PURBANCHAL UNIVERSITY

FACULTY OF ENGINEERING

Revised Course Structure of Bachelor in Civil Engineering (2021)

YEAR:I **SEMESTER:I**

S.N.	Course code	Subjects	Credit hours	L	T	P	Total	Internal		Final		Total
								Th.	Pr.	Th.	Pr.	
1	BEG104SH	Chemistry	3	3	2	2	7	40	10	60	15	125
2	BEG101SH	Mathematics I	3	3	2	-	5	40		60		100
3	BEG156CI	Applied Mechanics-I (Statics)	3	3	3		6	40		60	-	100
4	BEG159CI	Civil Engineering Materials	3	3	1	2	6	40	10	60	15	125
5	BEG---EL	Basic Electrical Engineering	2	2	1	2/2	4	10	25	40	-	75
6	BEG146ME	Engineering Drawing-I	3	1	-	3	4	20	50		30	100
7	BEG148ME	Workshop Technology	2	1	-	2	3	20	30		-	50
			19	16	9	10	35					675

CHEMISTRY
BEG104SH

YEAR-I **SEMESTER-I**

Teaching Schedule Hours/Week				Examination Scheme				
Cr	Theory	Tutorial	Practical	Internal Assessment		Final		Total Marks
				Theory	Practical	Theory	Practical	
3	3	2	2	40	10	60	15	125

Course Objectives: By the end of this course, students will be able to enhance their knowledge in Physical chemistry, Inorganic chemistry, and Organic chemistry and Applied chemistry.

Course Details:

Physical Chemistry

Unit-1Environmental Chemistry (8Hrs)

1.1 Air Pollution
1.2 Air Pollutants (Particulates and Gaseous) and their sources(TSP,PM10,PM2.5,SOx,NOx,CO,CO2 and O3)
1.3 Impacts of air pollutants and solutions for its control
1.4 Water Pollution and its type.
1.5 Sources of water pollutants, their impacts and possible remedies for their control.
1.6 Soil Pollution and soil pollutants. Sources of soil pollution, their impacts and solutions for their control measures

Unit-2Electrochemistry (8Hrs)

2.1 Electrolytic and Galvanic Cell.
2.2 Standard Hydrogen Electrode (SHE)
2.3 Nernst's equation.
2.4 Determination of P^H using glass electrode
2.4 Corrosion of metal, electrochemical series and Preventation of rusting
(Solving related numerical)

Unit-3 Ionic Equilibrium (6Hrs)

3.1 Ostwald's Dilution law

3.2 P^H and P^H scale
3.3 Buffer and its mechanism.
3.4 Derivation of Henderson's equation for pH calculation of buffer solution
(Solving related numerical)

Inorganic Chemistry

Unit-4 Transition Elements (6Hrs)

4.1 Periodic properties of Transition metals.
4.2Characteristics and properties of Transition metals.
4.3 Oxidation states
4.4 Complex formation and Magnetic properties.
4.5 Colour formation

Unit-5 Co-ordination complex (6Hrs)

5.1 Co-ordination compound
5.2 Werner's co-ordination theory
5.3 Sidgwick model
5.4 Nomenclature of co-ordination complex
5.5 Valence bond the theory (VBT)
5.6 Structure and magnetic properties of tetrahedral complexes, square planar complexes and octahedral complexes (inner and outer complex)

Organic chemistry

Unit -6 Stereoisomeris (6Hrs)

6.1 Geometrical isomerism Cis and Trans structure and also Z and E Configurations
6.2 Optical isomerism Conditions required for optical isomerism
6.3 Enantiomers (Dextro and Levo isomers)
6.4 Diastereomers and Meso compounds
6.5 Racemic mixture and resolution

Unit-7 Types of Organic reactions (6Hrs)

7.1 Substitution reaction SN1 and SN2
7.2 Elimination reaction E1 and E2
7.3 Addition reaction Examples
7.4 Re-arrangement reaction examples

