

I/IV B.Tech CE-Semester – 1 (Theory - 5, Lab -4)

S.No	Course No	Course Name	Category	L-T-P-C
1	CE 111	Mathematics I (Calculus & Linear Algebra)	BS	3-0-0-3
2	CE 112	Engineering Physics	BS	3-0-0-3
3	CE 113	Problem Solving & Programming(using C)	ES	3-1-0-4
4	CE 114	Communicative English I	HS	2-0-0-2
5	CE 115	Environmental Science	MC	3-0-0-0
6	CE 151	Physics lab	BS	0-0-3-1.5
7	CE 152	Problem solving & Programming using C	ES	0-0-3-1.5
8	CE153	English lab	HS	0-0-3-1.5
9	CE 154	Workshop I (Basic Engineering Workshop)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>18</b>

I/IV B.Tech CE-Semester - 2 (Theory - 6, Lab - 5)

S.No	Course No	Course Name	Category	L-T-P-C
1	CE 121	Mathematics II (ODE and Multivariable Calculus)	BS	3-0-0-3
2	CE 122	Engineering Chemistry	BS	3-0-0-3
3	CE 123	Engineering Graphics & Design	ES	1-0-3-2.5
4	CE 124	Essential Electrical & Electronic Engineering	ES	3-1-0-4
5	CE 125	Python Programming	ES	2-1-0-3
6	CE 126	Constitution of India	MC	3-0-0-0
7	CE 161	Chemistry Lab	BS	0-0-3-1.5
8	CE 162	Electrical & Electronics Lab	ES	0-0-3-1.5
9	CE 163	Python Lab	ES	0-0-3-1.5
10	CE 164	Workshop (Civil Engineering)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>21.5</b>

I/IV B.Tech CSE-Semester – 1(Theory - 5, Lab -4)

S.No	Course No	Course Name	Category	L-T-P-C
1	CSE 111	Mathematics I (Calculus & Linear Algebra)	BS	3-0-0-3
2	CSE 112	Engineering Chemistry	BS	3-0-0-3
3	CSE 113	Problem Solving & Programming(using C)	ES	3-1-0-4
4	CSE 114	Communicative English I	HS	2-0-0-2
5	CSE 115	Constitution of India	MC	3-0-0-0
6	CSE 151	Chemistry lab	BS	0-0-3-1.5
7	CSE 152	Problem solving & Programming using C	ES	0-0-3-1.5
8	CSE153	English lab	HS	0-0-3-1.5
9	CSE 154	Workshop I (Basic Engineering Workshop)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>18</b>

I/IV B.Tech CSE-Semester - 2 (Theory - 6, Lab - 5)

1	CSE 121	Mathematics II (Probability & Statistics)	BS	3-0-0-3
2	CSE 122	Engineering Physics	BS	3-0-0-3
3	CSE 123	Engineering Graphics & Design	ES	1-0-3-2.5
4	CSE 124	Essential Electrical & Electronic Engineering	ES	3-1-0-4
5	CSE 125	Python Programming	ES	2-1-0-3
6	CSE 126	Environmental Science	MC	3-0-0-0
7	CSE 161	Physics Lab	BS	0-0-3-1.5
8	CSE 162	Electrical & Electronics Lab	ES	0-0-3-1.5
9	CSE 163	Python Lab	ES	0-0-3-1.5
10	CSE 164	Workshop (Computer Science and Engineering)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>21.5</b>

I/IV B.Tech ECE-Semester – 1(Theory - 5, Lab -4)

S.No	Course No	Course Name	Category	L-T-P-C
1	ECE 111	Mathematics I (Calculus & Linear Algebra)	BS	3-0-0-3
2	ECE 112	Engineering Physics	BS	3-0-0-3
3	ECE 113	Problem Solving & Programming(using C)	ES	3-1-0-4
4	ECE 114	Communicative English I	HS	2-0-0-2
5	ECE 115	Environmental Science	MC	3-0-0-0
6	ECE 151	Physics lab	BS	0-0-3-1.5
7	ECE 152	Problem solving & Programming using C	ES	0-0-3-1.5
8	ECE153	English lab	HS	0-0-3-1.5
9	ECE 154	Workshop I (Basic Engineering Workshop)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>18</b>

I/IV B.Tech ECE-Semester - 2 (Theory - 6, Lab - 5)

S.No	Course No	Course Name	Category	L-T-P-C
1	ECE 121	Mathematics II (ODE and Multivariable Calculus)	BS	3-0-0-3
2	ECE 122	Engineering Chemistry	BS	3-0-0-3
3	ECE 123	Engineering Graphics & Design	ES	1-0-3-2.5
4	ECE 124	Essential Electrical & Electronic Engineering	ES	3-1-0-4
5	ECE 125	Python Programming	ES	2-1-0-3
6	ECE 126	Constitution of India	MC	3-0-0-0
7	ECE 161	Chemistry Lab	BS	0-0-3-1.5
8	ECE 162	Electrical & Electronics Lab	ES	0-0-3-1.5
9	ECE 163	Python Lab	ES	0-0-3-1.5
10	ECE 164	Workshop (Electronics and Communication Engineering)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>21.5</b>

*I/IV B.Tech EEE-Semester – 1(Theory - 5, Lab -4)*

<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P-C</b>
1	EEE 111	Mathematics I (Calculus & Linear Algebra)	BS	3-0-0-3
2	EEE 112	Engineering Chemistry	BS	3-0-0-3
3	EEE 113	Problem Solving & Programming(using C)	ES	3-1-0-4
4	EEE 114	Communicative English I	HS	2-0-0-2
5	EEE 115	Constitution of India	MC	3-0-0-0
6	EEE 151	Chemistry lab	BS	0-0-3-1.5
7	EEE 152	Problem solving & Programming using C	ES	0-0-3-1.5
8	EEE153	English lab	HS	0-0-3-1.5
9	EEE 154	Workshop I (Basic Engineering Workshop)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>18</b>

*I/IV B.Tech EEE-Semester - 2 (Theory - 6, Lab - 5)*

<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P-C</b>
1	EEE 121	Mathematics II (Probability & Statistics)	BS	3-0-0-3
2	EEE 122	Engineering Physics	BS	3-0-0-3
3	EEE 123	Engineering Graphics & Design	ES	1-0-3-2.5
4	EEE 124	Essential Electrical & Electronic Engineering	ES	3-1-0-4
5	EEE 125	Python Programming	ES	2-1-0-3
6	EEE 126	Environmental Science	MC	3-0-0-0
7	EEE 161	Physics Lab	BS	0-0-3-1.5
8	EEE 162	Electrical & Electronics Lab	ES	0-0-3-1.5
9.	EEE 163	Python Lab	ES	0-0-3-1.5
10	EEE 164	Workshop (Electrical and Electronics Engineering)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>21.5</b>

I/IV B.Tech ME-Semester – 1(Theory - 5, Lab-4)

S.No	Course No	Course Name	Category	L-T-P-C
1	ME 111	Mathematics I (Calculus & Linear Algebra)	BS	3-0-0-3
2	ME 112	Engineering Physics	BS	3-0-0-3
3	ME 113	Problem Solving & Programming(using C)	ES	3-1-0-4
4	ME 114	Communicative English I	HS	2-0-0-2
5	ME 115	Environmental Science	MC	3-0-0-0
6	ME 151	Physics lab	BS	0-0-3-1.5
7	ME 152	Problem solving & Programming using C	ES	0-0-3-1.5
8	ME153	English lab	HS	0-0-3-1.5
9	ME 154	Workshop I (Basic Engineering Workshop)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>18</b>

I/IV B.Tech ME-Semester - 2 (Theory - 6, Lab - 5)

S.No	Course No	Course Name	Category	L-T-P-C
1	ME 121	Mathematics II (ODE and Multivariable Calculus)	BS	3-0-0-3
2	ME 122	Engineering Chemistry	BS	3-0-0-3
3	ME 123	Engineering Graphics & Design	ES	1-0-3-2.5
4	ME 124	Engineering Mechanics	ES	3-1-0-4
5	ME 125	Python Programming	ES	2-1-0-3
6	ME 126	Constitution of India	MC	3-0-0-0
7	ME 161	Chemistry Lab	BS	0-0-3-1.5
8	ME 162	2D Drafting Lab	ES	0-0-3-1.5
9	ME 163	Python Lab	ES	0-0-3-1.5
10	ME 164	Workshop (Mechanical)	LC	0-0-3-1.5
<b>Total ==&gt;</b>				<b>21.5</b>

