

MATHEMATICS-I

BEG101SH

Year: I

Semester: I

Teaching Schedule Hours/week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	3	-	3	80	-	-	20	-	100	

Objectives: The basic objective of the course is to provide a sound knowledge of calculus and other related topics.

1. Limit and continuity of a function:..... 3hrs

Limit of a function with examples, infinity as a limit, continuity of a function with their Properties

2. Derivatives: 5hrs

Derivatives of explicit, implicit, parametric equations, Derivative of hyperbolic and inverse hyperbolic functions, Higher order derivative and Leibnitz's Theorem, Partial derivatives of a function of two and three variables, and total differential coefficients.

3. Application of derivatives: 10Hrs

Extrema of function of two and three variables, Mean value theorems Taylor and Maclaurin's infinite series, indeterminate forms and L'Hospital rule Tangent and Normal, Curvature, Asymptotes, Curve Tracing (Cartesian, Parametric and Polar)

4. Integration: 8Hrs

Basic integration formulae, Integration method, Standard integrals, Definite integral and its properties Definite integral as a limit of a sum, Fundamental Theorem of integral calculus, Improper integrals, Reduction formula for integrals Beta and Gamma functions

5. Application of integral Calculus 7Hrs

Determination of area, length and volumes, Surface area of solid of revolution Double integrals of Cartesian curves.

6. Plane Analytic Geometry: 6Hrs

Translation and rotation of axes, Circles, Parabola, Ellipse, Hyperbola

7. Vector Algebra: 7Hrs

Vector Components, Types of vectors, Vector addition and subtraction, Direction cosines, Space coordinates (Cartesian, cylindrical and spherical) and equations relating to these co-ordinates. Scalar and vector product of two vectors, Product of Three vectors, Product of Four vectors, Vector equation of lines and planes

Laboratories:

Seven Laboratories exercise will be performed in this course. These are:

1. Sieve analysis of clay, sand, gravel and crushed rock.
2. Hardness (Rockwell) tests on mild steel, alloy steel, aluminium alloy and cast iron.
3. Toughness (charpy) tests on mild steel, alloy steel, aluminium alloy and cast iron
4. Microstructure examination of mild steel, alloy steel, aluminium alloy, cast iron and wood using optical microscopes.
5. Tests to determine the linear coefficient of thermal expansion of aluminium, steel, wood, lime mortar, asphalt concrete and synthetic polymer
6. Setting time of cement
7. Microstructure examination of clay, lime mortar, cements mortar, asphalt concrete and one synthetic polymer.

Recommended Books:

1. "Fundamentals of Engineering Materials", Peter A. Thornton & Vito J. Colangelo, Prentice Hall Publishing company
2. "A text book of Material Science and Metallurgy, O.P. Khanna
3. Introduction to Engineering Materials, B.K. Agrawal
4. Engineering Materials, Gurucharan Singh

APPLIED MECHANICS I (STATICS)

BEG156CI

Year: I

Semester: I

Teaching Schedule Hours/week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
3	-	2	3	80	-	-	20	-	100	

1. Introduction:

(3 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

2. Vector:

(5 hrs)

- 2.1 Introduction (Vector & Scalar quantities, simple operation of vectors & their Laws, Position vectors)
- 2.2 Unit vectors in Cartesian co-ordinates.
- 2.3 Dot product (Definition, laws & applications)
- 2.4 Cross product (Definition, laws & application)
- 2.5 Scalar and vector triple product

3. Forces:

(7 hrs)

- 3.1 Definition & principles of forces
- 3.2 Types of forces (coplanar, collinear, concurrent, parallel, external & internal Forces)
- 3.3 Principle of transmissibility & its limitations.
- 3.4 Resolution & composition of forces
- 3.5 Lami's theorem, Variignon's theorem, triangle, parallelogram & Polygon law of Forces
- 3.6 Moment of forces about a point & axis (In scalar & vector form)
- 3.7 Definition of couple & prove it as free vector
- 3.8 Resolution of force into force & a couple & vice versa.
- 3.9 Resultant of a system of forces. (Wrench, parallel, coplanar, concurrent & General)

4. Distributed force:

(5 hrs)

- 4.1 Definition & Derivation of center of gravity & centroid. (Composite figure & Direct Integration method)
- 4.2 Centroid of lines, areas and volumes.
- 4.3 Definition of second moment of area (moment of Inertia) and Radius of gyration
- 4.4 Parallel and perpendicular axis theorem, MOI of common figures (e.g. rectangle, Triangle, Circle and ellipse) and uniform thin rod
- 4.5 MOI of Built up section.
- 4.6 MOI by Direct integration method.