Unit-8 Organometallic compound, Explosives and Paints (6Hrs)

8.1 Preparation, properties and uses of organometallic compound.
8.2 Explosives and their types (High explosive and low explosive)
8.3 Preparation, properties and action of TNT, TNG and Nitrocellulose
8.4 Paints and enamels their properties and applications

Unit-9 Polymers and Applied Chemistry (8Hrs)

9.1 Polymers and their type (Composition, conductivity and degradation)
9.2. Synthetic Polymer Polystyrene, Nylon6.6, PTFE, Silicones and Fiber reinforced Plastics (FRP)
9.3 Natural Rubber and Synthetic rubber, neoprene, buna rubber and vulcanization of rubber
9.4 Hazards and their chemical control in petroleum refineries and LPG bottling plants.

Laboratory Works

Students are supposed to perform at least five practical out of provided syllabus.

1. To determine the alkanity of the given sample of water (sample A and B)
2. To determine the total hardness of water sample.
3. To determine the permanent hardness of water sample.
4. To determine the amount of free chlorine in the given sample of water.
5. To determine the Iron from Mohr's salt.
6. To estimate the amount of Barium in given sample.
7. To estimate the amount of sulphate in given sample.
8 .To determination pH of soils
9. To determine the pH of unknown buffer by using standard buffer.

References Books:

1. R.K.Sharma &B.P. Panthi; *A text book of Engineering Chemistry*. 3rd edition.Heritage pub. Pvt.Ltd.(2018).
2. Arun Bahl, B.S. Bahl & G.D. Tuli; *Essential of Physical Chemistry*,S. Chand & Company.Ltd, New Delhi,(2012).
3. S.H.Maron &C. Prutton; *Principle of Physical Chemistry*,4th edition, oxford & IBH pub. Co, (1992).
4. R.D.Madan, Satya Prakash , *Modern Inorganic Chemistry*;S. Chand company Ltd,(1994).
5. J.D. Lee; *Concise Inorganic chemistry*;5th edition ,John Wiley and sons;Inc,(2007).c
6. R.T.Morrison & R.N. Boyd; *Organic chemistry*.6th &7th edition, prentice-Hall of india Pvt,Ltd.(2008).
7. B.S Bahl and A.Bahl, *A text book of Organic Chemistry*; S, Chand publication, New Dehli.India,(2012).
8. Charles E, Dryden, *Outline of Chemical Technology*,edition and revised by M,Gopal Rao and Marshall sitting affiliated East –West press Pvt. Ltd. New Delhi, (2010).
9. J. Bhattarai ;*Frontiers of Corrosion Science* ,1st edition, kshitiz pub.ktm, (2010)
10. N.M. Khadka, S.D. Gautam & P.N. Yadav; *A core Experimental Chemistry*; 2nd edition. Bench Mark pvt. Ltd. (2009).

MATHEMATICS I

BEG101SH

YEAR: I **SEMESTER: I**

Teaching Schedule Hours/Week			Examination Scheme		
Credit Hours	Theory	Tutorial	Internal Assessment	Final	Total Marks
3	3	2	Theory Marks 40	Theory Marks 60	100

OBJECTIVES: The main aim of this course is to provide the students a sound knowledge of calculus (differential and integral), vector algebra and analytic geometry through theoretical explanations and numerical examples via problem solving techniques and applications.

