# *Curriculum Structure & Syllabus*
# *(to be effective from 2018-19 admission batch)*

## Curriculum for B.Tech 1st Semester

## Under Autonomy (**GR A:** ECE, EE, EIE, BME; **GR B:** CSE, IT, ME, CE, FT)

| Sl No | Paper Code | Theory | Contact Hours /Week | | | | Credit Points |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | Total | |
| **A. THEORY** | | | | | | | |
| 1 | 18_M 101 | Mathematics -I | 3 | 1 | 0 | 4 | 4 |
| 2 | 18_CH 101/ 18_PH 101 | Chemistry-I (Gr. A) / Physics - I(Gr. B) | 3 | 0 | 0 | 3 | 3 |
| 3 | 18_EE 101/ 18_EC 101 | Basic Electrical Engineering (Gr. A) / Basic Electronics Engineering (Gr. B) | 3 | 0 | 0 | 3 | 3 |
| 4 | 18_HU 101 | English | 2 | 0 | 0 | 2 | 2 |
| **Total of Theory** | | | | | | **12** | **12** |
| **B. PRACTICAL** | | | | | | | |
| 5 | 18_CH 191/ 18_PH191 | Chemistry-I Lab (Gr. A) / Physics-I Lab(Gr. B) | 0 | 0 | 3 | 3 | 1.5 |
| 6 | 18_EE 191/ 18_EC 191 | Basic Electrical Engineering Lab (Gr. A) /Basic Electronics Engineering Lab(Gr. B) | 0 | 0 | 3 | 3 | 1.5 |
| 7 | 18_ME 191/ 18_ME 192 | Engineering Graphics & Design (Gr A) / Workshop/Manufacturing Practices (Gr-B) | 0 | 0 | 3 | 3 | 1.5 |
| **C. SESSIONAL** | | | | | | | |
| 8 | 18_XC181 | Extra-Curricular Activity I | 0 | 0 | 0 | 0 | 2 units |
| **D. PROJECT*** | | | | | | | |
| 9 | **Project Code** | **Project Name** | **Contact Hours /Week** | | | | **Credit Points** |
| | 18_M 151 | Mathematics Project | 1 | | | | 0.5 |
| | 18_CS 151 | Programming for Problem Solving Project | 1 | | | | 0.5 |
| | 18_ME 151 | Engineering Mechanics Project | 1 | | | | 0.5 |
| | 18_CH 151/ 18_PH 151 | Chemistry Project (Gr. A) / Physics Project (Gr. B) | 1 | | | | 0.5 |
| | 18_EE 151/ 18_EC 151 | Basic Electrical Project (Gr. A) /Basic Electronics Project (Gr. B) | 1 | | | | 0.5 |
| **Total of Theory, Practical, Sessional & Project** | | | **23** | | | | **16.5+1** |

* Student need to select any two projects (Total Credit: 0.5+0.5=1)

# Syllabus

## Theory

**Subject Name: Mathematics-I**
**Subject Code: 18_M 101**
**Total Contact Hours: 43**
**Credit: 4**
**Weekly 3L + 1T+ 1Project**

**Prerequisite:**

The students to whom this course will be offered must have the concept of (10+2) standard matrix algebra and calculus.

**Course Objectives:**

The objective of this course is to disseminate the prospective engineers with techniques in matrix algebra and calculus. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to:

| CODES | BLOOM'S TAXONOMY | DESCRIPTIONS |
|---|---|---|
| **18_M 101.1** | Remembering | Recall the distinctive characteristics of matrix algebra and calculus. |
| **18_M 101.2** | Understanding | Understand the theoretical working of matrix algebra and calculus. |
| **18_M 101.3** | Applying | Apply the principles of matrix algebra and calculus to address problems in their disciplines. |
| **18_M 101.4** | Analyzing | Examine the nature of system using the concept of matrix algebra and calculus. |

**Course Content:**

**Module I: Matrix Algebra (10)**

Echelon form and Normal (Canonical) form of a matrix; Inverse and rank of a matrix; Consistency and inconsistency of system of linear equations, Solution of system of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton theorem.

**Module II: Differential Calculus and Infinite Series (9)**

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Concept of sequence and series, Tests for convergence of infinite series: Comparison test, D'Alembert's ratio test, Raabe's test, Cauchy's root test, Power series; Taylor's series, Series for exponential, trigonometric and logarithm functions.

**Module III: Multivariable Calculus (Differentiation) - I (8)**

Function of several variables, Concept of limit, continuity and differentiability; Partial derivatives, Total derivative and its application; Chain rules, Derivatives of implicit functions Euler's theorem on homogeneous function, Jacobian.

**Module IV: Multivariable Calculus (Differentiation) - II (6)**

Maxima and minima of functions of two variables, Method of Lagrange multipliers; Directional derivatives, Gradient, Divergence, Curl.

**Module V: Integral Calculus (10)**

Evolutes and involutes; Evaluation of definite integrals and its applications to evaluate surface areas and volumes of revolutions; Improper integrals; Beta and Gamma functions and their properties.

**Project Domains:**

1. Study on eigenvalues and eigenvectors.
2. Study on convergence of infinite series.
3. Application of partial derivatives.
4. Application of vector calculus
5. Application of integral calculus.

**Text Books:**


1. Kreyszig, E., Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Ramana, B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Veerarajan, T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
5. Bali, N.P. and Goyal, M., A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.


**Reference Books:**


1. Thomas, G.B. and Finney, R.L., Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Apostol, M., Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern, 1980.
3. Kumaresan, S., Linear Algebra - A Geometric approach, Prentice Hall of India, 2000.
4. Poole, D., Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. Bronson, R., Schaum's Outline of Matrix Operations. 1988.
6. Piskunov, N., Differential and Integral Calculus, Vol. I & Vol. II, Mir Publishers, 1969

**CO-PO Mapping:**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_M 101.1** | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| **18_M 101.2** | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| **18_M 101.3** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **18_M 101.4** | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 1 |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Subject : Chemistry 1**
**Subject Code: 18_CH 101**
**Credits : 3**
**Contact hour: 35**
**Weekly 3L + 1T+ 1Project**

**Subject Code: 18_CH 101**

**Pre requisites:** Knowledge of Chemistry up to 12$^{th}$ standard.

**Course Objective**

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

**Course Outcomes**

**18_**CH 101.1 : Able to describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table

**18_CH 101.2** : Able to apply fundamental concepts of thermodynamics in different engineering applications.

**18_CH 101.3**: Able to apply the knowledge of water quality parameters, corrosion control & polymers to different industries.

**18_CH 101.4**: Able to determine the structure of organic molecules using different spectroscopic techniques.

**18_CH 101.5:** Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

## Detailed contents

### Module I: Inorganic Chemistry (8 L)

**(i) Atomic structure (4 Lectures)**

Bohr's theory to hydrogen-like atoms and ions; spectrum of hydrogen atom. Quantum numbers, Introduction to the concept of atomic orbitals, diagrams of s, p and d orbitals, Pauli's exclusion principle, Hund's rule, exchange energy, Aufbau principle and its limitation, introduction to Schrodinger equation.

**(ii) Periodic properties (4 Lectures)**

Modern Periodic table, group trends and periodic trends in physical properties: electron affinity, electronegativity, polarizability, oxidation states, effective nuclear charges, penetration of orbitals, variations of s, p and d orbital energies of atoms.

### Module II: Physical Chemistry (8 L)

**(iii) Use of free energy in chemical equilibria (6 lectures)**

Thermodynamic functions: internal energy, enthalpy, entropy and free energy. $2^{nd}$ Law of Thermodynamics, Estimations of entropy and free energies, Free energy and emf, Cell potentials, the Nernst equation and applications.

**(iv) Real Gases (2 lectures)**

Reason for deviation of real gases from ideal behavior, Equations of state of real gases,

Vander Waals' equation, pressure & volume correction, validity, critical state of gas.

### Module III: Organic Chemistry (8 L)

**(v) Stereochemistry (4 lectures)**

Representations of 3 dimensional structures, Chirality, optical activity, isomerism, structural isomerism, stereoisomers, enantiomers, diastereomers, configurations (D,L & cis trans), racemisation.

**(vi) Organic reactions (4 lectures)**

Concepts of inductive effect, resonance, hyperconjugation, introduction to reactions involving substitution, addition, elimination, oxidation

(Baeyer villiger oxidation), reduction (Clemmensen reduction, Wolff-Kishner reduction)

**Module IV: Industrial Chemistry 8L**

**(vii) Water (2 lectures)**

Hardness, alkalinity, numerical

**(viii) Corrosion. (2 lectures)**

Types of corrosion: wet & dry, preventive measures

**(ix) Polymers (3 lectures)**

Classification of polymers, conducting polymers, biodegradable polymers

**(x) Synthesis of a commonly used drug molecule. (1 lecture)**

Paracetamol, Aspirin

**Module V: Spectroscopic techniques in Chemistry (3L)**

Electromagnetic radiation, Principles of spectroscopy, spectrophotometer, infrared spectroscopy, fingerprint region, functional group region, UV-VIS spectroscopy, $^{1}H$ Nuclear magnetic resonance spectroscopy, chemical shift

**Project Domain**

1. Application of Thermodynamics
2. Application of polymers in daily life
3. Nanomaterials and its applications
4. Determination of water quality parameters
5. Electronic storage devices
6. Managing E –wastes
7. Application of chemistry in core engineering
8. Application of spectroscopy in medical field
9. Applications of green chemistry
10. Merits of commercial organic products
11. Bioplastics
12. Any other related topics

**Suggested Text Books**

(i) A Text Book of Organic Chemistry, Arun Bahl & Arun Bahl
(ii) General & Inorganic Chemistry, P.K. Dutt
(iii) General & Inorganic Chemistry, Vol I, R.P. Sarkar
(iv) Physical Chemistry, P.C. Rakshit

**Reference Books**

(v) Chemistry: Principles and Applications, by M. J. Sienko

and R. A. Plane (iii)Fundamentals of Molecular
Spectroscopy, by C. N. Banwell
(iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(v) Physical Chemistry, by P. W. Atkins
(vi) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition
http://bcs.whfreeman.com/vollhardtschore5e/default.asp

**CO v/s PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | 2 | - | - | - | - | 1 | 2 | 2 | 2 |
| 2 | 3 | 3 | 3 | 3 | - | - | - | - | 1 | 1 | 2 | 3 |
| 3 | 3 | 3 | 2 | 1 | - | 2 | 1 | - | 1 | - | 3 | 3 |
| 4 | 3 | 2 | 3 | 2 | - | - | 1 | - | 1 | 2 | 3 | 3 |
| 5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | - | 1 | - | 2 | 3 |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Paper Name: Physics –I**
**Paper Code: 18_PH 101**
**Total Contact Hours: 34**
**Credit: 3**
***Weekly 3L + 1T+1Project proposed to implement the project based study**

**Pre requisites:** Knowledge of Physics up to $12^{th}$ standard.

**Course Objective:**

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

**Course Outcome (CO) of Physics I (PH 101/PH 201)**

At the end of the course students' should be able to

| | |
|---|---|
| **18_PH 101.1 : define**<br>➢ **De-Broglie hypothesis, and Heisenberg's Uncertainty Principle**<br>➢ **Amplitude and Velocity Resonance**<br>➢ **Malus's Law, Brewster's Law**<br>➢ **Characteristics of LASER light**<br>➢ **Intrinsic and extrinsic semiconductor.** | |
| **18_PH 101.2 : explain**<br>➢ **Polarizer and analyzer**<br>➢ **basic principles and different types of LASER and Optical Fibre**<br>➢ **structure of solids, Miller indices**<br>➢ **theory of Matter Wave, equation of motion of Matter Wave**<br>➢ **wave function and its role in representing wave nature of matter**<br>➢ **p-n junction.** | |
| **18_PH 101. 3 : apply the knowledge of**<br>➢ **mechanical vibration in electrical circuits**<br>➢ **superposition principle in Newton's ring phenomenon, diffraction phenomenon**<br>➢ **quantum nature of e.m. waves for production of laser**<br>➢ **total internal reflection in transmitting light through optical fibres**<br>➢ **x-ray diffraction in crystal structure**<br>➢ **probability interpretation in Heisenberg's uncertainty principle** | |
| **18_PH 101.4 : analyze**<br>➢ **grating as many slit system**<br>➢ **role of Q factor in a resonating circuit, conditions of different types of resonance**<br>➢ **minimum requirements for lasing action**<br>➢ **importance of light as a carrier of information**<br>➢ **the failures of classical physics in microscopic situation and need of quantum** | |

| | |
|---|---|
| **physics**<br>➢ **Einstein's A, B coefficient and predict the wavelength domain of Lasing action**<br>➢ **Requirement of Miller indices for describing crystallographic planes** | |
| **18_PH 101.5 : judge**<br>➢ **X-ray production process is inverse of the process of Photoelectric Effect.**<br>➢ **different crystallographic structures according to their Co-ordination number and packing factors**<br>➢ **the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter** | |

