, Echoes, Loudness, Beats, Simple problems.

Module II:

Light:

Reflection & Refraction of light, Laws of reflection and refraction, critical angle, Total Internal Reflection, Derivation of prism formula, Dispersion with a prism, Interference of light-Path difference, Expression for fringe width in Young's double slit experiment, Photometry (Intensity of illumination, Inverse square law), Speed of light in vacuum and media, Simple Problem.

Module III:

Current Electricity:

Definitions of Conductor, Semiconductor, Insulator, Electric charge, current, Resistance, e.m.f., Ohm's Law, Resistances connected in series and parallel, Galvanometer, Ammeter, Voltmeter, Conversion (galvanometer to ammeter and galvanometer to voltmeter), Heating effect of current (Joule's law), Wheatstone bridge, Electric power and energy, Simple Problem.

Electrostatics: Coulomb's Law, Electric field and Potential difference, Electrical field due to a point charge and a line charge, Electric dipole and Electric dipole moment, Simple Problem.

Module IV:

Magnetism and Electromagnetic induction

Magnet and their properties, Magnetic moment, Magnetic field and lines of force, Magnetic force on a current carrying wire, Biot-Savart's law, Magnetic field due to infinitely long straight conductor, Magnetic field due to a circular current-carrying coil and solenoid, Earth's magnetic field and its three parameters, Faraday laws of Electromagnetic induction, Simple Problem.

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Module V:

Modern Physics:

Plank's hypothesis, properties of photons, Photoelectric effect, X-rays (Production and applications), Radioactivity (Alpha, Beta and Gamma rays), Laser (Introduction, Characteristics and Applications).

Reference and Text Books:

1. Physics-I, Tata McGraw-Hill raw-Hill, Publication New Delhi, By V. Rajendran
2. Engineering Physics, Bhanpat Rai Publication, New Delhi by R.K. Gaur and S.L. Gupta
3. Concepts of Physics by H.C Verma, Volume-II
4. Modern's ABC of Physics for Class XII
5. Physics for Class XII, Tata McGraw-Hill raw-Hill, Publication by N.K.Bajaj

UNIVERSITY POLYTECHNIC BIT MESRA, RANCHI

Diploma in Engineering (Semester-II)

SUBJECT: DEC 2101 FUNDAMENTALS OF ELECTRICAL & ELECTRONICS

Objective: Students will be able to

1. Develop the essential skills for understanding and interpreting DC circuits.
2. Learn and analyze AC circuits.
3. Acquire necessary ability to distinguish between various semiconductor materials and devices.
4. Learn and appreciate the operation and applications of BJT
5. Learn and apply logic gates to realize simple digital operations.

MODULE 1

Electrical elements their classification and characteristics: Resistance, Inductance, Capacitance, voltage source, current source. Series & Parallel connection of resistance and capacitance, Ohms Law, Kirchoff's Laws, current and voltage division rule.

MODULE 2

Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems; with numerical problems.

MODULE 3

AC single phase circuit: Common signals & their wave form, RMS & Average value, form factor, phasor quantities, impedance, power, power factor, active, reactive and apparent power.

AC three phase system, comparison between single phase and three phase.

Safeties in electrical system: Fuse, Circuit Breaker, Switches, Connectors, Relays, Wires/ Cables and Earthing.

MODULE 4

Classification of materials: Energy bands, Forbidden band, Conductor, Semiconductor, Insulator.

Introduction to semiconductor: Intrinsic & Extrinsic, PN junction, Diode characteristic Zener diode, V-I characteristics, Applications of Zener diode.

Introduction to BJT: Concept of transistors as two junction, three terminal device with two current carriers; PNP and NPN transistors, their symbols and mechanism of current flow; Explanation of fundamental current relation.

MODULE 5

Introduction to digital electronics: Concept of positive logic and negative logic; Definition, symbol and truth tables of Basic Gates, Universal Gates & Special Gates.