Course Details:

1. Derivatives and their Applications 15 hrs

1.1 Review of limit, continuity and differentiability
1.2 Tangents and Normals
1.3 Higher order derivatives, Leibnitz's theorem
1.4 Power series of single valued functions: Taylor's and Maclaurin's series
1.5 Indeterminate forms, L. Hospital's Rule
1.6 Curvature: Radius and chord of curvature
1.7 Asymptotes of Cartesian curves
1.8 Partial derivatives
1.9 Extreme values of functions of two and three variables

2. Anti-derivatives and their Applications 15 hrs

2.1 Review of indefinite and definite integrals
2.2 Properties of definite integrals
2.3 Improper integrals
2.4 Differentiation under integral sign
2.5 Reduction formula and Beta Gamma functions
2.6 Applications of integrals: ideas of curve tracings; area, arc-length, volume and surface areas in Cartesian form
2.7 Multiple integrals: double integrals and triple integrals
2.8 Change of order of integration in double integral

3. Plane Analytic Geometry 8 hrs

3.1 Translation and Rotation of Axes
3.2 Parabola: standard equations, tangent and normal
3.3 Ellipse and Hyperbola: Standard equations, foci, directrices, latera recta; equations of tangent and normal
3.4 General equation of conic section

4. Vector Algebra 7 hrs

4.1 Review of product of two vectors
4.2 Product of three and four vectors with applications
4.3 Reciprocal system of vector triads
4.4 Vector equation of lines (parametric form, symmetrical form and some problem) and Planes in Space (line of intersection of two planes and angle between two planes) by vector method.

REFERENCE BOOKS-

1. M. B. Singh and B. C. Bajracharya, *Differential Calculus*, Sukunda Pustak Bhawan, Kathmandu, Nepal.
2. G. B. Thomas and R. L. Finney, *Calculus and Analytic Geometry*, Addison Wesley Publishing Company.
3. M. B. Singh and B. C. Bajracharya, *A textbook of Vector Analysis*, National Book Center, Kathmandu, Nepal
4. D. G. Zill an M. R. Cullen, *Advanced Engineering Mathematics*, 3rd Edition, Jones and Bartlett Publishers Inc.
5. E. Kreyszig , *Advanced Engineering Mathematics* , 9^{th} Edition, John Wiley and Sons, Inc.

6. G. D. Pant and G. S. Shrestha, *Integral Calculus and Differential Equation*, Sunila Prakashan, Kathmandu, Nepal.
7. S. P. Shrestha, H. D. Chaudhary and P. R. Pokhrel, *A Text book of Engineering Mathematics*- Volume I, Vidhyarthi Pustak Bhandar, Kathmandu, Nepal.
8. S. P. Pradhanang and N. B. Khatakho, *Engineering Mathematics*- Volume I, Vidhyarthi Pustak Bhandar, Kathmandu, Nepal.

Applied Mechanics-I
BEG156CI

Year: I **Semester: I**

Teaching Schedule Hours/Week				Examination Scheme				
Cr	Theory	Tutorial	Practical	Internal Assessment		Final		Total Marks
				Theory	Practical	Theory	Practical	
3	3	3	-	40	-	60	-	100

Course Objective:

This course has been developed to provide the basic knowledge of engineering mechanics where in laws of physics are applied to solve engineering problems. This course will helps the students to understand structural engineering theory in later courses.

Course Details:

1. Introduction (5 hrs)
   - 1.1 Definition & Scope of mechanics, engineering mechanics and static
   - 1.2 Concepts of particle, rigid body, deformed & fluid bodies
   - 1.3 Equation of static equilibrium in 2D & 3D
   - 1.4 Free body diagram (definition, importance & example)
   - 1.5 System of units
   - 1.6 Introduction to vector (definition, laws & applications)

2. Forces (7 hrs)
   - 2.1 Definition & principles of forces
   - 2.2 Types of forces (coplanar, collinear, concurrent, parallel, external & internal forces)
   - 2.3 Principle of transmissibility & its limitations
   - 2.4 Resolution & composition of forces
   - 2.5 Lami's theorem, Varignon's theorem, triangle, parallelogram & polygon law of forces
   - 2.6 Moment of forces about a point & axis (in scalar & vector form)
   - 2.7 Definition of couple & proof of it as a free vector
   - 2.8 Resolution of force into force & a couple & vice versa
   - 2.9 Resultant of a system of forces. (wrench, parallel, coplanar, concurrent & general)