# MATHEMATICS-I

(Calculus & Algebra)

(Common to all branches of Engineering)

L T P C

3 0 0 3

## Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

**Bridge Course:** Limits, continuity, Types of matrices

## Unit I: Matrix Operations and Solving Systems of Linear Equations

10 hrs

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

### Learning Outcomes:

At the end of this unit, the student will be able to

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix; (L3)
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

## Unit II: Mean Value Theorems

6 hrs

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

### Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- analyze the behaviour of functions by using mean value theorems (L3)

## Unit III: Multivariable calculus

8 hrs

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

**Unit IV: Double Integrals****8hrs**

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)

**Unit V: Multiple Integrals and Special Functions****8 hrs**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Conclude the use of special function in multiple integrals (L4)
- evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

**Textbooks:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

**References:**

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

**Course Outcomes:**

At the end of the course, the student will be able to:

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions



# Engineering Physics

## (ECE, CSE, EEE)

L T P C  
3 0 3 4.5

### Course Objectives:

- To impart knowledge in basic concepts of wave optics, properties of dielectric and magnetic materials, electromagnetic theory, fiber optics, semiconductors, superconductivity
- To familiarize the applications of nanomaterials relevant to engineering branches

### Course Outcomes:

#### *The students will be able to*

- **interpret** the interaction of energy with the matter (L2)
- **explain** the principles of physics in materials science, nanoscience, medical physics and communication industry (L2)
- **apply** electromagnetic wave propagation in different guided media (L3)
- **calculate** conductivity of semiconductors (L3)
- **interpret** the difference between normal conductor and super conductor (L2)
- **demonstrate** the application of nanomaterials (L2)

### Unit-I : Wave Optics

(8hrs)

Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength.

Diffraction-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum - Determination of Wavelength.

Polarization-Polarization by reflection, refraction and double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Interference, Diffraction and Polarization.

### Learning Outcomes:

#### *The students will be able to*

- **explain** various types of coherent sources (L2)
- **outline** the conditions for sustained interference (L2)
- **identify** applications of interference including homodyne and heterodyne detection (L3)
- **analyze** the differences between interference and diffraction (L4)
- **illustrate** the concept of polarization of light and its applications (L2)
- **classify** the production and detection of different polarized light (L4)
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### Unit-II: Dielectrics and Magnetics

(10hrs)

Introduction to Dielectrics--Electric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics .

Introduction to Magnetics-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment -Classification of Magnetic materials - Hysteresis-soft and hard magnetic materials-Ferrites and applications.

### Learning Outcomes:

#### *The students will be able to*

- **explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **summarize** Gauss's law in the presence of dielectrics (L2)
- **interpret** dielectric loss, Lorentz field and Claussius- Mosotti relation (L2)
- **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **explain** the applications of dielectric and magnetic materials (L2)

### Unit – III: Electromagnetic Waves and Fiber Optics

(10hrs)

Divergence and Curl of Electric and Magnetic Fields-Maxwell's Equations- Electromagnetic wave Equation and velocity.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile, modes - Propagation of electromagnetic wave through optical fiber - -Block Diagram of Fiber optic Communication.

#### Learning Outcomes:

##### *The students will be able to*

- **apply** the Gauss' Theorem for divergence and Stokes' Theorem for curl (L3)
- **evaluate** Maxwell's displacement current and correction in Ampere's law (L3)
- **assess** the electromagnetic wave propagation in different media and its power (L3)
- **explain** the working principle of optical fibers and its classification based on refractive index profile and mode of propagation (L2)
- **identify** the applications of optical fibers in medical , communication and other fields (L2)

### Unit – IV: Semiconductors

(8 hrs)

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi conductors - Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type Dependence of Fermi energy on carrier concentration and temperature (Qualitative)- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Applications of Semiconductors.

#### Learning Outcomes:

##### *The students will be able to*

- **classify** the energy bands of semiconductors (L2)
- **outline** the properties of n-type and p-type semiconductors (L2)
- **interpret** the direct and indirect band gap in semiconductors (L2)
- **identify** the type of semiconductor using Hall effect (L2)
- **list** the applications of semiconductors in electronic manufacturing (L2)
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### Unit – V: Superconductors and Nano materials

( 8 hrs)

Superconductors-Properties-Critical parameters of Superconductors- Meissner effect-BCS Theory-Josephson effect(AC & DC)-Types of Superconductors-High  $T_c$  Superconductors- Applications.

Basics of Nano materials - Preparation and characterization – CNTs - Applications of Nano materials.

#### Learning Outcomes:

##### *The students will be able to*

- **explain** electrical resistivity of solids with temperature (L2)
- **classify** superconductors based on Meissner effect (L2)
- **explain** BCS theory , Josephson effect and high  $T_c$  materials (L2)
- **analyze** the size dependent properties of nanomaterials (L4)
- **choose** the methods for the preparation and characterization of CNTs (L3)

#### Text books:

1. M.N. Avadhanulu, P.G.Kshirsagar "A Text book of Engineering Physics"-S.Chand Publications,2017
2. H.K.Malik & A.K.Singh "Engineering Physics",- McGraw Hill Publishing Company Ltd, 2018

#### Reference Books:

1. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
2. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc GrawHill ,2008
3. Charles Kittel "Introduction to Solid State Physics",Wiley Publications,2011
4. S.M.Sze "Semiconductor devices-Physics and Technology"-Wiley,2008
5. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc GrawHill 2013

## ENGINEERING PHYSICS LABORATORY SYLLABUS

### Learning Outcomes:

#### *The students will be able to*

- **handle** optical instruments like microscope and spectrometer
- **determine** thickness of a hair/paper with the concept of interference
- **estimate** the wavelength and resolving power of different colors using diffraction grating
- **demonstrate** the importance of dielectric material in storage of electric field energy in the capacitors
- **plot** the intensity of the magnetic field of circular coil carrying current with varying distance
- **evaluate** the acceptance angle of an optical fiber and numerical aperture
- **determine** magnetic susceptibility of the material and its losses by B-H curve
- **determine** the fill-factor of the given semiconductor using solar cell
- **identify** the type of semiconductor i.e., n-type or p-type using Hall effect
- **determine** the band gap of a given semiconductor

#### **List of Physics Experiments**

1. Determine the thickness of the fiber using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Dispersive power of a Prism
5. Resolving power of a grating
6. Photo cell – I-V Characteristic curves and determination of stopping potential
7. Magnetic field along the axis of a circular coil carrying current.
8. To determine the self inductance of the coil (L) using Maxwells-wines bridge.
9. B-H Curve
10. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
11. Hall effect
12. Photo voltaic cell - Determination of fill-factor
13. To determine the energy gap of a semiconductor
14. Measurement of resistance with varying temperature
15. Determination of Acceleration due to gravity by using compound Pendulum
- 16. References:**
  1. S. Balasubramanian , M.N. Srinivasan “ A Text book of Practical Physics”- S Chand Publishers, 2017
  2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

## ENGINEERING PHYSICS

(Civil, Mechanical, Chemical Branches)

L T P C  
3 0 3 4.5

### Course Objectives:

- To impart knowledge in basic concepts of Wave optics, acoustics, material properties
- Familiarize Principles of Quantum Mechanics and Laser applications

### Course Outcomes:

*After completing this course students will be able to*

- **interpret** the interaction of energy with the matter (L2)
- **apply** the principles of acoustics for noise cancellation (L3)
- **explain** the relationship between elastic constants (L2)
- **evaluate** the energy of the electron by using Wave equation (L2)
- **identify** the Lasers for various engineering applications (L3)

### • **Unit-I : Wave Optics** (10 hrs)

- Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength.
- Diffraction-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength.
- Polarization-Polarization by reflection, refraction and double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Interference, Diffraction and Polarization.