**Module 1 (6L):-**
**Waves & Oscillations:**
**1.01-**Simple Harmonic Motion (only preliminary idea), damped harmonic motion-over damped, critically damped and under damped motion, energy decay, logarithmic decrement, force vibration and resonance (amplitude, velocity resonance), quality factor. Related numerical problems. 6L

**Module 2 (7L):-**
**Classical Optics:**
**2.01- Interference of light:** Huygens's principle, superposition of waves, conditions of sustained interference, Newton's ring (qualitative descriptions of working principles and procedures-no deduction required). Engineering applications, Numerical Problems. 3L

**2.02- Diffraction of light:** Fresnel and Fraunhofer class, Fraunhoffer diffraction of a single slit, multiple slits, missing order, Rayleigh criterion (no deduction) and resolving power (no deduction). 4L

**Module 3 (8L):-**
**Quantum Mechanics-I**
**3.01 Quantum Theory**: Inadequacy of classical physics and its modifications by Planck's quantum hypothesis-Qualitative (without deductions), particle concept of electromagnetic wave (example: photoelectric and Compton Effect; no derivation required, origin of modified and unmodified lines), wave particle duality; phase velocity and group velocity; de Broglie hypothesis; Davisson and Germer experiment. 4L

**3.02 Quantum Mechanics 1:** Concept of wave function, Physical significance of wave function, Probability interpretation; normalization of wave functions; uncertainty principle, relevant numerical problems. 4L

**Module 4 (7L):-**
**Solid State Physics-I:**
**4.01-**Structure of solids, amorphous and crystalline solids (definition and examples), lattice, basis, unit cell, Fundamental types of lattices –Bravais lattice, Simple cubic, fcc and bcc lattices,

Miller indices and miller planes, Co-ordination number and Atomic packing factor, Bragg's equation, Applications, Numerical problems. 4L

4.02-Physics of semiconductors, electrons and holes, metal, insulator and semiconductor, intrinsic and extrinsic semiconductor, p-n junction. 3L

**Module 5 (6L):**
**Modern Optics-I:**

**5.01- Laser:** Concepts of various emission and absorption process, Einstein A and B coefficients and equations, working principle of laser, metastable state, Population Inversion, condition necessary for active laser action, optical resonator, different types of lasers, semiconductor laser with illustrations, applications of laser. 4L

**2.05-Fibre optics**-Principle and propagation of light in optical fibres- Numerical aperture and Acceptance angle, Numerical problems. 2L

**Project Domain**

**Mandatory Project based study:**

**1. Study of Superposition of waves:** Lissajous figures.

**2. Electrical analogue of mechanical vibrations**: application to electrical circuit (LC and LCR circuits), Electrical and mechanical impedance, quality factor, complex representation and phasor diagram.

**3. Study of N-slit diffractions**

**4. Optical Fibre & its applications:** Study of losses, estimation of numerical aperture in practical problems.

**5. Photonic nature of electromagnetic waves**

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_PH 101.1** | **3** | - | - | - | - | - | - | - | - | - | - | 2 |
| **18_PH 101.2** | **3** | - | - | - | - | - | - | - | - | - | - | 2 |
| **18_PH 101.3** | **3** | 2 | - | - | - | - | - | - | - | - | - | 1 |
| **18_PH 101.4** | 2 | **3** | - | - | - | - | - | - | - | - | - | 1 |
| **18_PH 101.5** | 1 | **3** | - | - | - | - | - | - | - | - | - | **1** |
| **18_PH 101** | 2.4 | **2.6** | - | - | - | - | - | - | - | - | - | **1.4** |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Paper Name: Basic Electrical Engineering**
**Paper Code: 18_EE101**
**Contact hours: 3L per week**
**Credit: 3**

**Pre-requisites**

- **Basic 12th standard Physics and Mathematics.**
- **Concept of components of electric circuit.**

**Course Objective**

To introduce the students to basic principles of DC and AC circuits, Electrical Machines and Electrical Systems.

**Course Outcome**

At the end of this course, students will able

**18_EE 101.1.** To understand Basic Electrical circuits, Power distribution and Safety measures.

**18_EE 101.2.** To analyze an apply DC network theorems.

**18_EE 101.3.** To analyze and apply concept of AC circuits of single-phase and three-phase.

**18_EE 101.4.** To analyze and apply concepts of AC fundamentals in solving AC network problems.

**18_EE 101.5.** To understand basic principles of Transformers and Rotating Machines.

**Course contents**

**Module I: DC Circuits (8L)**

Definition of electric circuit, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, node, branch, active and passive elements, Kirchhoff's laws, Source equivalence and conversion, Network Theorems - Superposition Theorem, Thevenin's Theorem, Norton Theorem, Maximum Power Transfer Theorem, Star-Delta Conversions.

**Module II: AC Fundamentals (8L)**

Sinusoidal quantities, Average and RMS values, peak factor, Form factor, Phase and Phase difference, concept of phasor diagram, V-I Relationship in R, L, C circuit, Combination R-L-C in series and parallel circuits with phasor diagrams, impedance and admittance, impedance triangle and power triangle, Power factor, concept of resonance, Power in AC circuit, simple problems (series and parallel circuit only), Three-phase balanced circuits, Concept of three-phase power measurement.

**Module III: Single-Phase Transformer (4L)**

Brief idea on constructional parts, classifications, working principle. Problems on EMF equation. Phasor diagram, Equivalent circuit.

**Module IV: Electrical Rotating Machines (7L)**

**a) DC Machines (4L)**

Brief idea on constructional features, classifications, working principle of both motor and generator. Simple problems on Voltage equation.

**b) Three-Phase Induction Motor (3L)**

Basic concept of three phase circuit and production of rotating magnetic field. Working principle of three-phase induction motor and torque-speed characteristics (concept only). No numerical problem.

**Module V: General Structure of Electrical Power System (1L)**

Power generation to distribution through overhead lines and underground cables with single line diagram.

**Module VI: Electrical Installations (2L)**

Earthing of Electrical Equipment, ideas of basic components- MCB, MCCB, ELCB, SFU, Megger.

**Project Domains:**

a) **DC Network Theorem**

b) **R-L-C Circuit**

c) **Transformers**

d) **DC Motors**

**Text books:**


1. D. P. Kothari & I. J. Nagrath, Basic Electrical Engineering, TMH.
2. V. Mittle & Arvind Mittal, Basic Electrical Engineering, TMH.
3. Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication.
4. Chakrabarti,Nath & Chanda, Basic Electrical Engineering, TMH.
5. C.L. Wadhwa, Basic Electrical Engineering, Pearson Education**.**


**Reference books**


1. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Printice Hall India, 1989.

**CO-PO Mapping:**

| | PO1 | PO 2 | PO3 | PO 4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EE 101.1 | 3 | 1 | - | - | - | 2 | - | - | - | 2 | 2 | 1 |
| 18_EE 101.2 | 2 | 3 | - | - | - | - | - | - | - | - | 1 | 1 |
| 18_EE 101.3 | 2 | 3 | 1 | - | - | - | - | - | - | - | 1 | 1 |
| 18_EE 101.4 | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 1 |
| 18_EE 101.5 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Subject Name:** Basic Electronics Engineering

**Paper/Subject Code:** 18_ EC101

**Total Contact Hours:** 34

**Credit:** 3

**Prerequisite:**

Electric current and voltage-D.C and A.C., Complex impedance, conductivity, resistivity, transformer, charging and discharging of capacitor, active and passive elements.

**Course Objective:**

1. To understand the behavior of Conductors, Insulators, and Semiconductors based on energy-band theory and relevant problems.
2. To instill the knowledge of working principles of P-N Junction Diode, Zener diode and analyze their applications in the rectifier, clipper, clamper, regulator etc.
3. To familiarize with the characteristics of Bipolar junction transistor(BJT) under CE, CE, CC mode of operation and its biasing mechanisms.
4. To understand working principles of JFET, MOSFET and perform operations under CG, CS, CD configurations for parametric observation.
5. To determine the parameters due to the effect of feedback in amplifier to ,adder circuit , integrator and differentiator circuit using Operational Amplifier

**Course Outcome:**

| Course Name | COs | CO Statement |
|---|---|---|
| BASIC ELECTRONICS ENGINEERING (18_EC101) | 18_EC101.1 | Students able to describe the fundamentals of Semiconductors |
| | 18_EC101.2 | Students able to explain V-I characteristics of P-N Junction Diode, zener diode , working of diode rectifier, clipper, clamper, and regulator circuit |
| | 18_EC101.3 | Students able to analyze characteristics of Bipolar junction |

| | | |
|---|---|---|
| | | transistor(BJT) under CE, CB, CC mode of operation and its biasing therein |
| | 18_EC101.4 | Students able to illustrate the operations of JFET, MOSFET and the CS,CD , CG configuration using JFET |
| | 18_EC101.5 | Students able to determine parameters due to effect of feedback in amplifier |
| | 18_EC101.6 | Students able to construct inverting amplifier circuit , non-inverting amplifier circuit ,adder circuit , integrator and differentiator circuit using Operational Amplifier IC |

**Course Content:**

**Module-I: Basics of semiconductor (6L)**
Conductors, Insulators, and Semiconductors- crystal structure, Fermi Dirac function, Fermi level, Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic ( p-type and n-type) semiconductors, position of Fermi level in intrinsic and extrinsic semiconductor, drift and diffusion current – expression only ( no derivation) , mass action law , charge neutrality in semiconductor, Einstein relationship in semiconductor , Numerical problems.

**Module-II: P-N Junction Diode and its applications (8L)**
p-n junction formation and depletion region, energy band diagram of p-n junction at equilibrium and barrier energy, built in potential at p-n junction, energy band diagram and current through p-n junction at forward and reverse bias, Static and Dynamic resistance of Diode, Transition capacitance and diffusion capacitance, V-I characteristics and current expression of diode, temperature dependencies of V-I characteristics of diode, p-n junction breakdown – conditions, avalanche and Zener breakdown, Concept of Junction capacitance, Zener diode and characteristics.

Diode half wave and full wave rectifiers (centre tapped and bridge) circuits and operation ($I_{DC,}$ $I_{rms}$, $V_{Dc,}$ $V_{rms}$), ripple factor without filter, efficiency, PIV, TUF; Reduction of ac ripples using filter circuit (Qualitative analysis); Design of diode clipper and clamper circuit - explanation with example, application of Zener diode in regulator circuit. Numerical problems.

**Module-III: Bipolar junction transistor (BJT) (6L)**
Concept of "Transistor", Formation of PNP/NPN Transistors, energy band diagram, current conduction mechanism, CE, CB, CC configurations, transistor static characteristics in CE, CB and CC mode, junction biasing condition for active, saturation and cut-off modes, current gain $\alpha$, $\beta$ and $\gamma$, early effect.
Biasing and bias stability; biasing circuits - fixed bias; voltage divider bias; collector to base bias, D.C. load line and Quiescent point, calculation of stability factors for different biasing circuits.
BJT as an amplifier and as a switch – Graphical analysis; Numerical Problems.

**Module-IV: Field effect transistor (FET) (6L)**
Concept of "field effect", Classification of FETs-JFET, MOSFET, operating principle of JFET. Drain and transfer characteristics of JFET (n-channel and p-channel), CS, CG, CD configurations, Relation between JFET parameters. FET as an amplifier and as a switch– graphical analysis. E-MOSFET (n-channel and p-channel), D-MOSFET (n-channel and p-channel), Numerical Problems.

**Module-V: Feedback and Operational Amplifier (8L)**

Concept of feedback with block diagram, positive and negative feedback, gain with feedback. Feedback topologies, effect of feedback on input and output impedance, distortion, concept of oscillation and Barkhausen criterion.
Operational amplifier – electrical equivalent circuit, ideal characteristics, non-ideal characteristics of op-amp – offset voltages; bias current; offset current; Slew rate; CMRR and bandwidth, Configuration of inverting and non-inverting amplifier using Op-amp, closed loop voltage gain of inverting and non-inverting amplifier, Concept of virtual ground, Applications op-amp – summing amplifier; differential amplifier; voltage follower; basic differentiator and integrator, Numerical Problems.