3. Distributed Forces
(6 hrs)

3.1 Definition & derivation of center of gravity & centroid (composite figure & direct Integration method)

3.2 Centroid of lines, areas and volumes

3.3 Definition of second moment of area (moment of Inertia) and radius of gyration

3.4 Parallel and perpendicular axis theorem, MOI of common figures (e.g. rectangle, triangle, circle and ellipse) and uniform thin rod

3.5 MOI of built up section.

3.6 MOI by direct integration method.

4. Friction (4 hrs)

4.1 Introduction (definition, types, cause & effect)

4.2 Laws of dry friction

4.3 Static friction, co-efficient of friction & angle friction

4.4 Condition of sliding or tipping

4.5 Application to static problems

5. Introduction to Structures (3 hrs)

5.1 Structural components (beam, frame, truss, 2-D Plate, cable, arch, grid)

5.2 Difference between plane and space structures. 5.3 Difference between mechanism & structures

5.4 Types of loading & supports.

5.5 Determinacy (internal & external) and stability (statical & geometrical)

6. Introduction to Analysis of Beam (8 hrs)

6.1 Definition and types of beam

6.2 External and internal forces in beam

6.3 Definition and sign convection of axial forces, shear forces and bending moment

6.4 Relationship between load, shear force & bending moment

6.5 Axial force, shear force & bending moment diagram

7. Introduction to Analysis of Frame (6 hrs)

7.1 Definition & type of frame (rigid, deficient, redundant)

7.2 Determinacy & stability

7.3 Axial force, shear force & bending moment diagram

8. Introduction to Analysis of Truss (6 hrs)

8.1 Definition & types of plane truss (according to support condition purpose of utilization, degree of complexity)

8.2 Determinacy & stability of plane truss

8.3 Analysis of plane truss (method of joints & method of section)

8.4 Introduction of space truss

References:

1. Beer F.P., & Johnston, E.R. (1987). Mechanics for Engineers-Statics and Dynamics. 4th edition, Mcgraw-Hill.
2. Hibbeler, R.C., & Gupta, A. (2009). Engineering Mechanics-Statics and Dynamics. 11th edition. Pearson Education.
3. Shames, I.H. (1990). Engineering Mechanics-Statics and Dynamics. 3rd edition. Prentice Hall of India.

Civil Engineering Materials

BEG159CI

Year: I **Semester: I**

Teaching Schedule Hours/Week				Examination Scheme				
Cr	Theory	Tutorial	Practical	Internal Assessment		Final		Total Marks
				Theory	Practical	Theory	Practical	
3	3	1	2	40	10	60	15	125

Course Objective:

To provide knowledge and concept of civil engineering materials (composition, manufacturing, properties and uses) that can be used in the construction works of civil structures.

Course Details:

1. Introduction to Construction Materials (4 hrs)
   - 1.1 Scope of construction materials
   - 1.2 Selection criteria of construction materials
   - 1.3 Classification of construction materials
   - 1.4 Properties of construction materials
   - 1.5 Concept of Stress-Strain relationship and Griffith's theory
   - 1.6 Hardness and toughness tests of construction materials

2. Building stones (5 hrs)
   - 2.1 Introduction
   - 2.2 Sieve analysis
   - 2.3 Aggregate (fine and coarse)
   - 2.4 Bulking of sand
   - 2.5 Characteristics of good building stones
   - 2.6 Selection of stones
   - 2.7 Deterioration and preservation of stone
   - 2.8 Natural bed of stone
   - 2.9 Dressing of stone

3. Clay products (6 hrs)

- 3.1 Introduction
- 3.2 Ingredients of brick earth
- 3.3 Manufacture of bricks
- 3.4 Characteristics of good bricks
- 3.5 Classification of bricks
- 3.6 Standard test on bricks
- 3.7 Tiles and their types
- 3.8 Introduction to typical Nepali traditional brick (Terracota Bricks)