Text/Reference Books:

1. Basics of Electrical, Electronics and Communication Engineering- K.A.NAVAS & T.A.Suhail , Rajath Publishers, Kochi.
2. Fundamental Electrical and Electronic Principles (Third Edition)- Christopher R Robertson, Newnes, Elsevier
3. Basic Electronics & Linear Circuits- N.N.Bhargava, D.C. Kulashreshtha, S.C. Gupta- TTTI Chandigarh, TMH.
4. Electronic Devices & Components- Allen Mottershead, PHI.

**UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI**

Diploma in Engineering(Semester-II)

SUBJECT: DAS 2102

APPLIED SCIENCE LAB.

SECTION – A (APPLIED PHYSICS)

LIST OF EXPERIMENTS

1. To study the compression / Extension of helical spring and to find the stiffness and modulus of rigidity.
2. To determine the effort required to raise various loads using the Screw Jack apparatus.
3. To determine the coefficient of static friction and its range between any two given material surfaces with the help of an inclined plane.
4. To study current voltage relationship (Ohm's Law) by using an Ammeter & Voltmeter and also plot the graph between current & Voltage.
5. To use a Wheat-Stone bridge (meter-bridge) for finding an unknown resistance.
6. To determine the refractive index of material (glass) of the given prism.
7. To verify Hooke's Law by Searle's method and to calculate Young's modulus of elasticity of steel wire.
8. To determine the thermal conductivity of a bad conductor by Lee's method.

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SECTION – B (APPLIED CHEMISTRY)

1. To determine the carbonate hardness of given water sample.
2. To determine the non-carbonate hardness of given water sample.
3. To determine the total hardness of given water sample by EDTA method.
4. To determine the alkalinity of given water sample.
5. To determine neutralization point of acetic acid (weak acid) and ammonium hydroxide (weak base). Calculate normality and strength of acetic acid.
6. To determine the viscosity of given oil in Redwood-1 under ambient conditions and then the absolute viscosity.
7. To determine acid value of given lubricant.
8. To determine the strength of given hydrochloric acid solution by titrating it against sodium hydroxide solution by using pH meter.
9. To determine the equivalent point of precipitation titration of BaCl_2 with H_2SO_4 using conductivity meter. To find the normality and strength of BaCl_2 solution.
10. To verify Faraday's second law of electrolysis.

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-II)

SUBJECT: DEC 2002

ELECTRICAL AND ELECTRONICS LAB.

List of Experiments:

1. Study of various Passive components.
2. Measurement of resistances using multimeter and verification using color codes.
3. Measurement of resistances in series.
4. Measurement of resistances in parallel.
5. Measurement of capacitance.
6. Measurement of capacitances in series.
7. Measurement of capacitances in parallel.
8. Forward & Reverse characteristics of diode
9. Forward & Reverse characteristics of Zener diode.
10. Zener Diode Regulator.
11. Identification of Transistors.
12. Study of transistors using data sheets.

LEARNING RESOURCES:

1. Basics of Electrical, Electronics and Communication Engineering- K.A.NAVAS & T.A.Suhail , Rajath Publishers, Kochi.
2. Fundamental Electrical and Electronic Principles (Third Edition)-Christopher R Robertson, Newnes, Elsevier
3. Basic Electronics & Linear Circuits- N.N.Bhargava, D.C. Kulashreshtha, S.C. Gupta- TTTI Chandigarh, TMH.
4. Electronic Devices & Components- Allen Mottershead, PHI.

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Diploma in Engineering(Semester-II)

SUBJECT: DME 2002

ENGINEERING GRAPHICS- II

Objective:

The students shall be able to:

1. Understand the basic concepts of engineering drawing.
2. Visualize the objects.
3. Draw different views in different positions of objects.
4. Draw the different views of machine elements.

Detailed Practical content:

1. Sectional Views:

Types of sections, Conversion of pictorial view into sectional orthographic views (First Angle Projection Method only)

2. Missing Views:

Draw missing view from the given Orthographic views - simple components (First Angle Projection Method only)

3. Intersection of Solid Surfaces:

Intersection of following solid surfaces-cylinder vs cylinder, cone vs cylinder, square prism vs square prism, square prism vs cylinder.

