# MA10001–Mathematics–I

| Marks(L/P) | | L | T | P | CREDITS | | TOTAL |
|---|---|---|---|---|---|---|---|
| CW/SW | END | | | | T | P | CREDITS |
| 30/0 | 70 | 3 | 1 | 0 | 4 | 0 | 4 |

## COURSE OBJECTIVES

CO #1 Understand the fundamental concepts of differential calculus and their applications in engineering problems.

CO #2 Understand the basic concepts of integral calculus and their applications in engineering problems.

CO #3 Incorporate the knowledge of differential and integral calculus to support the concurrent and subsequent engineering studies.

CO #4 Understand the basic concept of Boolean algebra and its application to design switching circuits.

## COURSE CONTENTS

Unit-1. Differential Calculus-I: Partial derivatives: Definition, Euler's theorem of homogeneous function, Differentiation of implicit function, Total differential coefficients, Jacobians, Expansion of functions by Taylor's and Maclaurin's series of one and two variables.

Unit-2. Differential Calculus-II: Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers and their applications, Curvature in Cartesian and polar coordinates, Asymptotes (Cartesian coordinates).

Unit-3. Integral Calculus-I: Detailed study of tracing of curves, Area, Length of curve, Volume and Surface of revolution.

Unit-4. Integral Calculus-II: Beta and Gamma functions, Elementary ideas of multiple integrals, Change of order of integration, and change of variables in double integrals using Jacobians.

Unit-5. Boolean Algebra: Laws of Boolean algebra, Boolean function and Boolean expression, Principle of Duality, Representation of Boolean function, Sum of product function.

Application of Boolean algebra in design of switching circuits.

**Text Books**

1. B.V.Ramana,HigherEngineeringMathematics,TataMcGrawHillPublishingCompanyLtd.,New Delhi, 2006.
2. H.K.Dass,AdvancedEngineeringMathematics,S.ChandandCompanyLtd.,New-Delhi,2009.

**Reference books**

3. S.S.Sastry,EngineeringMathematicsVolumeIandVolumeII,PHILearningPrivateLimited,New Delhi2008.
4. TaritMajumder,EngineeringMathematicsVolume-I,NewCentralBookAgency(P)LTD,Kolkata.
5. SPalandS.C.Bhunia,EngineeringMathematics,OxfordUniversityPress,NewDelhi,2015.

# PH 10006 :  PHYSICS

## I Year BE  (COMMON TO ALL BRANCHES)

| Marks (L/P) | | L | T | P | Credits | | Total |
|---|---|---|---|---|---|---|---|
| CW/SW | END | | | | T | P | Credits |
| 30/20 | 70/30 | 3 | 1 | 2 | 4 | 1 | 05 |

**Course Objectives** : To provide knowdelge and understanging capacity of both basic, applied and modern physics. To generate attidude and interst to solve problems at macro, micro to nanoscale level systems. To update the knowdelge of physics tools, instruments and techniques.

**Course Outcome:** To identify, conduct, formulate and solve engineering problems with the basics and applied knowledge of Physics. The ability use modern engineering physics techniques and tools including software.

# PH10006 : Theory

**1. Electromagnetic Waves Propagation :**
 Introduction, wave packets, Phase and  group velocity, wave equation, Gradient, scalar, divergence and curl; physical meaning, Gauss and Stoke's theorems,  Maxwell's equations, em wave equations for plane waves in dielectric medium and free space, relation among E, B and k, Poynting theorem.

 **2. Optics: Principle of superposition.** Conditions for sustained interference, Division of wavefront and amplitude, Newton's rings. Fresnel and Fraunhofer class of diffraction, diffraction at single slit, double and N (grating) slits. Rayleigh's criteria and resolving power.

 **3. Quantum Theory :** Planck's radiation formula, Ultraviolet catastrophe, Compton's effect, de Broglie's concept of matter waves, Heisenberg's uncertainty relations, Schrodinger's wave equation, Physical interpretation of wave function, Particle in a one-dimensional potential well.

 **4**. **Lasers:** Spontaneous and Stimulated emission, components of lasers, optical resonator, Einstein's A & B coefficients,  Population inversion, Ruby and He-Ne lasers, applications.