**Project Domains:**

1. Zener diode in voltage regulation
2. Amplifier design using BJT
3. Amplifier design using FET
4. Circuit design using Op-Amp

**Mapping of COs with POs**

| COs | PO1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EC101.1 | 3 | 2 | 1 | 1 | - | - | - | - | - | 2 | - | 1 |
| 18_EC101.2 | 3 | 3 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | 2 |
| 18_EC101.3 | 3 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 1 | 1 |
| 18_EC101.4 | 3 | 2 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 |
| 18_EC101.5 | 3 | 2 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | 2 |
| 18_EC101.6 | 3 | 3 | 3 | 1 | - | - | - | - | 2 | 1 | 2 | 3 |

**N.B. : 3 = Highly Mapped, 2=Moderately Mapped , 1=Slightly Mapped , Not Mapped = '-'**

**Paper Name: English**
**Paer Code: 18_HU 101**
**Credits: 2**
**Total Contact hour: 24**

**Prerequisites:** The course presupposes a high school level knowledge of English grammar, punctuation, and elementary to intermediate reading and writing skills.

**Course Objectives**: The basic objectives of this course are to impart professional communication skills in the globalized workplace context, to enable functional competence in reading and writing so as to create industry-ready personnel.

**Course Outcomes:** By pursuing this course the students shall be able to

- Know about and employ communication in a globalized workplace scenario.

- Understand and apply functional grammar, reading skills and sub-skills.
- Acquire a working knowledge of writing strategies, formats and templates of professional writing.
- Apply and make use of the modalities of intercultural communication.

The proposed revised syllabus is as follows:

**Module 1: Communication in a Globalized World** **4L**

1.1 Definition, Process, Types of Communication
1.2 Verbal and Non-Verbal Communication
1.3 Barriers to Communication
1.4 Workplace Communication

**Module 2: Functional Grammar** **4L**

2.1Articles, Prepositions and Verbs
2.2 Verb-Subject Agreement
2.3 Voice, Modality and Modifiers
2.4 Direct and Indirect Speech
2.5 Common Errors in English

**Module 3: Vocabulary and Reading** **6L**

3.1 Word Roots, Prefixes and Suffixes
3.2 Antonyms, Synonyms and one word Substitution
3.3 Reading—Purposes and Skills (Skimming, Scanning & Intensive Reading)
3.4 Reading Comprehension (Fictional and Non-fictional prose)

**Texts:**

*a.* **Ruskin Bond:** ***The Night Train at Deoli*** **OR Khushwant Singh:** ***The Portrait of a Lady***
**b. Roald Dahl:** ***Lamb to the Slaughter*** OR **Somerset Maugham:** ***The Man with the Scar***
**c. Anne Frank:** ***The Diary of a Young Girl*** **(Letters of 3rd February 1944, 12th February 1944 and 13th February 1944)** OR **Jawaharlal Nehru: "How Britain Ruled India" (*Glimpses of World History*, Chap 112)**

**Module 4: Professional Writing** **10L**

4.1Writing Functions: Describing, Defining, Classifying
4.2 Structuring—coherence and clarity
4.3 Business Writing—Letters (Enquiry, Order, Sales, Complaint, Adjustment, Job Application letters), Memos, Notices, Circulars, Agendas and Minutes of Meetings).
4.4 E-mails—types, conventions, jargons and modalities.
4.5 Reports and Proposals
4.6 Précis writing
4.7 Essay writing
4.8 Punctuation and its importance in writing
4.9 Writing for an Audience

**The following areas for student projects may be suggested:**

**a. Role of Communication in Everyday Life**
**b. Grammar Builders**
**c. Group Activities on Workplace Communication**
**d. Reading Challenge**
**e. Quizzicals**

**References:**

1.Raymond Murphy. *English Grammar in Use*. 3rd Edn. CUP, 2001.
2. A. J Thomson and A. V. Martinet. *A Practical English Grammar* Oxford: OUP, 1980.
3. Michael Swan. *Practical English Usage*. Oxford: OUP, 1980.
4. Simeon Potter. *Our Language*. Oxford: OUP, 1950.
5. Pickett, Laster and Staples. *Technical English: Writing, Reading & Speaking*. 8th ed. London: Longman, 2001.
6. Ben Heasley and Liz Hamp-Lyons. *Study Writing*. Cambridge: CUP, 2006.

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**CO-PO Mapping**
**Course Name: Communicative English (HU101)1st Year 1st Sem**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_HU101.1** | **3** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **-** | **3** | **-** | **2** |
| **18_HU101.2** | **2** | **3** | **2** | **-** | **-** | **2** | **2** | **-** | **-** | **3** | **-** | **3** |
| **18_HU101.3** | **1** | **3** | **-** | **-** | **-** | **3** | **3** | **-** | **-** | **3** | **-** | **3** |
| **18_HU101.4** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | | | **3** | **-** | **3** |

## Practical:

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

Paper Name: Chemistry I Lab
Paper Code: 18_CH 191
Total Contact Hours: 3 P/Week
Credit: 1.5

**Pre requisites:** Knowledge of Physics upto 12th standard.

**Course Objective**

- Study the basic principles of pH meter and conductivity meter for different applications.
- Analysis of water for its various parameters & its significance in industries.
- Learn to synthesis Polymeric materials and drugs.
- Study the various reactions in homogeneous and heterogeneous medium.

**Course Outcome**

**18_CH191.1**: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.
**18_CH191.2**: Able to analyse and determine the composition of liquid and solid samples working as an individual and also as an team member

**18_CH191.3:** Able to analyse different parameters of water considering environmental issues
**18_CH191.4**: Able to synthesize drug and polymer materials.
**18_CH191.5:** Capable to design innovative experiments applying the fundamentals of chemistry

**Course Content**

**Choice of 10-12 experiments from the following:**

- Determination of surface tension and viscosity
- Thin layer chromatography
- Determination of hardness of water
- Determination of chloride content of water
- Determination of the rate constant of a reaction
- Determination of cell constant and conductometric tritration
- pH metric titrations
- Synthesis of a polymer/drug
- Saponification/acid value of an oil
- Chemical analysis of a salt
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids
- Adsorption of acetic acid by charcoal

**Innovative experiments (any one)**

- Synthesis of silver nano particles
- Green synthesis

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 3 | 1 | - | 2 | 3 | - | - | - | - | 1 |
| 2 | 2 | 2 | 1 | 1 | - | 1 | - | - | - | 1 | - | 1 |
| 3 | - | - | - | - | - | - | - | - | 3 | 3 | 2 | 2 |
| 4 | 2 | 1 | 2 | 2 | - | - | 1 | - | - | - | - | 2 |
| 5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | - | - | 2 | 2 |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Paper Name: Physics I Lab**
**Paper Code: 18_PH 191**
**Total Contact Hours: 3 P/Week**

**Credit: 2**

**Pre requisites:** Knowledge of Physics upto 12th standard.

**Course Outcome of Physics-I practical (PH 191)**

**At the end of the course students' will be able to**
**General idea about Measurements and Errors (One Mandatory):**

i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.
ii) Proportional error calculation using Carrey Foster Bridge.

**Any 6 to be performed from the following experiments**

**Experiments on Waves & Oscillations:**
1. Study of Torsional oscillation of Torsional pendulum & determination of time period using various load of the oscillator.
2. Determination of elastic moduli of different materials (Young's modulus /Rigidity modulus)

**Experiments on Classical Optics:**
3. Determination of wavelength of light by Newton's ring method.
4. Determination of wavelength of light by Laser diffraction method.

**Experiments on Quantum Physics-I:**
5. Determination of Planck's constant using photoelectric cell.
6. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
7. Determination of Stefan's Constant

**Experiments on Solid State Physics-I:**
8. Determination of Band gap of a semiconductor

**In addition it is **recommended** that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

**Probable experiments beyond the syllabus:**
1. Determination of wavelength of light by Fresnel's bi-prism method (beyond the syllabus).
3. Study of dispersive power of material of a prism.
4. Study of viscosity using Poyseullie's caplillary flow method/using Stoke's law.
5. Measurement of nodal and antinodal points along transmission wire and measurement of wave length.
6. Any other experiment related to the theory**.**

**Course Outcome**

**At the end of the course students' should have the**

| | |
|---|---|
| **CO1:ability to define, understand and explain**<br>✓ **Error estimation, Proportional error calculation**<br>✓ **superposition principle in Newton's ring, Fresnel's biprism, laser diffraction** | PO1 |

| | |
|---|---|
| ✓ **Basic circuit analysis in LCR circuits** | |
| **CO2:Ability to conduct experiments using**<br>➢ **LASER, Optical fibre**<br>➢ **Interference by division of wave front, division of amplitude, diffraction grating, polarization of light**<br>➢ **Quantization of electronic energy inside an atom**<br>➢ **Torsional pendulum** | PO4 |
| **CO3:Function effectively as an individual, and as a member or leader in laboratory sessions** | PO9 |
| **CO4: Ability to communicate effectively, write reports and make effective presentationusing available technology**<br>➢ **on presentation of laboratory experiment reports**<br>➢ **on presentation of innovative experiments** | PO10 |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | M | | | | | | | | | | | |
| **CO2** | | | | H | | | | | | | | |
| **CO3** | | | | | | | | | H | | | |
| **CO4** | | | | | | | | | | L | | |

**H:3 , M:2, L:1**

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Paper Name: Basic Electrical Engineering Laboratory**
**Paper Code: 18_EE 191**
**Total Contact Hours: 36**
**Credit: 1.5**

**Pre requisites:**

- Basic Physics and applied physics.
- Basic Mathematics.
- Basic concept of Electric Circuit

**Course Objective:**

To impart and apply knowledge about the Basic Electrical Components, Machineries, Instruments and Safety measures.

**Course Outcome:**

**18_EE 191.1.** Identify and use common electrical components.
**18_EE 191.2.** To develop electrical networks by physical connection of various components and analyze the circuit behavior.
**18_EE 191.3.** Apply and analyze the basic characteristics of transformers and electrical machines.

**Course contents**

**List of Experiments:**

1. Basic safety precautions – earthing, introduction to measuring instruments – Voltmeter, Ammeter, Multimeter, Wattmeter, Real life Resistor, Capacitor, Inductor.
2. Verification of Thevenin's and Norton's Theorem.
3. Verification of Superposition and Maximum Power Transfer Theorem.
4. Characteristics of Fluorescent, Tungsten and Carbon filament lamps.
5. Study of R-L-C series circuit.
6. Three-phase Power measurement with two wattmeter method.
7. Demonstration of cut-out sections of machines: DC Machine (commutator-brush arrangement), Induction Machine (squirrel cage rotor).
8. Measurement of primary and secondary voltage and current of single-phase transformer – Open Circuit and Short Circuit Test.
9. Starting, Reversing and speed control of DC shunt motor.
10. Torque-Speed characteristics of DC Machine.
11. Torque-Speed characteristics of Three-phase Induction Motor.
12. Test on single-phase Energy Meter.