### Learning Outcomes:

*The students will be able to*

- **explain** various types of coherent sources (L2)
- **outline** the conditions for sustained interference (L2)
- **identify** applications of interference including homodyne and heterodyne detection (L3)
- **analyze** the differences between interference and diffraction (L4)
- **illustrate** the concept of polarization of light and its applications (L2)
- **classify** the production and detection of different polarized light (L4)

### **Unit-2: ACOUSTICS AND ULTRASONICS** (9 hrs)

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications - Sonogram

### Learning Outcomes:

*The students will be able to*

- **explain** how sound is propagated in buildings (L2)
- **analyze** acoustic properties of typically used materials in buildings (L4)
- **recognize** sound level desruptors and their use in architectural acoustics (L2)
- **identify** the use of ultrasonics in different fields (L3)

### **Unit-3: ELASTICITY (8 hrs)**

Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials; elastic constants and their relationships; Strain energy.

#### **Learning Outcomes:**

*The students will be able to*

- **interpret** stress and strain curve (L2)
- **develop** the relationship between elastic constants (L2)
- **identify** the fracture / yielding of materials with different loads (L3)

### **Unit-4: Principles of Quantum Mechanics (9 hrs)**

Dual nature of light, Matter waves & properties, de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle and application (non-existence of electron in nucleus). One dimensional time independent Schrodinger's wave equation, Physical significance of the wave function, Particle in a box (one dimensional).

#### **Learning Outcomes:**

*The students will be able to*

- **identify** the necessity of Matter waves (L3)
- **explain** Behavior of electron (L2)
- **determine** the Wave equation and energy of the particle (L3)

### **Unit – V: Lasers (8 hrs)**

Laser characteristics, Spontaneous and Stimulated emissions, Basic requirements of a laser, Population inversion – Solid state laser (Ruby laser), Gas (He-Ne) laser, Semiconductor (GaAs) laser, Applications of lasers.

#### **Learning Outcomes:**

*The students will be able to*

- **identify** different types of Lasers and applications (L3)
- **explain** the working principles of Lasers (L2)
- **select** Laser for different type of applications (L3)

#### **Text Books**

1. D.Kleppner and Robert Kolenkow "An introduction to Mechanics"-II -Cambridge University Press,2015
2. Gaur R.K. and Gupta S.L., "Engineering Physics"- Dhanpat Rai publishers, 2012
3. M.N.Avadhanulu&P.G.Kshirsagar "A Text book of Engineering Physics"-S.Chand Publications,2017
4. Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)

**Reference text books:**

M K Varma "Introduction to Mechanics"-Universities Press-2015.

1. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015

**ENGINEERING PHYSICS laboratory**  
**(Civil, Mechanical, Chemical Branches)**

**Learning Outcomes:**

*The students will be able to*

- **handle** optical instruments like microscope and spectrometer
- **determine** thickness of a hair/paper with the concept of interference
- **estimate** the wavelength and resolving power of different colors using diffraction grating
- **evaluate** the acceptance angle of an optical fiber and numerical aperture (L4)
- **determine** Wavelength of laser (L3)
- **measure** parameters of a given material (L5)

**List of Physics Experiments**

1. Determine the thickness of the fiber using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Dispersive power of a Prism
4. Resolving power of a grating
5. Magnetic field along the axis of a circular coil carrying current.
6. Poisson's ratio of aluminium and rubber
7. Determination of thermal conductivity of good conductors (Forbe's Apparatus)
8. Determine the thermal conductivity of a bad conductor by Lee's disc method
9. Determination of acceleration due to gravity by using Compound Pendulum.
10. Determination of ultrasonic velocity in liquid (Acoustic grating)
11. To determine the wavelength of Laser source
12. Determination of Numerical Aperture of an optical fiber.
13. Photo voltaic cell - Determination of fill-factor
14. Rigidity modulus of material of wire-dynamic method (torsional pendulum)
15. Determination of a.c. Frequency – Sonometer.

## References:

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017
2. <https://www.egr.msu.edu/.../HeatExchanger/Double%20Pipe%20HE%20Write%20U..>
3. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=354&cnt=1>
4. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1>

# Communicative English-I

B.T./CE/Ch.E./CSE/ECE/EEE/EI/IT/ME

L-T-P-C

2-0-3-3.5

## Course Objectives:

The course aims to inculcate a sense of professionalism among the students while emphasizing on the basic aspects of the language learning such as grammar and vocabulary building. It also aspires to train the students to meet the global challenges.

- Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language in the classroom sessions.
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

## Syllabus:

UNIT-1:

6 Hrs.

1. Reading: Reading Comprehension (Skimming, Scanning & Inference)
2. Writing: Paragraph Writing
3. Grammar: Common Errors in Nouns- Pronoun Agreement
4. Vocabulary Building: Content and Functional word list -100

## Learning Outcomes:

At the end of the module, the learners will be able to

- identify the context, topic, and pieces of specific information (L3)
- ask & answer general questions on familiar topics (L2)
- employ suitable strategies for skimming & scanning to get the general idea of a text and specific information (L3)
- recognize paragraph structure with beginnings/endings (L3)
- form sentences using proper grammatical structures and correct word forms (L3)

UNIT- II:

6 Hrs.

1. Reading: Jumbled Sentences
2. Writing: Proposal Writing
3. Grammar: Correction of Errors in Subject- Verb Agreement
4. Vocabulary Building: Sign Post, Transition signals

## Learning Outcomes:

At the end of the module, the learners will be able to

- comprehend short paragraphs on general topics (L2)
- understand the use of cohesive devices for better reading comprehension (L2)
- write well-structured paragraphs on specific topics (L3)
- make necessary grammatical corrections in short texts (L3)

UNIT - III:

6 Hrs.

1. Reading: Article Review
2. Writing: Note Making, Note Taking
3. Grammar: Correction of in Tense Usage
4. Vocabulary Building: Synonyms and Antonyms

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Review the content with clarity & precision from an article (L3)
- infer meanings of unfamiliar words using contextual clues (L3)
- write summaries based on global comprehension of reading texts (L3)
- produce a well-organized essay with adequate details (L3)
- use correct tense forms, appropriate structures in speaking and writing (L3)

UNIT - IV:

6 Hrs.

1. Reading: Story Reflection
2. Writing: Pictorial Description
3. Grammar: Correction of Errors in Adjectives, Articles, Prepositions
4. Vocabulary Building: Root Words (200)

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Reflect the content of the story with clarity & creatively (L3)
- infer meanings of unfamiliar words using contextual clues in the story (L3)
- infer & predict about content of a discourse (L4)
- interpret graphic elements used in academic texts (L2)
- make formal written communication using effective strategies (L3)

UNIT - V:

6 Hrs.

1. Reading: Mind Mapping
2. Writing: Information Transfer
3. Grammar: Correction of Errors in Wh- questions, Question Tags
4. Vocabulary Building: One Word Substitutes

**Learning Outcomes:**

At the end of the module, the learners will be able to

- take notes in mind while reading a text to answer questions (L3)
- edit short texts by correcting common errors (L4)
- produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- use language appropriate for description and interpretation of graphical elements (L4)

**Course Outcomes:**

At the end of the course, the learners will be able to

- identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)
- formulate sentences using proper grammatical structures and correct word forms (L3)
- speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
- write summaries based on global comprehension of reading texts (L3)
- produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- take notes while listening to a talk/lecture to answer questions (L3)



## REFERENCE BOOKS:

1. Bailey, Stephen. *Academic writing: A handbook for International Students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
3. *Skillful Level 2 Reading & Writing Student's Book Pack (B10)*, Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Michael Swan. *Practical English Usage*, OUP. 1995.
6. F.T. Wood. *Remedial English Grammar*, Macmillan.2007
7. William Zinsser. *On Writing Well*. Harper Resource Book. 2001
8. Liz Hamp-Lyons and Ben Heasley. *Study Writing*, Cambridge University Press. 2006.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.
10. Sharon J.Gerson, Steven M.Gerson, *Technical Writing*, New Delhi: Pearson education, 2007.
11. Sanjay Kumar and Pushp Lata, *Communication Skills*, Noida: Oxford University Press, 2012.
12. Dr. Shalini Verma, *Word Power Made Handy*, S.Chand & Co Ltd., 2009.

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# Environmental Science

Common to all branches

L-T-P-C  
3-0-0-0

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## OBJECTIVE:

To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

## UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

**NATURAL RESOURCES** : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

## LEARNING

## OUTCOMES

Students will be able to

1. articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values shape the viewer's perception of environmental problems and solutions.

