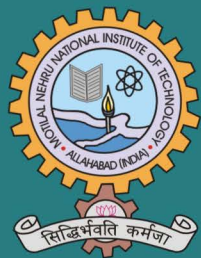




Motilal Nehru National Institute of Technology Allahabad

# Bachelor of Technology First Year Course Structure & Curriculum





## B.Tech I<sup>st</sup> Year

### I-Semester

S.No.	Code	Subject	Lecture	Tutorial	Practical	Credits
1	PH-1101	Physics-I	3	1	-	4
2.	HS-1101/ CS-1101	English Language and Composition/ Computer Programming	2	1	-	3
3.	CY-1101/AM-1101	Chemistry/ Engineering Mechanics	3	1	-	4
4.	MA-1101	Mathematics-I	3	1	-	4
5.	ME-1101/1102	Engineering Graphics/ Workshop	1	-	3	3
6.	HS-1102/ PH-1151	Communication Skill Workshop/ Physics (Lab)	2 -	- -	- 3	2
7.	CY-1152/ AM-1153	Chemistry (Lab)/ Engineering Mechanics (Lab)	-	-	3	2
8.	HS-1154/CS-1155	Language Lab/Computer Programming (Lab)	-	-	3	2
<b>Total</b>						<b>24</b>

### II-Semester

S.No.	Code	Subject	Lecture	Tutorial	Practical	Credits
1.	PH-1202	Physics-II	3	1	-	4
2.	HS-1201 / CS-1201	English Language and Composition / Computer Programming	2	1	-	3
3.	CY-1201/ AM-1201	Chemistry/ Engineering Mechanics	3	1	-	4
4.	MA-1201	Mathematics-II	3	1	-	4
5.	ME-1201/1202	Engineering Graphics/ Workshop	1	-	3	3
6.	CE-1201	Environment & Ecology	2	-	-	2
7.	HS-1202 PH-1251	Communication Skill Workshop/ Physics (Lab)	2 -	- -	- 3	2
8.	CY-1252/ AM-1253	Chemistry (Lab)/ Engineering Mechanics (Lab)	-	-	3	2
9.	HS-1254/ CS-1255	Language Lab/ Computer Programming (Lab)	-	-	3	2
<b>Total</b>						<b>26</b>

Course Codes : PH-Physics, CY- Chemistry, CE-Civil Engineering, HS-Humanities & Social Sciences, AM- Applied Mechanics, CS- Computer Science & Engineering, MA- Mathematics, ME- Mechanical Engineering



## PHYSICS-I (PH - 1101)

**UNIT 1: Special Theory of Relativity-** Frame of Reference, Galilean Transformation, Inertial and Non-inertial frames, Postulates of Special Theory of Relativity, Michelson-Morley Experiment Lorentz transformation of space and time, Length contraction, Time dilation, Simultaneity in relativity theory, Addition of velocities, Relativistic dynamics, Variation of mass with velocity, Equivalence of mass and energy, Momentum-energy transformation equations. 6(L)

**UNIT 2: Thermal Physics-** Maxwell-Boltzmann Law of distribution of molecular velocities, Evaluation of r.m.s. velocity, average and most probable speeds, Mean free path, Transport phenomena in gases. 5(L)

**UNIT 3: Geometrical Optics-** Combination of thin lenses, Cardinal points of coaxial optical system of thin lenses, thick lenses, location and properties of cardinal points, Newton's formula, graphical construction of images. Huygen's and Ramsden's eye pieces, Optical Instruments — Spectrometer, Sextant. 6(L)

### UNIT 4: Physical Optics

**Interference-** Condition of observing interference. Production of interference fringes and determination of wavelength using Fresnel's Biprism. Stoke's treatment, Interference due to thin films. Wedge shaped films. Newton's rings. 5(L)

**Diffraction-** Fresnel's Half Period Zone, Zone Plate, Fraunhofer's diffraction by single slit, double slit. Theory of plane transmission grating. Width of principal maxima. Rayleigh's criterion of limit of resolution. Resolving power of prism and grating. 6(L)

**Polarisation-** Unpolarised, polarized and partially polarized lights. Polarisation by reflection. Double refraction by uniaxial crystals, Nicol prism, Polaroids, Huygen's theory of double refraction. Half wave and quarter wave plates. Analysis of plane, elliptical and circularly polarized light. Optical activity. Fresnel's theory of optical rotation, Specific rotation, Biquartz and Laurent half-shade polarimeters. 7(L)