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EE 191.1 | 3 | - | - | - | - | 2 | - | - | - | - | - | 1 |
| 18_EE 191.2 | 2 | 3 | - | - | - | - | - | - | - | - | 1 | 1 |
| 18_EE 191.3 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Paper Name: Basic Electronics Engineering Lab**
**Paper Code: 18_EC 191**
**Contacts: 3P/Week**
**Credit: 1.5**

**Course Objective**

The objectives of this course are

1. To prepare the students to have a basic knowledge of active and passive components.
2. To build knowledge to distinguish pure and impure DC signals.
3. To grow measuring ability of signals through multi meter and CRO
4. To understand characteristics of proper biasing for BJT and FET.
5. To encourage in developing circuits using diodes, transistors, FETs and OPAMPs.

| Course Name | COs | CO Statement |
|---|---|---|
| BASIC ELECTRONICS ENGINEERING Lab (EC191) | 18_EC191.1 | Students able to identify different types of passive and active electronic components |
| | 18_EC191.2 | Students able to demonstrate the working of CRO , Function Generator ,Digital Multimeter and D.C. power supply |
| | 18_EC191.3 | Students able to sketch the I-V characteristics of ordinary diode , Zener diode , BJTs and FET |
| | 18_EC191.4 | Students able to construct the rectifier circuit using diode and Inverting and Non-inverting amplifiers Circuit using Op-Amp |
| | 18_EC191.5 | Students able to determine the characteristics parameters of actual Op-Amps |
| | 18_EC191.6 | Students able to validate the truth table of basic logic gates using digital IC |

**List of Experiments:**

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT)
2. Familiarization with measuring and testing equipment like Digital Multimeter, CRO, Signal generators and Power Supply etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.
7. Study of I-V characteristics of Field Effect Transistors.
8. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
9. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
10. Study of OPAMP circuits: Inverting and Non-inverting amplifiers.
11. Verification of truth table of basic logic gates using IC
12. Innovative Experiment

**Mapping of COs with POs**

| **COs** | **PO1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO1 0** | **PO1 1** | **PO1 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_EC191.1** | **3** | **2** | **1** | **1** | **-** | **-** | **-** | **1** | **2** | **2** | **1** | **2** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_EC191.2** | **3** | **2** | **1** | **2** | **2** | **-** | **-** | **1** | **2** | **2** | **1** | **2** |
| **18_EC191.3** | **3** | **3** | **1** | **1** | **2** | **-** | **-** | **1** | **2** | **1** | **1** | **2** |
| **18_EC191.4** | **3** | **3** | **3** | **2** | **2** | **1** | **1** | **1** | **3** | **2** | **2** | **3** |
| **18_EC191.5** | **3** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **1** | **2** |
| **18_EC191.6** | **3** | **3** | **3** | **1** | **-** | **-** | **-** | **-** | **2** | **1** | **2** | **2** |

**N.B. : 3 = Highly Mapped, 2=Moderately Mapped, 1=Slightly Mapped, Not Mapped = '-'**

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Subject Name:** Engineering Graphics & Design

**Paper / Subject Code:** 18_ME 191

**Total Contact Hours:** 36

**Credit:** 1.5

**Prerequisite:** Basic knowledge of geometry

**Course Objectives:**

To learn detailed drawing and modeling of a system, component, or process which meets desired needs within realistic constraints. It will help students to use the techniques, skills, and modern engineering tools and communicate effectively.

**Course Outcomes:** On successful completion of the course the student will be able to

1. Get introduced with Engineering Graphics and visual aspects of design.
2. Know and use common drafting tools with the knowledge of drafting standards.
3. Apply computer aided drafting techniques to represent line, surface or solid models in different engineering viewpoints.
3. Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

**Course Content:**

**Traditional Engineering Graphics**:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

**Computer Graphics**:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling.

**Module 1: Introduction to Engineering Drawing (6P)**

Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

**Module 2: Orthographic & Isometric Projections (9P)**

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Projection of Solids inclined to both the Planes- Auxiliary Views; Isometric Scale, Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa.

**Module 3: Sections and Sectional Views of Right Angular Solids (6P)**

Drawing sectional views of solids for Prism, Cylinder, Pyramid, Cone and project the true shape of the sectioned surface, Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw sectional orthographic views of objects from industry and dwellings (foundation to slab only)

**Module 4: Overview of Computer Graphics (3P)**

Demonstration of CAD software [The Menu System, Toolbars (Standard, Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Zooming methods, Select and erase objects].

**Module 5: CAD Drawing, Customization, Annotations, layering (6P)**

Set up of drawing page including scale settings, ISO and ANSI standards for dimensioning and tolerancing; Using various methods to draw straight lines, circles, applying dimensions and annotations to drawings; Setting up and use of Layers, Changing line lengths (extend/lengthen); Printing documents; Drawing sectional views of solids and project the true shape of the sectioned surface; Drawing annotation, CAD modeling of parts and assemblies with animation, Parametric and non parametric solid, surface and wireframe modeling, Part editing and two dimensional documentation of models.

**Module 6:**

**Demonstration of a simple team design project (6P)**

Illustrating Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; Meshed topologies for engineering analysis and tool-path generation for component manufacture, Use of solid-modeling software for creating associative models at the component and assembly levels.

## Project Domain

2D and 3D modeling of Machine parts or Households.

**Text Books:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2. (Corresponding set of) CAD Software Theory and User Manuals

**References:**

1. K. Venugopal Engineering Drawing + AutoCAD, New Age International publishers
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
3. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | - | 1 | - | 1 | 1 | - | 1 | 2 | 1 | - | - |
| **CO2** | 2 | 1 | 2 | - | 1 | 1 | - | 2 | 1 | 2 | 1 | 1 |
| **CO3** | 2 | 1 | 3 | 2 | 3 | - | - | 2 | 2 | 2 | 1 | 1 |
| **CO4** | 2 | 1 | 3 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Subject Name:** Workshop/Manufacturing Practices

**Paper / Subject Code: 18_**ME 192

**Total Contact Hours:** 36

**Credit:** 1.5

**Prerequisite:** Higher Secondary with Mathematics, Physics and Chemistry

**Course Objectives:**

To understand the basic knowledge of Workshop Practice and Safety. To identify and use of different hand tools and other instruments like Hack Saw, Jack Plane, Chisels etc. and operations like Marking, Cutting etc. To expose students to different types of manufacturing/fabrication processes

**Course Outcomes:** Upon completion of this laboratory course, students will be able to

1. Fabricate components with their own hands.
2. Get practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.
3. Produce small devices of their interest for project or research purpose.

**Course Content:**

**(i) Theoretical discussion & videos: (6P)**

Detailed contents:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations & power tools
3. Carpentry
4. Welding (arc welding & gas welding), brazing
5. Electrical & Electronics
6. Metal casting
7. CNC machining, Additive manufacturing
8. Plastic moulding& Glass Cutting.

**(ii) Workshop Practice:**

**Module 1 - Machine shop (6P)**

Typical jobs that may be made in this practice module:

i. To make a pin from a mild steel rod in a lathe.

ii. To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine.

**Module 2 - Fitting shop (6P)**

Typical jobs that may be made in this practice module:

i. To make a Gauge from MS plate.

**Module 3 - Carpentry** **(6P)**

Typical jobs that may be made in this practice module:

i. To make wooden joints and/or a pattern or like.

**Module 4 - Welding shop (Arc welding 3P + gas welding 3P)** **(6P)**

Typical jobs that may be made in this practice module:

i. ARC WELDING (3P): To join two thick (approx 5mm) MS plates by manual metal arcwelding.

ii. GAS WELDING (3P): To join two thin mild steel plates or sheets by gas welding.

**Module 5 - Electrical & Electronics** **(3P)**

House wiring, soft Soldering

**Module 6 - Smithy** **(3P)**

Typical jobs that may be made in this practice module:

i. A simple job of making a square rod from a round bar or like.

**For further study (Optional)**

**Module 7 - Casting**

Typical jobs that may be made in this practice module:

i. One/ two green sand moulds to prepare, and a casting be demonstrated.

**Module 8 - Plastic moulding & Glass Cutting**

Typical jobs that may be made in this practice module:

i. For plastic moulding, making at least one simple plastic component should be made.

ii. At least one sample shape on glass should be made using laser cutting machine.

**Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.**

**Project domain:** Carpentry, Machining, Welding, Casting, Smithy, Advanced manufacturing processes

**Text Books:**

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of WorkshopTechnology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

**References:**

1. Gowri P., Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.
2. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
3. Kalpakjian S. and Steven S. Schmid, Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.
4. Manufacturing Science by A.Ghosh and A.K.Mallick, Wiley Eastern.
5. Principles of Metal Cutting/Principles of Machine Tools by G.C.Sen and A.Bhattacharya, New Central Book Agency, Kolkata.

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 1 | 2 | 1 | 1 | - | - | - | 2 | 1 | - | 2 |
| **CO2** | 3 | 3 | 2 | 2 | 1 | - | - | - | 2 | 1 | - | 2 |
| **CO3** | 3 | 2 | 2 | 2 | 1 | 1 | - | 1 | 2 | 2 | 3 | 2 |

## Sessional

**Paper Name: Extra Curricular Activity**
**Paper Code: 18_XC 181**
**Total Contact hours: 20**
**Credit: 1**

**Course Objectives**: The objectives of the course are as follows:

- To increase student awareness about the weaker and unprivileged sections of society
- To expose students to environmental issues and ecological concerns
- To make students self aware about their participatory role in sustaining society and the environment

**Course contents**

**List of Activities:**

a) Creating awareness in social issues
b) Participating in mass education programmes
c) Proposal for local slum area development
d) Waste disposal
e) Environmental awareness ``
f) Production Oriented Programmes

g) Relief & Rehabilitation work during Natural calamities

Creating awareness in social issues:

1. Women's development – includes health, income-generation, rights awareness.
2. Hospital activities – Eg. writing letters for patients, guiding visitors
3. Old age home – visiting the aging in-mates, arranging for their entertainment.
4. Children's Homes - visiting the young in-mates, arranging for their entertainment
5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
6. Gender issues- Developing an awareness, to link it with Women's Cell of college

Participating in mass education programmes

1.Adult education

2. Children's education

Proposal for local slum area development

One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

Environmental awareness

• Resource conservation – Awareness to be developed on water, energy,soil.
• Preservation of heritage monuments- Marches, poster campaigns
• Alternative energy consciousness amongst younger school-children.
• Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.
• Waste disposal- Proper methods of domestic waste disposal.

Production Oriented Programmes

5. Working with people and explaining and teaching improved agricultural practices
6. Rodent control land pest control practices;
7. Soil-testing, soil health care and soil conservation;
8. Assistance in repair of agriculture machinery;
9. Work for the promotion and strengthening of cooperative societies in villages;
10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
11. Popularization of small savings and
12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

g) Assisting the authorities in distribution of rations, medicine, clothes etc.;

h) Assisting the health authorities in inoculation and immunization, supply of medicine etc.;

i) Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;

j) Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;

# Curriculum for B.Tech 2nd Semester

## Under Autonomy (**GR A:** ECE, EE, EIE, BME; **GR B:** CSE, IT, ME, CE, FT)

| Sl No | Paper Code | Theory | Contact Hours /Week | | | | Credit Points |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | Total | |
| **A. THEORY** | | | | | | | |
| 1 | 18_M 201 | Mathematics -II | 3 | 1 | 0 | 4 | 4 |
| 2 | 18_CH 201/ 18_PH 201 | Chemistry-I(Gr. B) / Physics - I(Gr. A) | 3 | 0 | 0 | 3 | 3 |
| 3 | 18_EE 201/ 18_EC 201 | Basic Electrical Engineering (Gr. B) / Basic Electronics Engineering (Gr. A) | 3 | 0 | 0 | 3 | 3 |
| 4 | 18_CS 201 | Programming for Problem Solving | 3 | 0 | 0 | 3 | 3 |
| 5 | 18_ME 201 | Engineering Mechanics | 3 | 0 | 0 | 3 | 3 |
| **Total of Theory** | | | | | | **16** | **16** |
| **B. PRACTICAL** | | | | | | | |
| 6 | 18_CS291 | Programming for Problem Solving Lab | 0 | 0 | 3 | 3 | 1.5 |
| 7 | 18_CH 291/ 18_PH 291 | Chemistry I Lab (Gr. B) / Physics - I Lab (Gr. A) | 0 | 0 | 3 | 3 | 1.5 |
| 8 | 18_EE 291/ 18_EC 291 | Basic Electrical Engineering Lab (Gr. A) / Basic Electronics Engineering Lab (Gr. B) | 0 | 0 | 3 | 3 | 1.5 |
| 9 | 18_ME 191/ 18_ME 192 | Engineering Graphics & Design (Gr B) /Workshop/Manufacturing Practice (Gr-A) | 0 | 0 | 3 | 3 | 1.5 |
| 10 | 18_HU 291 | Language Lab and Seminar Presentation | 0 | 0 | 2 | 2 | 1 |
| **C.SESSIONAL** | | | | | | | |
| 11 | 18_XC 281 | Extra-Curricular Activity II | 0 | 0 | 0 | 0 | 2 Units |
| **D. PROJECT*** | | | | | | | |
| 12 | **Project Code** | **Project Name** | **Contact Hours /Week** | | | | **Credit Points** |
| | 18_M 251 | Mathematics Project | 1 | | | | 0.5 |
| | 18_CS 251 | Programming for Problem Solving Project | 1 | | | | 0.5 |
| | 18_ME 251 | Engineering Mechanics Project | 1 | | | | 0.5 |
| | 18_CH 251/ 18_PH 251 | Chemistry Project (Gr. B) / Physics Project (Gr. A) | 1 | | | | 0.5 |
| | 18_EE 251/ 18_EC 251 | Basic Electrical Project (Gr. B) /Basic Electronics Project (Gr. A) | 1 | | | | 0.5 |
| **Total of Theory, Practical, Sessional & Project** | | | **32** | | | | **23+1** |

* Student need to select any two projects (Total Credit: 0.5+0.5=1)

# Syllabus

## Theory

**Course Name: 18_Mathematics - II**
**Course Code: M 201**
**Total Contact Hours: 42**
**Credit: 4**

**Prerequisite:**

The students to whom this course will be offered must have the concept of (10+2) standard calculus.