4. Cementing materials (6 hrs)

- 4.1 Clay
- 4.2 Lime
- 4.3 Types, properties, and uses of lime
- 4.4 Properties and uses of pozzolanic materials
- 4.5 Cement
- 4.6 Type, properties, and uses of cement
- 4.7 Ingredients of cement
- 4.8 Manufacture of cement
- 4.9 Cement clinker and its composition
- 4.10 Standard test on cement
- 4.11 Cement water proofer and admixtures

5. Mortar (2 hrs)

- 5.1 Introduction
- 5.2 Classification of mortar
- 5.3 Function of mortar and Preparation Process
- 5.4 Selection of mortar

6. Timber (6 hrs)

- 6.1 Introduction
- 6.2 Structure of tree and microstructure of wood
- 6.3 Classification of tree
- 6.4 Characteristics of good timber
- 6.5 Seasoning of timber
- 6.6 Defects of timber
- 6.7 Deterioration and preservation of timber
- 6.8 Bamboo as a construction material
- 6.9 Commercial products of timber

7. Metals and alloys
(6 hrs)
- 7.1 Introduction
- 7.2 Type, properties, and uses of iron
- 7.3 Composition and properties of steel
- 7.4 Deformation of steel
- 7.5 Heat treatment process
- 7.6 Nonferrous metal
- 7.7 Microstructure study of steel
- 7.8 Elastic and plastic behavior
- 7.9 Deformation of steel
- 7.10 Commercial product of metals

8. Paints and varnishes (4 hrs)
- 8.1 Function, ingredient, type and uses of paints and varnishes
- 8.2 Distemper and its types
- 8.3 Anti-termite treatment

9. Asphalt, bitumen, and tar (4 hrs)
- 9.1 Introduction
- 9.2 Properties of asphalt, bitumen, and tar
- 9.3 Uses of asphalt, bitumen, and tar
- 9.4 Asphalt concrete
- 9.5 Standard test on bitumen

10. Miscellaneous materials (2 hrs)
- 10.1 Glass and its types
- 10.2 Plastic materials
- 10.3 Insulating materials
- 10.4 Gypsum products
- 10.5 Composite materials
- 10.6 Rubber

<u>Laboratories:</u>

1. Sieve analysis (fine and coarse aggregate)
2. Bulking of sand
3. Water absorption test and bulk specific gravity test on brick
4. Compressive strength test of brick and stone 5. Consistency test of cement
6. Setting time test of cement (initial and final)
7. Compressive strength of mortar
8. Toughness (Charpy) test on steel and timer

Field Visit: 3 days field visit on manufacturing of steel, cement, asphalt materials, brick, timber and miscellaneous materials.

Project Work: Case study on any one construction material site.

References:

1. Singh, P. (2013). Civil Engineering Material. Katson Books.
2. Thornton, P. A., & Colangela, V. J. (1985). Fundamental of Engineering Materials. Prentice Hall Publishing Company.
3. Rajput, R. K. (2000). Engineering Materials, 2nd (Doctoral dissertation, Ed. S. Chand Company Limited, New Delhi.

Basic Electrical Engineering

BEG---EL

Year: I **Semester: I**

Teaching Schedule Hours/Week				Examination Scheme				
Cr	Theory	Tutorial	Practical	Internal Assessment		Final		Total Marks
				Theory	Practical	Theory	Practical	
2	2	1	2/2	10	25	40	-	75

Course Objective:

The basic objective of the course is to provide knowledge on DC and single phase AC circuits.