## UNIT – II: Ecosystems, Biodiversity, and its Conservation

**ECOSYSTEMS**: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem.
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**BIODIVERSITY AND ITS CONSERVATION** : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

## LEARNING OUTCOMES

Students will be able to

1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.
4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

## UNIT – III: Environmental Pollution and Solid Waste Management

**ENVIRONMENTAL POLLUTION**: Definition, Cause, effects and control measures of :

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

**SOLID WASTE MANAGEMENT** :Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

### **LEARNING OUTCOMES UNIT-3**

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

### **UNIT – IV: Social Issues and the Environment**

**SOCIAL ISSUES AND THE ENVIRONMENT:** From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

### **LEARNING OUTCOMES:**

Students will be able to

1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation
4. understand solid waste management.

### **UNIT – V: Human Population and the Environment**

**HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

**FIELD WORK** : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

### **LEARNING OUTCOMES**

Students will have

1. knowledge about watershed management and environmental ethics.
2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.

### **TEXT BOOKS :**

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

### **REFERENCES :**

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

**Course Outcomes:** At the end of the course, the student will be able to:

<b>CO1</b>	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
<b>CO2</b>	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
<b>CO3</b>	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
<b>CO4</b>	Recognize the interconnectedness of human dependence on the earth's ecosystems
<b>CO5</b>	Influence their society in proper utilization of goods and services.
<b>CO6</b>	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.

# Communicative English Lab -I

(*Common to all branches*)

Lectures: 3 Periods

Sessional Marks: 40

University Exam: 3 hours

University Examination Marks: 60

## **Learning Objectives**

The *Communicative English Lab* mainly focuses on to improve the Linguistic Listening, Communicative Competence and Presentation Skills of the learners. Activities in the English Communication Skills Lab will simulate actual discourses that students will engage in their interaction with their peers, teachers or strangers in their day-to-day situations.

## **Learning Outcomes**

The students will be able to

- Identify the sounds of English and able to check the correct pronunciation of the words
- Able to listen carefully to communicate effectively in cross- cultural contexts
- Capable to make the students communicate in Daily life situations
- Capable to read for content/ main idea
- Able to communicate confidently in oral presentations
- Enhance vocabulary

## **List of Activities**

1. Identifying phonic sounds, listening to the sounds, practice and record the sounds from the English learning software
2. Common mispronounced words
3. Listening to the short audios and complete the tasks based on the audios
4. Listening to motivational speeches and answering the questions
5. Comprehending Spoken material in British English & American English
6. Situational Dialogues
7. Role plays
8. Reading comprehension exercises for GRE, TOEFL, GATE etc
9. Reading articles from newspaper
10. Specific reading for enhancing vocabulary
11. Vocabulary building exercises
12. Extempore
13. JAM sessions
14. Small talks
15. Oral presentations

# Basic Engineering Workshop (Common to all branches)

L T P C  
0 0 3 1.5

## Course Objective:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

## Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

- a. Half – Lap joint
- b. Mortise and Tenon joint
- c. Corner Dovetail joint or Bridle joint

## Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

- a. Tapered tray
- b) Conical funnel
- c) Elbow pipe
- d) Brazing

## Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

- a. V-fit
- b) Dovetail fit
- c) Semi-circular fit
- d) Bicycle tire puncture and change of two wheeler tyre

## Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

- a. Parallel and series
- b) Two way switch
- c) Godown lighting
- d) Tube light
- e) Three phase motor
- f) Soldering of wires

## Course Outcomes:

After completion of this lab the student will be able to

1. apply wood working skills in real world applications. (L3)
2. build different parts with metal sheets in real world applications. (L3)
3. apply fitting operations in various applications. (L3)
4. apply different types of basic electric circuit connections. (L3)
5. demonstrate soldering and brazing. (L2)

**Mathematics-II**  
**(ODE, PDE and Multivariable Calculus)**  
**(Common to all branches of Engineering except CSE)**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- 1) To enlighten the learners in the concept of differential equations and multivariable calculus.
- 2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

**UNIT I: Linear Differential Equations of Higher Order**

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients (L3)
- solve the linear differential equations with constant coefficients by appropriate method (L3)

**UNIT II: Equations Reducible to Linear Differential Equations and Applications**

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- classify and interpret the solutions of linear differential equations (L3)
- formulate and solve the higher order differential equation by analyzing physical situations (L3)

**UNIT III: Partial Differential Equations – First order**

**8 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Solutions to homogenous and non-homogenous higher order linear partial differential equations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (L3)

- outline the basic properties of standard PDEs (L2)

#### **UNIT IV: Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

#### **Learning Outcomes:**

At the end of this unit, the student will be able to

- apply del to Scalar and vector point functions (L3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

#### **UNIT V: Multivariable Calculus (Vector integration)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

#### **Learning Outcomes:**

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

#### **Textbooks:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

#### **References:**

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.



5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

**Course Outcomes:**

At the end of the course, the student will be able to

- solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- estimate the work done against a field, circulation and flux using vector calculus (L6)

# Mathematics-II

(Probability and Statistics)  
(CSE)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## Course Objectives:

- 1) To familiarize the students with the foundations of probability and statistical methods
- 2) To impart probability concepts and statistical methods in various applications Engineering

## Unit 1: Descriptive statistics and methods for data science

**10 hrs**

Data science(Applications or importance in Engineering), Statistics Introduction, Population vs Sample, Measures of Central tendency, Measures of Variability (spread or variance) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, regression lines.

### Learning Outcomes:

At the end of this unit, the student will be able to

- summarize the basic concepts of data science and its importance in engineering (L2)
- analyze the data quantitatively or categorically , measure of averages, variability (L4)
- adopt correlation methods and principle of least squares, regression analysis (L5)

## UNIT 2: Probability

**8 hrs**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

### Learning Outcomes:

At the end of this unit, the student will be able to

- define the terms trial, events, sample space, probability, and laws of probability (L1)
- make use of probabilities of events in finite sample spaces from experiments (L3)
- apply Baye's theorem to real time problems (L3)
- explain the notion of random variable, distribution functions and expected value(L2)

## UNIT 3: Probability distributions

**6 hrs**

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.

### Learning Outcomes:

At the end of this unit, the student will be able to

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (L3)
- interpret the properties of normal distribution and its applications (L2)

## Unit 4: Estimation and Testing of hypothesis, large sample tests

**8 hrs**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

### Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of estimation, interval estimation and confidence intervals (L2)
- apply the concept of hypothesis testing for large samples (L4)

**Unit 5: Small sample tests****8 hrs**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test),  $\chi^2$  - test for goodness of fit,  $\chi^2$  - test for independence of attributes.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- estimate the goodness of fit (L5)

**Textbooks:**

1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

**Reference Books:**

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

**Course Learning Outcomes:**

Upon successful completion of this course, the student should be able to

- make use of the concepts of probability and their applications (L3)
- apply discrete and continuous probability distributions (L3)
- classify the concepts of data science and its importance (L4)
- interpret the association of characteristics and through correlation and regression tools (L4)
- design the components of a classical hypothesis test (L6)
- infer the statistical inferential methods based on small and large sampling tests (L6)

# ENGINEERING CHEMISTRY

Common

to all branches

L T P C

3 0 3 4.5

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## Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.
- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

## UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness unit and determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler Corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion-Exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

### Learning outcomes:

#### The student will be able to

- **list** the differences between temporary and permanent hardness of water (L1)
- **explain** the principles of reverse osmosis and electro dialysis. (L2)
- **compare** quality of drinking water with BIS and WHO standards. (L2)
- **illustrate** problems associated with hard water - scale and sludge. (L2)
- **explain** the working principles of different Industrial water treatment processes (L2)

## UNIT-II: POLYMER CHEMISTRY

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

**PLASTICS:** Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

**Conducting Polymers-** Introduction, examples, general applications and mechanism of Conduction on Polyacetylene.

**Chemistry of Nano materials:** Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

### Learning Outcomes:

#### At the end of this unit, the students will be able to

- **explain** different types of polymers and their applications (L2)
- **demonstrate** the mechanism of conduction in conducting polymers (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)
- **discuss** types and preparation of Nano materials and Fullerenes(L3)

### UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

BATTERIES: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell ( $H_2-O_2$  cell).