**Course Objectives:**

The objective of this course is to disseminate the prospective engineers with techniques in multivariable calculus, ordinary differential equations and Laplace transform. It aims to equip the students with concepts and tools at an intermediate to advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcomes (COs):**
On successful completion of the learning sessions of the course, the learner will be able to:

| CODES | BLOOM'S TAXONOMY | DESCRIPTIONS |
|---|---|---|
| **18_M 201.1** | Applying | Use mathematical tools to evaluate multiple integrals and vector integrals |
| **18_M 201.2** | Applying | Apply effective mathematical tools for the solutions of ordinary differential equations that model physical processes. |
| **18_M 201.3** | Remembering | Recall the properties of Laplace Transform to evaluate multiple integrals and their usage |
| **18_M 201.4** | Understand | Understand the concept of Laplace transform to solve ordinary differential equations. |

**Course Content:**

***Module I: Multivariable Calculus (Integration): (10 Lectures)***

Double integration, Change of order of integration in double integrals, Triple integrals, vector line integrals, scalar surface integrals, vector surface integrals, Green's theorem, Gauss divergence theorem and Stokes' theorem.

***Module II: First Order Ordinary Differential Equations (ODE): (10 Lectures)***

Solution of first order and first degree ODE: Exact ODE, Rules for finding Integrating factors, Linear ODE, Bernoulli's equation, Solution of first order and higher degree ODE: solvable for $p$, solvable for $y$ solvable for $x$ and Clairaut's equation.

***Module III: Second Order Ordinary Differential Equations (ODE): (10 Lectures)***

Solution of second order ODE with constant coefficients: C.F. & P.I., Method of variation of parameters, Cauchy-Euler equations, Reduction of 2nd order ODE to a pair of first order ODEs, Solution of simultaneous linear ODEs.

***Module IV: Laplace Transform (LT): (12 Lectures)***

Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property, LT of $t\,f\,(t)$ , LT of $\frac{f\,(t)}{t}$, LT of derivatives of f (t), LT of $\int f(t)dt$, Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties, Convolution theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT.

**Project Domains:**

6. Application of multivariable integration.
7. Study on Green's theorem, Gauss divergence theorem and Stokes' theorem.
8. Mathematical modeling using ODE.
9. Application of ODE.
10. Mathematical modeling of an electrical circuit using LT.

**Text Books:**


6. Kreyszig, E., Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
7. Ramana, B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
8. Veerarajan, T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
9. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
10. Bali, N.P. and Goyal, M., A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.


**Reference Books:**


7. Thomas, G.B. and Finney, R.L., Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
8. Boyce, W. E. and DiPrima, R. C., Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
9. Ross, S. L., Differential Equations, 3rd Ed., Wiley India, 1984.
10. Piskunov, N., Differential and Integral Calculus, Vol. I & Vol. II, Mir Publishers, 1969.
11. Coddington, E. A., An Introduction to Ordinary Differential Equations, Prentice Hall, India, 1995.


**CO-PO Mapping:**

| PO / CO | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **P10** | **P11** | **P12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_M 201.1** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **18_M 201.2** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| **18_M 201.3** | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| **18_M 201.4** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 1 |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Subject : Chemistry 1**
**Subject Code: 18_CH201**
**Credits : 3**
**Contact hour: 35**

**Pre requisites:** Knowledge of Chemistry up to 12th standard.

**Course Objective**

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

**Course Outcomes**

**18_CH 201.1:** Able to describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table
**18_CH 201.2:** Able to apply fundamental concepts of thermodynamics in different engineering applications.
**18_CH 201.3:** Able to apply the knowledge of water quality parameters, corrosion control & polymers to different industries.
**18_CH 201.4:** Able to determine the structure of organic molecules using different spectroscopic techniques.
**18_CH 201.5:** Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

## Detailed Contents

**Module I: Inorganic Chemistry (8 L)**

**(iv) Atomic structure (4 Lectures)**

Bohr's theory to hydrogen-like atoms and ions; spectrum of hydrogen atom. Quantum numbers, Introduction to the concept of atomic orbitals, diagrams of s, p and d orbitals, Pauli's exclusion principle, Hund's rule, exchange energy, Aufbau principle and its limitation, introduction to Schrodinger equation.

**(v) Periodic properties (4 Lectures)**

Modern Periodic table, group trends and periodic trends in physical properties: electron affinity, electronegativity, polarizability, oxidation states, effective nuclear charges, penetration of orbitals, variations of s, p and d orbital energies of atoms.

**Module II: Physical Chemistry (8 L)**

**(vi) Use of free energy in chemical equilibria (6 lectures)**

Thermodynamic functions: internal energy, enthalpy, entropy and free energy. 2nd Law of Thermodynamics, Estimations of entropy and free energies, Free energy and emf, Cell potentials, the Nernst equation and applications.

**(iv) Real Gases (2 lectures)**

Reason for deviation of real gases from ideal behavior, Equations of state of real gases,

Vander Waals' equation, pressure & volume correction, validity, critical state of gas.

**Module III: Organic Chemistry (8 L)**

**(v) Stereochemistry (4 lectures)**

Representations of 3 dimensional structures, Chirality, optical activity, isomerism, structural isomerism, stereoisomers, enantiomers, diastereomers, configurations (D,L & cis trans), racemisation.

**(vi) Organic reactions (4 lectures)**

Concepts of inductive effect, resonance, hyperconjugation, introduction to reactions involving substitution, addition, elimination, oxidation (Baeyer villiger oxidation), reduction (Clemmensen reduction, Wolff-Kishner reduction)

**Module IV: Industrial Chemistry 8L**

**(vii) Water (2 lectures)**

Hardness, alkalinity, numerical

**(viii) Corrosion. (2 lectures)**

Types of corrosion: wet & dry, preventive measures

**(ix) Polymers (3 lectures)**

Classification of polymers, conducting polymers, biodegradable polymers

**(x) Synthesis of a commonly used drug molecule. (1 lecture)**

Paracetamol, Aspirin

**Module V: Spectroscopic techniques in Chemistry (3L)**

Electromagnetic radiation, Principles of spectroscopy, spectrophotometer, infrared spectroscopy, fingerprint region, functional group region, UV-VIS spectroscopy, $^{1}H$ Nuclear magnetic resonance spectroscopy, chemical shift

**Project Domain**

13. Application of Thermodynamics
14. Application of polymers in daily life
15. Nanomaterials and its applications
16. Determination of water quality parameters
17. Electronic storage devices
18. Managing E –wastes
19. Application of chemistry in core engineering
20. Application of spectroscopy in medical field
21. Applications of green chemistry
22. Merits of commercial organic products
23. Bioplastics
24. Any other related topics

**Suggested Text Books**

(vi) A Text Book of Organic Chemistry, Arun Bahl & Arun Bahl
(vii) General & Inorganic Chemistry, P.K. Dutt
(viii) General & Inorganic Chemistry, Vol I, R.P. Sarkar
(ix) Physical Chemistry, P.C. Rakshit

**Reference Books**

(x) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane (iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(vii)Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(viii) Physical Chemistry, by P. W. Atkins
(ix) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

**CO v/s PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | 2 | - | - | - | - | 1 | 2 | 2 | 2 |
| 2 | 3 | 3 | 3 | 3 | - | - | - | - | 1 | 1 | 2 | 3 |
| 3 | 3 | 3 | 2 | 1 | - | 2 | 1 | - | 1 | - | 3 | 3 |
| 4 | 3 | 2 | 3 | 2 | - | - | 1 | - | 1 | 2 | 3 | 3 |
| 5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | - | 1 | - | 2 | 3 |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Paper Name: Physics –I**
**Paper Code: 18_PH 201**
**Total Contact Hours: 34**
**Credit: 3**
***Weekly 3L + 1T+1Project proposed to implement the project based study**

**Pre requisites:** Knowledge of Physics up to 12th standard.

**Course Objective:**

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

**Course Outcome (CO)**

At the end of the course students' should be able to

| | |
|---|---|
| **18_PH 201.1 : define**<br>➢ **De-Broglie hypothesis, and Heisenberg's Uncertainty Principle**<br>➢ **Amplitude and Velocity Resonance**<br>➢ **Malus's Law, Brewster's Law**<br>➢ **Characteristics of LASER light**<br>➢ **Intrinsic and extrinsic semiconductor.** | |

| | |
|---|---|
| **18_PH 201.2 : explain**<br>➢ **Polarizer and analyzer**<br>➢ **basic principles and different types of LASER and Optical Fibre**<br>➢ **structure of solids, Miller indices**<br>➢ **theory of Matter Wave, equation of motion of Matter Wave**<br>➢ **wave function and its role in representing wave nature of matter**<br>➢ **p-n junction.** | |
| **18_PH 201. 3 : apply the knowledge of**<br>➢ **mechanical vibration in electrical circuits**<br>➢ **superposition principle in Newton's ring phenomenon, diffraction phenomenon**<br>➢ **quantum nature of e.m. waves for production of laser**<br>➢ **total internal reflection in transmitting light through optical fibres**<br>➢ **x-ray diffraction in crystal structure**<br>➢ **probability interpretation in Heisenberg's uncertainty principle** | |
| **18_PH 201.4 : analyze**<br>➢ **grating as many slit system**<br>➢ **role of Q factor in a resonating circuit, conditions of different types of resonance**<br>➢ **minimum requirements for lasing action**<br>➢ **importance of light as a carrier of information**<br>➢ **the failures of classical physics in microscopic situation and need of quantum physics**<br>➢ **Einstein's A, B coefficient and predict the wavelength domain of Lasing action**<br>➢ **Requirement of Miller indices for describing crystallographic planes** | |
| **18_PH 201.5 : judge**<br>➢ **X-ray production process is inverse of the process of Photoelectric Effect.**<br>➢ **different crystallographic structures according to their Co-ordination number and packing factors**<br>➢ **the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter** | |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_PH 201.1** | **3** | - | - | - | - | - | - | - | - | - | - | 2 |
| **18_PH 201.2** | **3** | - | - | - | - | - | - | - | - | - | - | 2 |
| **18_PH 201.3** | **3** | 2 | - | - | - | - | - | - | - | - | - | 1 |
| **18_PH 201.4** | 2 | **3** | - | - | - | - | - | - | - | - | - | 1 |
| **18_PH 201.5** | 1 | **3** | - | - | - | - | - | - | - | - | - | **1** |
| **18_PH 201** | 2.4 | **2.6** | - | - | - | - | - | - | - | - | - | **1.4** |

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Paper Name: Basic Electrical Engineering**
**Paper Code: 18_EE201**
**Contact hours: 3L per week**
**Credit: 3**

**Pre-requisites**

- **Basic 12$^{th}$ standard Physics and Mathematics.**
- **Concept of components of electric circuit.**

**Course Objective**

To introduce the students to basic principles of DC and AC circuits, Electrical Machines and Electrical Systems.

**Course Outcome**

At the end of this course, students will able

**18_EE 201.1.** To understand Basic Electrical circuits, Power distribution and Safety measures.

**18_EE 201.2** To analyze an apply DC network theorems.

**18_EE 201.3** To analyze and apply concept of AC circuits of single-phase and three-phase.

**18_EE 201.4** To analyze and apply concepts of AC fundamentals in solving AC network problems.

**18_EE 201.5** To understand basic principles of Transformers and Rotating Machines.

**Course contents**

**Module I: DC Circuits (8L)**

Definition of electric circuit, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, node, branch, active and passive elements, Kirchhoff's laws, Source

equivalence and conversion, Network Theorems - Superposition Theorem, Thevenin's Theorem, Norton Theorem, Maximum Power Transfer Theorem, Star-Delta Conversions.

**Module II: AC Fundamentals (8L)**

Sinusoidal quantities, Average and RMS values, peak factor, Form factor, Phase and Phase difference, concept of phasor diagram, V-I Relationship in R, L, C circuit, Combination R-L-C in series and parallel circuits with phasor diagrams, impedance and admittance, impedance triangle and power triangle, Power factor, concept of resonance, Power in AC circuit, simple problems (series and parallel circuit only), Three-phase balanced circuits, Concept of three-phase power measurement.