4. Projections of Solids:

Projections of Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube with their axes inclined to one reference plane and parallel to other.

5. Sections of Solids:

Solids: -Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube.

Cone, Pyramid and Tetrahedron resting on their base on Horizontal Plane.

Prism, Cylinder: -a)Axis parallel to both the reference plane

b) Resting on their base on HP.

Section plane inclined to one reference plane and perpendicular to other.

6. Developments of Surfaces:

Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.

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Diploma in Engineering(Semester-II)

SUBJECT: DHU 2002

DEVELOPMENT OF LIFE SKILLS-I

Objective:

The students will be able to:

1. Develop reading skills
2. Use techniques of acquisition of information from various sources
3. Draw the notes from the text for better learning.
4. Apply the techniques of enhancing the memory power.
5. Develop assertive skills.
6. Prepare report on industrial visit.
7. Apply techniques of effective time management.
8. Set the goal for personal development.
9. Enhance creativity skills.
10. Develop good habits to overcome stress.
11. Face problems with confidence

1. Importance of DLS:

Introduction to subject, importance in present context, application.

2. Information Search:

Information source –Primary, secondary, tertiary Print and non –print, documentary, Electronic Information center, Library, exhibition, Government Departments. Internet Information search – Process of searching, collection of data –questionnaire, taking Interview, observation method.

3. Written communication:

Method of Note Taking

Report writing –Concept, types and format.

4. Self-Analysis:

Understanding self—Attitude, aptitude, assertiveness, self-esteem, Confidence buildings. Concept of motivation.

5. Self-Development:

Stress Management –Concept, causes, effects, and remedies to avoid /minimize stress.

Health Management – Importance, dietary guidelines and exercises.

Time management- Importance, Process of time planning, Urgent vs importance, Factors leading to time loss and ways to handle it, tips for effective time management.

Emotion-concept, types, controlling, emotional intelligence.

Creativity-concept, factors enhancing creativity.

Goal setting – concept, setting smart goal.

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6. Study habits:

Ways to enhance memory and concentration. Developing reading skill.

Organisation of knowledge, Model and methods of learning.

Text Books:

1. Marshall Cooks Adams Time management Viva Books, E.H. McGrath , S.J. Basic Managerial Skills for All Pretece Hall of India, Pvt Ltd
2. Allen Pease Body Language Sudha Publications Pvt. Ltd.
3. Lowe and Phil Creativity and problem solving, Kogan Page (I) P Ltd
4. Adair, J Decision making & Problem Solving Orient Longman Bishop , Sue Develop Your Assertiveness, Kogan Page India, Marion E Haynes Make Every Minute Kogan page India Count, Pearson Education Asia Organizational
5. Stress Management, Through Yoga and Meditation, Sterling Publisher Pvt. Ltd.
6. Richard Hale ,Peter Whilom Target setting and Goal Achievement Kogan page India
7. Chakravarty, Ajanta Time management Rupa and Company Harding ham .A Working in Teams Orient Longman

Internet Assistance:

- 1) <http://www.mindtools.com>
- 2) <http://www.stress.org>
- 3) <http://www.ethics.com>
- 4) <http://www.coopcomm.org/workbook.htm>
- 5) <http://www.mapfornonprofits.org/>
- 6) <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
- 7) <http://eqi.org/>
- 8) <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
- 9) <http://www.mapnp.org/library/ethics/ethxgde.htm>
- 10) http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
- 11) <http://members.aol.com/nonverbal2/diction1.htm>
- 12) http://www.thomasarmstron.com/multiple_intelligences.htm
- 13) <http://snow.utoronto.ca/Learn2/modules.html>
- 14) <http://www.quickmba.com/strategy/swot/>

Reference books: Nil

Suggested List of Laboratory Experiments: Nil

Suggested List of Assignments/Tutorial:

The Term Work Will Consist Of Following Assignments.