5. Friction: (4 hrs)

- 5.1 Introduction (definition, Types, Cause & effect)
- 5.2 Laws of Dry friction
- 5.3 Static friction, co-efficient of friction & angle friction
- 5.4 Condition of sliding or tipping
- 5.5 Application to static problems

6. Introduction to structures: (5 hrs)

- 6.1 Structural components (Beam, Frame, truss, 2-D Plate, cable, Arch, Grid)
- 6.2 Difference between plane and space structures.
- 6.3 Difference between Mechanism & Structures.
- 6.4 Types of loading & supports.
- 6.5 Determinacy (internal & external) and stability (statical & geometrical) [General Concept]

7. Introduction to Analysis of Beam: (6 hrs)

- 7.1 Definition and types of beam
- 7.2 External and internal forces in beam
- 7.3 Definition and sign convention of axial forces, shear forces and bending moment
- 7.4 Relationship between load, shear force & Bending moment
- 7.5 Axial force, shear force & bending moment diagram

8. Introduction to Analysis of Frame: (4 hrs)

- 8.1 Definition & type of frame (rigid, deficient, redundant)
- 8.2 Determinacy & stability
- 8.3 Axial force, shear force & bending moment diagram

9. Introduction to Analysis of plane truss: (4 hrs)

- 9.1 Definition & types (according to support condition purpose of utilization, degree Of Complexity)
- 9.2 Determinacy & Stability
- 9.3 Analysis of truss (method of joints & Method of section)

10. Introduction to space truss: (2 hrs)

- 10.1 Definition
- 10.2 Tension coefficients, shear leg, tripods.
- 10.3 Analysis of simple space truss.

Recommended Books

"Engineering Mechanics"- Statics and Dynamics" Shames,I.H, 3rd edition. New Delhi
Prentice Hall of India 1990.

"Mechanics for Engineers-Statics and Dynamics"- F.P. Beer and E.R. Johnston, JR 4th
Edition, Mcgraw-Hill 1987.

Semester: I

- 3.1.Ostwald's dilution law
- 3.2.Ph and ph scale
- 3.3.Buffer and its functioning
- 3.4.Electrolytic and galvanic cell
- 3.5.Nernst equation
- 3.6.Corrosion of metals

- 4. Coordination complex 5 Hrs**
- 4.1. Coronation compound
 - 4.2. Werner's coordination theory
 - 4.3. Nomenclature of coordination complex
 - 4.4. Electronic interpretation of coordination
 - 4.5. Valence bond theory
- 5. Transition element 5 Hrs**
- 5.1. Transition elements with periodic table
 - 5.2. Characteristic and properties of transition elements
 - 5.3. Complex formation and magnetic property and color compound
- 6. Types of organic compound 6 Hrs**
- 6.1. Substitution reaction
 - 6.2. Addition reaction
 - 6.3. Elimination reaction
 - 6.4. Rearrangement reaction
- 7. Stereochemistry 3 Hrs**
- 7.1. Optical and geometrical isomerism
 - 7.2. Racemic modification
- 8. Organometallic compound and explosives 3 Hrs**
- 8.1. Preparation, properties and uses of Grignard reagent.
 - 8.2. Preparation, properties and action of explosive
- 9. Polymer and polymerization 4 Hrs**
- 9.1. Polymer and their type
 - 9.2. Synthetic and natural polymer
 - 9.3. Synthetic fibers

Laboratory Works:

1. To determine the alkalinity of the given sample of water (Two Labs).
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 condition in which corrosion takes place.
6. To measure the quantity of charge required to deposit one mole of copper.
7. To determine the iron from Mohr's copper.

References Books:

1. Selected topics in physical Chemistry- Motikaji Sthapit
- 2) Principles of physical Chemistry_ Marron & prutto
- 3) Essentials of physical Chemistry_ Bahl & Tuli
- 4) Organic Chemistry - B. S. Bahl

ENGINEERING DRAWING I

BEG146ME

Year: I							Semester: I			
Teaching Schedule Hours/week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
1	3	0	-	-	3	40	10	50	100	

Course objective:

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

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 1st angle projection and 3rd 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, 13 weeks

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						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
1	3	-	-	-	-		20	80	100	

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

COMPUTER CONCEPT AND PROGRAMMING
BEG174CO

Year: I

Semester: I

Teaching Schedule Hours/week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	3	3	80			20	25	125	

Course Description: This course deals with the fundamental concept of computers and programming language. Working with some basic software will be taught in this course. The use of computer in civil engineering will be explained through programming.