**Module III: Single-Phase Transformer (4L)**

Brief idea on constructional parts, classifications, working principle. Problems on EMF equation. Phasor diagram, Equivalent circuit.

**Module IV: Electrical Rotating Machines (7L)**

**a) DC Machines (4L)**

Brief idea on constructional features, classifications, working principle of both motor and generator. Simple problems on Voltage equation.

**b) Three-Phase Induction Motor (3L)**

Basic concept of three phase circuit and production of rotating magnetic field. Working principle of three-phase induction motor and torque-speed characteristics (concept only). No numerical problem.

**Module V: General Structure of Electrical Power System (1L)**

Power generation to distribution through overhead lines and underground cables with single line diagram.

**Module VI: Electrical Installations (2L)**

Earthing of Electrical Equipment, ideas of basic components- MCB, MCCB, ELCB, SFU, Megger.

**Project Domains:**

e) **DC Network Theorem**

f) **R-L-C Circuit**

g) **Transformers**

h) **DC Motors**

**Text books:**


6. D. P. Kothari & I. J. Nagrath, Basic Electrical Engineering, TMH.
7. V. Mittle & Arvind Mittal, Basic Electrical Engineering, TMH.

8. Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication.
9. Chakrabarti,Nath & Chanda, Basic Electrical Engineering, TMH.
10. C.L. Wadhwa, Basic Electrical Engineering, Pearson Education.

**Reference books**

3. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
4. V. D. Toro, "Electrical Engineering Fundamentals", Printice Hall India, 1989.

**CO-PO Mapping:**

| | PO1 | PO2 | PO 3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EE 201.1 | 3 | 1 | - | - | - | 2 | - | - | - | 2 | 2 | 1 |
| 18_EE 201.2 | 2 | 3 | - | - | - | - | - | - | - | - | 1 | 1 |
| 18_EE 201.3 | 2 | 3 | 1 | - | - | - | - | - | - | - | 1 | 1 |
| 18_EE 201.4 | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 1 |
| 18_EE 201.5 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Subject Name:** Basic Electronics Engineering

**Paper/Subject Code:** 18_EC201

**Total Contact Hours:** 3L/Week (Total 34 L)

**Credit:** 3

**Prerequisite:**

Electric current and voltage-D.C and A.C., Complex impedance, conductivity, resistivity, transformer, charging and discharging of capacitor, active and passive elements.

**Course Objective:**

6. To understand the behavior of Conductors, Insulators, and Semiconductors based on energy-band theory and relevant problems.
7. To instill the knowledge of working principles of P-N Junction Diode, Zener diode and analyze their applications in the rectifier, clipper, clamper, regulator etc.
8. To familiarize with the characteristics of Bipolar junction transistor(BJT) under CE, CE,

CC mode of operation and its biasing mechanisms.

9. To understand working principles of JFET, MOSFET and perform operations under CG, CS, CD configurations for parametric observation.
10. To determine the parameters due to the effect of feedback in amplifier to ,adder circuit , integrator and differentiator circuit using Operational Amplifier

**Course Outcome:**

| Course Name | COs | CO Statement |
|---|---|---|
| BASIC ELECTRONICS ENGINEERING (18_EC201) | 18_EC201.1 | Students able to describe the fundamentals of Semiconductors |
| | 18_EC201.2 | Students able to explain V-I characteristics of P-N Junction Diode, zener diode , working of diode rectifier, clipper, clamper, and regulator circuit |
| | 18_EC201.3 | Students able to analyze characteristics of Bipolar junction transistor(BJT) under CE, CB, CC mode of operation and its biasing therein |
| | 18_EC201.4 | Students able to illustrate the operations of JFET, MOSFET and the CS,CD , CG configuration using JFET |
| | 18_EC201.5 | Students able to determine parameters due to effect of feedback in amplifier |
| | 18_EC201.6 | Students able to construct inverting amplifier circuit , non-inverting amplifier circuit ,adder circuit , integrator and differentiator circuit using Operational Amplifier IC |

**Course Content:**

**Module-I: Basics of semiconductor (6L)**

Conductors, Insulators, and Semiconductors- crystal structure, Fermi Dirac function, Fermi level, Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic ( p-type and n-type) semiconductors, position of Fermi level in intrinsic and extrinsic semiconductor, drift and diffusion current – expression only ( no derivation) , mass action law , charge neutrality in semiconductor, Einstein relationship in semiconductor , Numerical problems.

**Module-II: P-N Junction Diode and its applications (8L)**

p-n junction formation and depletion region, energy band diagram of p-n junction at equilibrium and barrier energy, built in potential at p-n junction, energy band diagram and current through p-n junction at forward and reverse bias, Static and Dynamic resistance of Diode, Transition capacitance and diffusion capacitance, V-I characteristics and current expression of diode, temperature dependencies of V-I characteristics of diode, p-n junction breakdown – conditions, avalanche and Zener breakdown, Concept of Junction capacitance, Zener diode and characteristics.

Diode half wave and full wave rectifiers (centre tapped and bridge) circuits and operation ($I_{DC,}$ $I_{rms}$, $V_{Dc,}$ $V_{rms)}$, ripple factor without filter, efficiency, PIV, TUF; Reduction of ac ripples using filter circuit (Qualitative analysis); Design of diode clipper and clamper circuit - explanation with example, application of Zener diode in regulator circuit. Numerical problems.

**Module-III: Bipolar junction transistor (BJT) (6L)**

Concept of "Transistor", Formation of PNP/NPN Transistors, energy band diagram, current conduction mechanism, CE, CB, CC configurations, transistor static characteristics in CE, CB

and CC mode, junction biasing condition for active, saturation and cut-off modes, current gain α, β and γ, early effect.
Biasing and bias stability; biasing circuits - fixed bias; voltage divider bias; collector to base bias, D.C. load line and Quiescent point, calculation of stability factors for different biasing circuits.
BJT as an amplifier and as a switch – Graphical analysis; Numerical Problems.

**Module-IV: Field effect transistor (FET) (6L)**
Concept of "field effect", Classification of FETs-JFET, MOSFET, operating principle of JFET. Drain and transfer characteristics of JFET (n-channel and p-channel), CS, CG, CD configurations, Relation between JFET parameters. FET as an amplifier and as a switch– graphical analysis. E-MOSFET (n-channel and p-channel), D-MOSFET (n-channel and p-channel), Numerical Problems.

**Module-V: Feedback and Operational Amplifier (8L)**

Concept of feedback with block diagram, positive and negative feedback, gain with feedback. Feedback topologies, effect of feedback on input and output impedance, distortion, concept of oscillation and Barkhausen criterion.
Operational amplifier – electrical equivalent circuit, ideal characteristics, non-ideal characteristics of op-amp – offset voltages; bias current; offset current; Slew rate; CMRR and bandwidth, Configuration of inverting and non-inverting amplifier using Op-amp, closed loop voltage gain of inverting and non-inverting amplifier, Concept of virtual ground, Applications op-amp – summing amplifier; differential amplifier; voltage follower; basic differentiator and integrator, Numerical Problems.

**Project Domains:**

5. Zener diode in voltage regulation
6. Amplifier design using BJT
7. Amplifier design using FET
8. Circuit design using Op-Amp

**Mapping of COs with POs**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EC201.1 | 3 | 2 | 1 | 1 | - | - | - | - | - | 2 | - | 1 |
| 18_EC201.2 | 3 | 3 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | 2 |
| 18_EC201.3 | 3 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 1 | 1 |
| 18_EC201.4 | 3 | 2 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 |
| 18_EC201.5 | 3 | 2 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | 2 |
| 18_EC201.6 | 3 | 3 | 3 | 1 | - | - | - | - | 2 | 1 | 2 | 3 |

**N.B. : 3 = Highly Mapped, 2=Moderately Mapped , 1=Slightly Mapped , Not Mapped = '-'**

**Programming for Problem Solving**

**Code: 18_CS 201**
**Contacts: 3L + 0T = 3**
**Total No. of Lectures: 35**
**Credits: 3**

**Course Outcome(s):**

**On completion of the course students will be able to**

| | |
|---|---|
| **18_CS 201.1** | **Understand** and **differentiate** among different programming languages for problem solving. |
| **18_CS 201.2** | **Describe** the way of execution and **debug** programs in C language. |
| **18_CS 201.3** | **Define**, **select**, and **compare** data types, loops, functions to solve mathematical and scientific problem. |
| **18_CS 201.4** | **Understand** the dynamic behavior of memory by the use of pointers. |
| **18_CS 201.5** | **Design** and **develop** modular programs using control structure, selection structure and file. |

**Fundamentals of Computer: (7 L)**

History of Computer, Generation of Computer, Classification of Computers, Basic structure of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices 2L

Binary and Allied number systems representation of signed & unsigned numbers, BCD, ASCII, Binary number Arithmetic – Addition and Subtraction (using 1's complement and 2's complement) 2L

Overview of Procedural vs Structural language, compiler and assembler (basic concepts) 1L

Problem solving-Algorithm & flow chart
2L

**C Fundamentals: (28 L)**

**Variable and Data Types:**
The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements 2L

**C Operators & Expressions:**
Arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, conditional operators, special operators - type conversion, C expressions, precedence and associativity.

Input and Output: Standard input and output, formatted output - printf, formatted input scanf, bit fields 4L

**Branching and Loop Statements:**
Statement and blocks, if - else, switch, goto and labels, Loops - while, for, do while, break and continue 4L

**Fundamentals and Program Structures:**
auto, external, static and register variables
Functions, function types, function prototypes, functions returning values, functions not returning values, scope rules, recursion, C preprocessor and macro 5L

**Arrays, Strings and Pointers:**
One dimensional arrays, Two-dimensional arrays, Multidimensional arrays. Passing an array to a function
Character array and string, array of strings, Passing a string to a function, String related functions
Pointers, Pointer and Array, Pointer and String, Pointer and functions, Dynamic memory allocation 7L

**Structures and Unions:**
Basic of structures, arrays of structures, structures and pointers, structures and functions 3L

**Files handling with C:**
formatted and unformatted files, Command line arguments, fopen, fclose, fgetc, fputc, fprintf, fscanf function 3L

**Text book:**
Kerninghan B.W. & Ritchie D.M. - The C Programming Language ,PHI, 2nd Edition

Kanetkar Y. - Let us C, BPB Publication, 15th Edition

**Recommended reference Books:**

E Balagurusamy – Programming in ANSI C, TMH, 3rd Edition

K R Venugopal & S R Prasad – MASTERING C, TMH, 2nd Edition

Reema Thareja – INTRODUCTION TO C PROGRAMMING, OXFORD UNIVERSITY PRESS, 2nd Edition

**Mapping with Program Outcomes (POs) and Program Specific Outcomes (PSOs)**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_CS 201.1** | 3 | 2 | 1 | 1 | | | 1 | | 3 | 3 | 1 | 1 |
| **18_CS 201.2** | 2 | 2 | 3 | 3 | 2 | 2 | | | 3 | 3 | 3 | 3 |
| **18_CS 201.3** | 2 | 2 | 2 | 2 | 2 | 1 | | | 3 | 3 | 1 | 3 |
| **18_CS 201.4** | 3 | 2 | 2 | 2 | 2 | 3 | | | 3 | 3 | 2 | 3 |
| **18_CS 201.5** | 3 | 3 | 3 | 3 | 2 | 3 | | | 3 | 3 | 3 | 3 |
| **18_CS201** | 3 | 2 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 2 | 3 |

**Subject Name: Engineering Mechanics**

**Paper/Subject Code: 18_ME 201**

**Total Contact Hours: 36**

**Credit: 3**

**Course Objective:**

This course teaches students how to apply Newtonian physics to relatively simple real life applications. This course covers statics, dynamics and elementary part of strength of materials.

**Course Outcome(s):**

1. To understand the vector and scalar representation of force and moments.
2. To draw free-body diagrams and writes the equilibrium equations from the free-body diagram.
3. To analyze systems in static condition that includes frictional forces.
4. To locate the centroid of an area applying the concept of distributed forces.
5. Applications of conservation of momentum & energy principle.
6. Understanding of elementary concept of strength of materials applicable to mechanical system design.

**Course Content, i.e. detail syllabus:**

**Module 1*: Introduction to Engineering Mechanics*** covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

**Module 2: Friction covering**, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack.

**Module 3: Basic Structural Analysis** covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.

**Module 4: Centroid and Centre of Gravity** covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

**Module 5: Virtual Work and Energy Method**- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

**Module 6: Review of particle dynamics-** Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's $2^{nd}$ law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy.Impulse-momentum (linear, angular); Impact (Direct and oblique).