1. Library search:-

Visit your Institute's Library and enlist the books available on the topic given by your teacher. Prepare a bibliography consisting name of the author, title of the book, publication and place of publication.

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2. Enlist the magazines, periodicals and journals being available in your library. Select any one of them and write down its content. Choose a topic for presentation.
3. Attend a seminar or a guest lecture, listen it carefully and note down the important points and prepare a report of the same.
4. Visit to any one place like historical/office/farms/development sites etc. and gather information through observation, print resources and interviewing the people.
- 5 Prepare your individual time table for a week –
 - (b) List down your daily activities.
 - (c) Decide priorities to be given according to the urgency and importance of the activities.
 - (d) Find out your time wasters and mention the corrective measures.
- 6 Keep a diary for your individual indicating- planning of time, daily transactions, collection of good thoughts, important data, etc
- 7 Find out the causes of your stress that leads tension or frustration .Provide the ways to Avoid them or to reduce them.
- 8 Undergo the demonstration on yoga and meditation and practice it. Write your own views, feeling and experiences on it.

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Diploma in Engineering(Semester-II)

SUBJECT: DHU 2004

PROFESSIONAL PRACTICES-I

Outcome:

The Student will be able to:

1. Acquire information from different sources. Prepare notes for given topic.
2. Present given topic in a seminar. Interact with peers to share thoughts.
3. Prepare a report on industrial visit, expert lecture.

Industrial Visits:

Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work.

Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any THREE of the following areas:

- i) Pollution control.
- ii) Non-destructive testing.
- iii) Acoustics.
- iv) Illumination / Lighting system.
- v) Fire Fighting / Safety Precautions and First aids.
- vi) Computer Networking and Security.
- vii) Topics related to Social Awareness such as – Traffic Control System, Career opportunities, Communication in Industry, Yoga Meditation, Aids awareness and health awareness.

Group Discussion:

The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are -

Sports, Current news items, Discipline and House Keeping, Current topics related to mechanical engineering field.

Student Activities:

The students in a group of 3 to 4 will perform any one of the following activities (others similar activities may be considered

Activity:

- i) Collect and study IS code for Engineering Drawing.
- ii) Collecting information from Market: Nomenclatures and specifications of engineering materials.
- iii) Specifications of Lubricants.
- iv) Draw orthographic projections of a given simple machine element using and CAD software

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Diploma in Engineering(Semester-II)

SUBJECT: DMA2002

WORKSHOP PRACTICE – II

Objective:

The students will be able to

- Know basic workshop processes
- Read and interpret job drawing
- Identify, select and use various measuring, holding, striking and cutting tools & equipment
- Operate and control different machines and equipment
- Inspect the job for specified dimensions
- Make the job as per specified dimension
- Adopt safety precaution while working on different machines

Details of Practical Contents:

1. CARPENTRY SHOP

- Any one composite job using different joint. Turning and planing operation. Surface finishing like making two piece pattern, duster etc.

2. SMITHY SHOP

- Demonstration of different forging tools and equipment.
- Demonstration of different forging processes.
- One simple job like hook peg, semi-finished nut or any hardware item

3. MACHINE SHOP

Demonstration of different tools and equipment used in M/c shop:

- Demonstration of different operations like facing, turning, knurling, chamfering, drilling, cutting etc.
- One simple job like making semi-finished nut and bolt.

4. FOUNDRY SHOP

- Demonstration of different foundry tools and equipment.
- Demonstration of gating system, uses of riser, runner, gates etc.
- Making a mould using given pattern.

TEXT BOOKS:

- S.K.Hazara Choudhary, “Workshop Technology”, Media Promoters and Publishers
- B.S.Raghuwanshi, “Workshop Technology”, Dhanpat Rai & Sons
- R.K.Jain, “Production Technology”, Khanna Publishers
- H.S.Bawa, “Workshop Technology”, TMH
- S.K.Garg, “Workshop Technology”, University Science press, Laxmi Publisher Pvt. Ltd