#### Corrosion:

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

**Corrosion control:** Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

#### Learning Outcomes:

*At the end of this unit, the students will be able to*

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **explain** the types of corrosion, factors affecting corrosion(L2)
- **explain** protection methods of corrosion and corrosion inhibitors(L2)

### UNIT-IV: INSTRUMENTAL METHODS

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

#### Learning outcomes:

After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

### UNIT-V: (i) Cement and Concrete Chemistry

Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

#### (ii) Organic reactions and synthesis of a drug molecule:

Introduction to reactions involving substitution ( $SN_1$  and  $SN_2$ ), elimination reactions ( $E_1$  and  $E_2$ ), Synthesis of commonly used drug molecule – Aspirin and Paracetmol.

#### Learning Outcomes:

*At the end of this unit, the students will be able to*

- **explain** the manufacturing of portland cement (L2)
- **demonstrate** the scheme of concrete formation (L2)
- **identify** the constituents of portland cement (L2)
- **enumerate** the reactions at different temperatures in the manufacture of cement (L2)
- **explain** substitution and elimination reactions(L2)
- **explain** the synthesis of aspirin and paracetmol drug molecules(L2)

### Prescribed Text Books

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi
2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4. Shashi chawla, A text book of engineering chemistry, 3<sup>rd</sup> Edition, Dhanpat rai & co new delhi, 2007.
5. Gurudeep raj & chatwal anand, "Instrumental methods of analysis", 7<sup>th</sup> edition, CBS publications, 1986.
6. Quantitative analysis by day & underwood.
7. A Text book of Instrumental methods by Skoog and West.
8. H.W. Wilard and demerit, "Instrumental methods of analysis", 7<sup>th</sup> edition, CBS publications, 1986.
9. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.

### Course Outcomes:

#### At the end of the course, the students will be able to

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
- **explain** the manufacturing of portland cement and concrete formation (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

### ENGINEERING CHEMISTRY LABORATORY

### Course Objectives:

- Verify the fundamental concepts with experiments

### LIST OF EXPERIMENTS:

1. Determination of hardness of water by EDTA method
2. Estimation of Mohr's salt by Permanganometry
3. Estimation of Mohr's salt by Dicrometry
4. Determination of alkalinity of water
5. Percentage of purity of washing soda
6. Determination of available chlorine in bleaching powder
7. Preparation of Urea-formaldehyde resin
8. Determination on strength of NaoH using HCl conductometrically
9. Acid-Base titration by P<sup>H</sup> meter
10. Acid-Base titration by Potentiometer
11. Determination of viscosity of lubricating oil
12. Determination of Surface tension

### Course Outcomes:

#### At the end of the course, the students will be able to

- **measure** the strength of an acid present in secondary batteries (L3)
- **determine** the cell constant and conductance of solutions (L3)
- **prepare** advanced polymer materials (L2)
- **determine** the physical properties like surface tension, adsorption and viscosity (L3)
- **estimate** the Iron and Calcium in cement (L3)
- **calculate** the hardness of water (L4)

# ENGINEERING CHEMISTRY

L T P C  
3 0 3 4.5

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## Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.
- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

## UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness unit and determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler Corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion-Exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

## Learning outcomes:

### The student will be able to

- **list** the differences between temporary and permanent hardness of water (L1)
- **explain** the principles of reverse osmosis and electro dialysis. (L2)
- **compare** quality of drinking water with BIS and WHO standards. (L2)
- **illustrate** problems associated with hard water - scale and sludge. (L2)
- **explain** the working principles of different Industrial water treatment processes (L2)

## UNIT-II: POLYMER CHEMISTRY

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

**PLASTICS:** Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

**Conducting Polymers-** Introduction, examples, general applications and mechanism of Conduction on Polyacetylene.

**Chemistry of Nano materials:** Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

### **Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **explain** different types of polymers and their applications (L2)
- **demonstrate** the mechanism of conduction in conducting polymers (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)
- **discuss** types and preparation of Nano materials and Fullerenes(L3)

### **UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS**

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

**BATTERIES:** Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell (H<sub>2</sub>-O<sub>2</sub> cell).

### **Corrosion:**

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

**Corrosion control:** Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

### **Learning Outcomes:**



***At the end of this unit, the students will be able to***

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **explain** the types of corrosion, factors affecting corrosion(L2)
- **explain** protection methods of corrosion and corrosion inhibitors(L2)

#### **UNIT-IV: INSTRUMENTAL METHODS**

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

##### **Learning outcomes:**

After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

#### **UNIT-V: (i) Cement and Concrete Chemistry**

Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

##### **(ii) Organic reactions and synthesis of a drug molecule:**

Introduction to reactions involving substitution ( $SN_1$  and  $SN_2$ ), elimination reactions ( $E_1$  and  $E_2$ ), Synthesis of commonly used drug molecule – Aspirin and Paracetmol.

##### **Learning Outcomes:**

***At the end of this unit, the students will be able to***

- **explain** the manufacturing of portland cement (L2)
- **demonstrate** the scheme of concrete formation (L2)
- **identify** the constituents of portland cement (L2)
- **enumerate** the reactions at different temperatures in the manufacture of cement (L2)
- **explain** substitution and elimination reactions(L2)
- **explain** the synthesis of aspirin and paracetmol drug molecules(L2)

#### **Prescribed Text Books**

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi
2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4. Shashi chawla, A text book of engineering chemistry, 3<sup>rd</sup> Edition, Dhanpat rai & co new delhi, 2007.
5. Gurudeep raj & chatwal anand , "Instrumental methods of analysis " , 7<sup>th</sup> edition, CBS publications, 1986.
6. Quantitative analysis by day & underwood.
7. A Text book of Instrumental methods by Skoog and West.
8. H.W. Wilard and demerit, "Instrumental methods of analysis " , 7<sup>th</sup> edition, CBS publications, 1986.
9. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.

## Course Outcomes:

### At the end of the course, the students will be able to

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
- **explain** the manufacturing of portland cement **and** concrete formation (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

**I YEAR II SEM**

**10.02.2019**

**Engineering Graphics and  
Design**

L T P C

1 0 3 2.5

**Course Objectives:**

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

**Manual Drawing: (7 Classes)**

**Introduction to Engineering graphics:** Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions. Dimensioning principles and conventional representations

a) Conic sections including the rectangular hyperbola- general method only, b) Cycloid, epicycloids and hypocycloid

c) Involutés

**(2L + 6P hrs)**

**Projection of points, lines and planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.**(2L + 6P hrs)**

**Projections of solids:** Projections of regular solids inclined to one or both planes by rotational.**(1L + 3P hrs)**

**Sections of solids:** Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.**(1L + 3P hrs)**

**Development of surfaces:** Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts. **(1L + 6P hrs)**

**Orthographic Projections:** Systems of projections, orthographic projections (Simple Figures). **(3L +9P hrs)**

**Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids. **(2L + 6P hrs)**

#### Text Books

1. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016. Reference Books:
  1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
  2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
  3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
  4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
  5. BasantAgarwal&C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

## Course

### Outcomes:

After completing the course, the student will be able to

- draw various curves applied in engineering. (L2)
- show projections of solids and sections graphically. (L2)
- draw the development of surfaces of solids. (L3)
  - use computers as a drafting tool. (L2)
  - draw isometric and orthographic drawings using CAD

packages. (L3) Note:

1. Manual and Computer Aided Drafting classes can be held in alternative weeks for optimal utilization of computer facilities.
2. External examinations to be conducted both manual and computer mode with equal

weightage of marks. Additional Sources

1. Youtube: <http://sewor.carleton.ca/gkardos/88403/drawings.html> conic sections-online, red woods.edu

# Essential Electrical & Electronic Engineering

Common to all branches

L-T-P-C  
3-1-3-5.5

## Course Objectives:

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on Basic Electronic Components.

## UNIT – I: DC & AC Circuits

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and loop analysis .Thevenin's and Superposition Theorems

Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits. Series Resonance and band width.

## .UNIT-II: Poly phase & Magnetic circuits

Generation of 3-phase voltages - phase sequence - star & delta connections - voltage, current & power in star & delta connected systems - analysis of 3-phase balanced circuits - measurement of 3-phase power by 2 wattmeter method.

Faraday's Laws of Electromagnetic Induction .Dynamically induced EMF –Statically induced EMF – Self Inductance – Mutual Inductance - Coefficient of coupling –Inductances in Series – Inductances in parallel – Dot convention.

## UNIT-III: DC Machines

Principle and operation of DC Generator - EMF equation - OCC characteristics of DC generator – Principle and operation of DC Motor – Performance Characteristics of DC Motors - Speed control of DC Motors.