 **5. Fiber Optics :**  Classification, acceptance angle, numerical aperture, V-number, attenuation, ray dispersion in fibers,  fiber optics sensors, optical fiber communication system.

## Text Books

1. N. Subramanyam and B. Lal : A Text book of Optics, (S. Chand, New Delhi) 2010.
2. A. Beiser, S. Mahajan, S. R. Choudhary :  Concepts of Modern Physics, 6th Edition,(SIE, Tata-McGraw              Hill, New Delhi) 2012.
3. A. Ghatak : Optics, 4th Edition, (Tata McGraw-Hill, New Delhi) 2009. Reference Books
4. H. K. Malik and A. K. Singh : Engineering Physics (Tata McGraw Hill New Delhi) 2010.
5. R.P. Feynman, R.B. Leighton and M.Sands : Feynman Lectures on Physics Vol. 1 -3 (Addison-Wesley, Delhi 1995).
6. W.H. Hayt : Engineering Electromagnetic, 5th Ed. (Tata-McGraw Hill, New Delhi) 1995.
7. M.N.O. Sadiku : Elements of Electromagnetic, 3rd Ed. (Oxford) 2000.

# CIVIL ENGINEERING AND APPLIED MECHANICS DEPARTMENT

## B. E. I YEAR (4YDC)
## CE:10003 : FUNDAMENTALS OF CIVIL ENGINEERING AND
## APPLIED MECHANICS

**CREDITS:**

| HOURS PER WEEK | | | CREDITS | | MAXIMUM MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| L | T | P | Th. | Pr. | THEORY | | PRACTICAL | | TOTAL MARKS |
| 3 | 0 | 2 | 3 | `1 | Th. | CW | SW | Pr. | 150 |
| | | | | | 70 | 30 | 20 | 30 | |

**PRE-REQUISITE:** XII standard (hssc)

**COURSE OBJECTIVES:**

Students should be able

1. To analyze and solve Elastic /Rigid body, Trusses and Frames subjected to Forces under static equilibrium.

2. To calculate centre of Gravity and Moment of Inertia of Plane Areas.

3. To solve the problems of Static and Dynamic Equilibrium.

4. To measure linear Distances and Angles horizontally and vertically.

5. To measure and analyze heights and distances.

**COURSE OUTCOMES:**

Students should be able

1. To identify and analyze a system of forces, determine forces in members of trusses and calculate support reactions for beam subjected to various types of loading.

2. To determine the Center of Gravity and moment of Inertia of a given Plane Areas.

3. To solve the problems of Static and Dynamic Equilibrium.

4. To Measure linear Distances and Angles horizontally and vertically by applying the knowledge of compass surveying & leveling during survey work on field.

**COURSE CONTENTS:**

**THEORY:**

### PART - A: (67 % Weightage)
### APPLIED MECHANICS

**UNIT-1**

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and Non-concurrent Co-planner forces, Free Body Diagram, Force Diagram and Bow's notations.

Application of Equilibrium Concepts: Analysis of Plane Trusses: Method of Joints, Method of Sections. Support Reactions, Frictional force in equilibrium problems.

**UNIT-2**

Centre of Gravity and Moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Area and Mass, Radius of Gyration, Introduction to Product of Inertia and Principle Axes.

Rectilinear Translation: Kinematics of Rectilinear motion

## UNIT-3

Beams: Types of Beams: Simply Supported Beam, Overhanging Beam, Cantilever Beam. Types of Supports of a Beam or Frame: Roller, Hinged and Fixed Supports. Load on the Beam or Frame: Different Types of Loading. Support Reaction of a Beam or Frame: Analytical Method.

Introduction to Dynamics: Overview of Dynamics, Basic Concepts and Terms Used in Dynamics, Motion, Types of Motion, Newton's Laws of Motion, Newton's Law of Gravitation.

### PART - C: (33 % Weightage)

**SURVEYING:**

## UNIT-4

Linear Measurements: Chain and Tape Surveying, Errors and Correction, Obstacles, Area Measurement by Planimeter.

Angular Measurements: Bearing, Prismatic Compass, Local Attraction, Declination, Bowditch rule of correction for traverse, Accuracy and Precision.

## UNIT-5

Levelling: Types of Levels, Levelling Methods, Height of Instrument and Rise and Fall Method, Measurements, Recording, Reciprocal Levelling, Contours and Properties.