Course Details:

1. General Electric System (6 hrs)

1.1 Constituent part of an Electric System (source, load, communication & control)

1.2 Current flow in a circuit

1.3 Electromotive force and Potential Difference

1.4 Ohm's Law, its applications and limitations

1.5 Resistors and Resistivity

1.6 Temperature rise and Temperature Coefficient of resistance

1.7 Voltage and Current Sources

2. DC Circuits (6 hrs)

2.1 Series and Parallel Combination of resistors

2.2 Kirchhoff's Law and their applications

2.2.1 Mesh Analysis

2.2.2 Nodal Analysis

3. Network Theorems (6 hrs)

3.1 Star-delta transformation and Delta-star transformation

3.2 Superposition Theorem

3.3 Thevenin's Theorem

3.4 Maximum power transmission theorem

4. Inductance and Capacitance in an Electric Circuits (4 hrs)

4.1 Capacitor and its Capacitance, Capacitor in series and parallel

4.2 Inductor and its Inductance, Inductor in series and parallel

5. AC Fundamentals (8 hrs)

5.1 Generation of AC

5.2 Waveform and Terms used in AC

5.3 Average and R.M.S values of Current and Voltage

5.4 Phasor representation

5.5 AC through Resistance, Inductance and Capacitance

5.6 AC through RL, RC, and RLC and their phasor representation

5.7 Power and Power factor in AC

5.8 Concept of three phase system.

Laboratories:

1. Introduction to Electrical equipments and Verification of Ohm's Law
2. Verification of KVL and KCL
3. Verification of Superposition Theorem
4. Verification of Thevenin's Theorem
5. Measurement of Amplitude, Frequency and Time with Oscilloscope: Calculate and verify Average and RMS value
6. Measurement of Alternating quantities in R ,RL,and RC circuit.

References:

1. Theraja, B. L., Theraja, A. K., &; Deshpande, S. D. *A text-book of electrical technology: In S.I. systems of units* Vol. 1, S. Chand & Company, New Delhi, 2005
2. Gupta, J.B. *A Course in Electrical technology (B E E)*, Vol.1, S.K. Kataria and Sons, 2013
3. DelToro, V. *Electrical engineering fundamentals*. Englewood Cliffs, NJ: Prentice-Hall, 1986
4. Hughes, E. *Electrical Technology*. Harlow: Longman, 1995

ENGINEERING DRAWING I

BEG146ME

Year: I **Semester: I**

Teaching Schedule Hours/Week				Examination Scheme				
Cr	Theory	Tutorial	Practical	Internal Assessment		Final		Total Marks
				Theory	Practical	Theory	Practical	
3	1	-	3	10	50	-	40	100

Course objective:

To develop the basic understanding and the skills of Engineering graphic technology to the students.

Course Details:

1.0 Instrumental Drawing; Practices & Techniques (2 hrs)

1.1 Equipment and materials; Description of drawing instruments, auxiliary equipment and Drawing materials

1.2 Techniques of Instrumental Drawing, Pencil Sharpening, securing paper, proper use of T-squares, triangles, scales, dividers, and compasses, crashing shields, French curves, Inking pens

2.0 Freehand Technical lettering (2 hrs)

2.1 Lettering strokes, letter proportions, use of pencils and pens, uniformity and Appearance of letters, freehand techniques, inclined and vertical letters and numerals, Upper and Lower cases, Standard English lettering forms.

3.0 Dimensioning **(5 hrs)**

3.1 Fundamentals and Techniques; Size and location dimensioning, SI Conventions. Use of Scales, measurement units, reducing and enlarging drawings

3.2 General Dimensioning practices placement of dimensions; aligned and unidirectional Recommended practice; some 50 items

4.0 Applied Geometry **(8 hrs)**

4.1 Plane Geometrical construction; Bisecting and trisecting lines and angles, proportional Division of lines, Construction of angles, triangles, square, polygons. Construction using Tangents and circular areas. Methods for drawing standard curves such as ellipses Parabolas, hyperbolas, involutes, spirals and cam or heart wheel