## UNIT-IV: AC Machines:

Principle and operation of Single Phase Transformer - EMF equations-losses in transformers, regulation and efficiency. OC and SC test on transformer – auto transformer.

Principle, operation and construction of Three phase Induction Motor –torque equation and torque slip characteristics-power losses and efficiency.

## UNIT-V: Semiconductor Devices:

Characteristics of Semiconductor junction Diode, Zener diode, transistor, JFET, UJT, SCR and their applications. Half-wave, Full-wave rectifiers and Bridge rectifier, with (L and LC) and without filters.

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitter configuration, Transistor amplifying action, Common collector configuration, Operating point

## Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

## References:

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

## Course Outcomes:

- Apply concepts of KVL/KCL in solving DC circuits
- Choose correct rating of a transformer for a specific application
- Illustrate working principles of DC Motor - induction motor
- Identify type of electrical machine based on their operation.
- Describe working principles of different electronic devices.

**Course Objectives:**

1. To learn applications of various laws & theorems like Kirchoff's laws, Superposition theorem & Thevenin's theorem in circuit analysis
2. To learn performance characteristics of DC Machines, 1- Phase Transformers and 3-Phase Induction Motors
3. To study the characteristics of basic electronic devices like P-N junction diode, zener diode & transistor in various configurations

**List of experiments: -**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Verification of Kirchoff laws.
3. Verification of Superposition Theorem.
4. Verification of Thevenin's Theorems
5. Open circuit characteristics of a DC Shunt Generator.
6. Speed control of DC Shunt Motor.
7. Brake test on DC Shunt Motor.
8. OC & SC test of 1 – Phase Transformer.
9. Brake test on 3 - Phase Induction Motor.
10. Characteristics of PN junction and zener diode
11. Characteristics of transistor in common emitter configuration
12. Verification of transistor self bias circuit

**Course Outcomes: TO**

1. Verify Kirchoff's Laws, Superposition theorem & Thevenin's Theorem for dc excitation
2. Analyze the performance of AC and DC Machines by testing.
3. Study Characteristics of P-N junction and zener diode, transistor
4. Perform speed control of dc shunt motor

**II B.Tech I Semester**

**ENGINEERING  
MECHANICS**

**10.02.2019**

**L T P C  
3 1 0 4**



## Course

### Objectives:

- Explain the effect of force and moment in the different engineering applications.
- Teach centre of gravity and moment of inertia of solids and surfaces.
- Familiarize frictional forces in mechanical applications.
- Analysis of rigid bodies under dynamic conditions.

### Unit I hours

12

**Introduction to Engineering Mechanics:** Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and concurrent coplanar forces, resultant of coplanar force systems couple, moment of a force Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force systems.

**Friction:** Laws of friction, types of friction, equilibrium of force systems involving frictional forces, wedge friction. Free body diagrams involving frictional forces.

### Learning

#### Outcomes:

At the end of this unit, the student will be able to

- resolve the forces in mechanical systems (L2)
- identify the moments and forces (L3)
- draw free body diagram (L3)

### Unit II

10 hours

**Analysis of Structures:** Introduction to plane trusses, analysis of plane trusses by method of joints and method of sections.

**Properties of Surfaces and Volumes:** Centroid and center of gravity, derivation of centroids from first moment of area, centroids of composite sections, center of gravity of common volumes - cylinder, cone, sphere, theorem of Pappus-guldinus.

### Learning

#### Outcomes:

At the end of this unit, the student will be able to

- identify different types of trusses. (L2)
- analyze the plane trusses by method of joints and the method of sections. (L4)
- demonstrate equilibrium of ideal system. (L2)
- estimate the work done by a force and work done by a couple. (L3)

### Unit III

10 hours

**Moment of Inertia:** Area moment of inertia of plane and composite shapes, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, mass moment of inertia of common volumes -thin plates, thin rod, cylinder, cone, sphere, rectangular prism, radius of gyration.

**Learning  
Outcomes:**

At the end of this unit, the student will be able to

- identify the centre of gravity of composite sections. (L3)
- determine the centre of gravity of common solids. (L3)
- determine moment of inertia for composite volumes. (L3)

**Unit IV  
10 hours**

**Kinematics:** Equations of motion for rigid bodies, constant and variable acceleration, rectilinear and curvilinear motion, motion under gravity -projectile motion, use of rectangular coordinates, tangential and normal coordinates.

**Learning  
Outcomes:**

At the end of this unit, the student will be able to

- write equations of motion for rigid bodies. (L3)
- find velocity and acceleration in rectilinear and curvilinear motions (L4)
- trace the path of projectile. (L3)

**Unit V  
10 hours**

**Kinetics:** Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy.

**Ideal Systems:** Principle of conservation of energy, concept of power, conservation of linear and angular momentum, principle of momentum and impulse.

**Learning  
Outcomes:**

At the end of this unit, the student will be able to

- apply D'Alembert's principle in rectilinear translation. (L3)
- relate principle of work and energy in dynamic systems. (L3)
- make use of principle of momentum and impulse to dynamic bodies. (L4)

**Course  
Outcomes:**

Upon successful completion of the course, the students will be able to

- resolve forces and couples in mechanical systems. (L3)
- identify the frictional forces and its influence on equilibrium. (L3)
- find the centre of gravity and moment of inertia for various geometric shapes (L3)

- develop equations for different motions. (L4)
- determine the displacement, velocity and acceleration relations in dynamic systems (L4)
- relate the impulse and momentum (L4)

**Text  
book**

**s:**

1. N H Dubey, Engineering Mechanics: Statics and Dynamics, McGraw Hill, 2014.
2. S Timoshenko, DH Young, JV Rao, SukumarPati, Engineering Mechanics (in SI units), 5/e, McGraw Hill, 2013.
3. S SBhavikatti, Engineering Mechanics, 4/e, New Age International, 2008.

**Reference Books:**

1. Basudeb Bhattacharya., Engineering Mechanics, 2/e, Oxford University Press (India), 2015.
2. Irving Shames, G K M Rao, Engineering Mechanics: Statics and Dynamics, 4/e, Pearson, 2009.
3. K L Kumar, Veenu Kumar, Engineering Mechanics, 4/e, Tata McGraw Hill, 2010.

# Python programming

## Common to all branches

**L-T-P-C**  
**2-1-3-4.5**

### Unit 1:

**Context of software development:** Software, Development tools, Learning programming with Python, Writing a python program.

**Values and Variables:** Variables and assignments, identifier, Control codes within Strings, User Input, The eval function, the print function.

**Expressions and Arithmetic:** Expressions, Operator precedence and Associativity, Comments, Errors, More arithmetic operators.

### Unit 2:

**Conditional Execution:** Boolean Expressions, Simple if and if else, nested conditionals, multiway decision statements, conditional expressions, errors in conditional statements.

**Iteration:** While statements, for statement, definite loops and indefinite loops, nested loops, abnormal loop termination, infinite loops, iteration examples: computing square root, drawing a tree, printing prime numbers.

### Unit 3:

**Functions:** Introduction, standard mathematical functions, time functions, Random numbers, main function, parameter passing, Function examples: Better organized prime number, Command Interpreter, Restricted Input, Better Die rolling simulator, Tree-Drawing Function, Floating –Point equality, Custom functions Vs Standard functions.

**More on Functions:** Global variables, Default Parameters, recursion, Making functions reusable, documenting functions and modules, functions as data.

### Unit 4:

**Lists:** Using Lists, List assignment and equivalence, list bounds, Slicing, Lists and functions, Prime generation with a list

**Lists processing:** Sorting, flexible sorting, search, list permutations, randomly permuting a list, reversing a list.

### Unit 5:

**Objects:** Using Objects, String Objects, List Objects.

**Custom types:** geometric points, Methods, Custom type examples, Class inheritance.

**Handling Exceptions:** Motivation, Exception examples, Using Exceptions, Custom Exceptions.

### Text books:

1. LEARNING TO PROGRAM WITH PYTHON Richard L. Halterman
2. Core Python Programming by Dr. R.Nageswara Rao, dreamtech, second edition

### Lab:

1. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
2. Design a Python script to determine if a given string is a Palindrome using recursion
3. Design a Python script to sort numbers specified in a text file using lists.
4. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
5. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
6. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.( 0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
7. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e ) of a given number using infinite series of the function.