**ASSESMENT:** Continuous: Two midterm tests in a semester and a makeup test if required, Evaluation of Practical calculations & drawing sheets, internal submission and Viva Voice examination by internal examiner during. Semester-end: Theory examination of 3 Hours duration and Practical Viva Voice Examination by external examiner

**PRACTICALS:**
      **List of Experiments:**
1. To study the colour conventions and various instruments used in chaining .
2. To determine the horizontal distance between two points by doing ranging and chaining.
3. To determine perpendicular and oblique offsets from a given reference line.
4. To study prismatic compass and perform open traverse survey.
5. To do traversing of any regular figure with the help of compass and eliminate local attraction.
6. To determine RL of different points on the ground by fly or differential levelling with height of instrument (HI)  method
7. To determine RL of different points on the ground by fly or differential levelling with rise and fall method
8. To determine area of an uneven plane with the help of a planimeter

**ASSESMENT:** Sessional work will be based on syllabus of Engineering Mechanics and Surveying.

**TEXT BOOKS RECOMMENDED:**
1. Prasad I. B., *Applied Mechanics*, *Khanna Publication New Delhi, Edition 19th 2002.*
2. Rajput .R.K*., Engineering Mechanics, Dhanpat Rai and Sons New Delhi. Edition 3rd 2013.*
3. Rammamurtham S., *Applied Mechanics, Dhanpat Rai and SonsNew Delhi, Edition 2016.*
4. Duggal S.K. *,Surveying Vol. 1, Tata McGraw- Hill Education New Delhi Edition 4th 2013.*
5. .Punmia, B.C., *Surveying, Laxmi Publications, New Delhi,  Edition 16th 2005.*

**REFERENCE BOOKS:**
1. Kumar KL, *Engineering Mechanics*, *Tata McGraw- Hill Education New Delhi ,Edition 4th ,2011*

2. Ferdinand.P. Beer. E, Russell ,Jr Johnston., David Mazurek, Philip J Cornwell, "*Vector Mechanics for Engineers: Statics and Dynamics", McGraw – Hill Education New Delhi Edition 11$^{th}$ 2005.*
3. Timoshenko, and Young D.H., "*Engineering Mechanics", Tata Mc-Graw Hill Education New Delhi Edition 4$^{th}$ 2007.*
4. Chanchandramouli P.N., *Engineering Mechanics*, *PHI Learning Private Limited New DelhiEdition 2011*

# DEPARTMENT OF MECHANICAL ENGINEERING

## B. E. 1st Year (Common to all Branches of Engineering and Technology)

| CODE | SUBJECT NAME | L | T | P | MAXIMUM MARKS | | | | |
|------|-------------|---|---|---|-----|-----|-----|-----|-------|
| | | | | | Th. | CW | SW | Pr. | Total |
| ME -10149 | ENGINEERING DRAWING | 2 | - | 4 | 70 | 30 | 40 | 60 | 200 |

**COURSE OBJECTIVE**

1. To familiarize with the drawing instruments, scales and engineering curves.
2. To familiarize with the projection of 1D, 2D and 3D elements.
3. To familiarize with the sectioning of solids and development of surfaces.
4. To familiarize with the conversion of orthographic to isometric views and vice versa.
5. To familiarize with the software for drawing and modern drafting technologies.

**Unit I Basic Concepts, Scales and Curves:** Principles of Engineering Graphics and their significance, usage of Drawing instruments; lines, lettering and dimensioning; Scales – Plain, Diagonal and Vernier Scales; Conic sections including the Rectangular Hyperbola; Cycloid, Epicycloid, Hypocycloid and Involute.

**Unit II Projections of Line, Planes and Solids:** Principles of Orthographic Projections – Conventions, Projection of points and lines inclined to both planes; Projections of planes, inclined Planes – Auxiliary Planes; Solids inclined to both the Planes – Auxiliary Views.

**Unit III Sections of Solids:** Section planes – AIP, AVP; Sections of geometrical solids; True shape. **Development of Surfaces:** Development of surfaces of Right Regular Solids – Prism, Pyramid, Cylinder and Cone.

