SYLLABUS

SEMESTER-II

(Common for all branches)

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Course Structure
Second Semester

Subject Code	Subject	Theory	Tutorial	Lab.	Credit
DHE 2001	Communication Skill	2	1	0	3
DAM 2001	Engineering Mathematics	3	1	0	4
DAC 2001	Engineering Chemistry	3	0	0	3
DAP 2001	Engineering Physics	3	0	0	3
DEC 2001	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 2001   **ENGINEERING MATHEMATICS**

Objective:

1. Apply Mathematical term, concept, principles and different methods for studying engineering subjects.
2. Develop the ability to apply mathematical methods to solve technical problems.
3. Acquire sufficient mathematical knowledge necessary for daily and practical problems.

Module I:
Trigonometry:
Solution of Triangles. Inverse Trigonometric Functions.

Module II:
Functions, Limit, Continuity and Differentiability:
Concept of function and graphs with examples. Limit and continuity of functions.
Derivative introduced as rate of change of functions. Definition of derivative, concept of slope and tangent of a curve. Derivative of polynomial and trigonometric functions. Derivative of composite functions, chain rule, derivative of inverse trigonometric functions, derivative of implicit functions. Second and higher order derivatives, Successive differentiation, Leibnitz theorem (without proof), Rolle's and Lagrange's Mean Value Theorem (without proof), Taylor and Maclaurin's series (without proof).

Module III:
Applications of Derivatives:
Rate of change of particle in motion, increasing/decreasing functions, tangent and normal, use of derivative in approximation, maxima and minima (both first and second derivative test). Simple problems in real-life situations.

Module IV:
Integrals:
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.

Module V:
3D 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.

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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.

Text and reference Books:

1. R. S. Agarwal, "Senior Secondary School Mathematics for Class 11".
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
BIT MESRA, RANCHI

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

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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"

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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.

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 2001   FUNDAMENTALS OF ELECTRICAL & ELECTRONICS

Module I:
Electrical elements their classification and characteristics:
Resistance, Inductance, Capacitance, voltage source, current source. Series & Parallel connection of resistance and capacitance, Ohms Law, current and voltage division rule.
Safeties in electrical system: Fuse, Circuit Breaker, Switches, Connectors, Relays, Wires/ Cables and Earthing.

Module II:
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.

Module III:
Electrical Machine:
Transformer, working principle of transformer, Types of transformer, DC & AC generators and motors.

Module IV:
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 V:
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 Chandigharh, 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.

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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"

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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 Chandigharh, TMH.
4. Electronic Devices & Components- Allen Mottershead, PHI.

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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.

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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.

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 Pretice 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.learningmeditition.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.

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.

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

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

UNIVERSITY POLYTECHNIC
BIT MESRA, RANCHI

Diploma in Engineering(Semester-II)

SUBJECT: DMA2002   **WORKSHOP PRACTICE – II**

Objective:

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

Details of Practical Contents:

1. CARPENTRY SHOP
   - o Any one composite job using different joint. Turning and planning operation. Surface finishing like making two piece pattern, duster etc.
2. SMITHY SHOP
   - o Demonstration of different forging tools and equipment.
   - o Demonstration of different forging processes.
   - o 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:
   - o Demonstration of different operations like facing, turning, knurling, chamfering, drilling, cutting etc.
   - o One simple job like making semi-finished nut and bolt.
4. FOUNDRY SHOP
   - o Demonstration of different foundry tools and equipment.
   - o Demonstration of gating system, uses of riser, runner, gates etc.
   - o 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