**Module 7: Introduction to Kinetics of Rigid Bodies** covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

**Module8: Mechanical Vibrations** covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

**Tutorials from the above modules** covering, To find the various forces and angles including resultants in various parts of wall crane, roof truss, pipes, etc.; To verify the line of polygon on various forces; To find coefficient of friction between various materials on inclined plan; Free

body diagrams various systems including block-pulley; To verify the principle of moment in the disc apparatus; Helical block; To draw a load efficiency curve for a screw jack.

**1. Text books:**


1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3. R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
4. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
5. Shanes and Rao (2006), Engineering Mechanics, Pearson Education,
6. Hibler and Gupta (2010),Engineering Mechanics (Statics, Dynamics) by Pearson Education


**2. Reference books:**


1. Reddy Vijaykumar K. and K. Suresh Kumar(2010), Singer's Engineering Mechanics
2. Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
3. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
4. Tayal A.K. (2010), Engineering Mechanics, Umesh Publications


**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **18_ME 201.1** | 3 | 3 | 2 | 2 | - | - | - | - | 1 | - | - | - |
| **18_ME 201.2** | 3 | 3 | 2 | 2 | - | - | - | - | 1 | - | - | 1 |
| **18_ME 201.3** | 3 | 2 | 3 | 2 | 1 | - | - | - | 1 | - | - | 1 |
| **18_ME 201.4** | 3 | 3 | 3 | 3 | - | - | - | - | 1 | - | 1 | - |

## Practical

**Paper Name: Programming for Problem Solving Lab**
**Paper Code : 18_CS291**
**Total contact hours: 3P**
**Credits : 1.5**

**Course Outcome(s):**

**On completion of the course students will be able to**

| | |
|---|---|
| **18_CS291.1** | Learn the concept of DOS system commands and editor. |
| **18_CS291.2** | To formulate the algorithms for simple problems and to translate given algorithms to a working and correct program. |
| **18_CS291.3** | To be able to identify and correct syntax errors / logical errors as reported during compilation time and run time. |
| **18_CS291.4** | To be able to write iterative as well as recursive programs. |
| **18_CS291.5** | Learn the concept of programs with Arrays, Pointers, Structures, Union and Files. |

## Experiment should include but not limited to the following:

- Some basic commands of DOS, Windows and Linux Operating System, File handling and Directory structures, file permissions, creating and editing simple C program, compilation and execution of C program.
- Writing C Programs on variable, expression, operator and type-casting.
- Writing C Programs using different structures of if-else statement and switch-case statement.
- Writing C Programs demonstrating use of loop (for loop, while loop and do-while loop) concept and use of break and continue statement.
- Writing C Programs demonstrating concept of Single & Multidimensional arrays.
- Writing C Programs demonstrating concept of Function and Recursion.
- Writing C Programs demonstrating concept of Pointers, address of operator, declaring pointers and operations on pointers.
- Writing C Programs demonstrating concept of structures, union and pointer to structure.
- Writing C Programs demonstrating concept of String and command line arguments.
- Writing C Programs demonstrating concept of dynamic memory allocation.

- Writing C Programs demonstrating concept of File Programming.

**CO-PO Mapping**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | | | 2 | 2 | | 1 | | 1 | 2 | 3 |
| CO2 | 3 | 3 | 3 | | | | | | | | | 2 |
| CO3 | 2 | 2 | 2 | 2 | 2 | | | | | | | 3 |
| CO4 | 1 | 2 | 2 | 2 | 2 | | | | | | | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 1 | 3 | 3 | 3 | 3 |

## Practical

**FOR GROUP B: ME, CE, IT, CSE, FT**

Paper Name: Chemistry I Lab
Paper Code: 18_CH 291
Total Contact Hours: 3 P/Week
Credit: 1.5

**Pre requisites:** Knowledge of Physics upto $12^{th}$ standard.

**Course Objective**

- Study the basic principles of pH meter and conductivity meter for different applications.
- Analysis of water for its various parameters & its significance in industries.
- Learn to synthesis Polymeric materials and drugs.
- Study the various reactions in homogeneous and heterogeneous medium.

**Course Outcome**

**18_CH 291.1**: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.
**18_CH 291.2**: Able to analyse and determine the composition of liquid and solid samples working as an individual and also as an team member
**18_CH 291.3**: Able to analyse different parameters of water considering environmental issues
**18_CH 291.4**: Able to synthesize drug and polymer materials.

**18_CH 291.5**: Capable to design innovative experiments applying the fundamentals of chemistry

**Course Content**

**Choice of 10-12 experiments from the following:**

- Determination of surface tension and viscosity
- Thin layer chromatography
- Determination of hardness of water
- Determination of chloride content of water
- Determination of the rate constant of a reaction
- Determination of cell constant and conductometric tritration
- pH metric titrations
- Synthesis of a polymer/drug
- Saponification/acid value of an oil
- Chemical analysis of a salt
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids
- Adsorption of acetic acid by charcoal

**Innovative experiments (any one)**

- Synthesis of silver nano particles
- Green synthesis

**CO-PO Mapping**

| CO | PO 1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 3 | 1 | - | 2 | 3 | - | - | - | - | 1 |
| 2 | 2 | 2 | 1 | 1 | - | 1 | - | - | - | 1 | - | 1 |
| 3 | - | - | - | - | - | - | - | - | 3 | 3 | 2 | 2 |
| 4 | 2 | 1 | 2 | 2 | - | - | 1 | - | - | - | - | 2 |
| 5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | - | - | 2 | 2 |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Paper Name: PHYSICS-I LAB**
**Paper Code: 18_PH 291**
**Contacts: 3P**
**Credits: 2**

**General idea about Measurementsand Errors(One Mandatory):**
i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.

ii) Proportional error calculation using Carrey Foster Bridge.

**Any 7 to be performed from the following experiments**

**Experiments on Oscillations& Elasticity:**
1. Study of Torsional oscillation of Torsional pendulum & determination of time period using various load of the oscillator.
2. Experiments on Lissajous figure (using CRO).
3. Experiments on LCR circuit.
4. Determination of elastic modulii of different materials (Young's modulus and Rigidity modulus)

**Experiments on Optics:**
5. Determination of wavelength of light by Newton's ring method.
6. Determination of wavelength of light by Laser diffraction method.
7. Determination of numerical aperture and the energy losses related to optical fiber experiment
8. Measurement of specific rotation of an optically active solution by polarimeter.

**Experiments on Quantum Physics:**
11. Determination of Planck's constant using photoelectric cell.
12. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.

**In addition it is **recommended** that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

**Probable experiments beyond the syllabus:**

1. Determination of wavelength of light by Fresnel's bi-prism method (beyond the syllabus).
2. Study of half-wave, quarter-wave plate (beyond the syllabus)
3. Study of dispersive power of material of a prism.
4. Study of viscosity using Poyseullie's caplillary flow method/using Stoke's law.
5. Measurement of nodal and antinodal points along transmission wire and measurement of wave length.
6. Any other experiment related to the theory**.**

**Course Outcome of Physics-I practical (PH 291)**
**At the end of the course students' should have the**

| | |
|---|---|
| **CO1:ability to define, understand and explain**<br>✓ **Error estimation, Proportional error calculation**<br>✓ **superposition principle in Newton's ring, Fresnel's biprism, laser diffraction**<br>✓ **Basic circuit analysis in LCR circuits** | PO1 |
| **CO2:Ability to conduct experiments using**<br>➢ **LASER, Optical fibre**<br>➢ **Interference by division of wave front, division of amplitude, diffraction grating, polarization of light**<br>➢ **Quantization of electronic energy inside an atom** | PO4 |

| | |
|---|---|
| ➢ **Torsional pendulum** | |
| **CO3:Function effectively as an individual, and as a member or leader in laboratory sessions** | PO9 |
| **CO4: Ability to communicate effectively, write reports and make effective presentationusing available technology**<br>➢ **on presentation of laboratory experiment reports**<br>➢ **on presentation of innovative experiments** | PO10 |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | M | | | | | | | | | | | |
| **CO2** | | | | H | | | | | | | | |
| **CO3** | | | | | | | | | H | | | |
| **CO4** | | | | | | | | | | L | | |

**H:3 , M:2, L:1**

**Minimum CO attainment: 09/12=0.75**

**Assessments for CO:**

**Direct Tools:**

i) Continuous Internal Evaluations: Students performance, surprise test during Tutorial classes, Problem solving ability while working in group (POGIL), Problem presentation through seminar in related topics, Group discussions, Quizzing
ii) Unit tests
iii) Semester End Examination:

**Indirect Tools:**

i) Course End Survey (Feedback of Stake holders)

**Development of Rubrics:**

Student performance is articulated through the rubrics. It is a set of criteria for assessing student work or performance. Rubrics are particularly suited to learning outcomes that are complex or not easily quantifiable for which there are no clear 'right' or 'wrong' answers or which are not evaluated with standardized tests or surveys. Assessment of writing, oral communication or critical thinking often requires rubrics. Rubrics adopted for the measurement of course outcome are,

i) Surprise test

ii) Quizzing(CO5, CO6)

iii) Problem solving ability while working in group (POGIL) & presentation of the same. (CO6)

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Paper Name: Basic Electrical Engineering Laboratory**
**Paper Code: 18_EE291**
**Total Contact Hours: 36**
**Credit: 1.5**

**Pre requisites:**

- Basic Physics and applied physics.
- Basic Mathematics.
- Basic concept of Electric Circuit

**Course Objective:**

To impart and apply knowledge about the Basic Electrical Components, Machineries, Instruments and Safety measures.

**Course Outcome:**

**18_EE 291.1.** Identify and use common electrical components.
**18_EE 291.2.** To develop electrical networks by physical connection of various components and analyze the circuit behavior.
**18_EE 291.3.** Apply and analyze the basic characteristics of transformers and electrical machines.

**Course contents**

**List of Experiments:**

13. Basic safety precautions – earthing, introduction to measuring instruments – Voltmeter, Ammeter, Multimeter, Wattmeter, Real life Resistor, Capacitor, Inductor.
14. Verification of Thevenin's and Norton's Theorem.
15. Verification of Superposition and Maximum Power Transfer Theorem.
16. Characteristics of Fluorescent, Tungsten and Carbon filament lamps.
17. Study of R-L-C series circuit.
18. Three-phase Power measurement with two wattmeter method.
19. Demonstration of cut-out sections of machines: DC Machine (commutator-brush arrangement), Induction Machine (squirrel cage rotor).
20. Measurement of primary and secondary voltage and current of single-phase transformer – Open Circuit and Short Circuit Test.
21. Starting, Reversing and speed control of DC shunt motor.
22. Torque-Speed characteristics of DC Machine.
23. Torque-Speed characteristics of Three-phase Induction Motor.
24. Test on single-phase Energy Meter.

**CO-PO Mapping:**

| | PO1 | PO 2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EE 291.1 | 3 | - | - | - | - | 2 | - | - | - | - | - | 1 |
| 18_EE 291.2 | 2 | 3 | - | - | - | - | - | - | - | - | 1 | 1 |
| 18_EE 291.3 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Paper Name: Basic Electronics Engineering Lab**
**Paper Code: 18_EC 291**
**Contacts: 3P/Week**
**Credit: 1.5**
**Course Objective**

The objectives of this course are

1.To prepare the students to have a basic knowledge of active and passive components.

2.To build knowledge to distinguish pure and impure DC signals.

3.To grow measuring ability of signals through multi meter and CRO

4.To understand characteristics of proper biasing for BJT and FET.