**Unit IV Isometric Projections:** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Orthographic Views to Isometric Views.
**Orthographic Projections:** Conversion of Isometric Views to Orthographic Views of simple machine parts.

**Unit V Introduction to Drafting Software:** Demonstrating knowledge of the theory of CAD software-Ribbon tabs, Menu system, toolbars, Drawing Area, Dialog boxes and windows, Shortcut menus, Command Line, Status Bar; Different methods of zoom; Select and erase objects; Setting up the drawing page and the printer; Setting up of units and drawing limits; Orthographic constraints; Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines; Applying various ways of drawing circles; Applying dimensions to objects; applying annotations to drawings; Setting up and use of Layers; Computer-aided design (CAD) software modelling of parts and assemblies; Demonstration of a simple team design project.

## COURSE ASSESSMENT

The following methods shall be adopted for the assessment of this course:

1. Theory of examination (70 marks) on the basis of end term theory paper examination [from Units 1 to IV].
2. Class Work (30 marks) on the basis of regular evaluation of assignments, two mid semester tests and class attendance.
3. Sessional work (40 marks) on the basis of assignments, internal viva and attendance. Student are required to submit at least six imperial drawing sheets/computer aided drawing print.
4. Practical examination (60 marks) on the basis of evaluating practical knowledge, quiz and viva-voce.

## Textbooks

1. Agrawal Basant and Agrawal C.M. (2018), Engineering Drawing. McGraw Hill Publishing.
2. N. D. Bhatt and V M. Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.

## References

1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
3. (Corresponding set of) CAD Software Theory and User Manuals.

| Subject Code | Subject Name | L | T | P | Th. Credits | Pr. Credits | Maximum Marks | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | TH | CW | SW | Pr | Total |
| EE 10005 | FEE | 3 | 0 | 2 | 3 | 1 | 70 | 30 | 20 | 30 | 150 |

## Course Objective:
1. To acquaint students with the basic concepts, elements and properties of electrical circuits and network.
2. To introduce concept of phasor and power factor improvement in sinusoidal steady-state analysis.
3. To explain basics of magnetic circuit and its practical aspects.
4. To impart the knowledge of three-phase system- its generation and analysis.
5. To teach students basic principle of operation, construction, modelling and application of static and rotating electrical machines.

## UNIT: 1
Voltage and current sources & transformation, various signals & waveform analysis, resistors, effect of temperature on resistance, capacitors and inductors, their v-i relationships. Kirchhoff's laws, Mesh and Nodal analysis, Star Delta transformations, Superposition theorem, Thevenin's and Norton's theorem, Maximum power transfer theorem.

## UNIT: 2
Circuit analysis in sinusoidal steady state, Concept of phasor, impedance, admittance, phasor diagrams, Complex, real and reactive power in ac circuits, Power factor and power factor corrections, capacitor bank, electricity distribution system in houses.

## UNIT: 3
Magnetic circuits, definitions, B-H curves, Magnetic circuit calculations, laws of electro-magnetic induction. Hysteresis and eddy current losses, single phase Transformer construction, EMF equation, Equivalent circuit, Phasor diagram, regulation and efficiency.

## UNIT: 4
Generation of three phase voltages & measurement, star and delta connection, Line and Phase quantities, Three phase power, prime mover, synchronous generator, diesel generator set overview.

## UNIT: 5
DC motors, types, speed relation, starting and speed control of dc motors. Principle of rotating magnetic field in 3φ & 1φ induction motor, power flow diagram, losses and efficiency, single phase fan motor.

## Course Outcomes:

**1:** To formulate, model and analyse basic electric and magnetic circuits.

**2:** To realize the requirement of transformer for electrical transmission and distribution system.
**3:** Identifying the type of electrical machines for various practical applications and performance analysis.
**4:** Ability to investigate the adverse impacts of poor power factor and its mitigations.

**Course Assessment:** Students will be assessed on

a.      Continuous evaluation through two mid-term test with a weightage of 30% of the total marks. It includes class attendance as well as assignments on the course topics.
b.      The end-term theory examination weightage is 70%.

## Text Books:
1.  Vincent Del Toro, "Electrical Engineering Fundamentals", Prentice-Hall of India.
2.  I. J.Nagarath, "Basic Electrical Engineering", Tata McGraw Hill Publication.