**UNIT 5: Laser-** Characteristics of Laser light, Stimulated and spontaneous emission. Einstein's coefficients, Relative contribution of stimulated and spontaneous emissions, Population inversion, Laser emission, Ruby and He-Ne lasers. 5(L)

### Text / Reference Books:

- R. Resnik, *Introduction to Special Relativity*, John Wiley & Sons, Inc (2005).
- A. Ghatak, *Optics*, Tata McGraw-Hill, (2008).
- E. Hecht, *Optics*, Addison-Wesley (2002).
- A. Beiser, *Concepts of Modern Physics*, Tata McGraw-Hill, (2005).
- B. Laud, *Lasers and Non-Linear Optics*, Wiley, (2003)

## PHYSICS-II (PH-1202)

**UNIT 1: Electrostatics-** Gradient, divergence and curl operations, Gauss divergence theorem and Stoke's theorem, Gauss Law in electrostatics and its applications, Poissons and Laplace equations. 6(L)

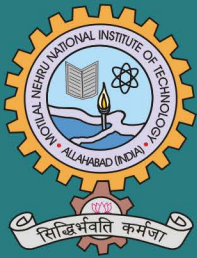
**UNIT 2: Magnetostatics-** Biot-Savart's law, Magnetic field of a steady current, Magnetic field due to circular loop at axial points. Working of Helmholtz galvanometer. Ampere's law and its applications, Force on a charged particle in electric and magnetic fields, Magnetic vector potential. 6(L)

**UNIT 3: Electrodynamics and electromagnetic waves-** Faradays' law of electromagnetic induction. Self and mutual inductance. Energy in Magnetic Field. Energy of a solenoid. Displacement current, Maxwell's equations (integral and differential forms) in free space, Plane wave solution, Propagation of electromagnetic waves in free space, Poynting's theorem. 8(L)

**UNIT 4: Quantum Mechanics-** Failure of classical concepts, Wave particle duality, Wave packets, Phase and group velocity, Heisenberg's uncertainty principle and its applications, Wave function and its physical interpretation, Probabilities and Normalization, Time independent and dependent Schrödinger wave equation and its simple applications. 9(L)

**UNIT 5: Magnetic Properties of Materials-** Magnetic permeability and susceptibility. Dia, Para, Ferro, Antiferro, Ferri magnetic Materials, Hysteresis curve and its uses. Curie-Weiss Law. Langevin's theory of magnetism. 5(L)





**UNIT 6: Solid State Physics-** Crystal structure, Space lattice, Unit cell, Miller indices, Interplaner spacing, Characteristic and Continuous, X-ray spectra, Mosley's law, X-ray absorption and diffraction, Bragg's law, Bragg's Diffractometer, Compton effect. 6(L)

**Text / Reference Books:**

- D. J. Griffiths, *Introduction to Electrodynamics*, Prentice Hall of India, (1999).
- S. Gasiorowicz, *Quantum Physics*, John Wiley & Sons, (2003).
- R. Eisberg and R. Resnik, *Quantum Physics*, John Wiley & Sons, (2007).
- A. Beiser, *Concepts of Modern Physics*, Tata McGraw-Hill, (2005).
- C. Kittel, *Introduction to Solid State Physics*, Wiley 8<sup>th</sup>, (2004)

**ENGLISH LANGUAGE AND COMPOSITION (HS-1101 / HS-1201)**

**UNIT 1: Remedial English Grammar-** Common Errors, Articles, Pronouns, Adjectives, Use of Adjectives, Prepositions, Subject-Verb Agreement, Vocabulary building & comprehension exercises. 12(L)

**UNIT 2: Literary Essays-** God in this Godless Universe, The Scientist & the Poet, Beauty & the Beast, Freedom, Albert Einstein at School, The Lotus Eater, Shooting an Elephant. 12(L)

**UNIT 3: Short Stories-** Sparrows, What Men Live By, The Fly, Love Across the Salt Desert, Dr. Heidegger's Experiment, The White Stocking, The Lagoon. 8(L)

**UNIT 4: Poetry-** On His Blindness, On Killing a Tree, Night of the Scorpion, My Grandmother's House, A River, The Darkling Thrush, Stopping by the Woods. 8(L)

**Text / Reference Books:**

- Pleasures of Reading, An Anthology of Poems, Orient Longman
- Wood F.T., A Remedial English Grammar for Foreign Students, Macmillan
- Selected Essays and Short Stories, Oxford University Press
- TOEFL & Cambridge IELTS Practice Book.