4.2 Solid Geometrical Construction; Classification and pictorial representation of solid Regular objects such as; Prisms: square, cubical, triangular and oblique Cylinders: right And oblique Cones: right and oblique, Pyramid: square, triangular, oblique, truncated, Doubly-Curved and Warped Surfaces: Sphere, torus, oblate ellipsoid, conoid, serpentine, paraboloid, hyperboloid (Definition)

5.0 Basic Descriptive Geometry **(8 hrs)**

5.1 Introduction; Application of descriptive geometry, principles to the solution of problems Involving positioning of objects in three-dimensional space

5.2 The projection of points, Lines and planes in space

5.3 Parallel Lines

5.4 True Length of Lines: horizontal, inclined and oblique lines

5.5 Perpendicular Lines

5.6 Bearing of a Line

5.7 Point view or End View of a Line

5.8 Shortest Distance from a point to a Line

5.9 Principal Lines of a Plane

5.10 Edge View of a Plane

5.11 True shape of a Line and a plane

5.12 Intersection of a Line and a Plane

5.13 Angle between a line and a plane

5.14 Angle between two intersecting lines

5.15 Angle between two Non-Intersecting (Skew) lines

5.16 Angle between two planes

5.17 Shortest Distance between Two Skew Lines

6.0 Theory of Projection (2 hrs)

6.1 Common types of projections- Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection

6.2 System of orthographic projection 1^{st} angle projection and 3^{rd} angle projection

7.0 Multi view (Orthographic projection Drawings (10 hrs)

7.1 Principal Views; Methods for obtaining orthographic views, projection of lines, angles and plane surfaces; analysis in three views projection of curved lines and surfaces. Object orientation and selection of views for best representation, Full and hidden lines

7.2 Orthographic Drawings; Making an orthographic drawing, visualizing objects from the given views, Interpretation of adjacent areas, True- length lines, Representation of holes- Conventional practices.

8.0 Sectional Views **(5 hrs)**

8.1 Full Section

8.2 Half Section

8.3 Broken Section

8.4 Revolved Section

8.5 Removed (Detail) Section

8.6 Phantom or Hidden Section

8.7 Auxiliary Section views

8.8 Specifying Cutting planes for Section

8.9 Conventions for hidden lines, holes, ribs, spokes

9.0 Auxiliary Views **(5 hrs)**

9.1 Basic Concept and Use of Auxiliary Views

9.2 Drawing Methods and Types of Auxiliary Views

9.3 Symmetrical and Unilateral Auxiliary Views

9.4 Projection of Curved Lines and Boundaries

9.5 Line of Intersection Between two Planes

9.6 True size of Dihedral Angles

9.7 True size and shape of plane surfaces

10.0 Freehand Sketching and Visualization (4 hrs)

10.1 Sketching and Design; Value of Sketching as part of design

10.2 Techniques of Sketching; pencil hardness, squared paper, line densities

Techniques for horizontal, vertical and circular lines

10.3 Multi view Sketches; Choice of views, adding detail, dimensioning, title, notes

Proportioning and comparative sizing

10.4 Sketching pictorial Views; General pictorial sketching Mechanical methods of sketching And proportioning Isometric sketching perspective Oblique sketching perspective Sketching conventional treatment of fillets, rounds and screw threads sketches of an Exploded view to show assembly of components

11.0 Developments, Intersections and Interpenetration (9 hrs)

11.1 Development General concepts and practical considerations. Developments of a rigid or oblique prism, cylinder, pyramid and cone. Development of a truncated pyramid and Cone Triangulation method for approximately developed surfaces Transition pieces of Connecting different shapes Development of a sphere

11.2 Intersection & Interpretation Lines of intersection of geometric surfaces Piercing point of a line and a geometric solid Intersection lines of two planes Intersection of prisms and pyramids Intersection of a cylinder and an oblique plane Intersection of a sphere and an oblique plane Constructing a development using auxiliary views Intersection of two Cylinders Intersection of a cylinder and a cone

LABORATORY **3 hrs/week**

1. Freehand Technical Lettering and Use of Drawing Instruments
2. Freehand Technical Lettering and Use of Drawing Instruments (cont)
3. Dimensioning
4. Geometrical and Projection Drawing
5. Descriptive Geometry
6. Descriptive Geometry (contd.)
7. Projection and Multi view Drawing
8. Projection and Multi view Drawing (contd.)
9. Sectional Views
10. Auxiliary views
11. Freehand Sketching and Visualization
12. Developments and Intersections
13. Developments and Intersections(contd.)