## References Books:
1.  Fitzgerald Higginbotham & Grabel, "Basic Electrical Engineering", Tata McGraw Hill Publication.
2.  Joseph Edminister, Mahmood Nahvi "Electric Circuits", Schaum's outlines series.
3.  J. B. Gupta, "A Textbook of Basic Electrical and Electronics Engineering", S. K. Kataria & Sons.

## Laboratory

# List OF Experiment
1.  Study of Electrical Machine Laboratory.
2.  Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
3.  To study the variation of resistance with variation in the temperature.
4.  To measure the power consumed by a single-phase circuit using a Single -phase wattmeter and computation of load power factor.
5.  Speed control of DC shunt motor by field control method.
6.  Speed control of DC shunt motor by armature voltage control method.
7.  To determine the inductance and time constant of a choke coil.
8.  Determination of efficiency of single phase transformer by direct loading.
9.  To obtain load characteristics of separately excited DC generator.
10. To determine the turns ratio of a single phase transformer.

# Laboratory Outcomes:
**.1:** Get an exposure to common electrical machines, measuring instruments, supply systems, and safety norms.
 **2:** Selection of appropriate measuring instrument range & making experimental set-up connections for energy conversion systems.
**3:** Ability to perform experiments, and analyse results.
**4:** Enhance communication skills and ability to work in group

# CH-10200 : Environmental Science

| Subject Code | Subject Nomenclature | Contact Hrs. | | | Maximum Marks | | | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | CW | End | Total | SW | End | Total | L | T | P | Total |
| CH10200 | Environmental Science | 0 | 1 | 2 | 0 | 0 | 0 | 100 | 0 | 100 | 0 | 1 | 1 | 2 |

**Course Objectives:**
CO # 1 The purpose of this course is to provide a general background on environmental science and how human activities are influencing the physical aspects of Earth and its biotic systems.

**Course Outcome:**
CO# 2  The course will enable student to develop an understanding of our excessive use of fossil fuels and its effect on the environment and climate.

CO# 3  Rationalize the importance of alternative energy sources.

CO# 4  List common and adverse human impacts on biotic communities, soil, water, and air quality and suggest sustainable strategies to mitigate these impacts.

CO# 5  Understand the concept of Mutual Dependance of Human beings with various Environmental Aspects.

CO # 6  The Assessment of Impact of Environment.

**Course Contents:**
**UNIT I: Environment: General Studies**
**(a)** Introduction, segments of environment, Energy flow in environment, Composition and structure of atmosphere. Chemical Species and particulates in atmosphere. Reaction and Phenomena occurring in atmosphere.          **(b)** Man and Environment

**UNIT II: Air Pollution**
**(a)** Air pollution: Sources and effects, particulate control, control of gaseous pollutants (SOx, NOx, oxides of carbon, hydrocarbon pollutants), Air Quality standards and Management.        **(b)** Case studies.

**UNIT III : Water Pollution**
**(a)** Water Pollution: Types of water pollution, sources, water pollution control. Waste water treatment technologies and Recycle.      **(b)**  Case studies

**UNIT IV: Soil and Noise Pollution**
**(a)** Soil Pollution: Introduction, sources/causes, effects and control.          **(b)** Noise Pollution: Introduction, sources/causes, effects and control, noise measuring instruments and noise pollution control technology.

**UNIT V: Environment, Society and Ethics**
**(a)**Society and Environment, Solid waste-types, impact on society, solid waste management, specific applications to solid waste management.          **(b)** Environmental Ethics: Need and Types, Regulations: ISO 14000, 9000, pollution Acts and Regulations. Environmental Auditing

**Text Books:**
1. S. C. Bhatia, "Environmental Pollution & Control in chemical process industries",Khanna Publishers, 1st edition, 2001.

2. C. S. Rao, "Environmental Pollution Control Engineering", Wiley Eastern, 1992.

## Reference Books:
1. S. P. Mahajan, "Pollution control in Process Industries", Tata Mc-Graw Hill, 1990.
2. F. P. Lees, "Loss prevention in process industries, Butter worth- Heinemann, 1996.
3. Martin Crawford, "Pollution Control Theory", Mc-Graw Hill, 1976.
4. Marell, "Solid Wastes", John Wiley, 1975.