8. Design a Python Script to convert a given number to words
9. Design a Python Script to convert a given number to roman number.
10. Design a Python Script to generate the frequency count of words in a text file.
11. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
12. Design a Python Script to implement Gaussian Elimination method.
13. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
14. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.
15. Design a Python script to search an element in the given list.
16. Design a Python script on *str* methods and *list* methods.

# Constitution of India

Common to all branches

L-T-P-C  
3- 0- 0- 0

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## Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

## UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

### LEARNING OUTCOMES:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

## UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

**LEARNING OUTCOMES:-** After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

## UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

**LEARNING OUTCOMES:-** After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariate

## UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

**LEARNING OUTCOMES:-** After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zilla panchayat block level organisation

#### **UNIT-V**

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

**LEARNING OUTCOMES:-** After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

#### **REFERENCES:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

#### **E-RESOURCES:**

1. [nptel.ac.in/courses/109104074/8](http://nptel.ac.in/courses/109104074/8)
2. [nptel.ac.in/courses/109104045/](http://nptel.ac.in/courses/109104045/)
3. [nptel.ac.in/courses/101104065/](http://nptel.ac.in/courses/101104065/)
4. [www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)
5. [www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution](http://www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution)

**Course Outcomes:** At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
  - Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
  - Understand the value of the fundamental rights and duties for becoming good citizen of India.
  - Analyze the decentralization of power between central, state and local self-government.
  - Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
1. Know the sources, features and principles of Indian Constitution.
  2. Learn about Union Government, State government and its administration.
  3. Get acquainted with Local administration and Pachayati Raj.
  4. Be aware of basic concepts and developments of Human Rights.
  5. Gain knowledge on roles and functioning of Election Commission.

## WORKSHOP – II (ECE)

### Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To equip with the knowledge of understanding data sheets of electronic components
- To give practical experience on soldering the electronic components on a PCB
- To introduce EDA tools
- To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide training on Productivity tools like word processors, spreadsheets, presentations
- To provide knowledge in understanding working of various communication systems

### List of Exercises / Experiments

1. Familiarization of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
  - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students
2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
  - Provide some exercises so that electronic measuring instruments are learned to be used by the students
3. Electronic Components: Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.
4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
  - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments
5. Study of Cathode Ray Oscilloscope (CRO)
  - Find the Amplitude and Frequency of a signal
  - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures
6. Interpret data sheets of discrete components and IC's.
  - Write important specifications/ratings of components & ICs and submit it in the form of a report
7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, Learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
  - Provide some exercises so that students are familiarized in using EDA tools
8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.
9. Familiarization with Computer Hardware & Operating System:



- Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.
- Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.
- Install Operating system on the computer. Students should record the entire installation process.

10. Familiarization with Office Tools

- Word Processor: Able to create documents using the word processor tool. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied.
- Spreadsheet: Able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.
- Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper-linking, running the slide show, setting the timing for slide show.

11. Familiarization of PA system with different microphones, loud speakers, mixer etc. Represent the same in the form of diagrams, write specifications and submit it in the form of a report.

12. Understand working of various Communication Systems like Television, Satellite Transmitter & Receiver, Radio Receiver, Mobile Phone. Prepare demo boards/charts of various communication systems.

**Course Outcomes:**

- Identify discrete components and ICs (L3)
- Assemble simple electronic circuits over a PCB (L3)
- Testing of various components (L4)
- Interpret specifications (ratings) of the component (L5)
- Demonstrate disassembling and assembling a Personal Computer and make the computer ready to use (L2)
- Make use of Office tools for preparing documents, spreadsheets and presentations (L3)
- Demonstrate working of various communication systems (L2)

**Text Books:**

1. Gerd Keiser, "Optical fiber Communication", McGraw-Hill International, Singapore, 3rd ed., 2000.

**References:**

1. J. M. Senior, "Optical Communication, Principles and Practice ", Prentice hall of India, 1994.
2. Joseph Palais, "Fiber Optic Communication", Pearson edition, 2008
3. M. N. Bandyopadhyay, "Optical Communication and Networks", PHI edition.

**Course Outcomes:**

- Compute number of possible modes that a fiber can support (L3)
- Analyze various losses and quantify (L4)
- Compare performance of optical LEDs and Semiconductor LASERs in terms of efficiency (L5)
- Assess noise performance of optical detectors (L5)
- Employ suitable optical fibers for specific applications (L3)

# Workshop for Civil Engineers

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I B.Tech II Sem

L-T-P-C: 0-0-3-1.5

1. Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.
  2. Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.
  3. Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
  4. Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
  5. Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.
  6. Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;
  7. Plastering and Finishing of wall
  8. Application of wall putty and painting a wall
  9. Application of base coat and laying of Tile flooring of one square meter
  10. Preparation of soil cement blocks for masonry and testing for compressive strength
  11. Casting and testing of Fly ash Blocks
  12. Preparation of cover blocks for providing cover to reinforcement
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# Workshop (Computer and IT)

L-T-P-C  
0-0-3-1.5

Course Objectives:

To

1. Introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
2. Teach basic command line interface commands on Linux
3. Teach the usage of Internet for productivity and self paced life long learning
4. Introduce Compression, Multimedia and Antivirus tools
5. Introduce Office Tools such as Word processors, Spreadsheets and Presentation tools

## Unit 1: **Computer Hardware**

Types of Computing Devices such as PC, Laptops, Servers, Smart Phones, Tablets, other accessories, PC parts, Input/Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Unit Outcomes:

Student should be able to

1. Identify various kinds Computing devices and their components.
2. Identify the different peripherals, ports and connecting cables in a PC.
3. Assemble and disassemble components of a PC

Text Books:

References:

1. Introduction to computer-peter Norton
2. [https://explorersposts.grc.nasa.gov/post631/2006-2007/computer\\_basics/ComputerPorts.doc](https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc)
3. [https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital\\_Storage\\_Basics.doc](https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc)

## Unit 2: **Operating Systems**

### **Virtual Machine setup:**

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

### **Operating System installation:**

- Installing an Operating System such as Linux on Computer hardware.

### **Linux Operating System commands:**

- General command syntax
- Basic *help* commands: *whatis*, *man*, *info*
- Filesystem: *ls*, *mkdir*, *cd*, *touch*, *chmod*, *rm*, *mv*, *bc*, *finger*, *who*, *whoami*, *ps*, *du*, *df*
- Date and Time: *cal*, *date*,
- Filters and Text processing: *echo*, *cat*, *tac*, *rev*, *more*, *less*, *head*, *tail*, *nl*, *cut*, *paste*, *wc*, *sort*, *uniq*, *cp*, *cmp*, *diff*, *tr*, *ln*, *grep*, *fgrep*, *egrep*, *sed*, *awk*, *find*, *xargs*, *tee*,
- File compression: *tar*, *compress*, *uncompress*, *split*, *uuencode*, *uudecode*, *gzip*, *gunzip*, *read*, *expr*, *test*, *ping*, *ssh*
- Miscellaneous: *apt-get*, *vi* editor
- Shell I/O redirection and piping, regular expressions, simple shell programs without control structures.

Search for “20 examples of grep in linux” and practice like this on all the given commands.

<https://www.thegeekstuff.com/2009/07/linux-ls-command-examples>

<https://www.pcsuggest.com/basic-linux-commands/>

<https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/>

Unit Outcomes:

Student should be able to:

1. construct a fully functional virtual machine (L3)
2. summarize various linux operating system commands (L2)

References:

1. <https://www.vmware.com/pdf/VMwarePlayerManual10.pdf>
2. <https://zorinos.com/help/>
3. <https://zorinos.com/help/install-zorin-os/>
4. <https://geek-university.com/vmware-player/manually-install-a-guest-operating-system/>
5. <https://clearlinux.org/documentation/clear-linux/get-started/virtual-machine-install/vmw-player-preconf>
6. <https://www.thegeekstuff.com/2009/07/linux-ls-command-examples>
7. <https://www.pcsuggest.com/basic-linux-commands/>
8. <https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/>

### Unit 3: Networking and Internet

#### Networking Commands :

- ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget, route

#### Internet Services:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Google search techniques(text based, voice based)
- alexa website traffic statistics
- Email creation and usage
- google hangout/skype/gotomeeting video conferencing
- archive.org for accessing archived resources on the web
- Creating a Digital Profile on LinkedIn, Twitter, Github

Unit Outcomes:

Students should be able to

1. resolve internet connectivity issues (L2)
2. secure a computer from cyber threats (L2)
3. apply google search techniques (L3)
4. create their own digital profile on social media (L3)

References:

1. [http://www.googleguide.com/advanced\\_operators\\_reference.html](http://www.googleguide.com/advanced_operators_reference.html)
2. <https://www.alexa.com/find-similar-sites>
3. <https://www.alexa.com/topsites> examine links Global, By Country and By Category
4. Use <https://archive.org/> to locate missing links in other sites.