5. To encourage in developing circuits using diodes, transistors, FETs and OPAMPs.

| Course Name | COs | CO Statement |
|---|---|---|
| BASIC ELECTRONICS ENGINEERING Lab (18_EC291) | 18_EC 291.1 | Students able to identify different types of passive and active electronic components |
| | 18_EC 291.2 | Students able to demonstrate the working of CRO , Function Generator ,Digital Multimeter and D.C. power supply |
| | 18_EC 291.3 | Students able to sketch the I-V characteristics of ordinary diode , Zener diode , BJTs and FET |
| | 18_ EC 291.4 | Students able to construct the rectifier circuit using diode and Inverting and Non-inverting amplifiers Circuit using Op-Amp |
| | 18_EC 291.5 | Students able to determine the characteristics parameters of actual Op-Amps |
| | 18_EC 291.6 | Students able to validate the truth table of basic logic gates using digital IC |

**List of Experiments:**

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT)
2. Familiarization with measuring and testing equipment like Digital Multimeter, CRO, Signal generators and Power Supply etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.
7. Study of I-V characteristics of Field Effect Transistors.
8. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
9. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
10. Study of OPAMP circuits: Inverting and Non-inverting amplifiers.
11. Verification of truth table of basic logic gates using IC
12. Innovative Experiment

**Mapping of COs with POs**

| COs | PO1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18_EC 291.1 | **3** | **2** | **1** | **1** | **-** | **-** | **-** | **1** | **2** | **2** | **1** | **2** |
| 18_EC 291.2 | **3** | **2** | **1** | **2** | **2** | **-** | **-** | **1** | **2** | **2** | **1** | **2** |
| 18_EC 291.3 | **3** | **3** | **1** | **1** | **2** | **-** | **-** | **1** | **2** | **1** | **1** | **2** |
| 18_ EC 291.4 | **3** | **3** | **3** | **2** | **2** | **1** | **1** | **1** | **3** | **2** | **2** | **3** |
| 18_EC 291.5 | **3** | **2** | **1** | **1** | **-** | **-** | **-** | **-** | **1** | **1** | **1** | **2** |
| 18_EC 291.6 | **3** | **3** | **3** | **1** | **-** | **-** | **-** | **-** | **2** | **1** | **2** | **2** |

**N.B. : 3 = Highly Mapped, 2=Moderately Mapped, 1=Slightly Mapped, Not Mapped = '-'**

**FOR GROUP B: ME, CE, IT, CSE, FT**

**Subject Name: Engineering Graphics & Design**

**Paper / Subject Code:** 18_ME 291

**Total Contact Hours:** 36

**Credit:** 1.5

**Prerequisite:** Basic knowledge of geometry

**Course Objectives:**

To learn detailed drawing and modeling of a system, component, or process which meets desired needs within realistic constraints. It will help students to use the techniques, skills, and modern engineering tools and communicate effectively.

**Course Outcomes:** On successful completion of the course the student will be able to

**18_ME 291.1.** Get introduced with Engineering Graphics and visual aspects of design.

**18_ME 291.2.** Know and use common drafting tools with the knowledge of drafting standards.

**18_ME 291.3.** Apply computer aided drafting techniques to represent line, surface or solid models in different engineering viewpoints.

**18_ME 291.4.** Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

**Course Content:**

**Traditional Engineering Graphics**:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

**Computer Graphics**:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling.

**Module 1: Introduction to Engineering Drawing**

**(6P)**

Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

**Module 2: Orthographic & Isometric Projections**

**(9P)**

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Projection of Solids inclined to both the Planes- Auxiliary Views; Isometric Scale, Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa.

**Module 3: Sections and Sectional Views of Right Angular Solids**

**(6P)**

Drawing sectional views of solids for Prism, Cylinder, Pyramid, Cone and project the true shape of the sectioned surface, Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw sectional orthographic views of objects from industry and dwellings (foundation to slab only)

**Module 4: Overview of Computer Graphics (3P)**

Demonstration of CAD software [The Menu System, Toolbars (Standard, Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Zooming methods, Select and erase objects].

**Module 5: CAD Drawing, Customization, Annotations, layering (6P)**

Set up of drawing page including scale settings, ISO and ANSI standards for dimensioning and tolerancing; Using various methods to draw straight lines, circles, applying dimensions and annotations to drawings; Setting up and use of Layers, Changing line lengths (extend/lengthen); Printing documents; Drawing sectional views of solids and project the true shape of the sectioned surface; Drawing annotation, CAD modeling of parts and assemblies with animation, Parametric and non parametric solid, surface and wireframe modeling, Part editing and two dimensional documentation of models.

**Module 6:**

**Demonstration of a simple team design project (6P)**

Illustrating Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; Meshed topologies for engineering analysis and tool-path generation for component manufacture, Use of solid-modeling software for creating associative models at the component and assembly levels.

## Project Domain

2D and 3D modeling of Machine parts or Households.

**Text Books:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2. (Corresponding set of) CAD Software Theory and User Manuals

**References:**

1. K. Venugopal, Engineering Drawing + AutoCAD, New Age International publishers
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
3. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | - | 1 | - | 1 | 1 | - | 1 | 2 | 1 | - | - |
| **CO2** | 2 | 1 | 2 | - | 1 | 1 | - | 2 | 1 | 2 | 1 | 1 |
| **CO3** | 2 | 1 | 3 | 2 | 3 | - | - | 2 | 2 | 2 | 1 | 1 |
| **CO4** | 2 | 1 | 3 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |

**FOR GROUP A: EE, ECE, EIE/AEIE, BME**

**Subject Name:** Workshop/Manufacturing Practices

**Paper / Subject Code: 18_ME 292**

**Total Contact Hours:** 36

**Credit:** 1.5

**Prerequisite:** Higher Secondary with Mathematics, Physics and Chemistry

**Course Objectives:**

To understand the basic knowledge of Workshop Practice and Safety. To identify and use of different hand tools and other instruments like Hack Saw, Jack Plane, Chisels etc. and operations like Marking, Cutting etc. To expose students to different types of manufacturing/fabrication processes

**Course Outcomes:** Upon completion of this laboratory course, students will be able to

**18_ME 292.1.** Fabricate components with their own hands.

**18_ME 292.2.** Get practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.

**18_ME 292.3.** Produce small devices of their interest for project or research purpose.

**Course Content:**

**(i) Theoretical discussion & videos: (6P)**

Detailed contents:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations & power tools
3. Carpentry
4. Welding (arc welding & gas welding), brazing
5. Electrical & Electronics
6. Metal casting
7. CNC machining, Additive manufacturing
8. Plastic moulding& Glass Cutting.

**(ii) Workshop Practice:**

**Module 1 - Machine shop**

**(6P)**

Typical jobs that may be made in this practice module:

i. To make a pin from a mild steel rod in a lathe.

ii. To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine.

**Module 2 - Fitting shop**

**(6P)**

Typical jobs that may be made in this practice module:

i. To make a Gauge from MS plate.

**Module 3 - Carpentry** **(6P)**

Typical jobs that may be made in this practice module:

i. To make wooden joints and/or a pattern or like.

**Module 4 - Welding shop (Arc welding 3P + gas welding 3P)** **(6P)**

Typical jobs that may be made in this practice module:

i. ARC WELDING (3P): To join two thick (approx 5mm) MS plates by manual metal arcwelding.

ii. GAS WELDING (3P): To join two thin mild steel plates or sheets by gas welding.

**Module 5 - Electrical & Electronics** **(3P)**

House wiring, soft Soldering

**Module 6 - Smithy** **(3P)**

Typical jobs that may be made in this practice module:

i. A simple job of making a square rod from a round bar or like.

**For further study (Optional)**

**Module 7 - Casting**

Typical jobs that may be made in this practice module:

i. One/ two green sand moulds to prepare, and a casting be demonstrated.

**Module 8 - Plastic moulding & Glass Cutting**

Typical jobs that may be made in this practice module:

i. For plastic moulding, making at least one simple plastic component should be made.

ii. At least one sample shape on glass should be made using laser cutting machine.

**Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.**

**Project domain:** Carpentry, Machining, Welding, Casting, Smithy, Advanced manufacturing processes

**Text Books:**

3. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of WorkshopTechnology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

4. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

**References:**

1. Gowri P., Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.

2. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

3. Kalpakjian S. and Steven S. Schmid, Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.

4. Manufacturing Science by A.Ghosh and A.K.Mallick, Wiley Eastern.

5. Principles of Metal Cutting/Principles of Machine Tools by G.C.Sen and A.Bhattacharya, New Central Book Agency, Kolkata.

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 1 | 2 | 1 | 1 | - | - | - | 2 | 1 | - | 2 |
| **CO2** | 3 | 3 | 2 | 2 | 1 | - | - | - | 2 | 1 | - | 2 |
| **CO3** | 3 | 2 | 2 | 2 | 1 | 1 | - | 1 | 2 | 2 | 3 | 2 |

**Paper Name: Lang. Lab. and Seminar Presentation**
**Paper Code: 18_HU 291**
**Total Contact Hours: 26**
**Credit: 1**

**Pre requisites:** Basic knowledge of LSRW skills.

**Course Objectives:** To train the students in acquiring interpersonal communication skills by focussing on language skill acquisition techniques and error feedback.

**Course Outcome:**
HU 291.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.
18_HU 291.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.
18_HU 291.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.
18_HU 291.4: Able to analyze communication behaviours.
18_HU 291.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

**Course Contents:**

**Module 1: Introduction to the Language Lab**
a. The Need for a Language Laboratory
b. Tasks in the Lab
c. Writing a Laboratory Note Book

**Module 2: Active Listening**
a. What is Active Listening?
b. Listening Sub-Skills—Predicting, Clarifying, Inferencing, Evaluating, Note-taking
c. Academic Listening vs Business Listening
d. Listening in Business Telephony
e. Study of Contextualized Examples based on Lab Recordings

**Module 3: Speaking**
a. Speaking—Accuracy and Fluency Parameters
b. Pronunciation Guide—Basics of Sound Scripting, Stress and Intonation
c. Fluency-focussed activities—JAM, Conversational Role Plays, Speaking using Picture/Audio Visual inputs
d. Accuracy-focussed activities—Identifying Minimal Pairs, Sound Mazes, Open and Closed Pair Drilling, Student Recordings (using software)
e. Group Discussion: Principles and Practice

**Module 4: Lab Project Work**

a. Making a brief Animation film with voice over (5 minutes)OR
b. Making a brief Documentary film (10 minutes)

**References:**

1.IIT Mumbai**, Preparatory Course in English** syllabus
2. IIT Mumbai, **Introduction to Linguistics** syllabus
3. Sasikumar et al. *A Course in Listening and Speaking*. New Delhi: Foundation Books, 2005.
4. Tony Lynch, *Study Listening*. Cambridge: Cambridge UP, 2004.

**Mapping of Course:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO.1** | 2 | - | - | 3 | - | **3** | **2** | **2** | **3** | **3** | - | **3** |
| **CO.2** | 2 | 3 | 3 | 3 | - | **3** | **3** | **3** | **2** | **3** | - | 3 |
| **CO.3** | 1 | 3 | 3 | 3 | - | **2** | **2** | **2** | **2** | **3** | - | 2 |
| **CO.4** | 1 | 2 | 3 | 3 | - | **2** | **1** | **1** | **2** | **3** | - | 2 |
| **CO.5** | 3 | 3 | 2 | 3 | - | **2** | **3** | **2** | **2** | **3** | - | 2 |

## Sessional

**Paper Name: Extra Curricular Activity**
**Paper Code: 18_XC 281**
**Total Contact hours: 20**
**Credit: 1**

**Course Objectives**: The objectives of the course are as follows:

- To increase student awareness about the weaker and unprivileged sections of society
- To expose students to environmental issues and ecological concerns
- To make students self aware about their participatory role in sustaining society and the environment

**Course contents**

**List of Activities:**

a) Creating awareness in social issues
b) Participating in mass education programmes
c) Proposal for local slum area development
d) Waste disposal
e) Environmental awareness ``
f) Production Oriented Programmes
g) Relief & Rehabilitation work during Natural calamities
Creating awareness in social issues:
1. Women's development – includes health, income-generation, rights awareness.

2. Hospital activities – Eg. writing letters for patients, guiding visitors
3. Old age home – visiting the aging in-mates, arranging for their entertainment.
4. Children's Homes - visiting the young in-mates, arranging for their entertainment
5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
6. Gender issues- Developing an awareness, to link it with Women's Cell of college

Participating in mass education programmes

1.Adult education
2. Children's education

Proposal for local slum area development

One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

Environmental awareness

• Resource conservation – Awareness to be developed on water, energy,soil.
• Preservation of heritage monuments- Marches, poster campaigns
• Alternative energy consciousness amongst younger school-children.
• Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.
• Waste disposal- Proper methods of domestic waste disposal.

Production Oriented Programmes

5. Working with people and explaining and teaching improved agricultural practices
6. Rodent control land pest control practices;
7. Soil-testing, soil health care and soil conservation;
8. Assistance in repair of agriculture machinery;
9. Work for the promotion and strengthening of cooperative societies in villages;
10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
11. Popularization of small savings and
12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

g) Assisting the authorities in distribution of rations, medicine, clothes etc.;
h) Assisting the health authorities in inoculation and immunization, supply of medicine etc.;
i) Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
j) Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;