Course objective: By the end of this course:

- ✓ Use and operates computers
- ✓ Enhance knowledge about computers
- ✓ Work under different operating system
- ✓ Work with word processor and spreadsheets
- ✓ Develop simple code in C-programming language

1-Computers and Introduction

3 Hrs

- 1.1 History of Computer
- 1.2 Type of computer
- 1.3 Generation of Computer
- 1.4 Uses: General purpose and Specific purpose
- 1.5 Comparison between Man and Computer

2-Computer System

4Hrs

- 2.1. Input unit, CPU, Output unit
- 2.2. CPU: Primary storage, Control Unit
- 2.3. RAM, DRAM, SDRAM, ROM, EPROM, PROM
- 2.4. Hard Disk, Printer and Keyboard

3-Number System

4Hrs

- 3.1. Decimal System
- 3.2. Binary System
- 3.3. Octal System
- 3.4. Hexadecimal System
- 3.5. Conversion of one system to another
- 3.6. Bits, Nibble , Bytes and words

4-Operating System**3Hrs**

- 4.1. Definition of operating system
- 4.2. Functions of operating system
- 4.3. Types of operating system

5-Computers Media**3 Hrs**

- 5.1. Magnetics Tape
- 5.2. Floppy Disc
- 5.3. Hard Disk
- 5.4. Computer Peripherals
- 5.5. Sound System

6-Software Applications**10 Hrs**

- 6.1. Word Processor
- 6.2. Spreadsheet
- 6.3. Database
- 6.4. Graphics
- 6.5. Engineering applications

7-Programming Language**6 Hrs**

- 7.1. Introduction and History of C- Language
- 7.2. Different steps in problem solving
- 7.3. Writing Simple C program

8. Writing program in C**12 Hrs**

- 8.1. Introduction to function Introduction to Array
- 8.2. Classes of Structures and Pointer

Construction Materials
BEG159CI

Year: I

Semester: I

Teaching Schedule Hours/week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	2/2	3	80	-	-	20	25	125	

Course Description:

This course deals with the fundamental concept of civil engineering related materials. The concept of this course is to provide the basic knowledge on the properties of materials and its use for the construction of any civil engineering related projects.

Course Contents:

1-Introduction

2.5 hrs

- ✓ Scope and Types of Construction Materials
- ✓ Properties of materials: Physical, Mechanical, Thermal and Electrical

2-Characteristics of construction materials

6.0 hrs

- ✓ Stress - Strain Relationships, modulus of Elasticity and Poisson's Ratio
- ✓ Comparative Stress-Strain curves for various engineering materials
- ✓ Stress-Strain diagram for ductile metal
- ✓ Griffith's theory for brittle fracture
- ✓ Principles of hardness and impact tests of engineering materials

3-Basic Construction Materials

3.0 hrs

- ✓ Sieve analysis
- ✓ Stone, its types and Properties
- ✓ Aggregate (fine and coarse), their quality
- ✓ Bulking of Sand

4-Metals and its microstructure study

8.0 hrs

- ✓ Categorization of metals : Steel, Aluminium, Cast Iron
- ✓ Formation, composition and Characteristics of cast iron, wrought iron, steel, aluminium and alloys and their uses
- ✓ Microstructure study of brittle and ductile metals/steel
- ✓ Elastic and Plastic behavior
- ✓ Hardness and toughness
- ✓ Ductility and resilience
- ✓ Other mechanical properties (i.e. brittleness, malleability, stiffness, tenacity, creep, fatigue, wear resistance etc)
- ✓ Deformation of steel
- ✓ Heat treatment of steel and its thermal properties

- ✓ Fracture modes of materials
- ✓ Steel corrosion and its treatment

5-Wood

6.0 hrs

- ✓ Types of wood
- ✓ Bamboo as a construction material
- ✓ Tree structure and microstructure of wood
- ✓ Characteristics of soft and hard wood
- ✓ Properties of quality wood
- ✓ Advantages and disadvantages of wood over other construction materials
- ✓ Commercial forms of wood
- ✓ Mechanical and Thermal Properties
- ✓ Physical Properties (eg. defects & seasoning)

6- Properties of Ceramic Materials

6.0 hrs

- ✓ Definition
- ✓ Types of ceramics (i.e., Traditional and new generation)
- ✓ Composition of brick, its harmful ingredients, qualities of good bricks
- ✓ Popular types of tiles and their uses, Roof Tiles, Floor Tiles, Wall Tiles
- ✓ Glass, its manufactory types, forms & common Properties

7- Cementing Materials

5.0 hrs

- ✓ Clay
- ✓ Lime (composition, formation)
- ✓ Types and properties of lime
- ✓ Cement (composition, formation)
- ✓ Types and properties of cement
- ✓ Chemical reaction between lime and water, cement and water
- ✓ Testing of cement mortar and lime mortar

8- Properties of Asphalt materials

3.0 hrs

- ✓ Asphalt, bitumen and tar
- ✓ Types of Asphalt cement, uses
- ✓ Introduction to asphalt concrete and properties

9- Synthetic Polymers

3.0 hrs

- ✓ Definition
- ✓ Basic types (paints, varnishes, plastics)
- ✓ Properties of some polymers
- ✓ Use of polymers in repairs of structure

10-Miscellaneous Materials

- ✓ Rubber
- ✓ Adhesives
- ✓ Additives
- ✓ Abrasives
- ✓ Insulating Materials