### Unit 4: Productivity Tools

#### Productivity Tools:

- archival and compression tools
- scanning and image editing tools
- photography with digital camera and photo editing tools
- OCR and text extraction
- audio players, recording using Mic, editing, podcast preparation
- video players, recording using webcam/camcorder, editing
- podcast, screencast, vodcast, webcasting

Unit Outcomes:

Students should be able to :

1. archive and unarchive data on the filesystem using relevant compression tools(L2)
2. edit photos & images in various formats using photo & image editing tools (L2)
3. recognize characters & extract text from scanned images (L2)
4. create audio files and podcasts (L4)
5. create video tutorials and publishing (L4)

References:

1. File Archivers: [https://en.wikipedia.org/wiki/File\\_archiver](https://en.wikipedia.org/wiki/File_archiver) .  
Comparison of file archivers: [https://en.wikipedia.org/wiki/Comparison\\_of\\_file\\_archivers](https://en.wikipedia.org/wiki/Comparison_of_file_archivers)

2. Image editing: [https://en.wikipedia.org/wiki/Image\\_editing](https://en.wikipedia.org/wiki/Image_editing)  
Comparison of raster graphics editors:  
[https://en.wikipedia.org/wiki/Comparison\\_of\\_raster\\_graphics\\_editors](https://en.wikipedia.org/wiki/Comparison_of_raster_graphics_editors)
3. Optical Character Recognition: [https://en.wikipedia.org/wiki/Optical\\_character\\_recognition](https://en.wikipedia.org/wiki/Optical_character_recognition)
4. Audio editing software: [https://en.wikipedia.org/wiki/Audio\\_editing\\_software](https://en.wikipedia.org/wiki/Audio_editing_software)  
Comparison of free software for audio:  
[https://en.wikipedia.org/wiki/Comparison\\_of\\_free\\_software\\_for\\_audio](https://en.wikipedia.org/wiki/Comparison_of_free_software_for_audio)
5. Video editing software: [https://en.wikipedia.org/wiki/Video\\_editing\\_software](https://en.wikipedia.org/wiki/Video_editing_software)  
Comparison of video editing software:  
[https://en.wikipedia.org/wiki/Comparison\\_of\\_video\\_editing\\_software](https://en.wikipedia.org/wiki/Comparison_of_video_editing_software)
6. Podcast: <https://en.wikipedia.org/wiki/Podcast>, Screencast:  
<https://en.wikipedia.org/wiki/Screencast>, Webcast: <https://en.wikipedia.org/wiki/Webcast>

#### Unit 5: Office Tools

##### Cloud based productivity enhancement and collaboration tools:

- Store, sync, and share files with ease in the cloud
  - Google Drive
- Document creation and editing text documents in your web browser
  - Google docs
- Handle task lists, create project plans, analyze data with charts and filters
  - Google Sheets
- Create pitch decks, project presentations, training modules
  - Google Slides
- Manage event registrations, create quizzes, analyze responses
  - Google Forms
- Build public sites, internal project hubs
  - Google Sites
- Web-based service providing detailed information about geographical regions and sites around the world. Explore the globe by entering addresses and coordinates
  - Google Maps and Earth
- Online collaboration through cross-platform support
  - Jamboard
- Keep track of important events, sharing one's schedule, and create multiple calendars.
  - Google Calendar

##### Unit Outcomes:

Students should be able to :

1. use office tools for documentation (L2)
2. build interactive presentations (L2)
3. navigate through the globe (L2)
4. build websites (L2)
5. create quizzes & analyze responses (L3)

##### References:

1. Cloud computing, productivity and collaboration tools, software and products offered by Google:  
[https://en.wikipedia.org/wiki/G\\_Suite](https://en.wikipedia.org/wiki/G_Suite),
2. G Suite Learning Center: <https://gsuite.google.com/learning-center/products/#!/>

##### Course Outcomes:

Students should be able to :

1. assemble and disassemble components of a PC (L3)
2. construct a fully functional virtual machine (L3)
3. summarize various linux operating system commands (L2)
4. secure a computer from cyber threats (L2)
5. apply google search techniques (L3)
6. create their own digital profile on social media (L3)
7. edit photos & images in various formats using photo & image editing tools (L2)
8. recognize characters & extract text from scanned images (L2)
9. create audio files and podcasts (L4)
10. create video tutorials and publishing (L4)
11. use office tools for documentation (L2)
12. build interactive presentations (L2)
13. build websites (L2)
14. create quizzes & analyze responses (L3)

# Electrical & Electronics Engineering Workshop

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## I B. Tech – II Semester WORKSHOP-II

L	T	P	C
0	0	3	1.5

### Course Objectives for Workshop:

1. To know about different tools, abbreviations and symbols in Electrical Engineering
2. To learn about types of measuring instruments to measure electrical quantities
3. To gain knowledge on different types of earthing and earth resistance
4. To study different types of wiring

### Syllabus:

1. Study on Introduction to Electrical tools, symbols and abbreviations
2. Study of types of sizes of wires and making "T" joint and straight joint for wires
3. Measurements of Electrical quantities (like Voltage, Current, Power, Power factor in RLC circuits)
4. Study of measurements of Energy (using Single phase and Three phase Energy meter) by connecting different loads
5. Study of earthing and measurement of earth resistance
6. Study and performance of residential wiring (using Energy meter, Fuses, Switches, Indicator, Lamps, etc.)
7. Study of Fluorescent lamp wiring
8. Study of various electrical gadgets (CFL and LED)
9. Study of PV Cell
10. Study of Induction motor and Transformer
11. Assembly of choke or small transformer
12. Study of trouble shooting of electrical equipments (fan, iron box, mixer-grinder, etc.)
13. Introduction to basics of Electronic components: Solder practice, Multi meter, Power supply
14. Measurement of wire gauges using gauge meter
15. Identification of color code, resistors, ICs, Transistors, capacitors, diodes, SCRs, IGBTs etc.

### References:

1. Lab manual of Electrical Engineering by TTTI, Chennai.

### Course Outcomes for Workshop:

1. Able to demonstrate knowledge on different tools, abbreviations and symbols used in Electrical Engineering (L2)
2. Able to measure different electrical quantities using measuring instruments (L3)
3. Able to demonstrate how to trouble shoot the electrical equipments (like fan, grinder, motor, etc.) (L4)
4. Able to perform wiring and earthing for residential houses (L5)

## I YEAR II SEM

### 2D DRAFTING LAB

L T P C  
0 0 3 1.5

**COURSE EDUCATIONAL OBJECTIVE:** The main objectives of this course are to familiarize various commands used in Auto-CAD and to visualize the orthographic views of any solid object.

**COMPUTER AIDED DRAFTING: (DEMONSTRATION) (6 hrs)**

**BASIC AUTO CAD COMMANDS: (9P hrs)**

1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide a line, offset).
4. Hatching & line commands (hatching with different angles & different types of lines).
5. Mirror & trim commands (mirror an object, trim, extend a line, chamfer & fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter & text).

**Drafting of Simple Figures (Practice) (9P hrs)**

**ORTHOGRAPHIC PROJECTIONS: (6P hrs)**

1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both  
Combination of plane figures and circular objects.

**COURSE OUTCOMES:** After completion of the course students are the able to:

CO1: Understand the Auto-CAD basics and apply to solve practical problems used in industries where the speed and accuracy can be achieved.

CO2: Understand the principle of Orthographic projections of points, lines, planes.

CO3: To draw 2D Draftings

At least 10 Exercises are to be conducted using Auto Cad software: BASIC AUTO CAD

#### REFERENCES

1. M. Kulkarni, A.P Rastogi, and A.K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
2. Bethune, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
3. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar Publishers, 2012.