Recommended Books:

1. "Fundamentals of Engineering Drawing", W.J.Luzadder, Prentice Hall, 8th Edition, 1981
2. "Engineering Drawing and Graphic Technology", TE. French, C.J. Vierck & R.J. Foster, MCGraw Hill,1981
3. "Technical Drawing" F.E. Giesecke, A. Mtichell, H.C, Spencer & J.T. Dygdone, Macmillan, 8th Edition,1986

WORKSHOP TECHNOLOGY

BEG 148ME

Year-I **Semester-I**

Teaching Schedule Hours/Week				Examination Scheme				
Cr	Theory	Tutorial	Practical	Internal Assessment		Final		Total Marks
				Theory	Practical	Theory	Practical	
2	1	-	2	20	30	-	50	50

Course Objective: To familiarize the students about the basic mechanical and plumbing workshop practices as well as brick works**,** using various hand tools and machine tools.

Course Contents:

1.0 Introductory Concepts **(2 hrs)**

1.1 Introduction to the subject

1.2 Manufacturing Processes: Primary and Secondary forming processes

1.3 Mechanization and Automation

2.0 Industrial Safety **(1 hrs)**

2.1 Introduction

2.2 Concept of accident and its causes

3.0 Bench Work an Fitting Shop **(2 hrs)**

3.1 Introduction and familiarization with various hand tools used in bench shop and its applications

3.2 Sheet Metal Works Tools, Marking & Layout, Bending & Cutting Operations

4.0 Machine Shop **(2 hrs)**

4.1 Function of Machine Tools: Lathe, Power-saw, Milling Machine,

Drilling Machine, Grinding Machine, Shaping Machine

5.0 Welding Shop **(3 hrs)**

5.1 Gas Welding principle, equipment and types of flames

5.2 Arc Welding, principle and equipment

5.3 Arc Welding elements and gas welding rods.

5.4 Principle and application of Brazing and Soldering

6.0 Plumbing Shop **(3hrs)**

6.1 Types of pipe and its materials

6.2 Various fittings used in metal and non-metal pipes

6.3 Methods of bending

7.0 Brick Works **(2 hrs)**

7.1 Types of bricks and its applications

7.2 Methods of laying the bricks and its advantages and disadvantages

Workshop Practice:

Project Work and Report on the following (any two)

i) Making of various components using fitting tools

ii) Carryout various processes using various machine tools

iii) Cut threads on the pipes and make various joints using various fittings

iv) Carryout various bricklaying exercise using common hand tools.

Industrial Visit (S)

Arrangements to be made with local industries (if available) for students industrial visits

Recommended Books:-

1. Shop Theory, J. Anderson and E.E. Tatro, McGraw Hill.
2. A course in workshop technology volume I & II, Prof B.S.Raghubanshi, Dhanpat Rai & Sons, Delhi
3. Workshop Technology Volume I & II, H.S. Bawa, Tata Mcgraw Hill Publishing Company Limited, New Delhi
4. A Course in Workshop Technology Volume I & II , Hazra & Choudhary
5. Machine Shop Operations and Setups, O.D.Lascoe, C.A.Nelson and H.W.Porter, American Technical Society.
6. Machine Shop Practice Volume -I & II Industrial Press, New York
7. Technology of Machine Tools, K.Oswald, Mc Graw Hill
8. Machinery's Hand Book, Oberg, Jones and Horton, Industrial Press
9. CNC Machines