**COMPUTER PROGRAMMING (CS-1101 / CS-1201)**

**Course Description:** This is a first course in programming which intends to introduce students to the foundations of computing, programming and problem-solving. Aim is to develop basic programming skills necessary for engineering education. Students would learn C/C++ programming in a Linux environment. This course has an associated lab with it.

**Course Outline :**

1. Introduction, LINUX Commands, editors, Files & Directories, Design of algorithms. 4(L)
2. Writing a Simple Program: Learning the form of a C program, Declaring variables, designing program flow and control, using standard terminal I/O functions. 4(L)
3. Fundamental Data Types and Storage Classes, Operators and Expressions Conditional Program Execution Loops and Iteration, Introduction to Abstraction, functions. 6(L)
4. Arrays, Pointers, Structures. 6(L)
5. Introduction to Object Oriented Programming concepts, Classes and Objects, Important C++ constructs. 6(L)
6. The Standard C/C++ Preprocessor, The Standard C/C++ Library. 4(L)

**Text/ Reference Books:**

- How to solve it by Computer by R. J. Dromey
- The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie
- On to C++ by PH Winston ( also available online)
- Structure and Interpretation of Computer Programs by Harold Abelson and Gerald Sussman with Julie Sussman, (Also available online)
- Herbert Schild, Complete reference in C



## CHEMISTRY (CY- 1101 / CY-1201)

**Unit 1: Chemical Bonding-** Ionic Bonding and Covalent Bonding, Valence Bond and Molecular orbital theories of bonding, Bonding in metals, semiconductors and insulators, imperfections in solids. 6(L)

**Unit 2: Polymers-** Classifications of polymers, types of polymerization and their principles, structure-property relationship, polymer materials of industrial importance, biopolymers. 5(L)

**Unit 3: Water Chemistry-** sources and nature of impurities, characteristics of natural water, water treatment processes, municipal supplied water. 5(L)

**Unit 4: Fuels-** Classification, calorific values, analysis of solid fuels, liquid fuels and its properties, refining, cracking and reforming of petroleum, knocking and octane and cetane rating, anti-knocking agents. 5(L)

**Unit 5: Corrosion-** theories of corrosion, types of corrosion, its prevention and control. 4(L)

Green Chemistry: Introduction to green chemistry and its importance. 3(L)

**Unit 6: Lubricants-** Definition, functions, mechanisms and classifications of lubricants, properties and testing of lubricants. 3(L)

Phase Rule: Derivation of phase rule and its application to one component water system. 2(L)

**Adsorption:** Definition and classification of adsorption, adsorption of gases on solids, adsorption from solution, applications of adsorptions, theories of adsorptions. 3(L)

### Text / Reference Books:

- Engineering Chemistry, Jain & Jain, Dhanpat Rai publishing Co., 2012, New Delhi
- Engineering Chemistry, Shashi Chawla, Dhanpat Rai publishing Co., 2012, New Delhi
- Engineering Chemistry, Dara & Umage, Chand Publication Ltd., 2012, New Delhi

## ENGINEERING MECHANICS (AM-1101 / AM-1201)

**UNIT 1: Introduction to Forces, Moments, Stresses and Strains-** Idealizations in Mechanics, Equilibrium of forces and moments, Free body diagram, Simple Stress and Strain, Axially loaded members and Hooke's law. 6(L)

**UNIT 2: Centroid & Moment of Inertia-** Introduction, Center of Gravity and Centroid, Moments of inertia – Area and Mass Moment of Inertia, Product of inertia, Principal axes and Principal moments of inertia, Transformation of Moment of Inertia. 6(L)

**UNIT 3: Structures-** Introduction, Classification, Analysis of Plane Trusses- Method of Joints, Method of Sections, Method of Tension Coefficients, Graphical Method, Beams - Shear force and Bending Moment Diagrams. 6(L)

**UNIT 4: Friction-** Introduction, Laws of Coulomb friction, Angle of friction, Angle of Repose, Cone of Friction, Sliding and Rolling Friction, Rope and Belt Friction, Screw Friction, Wedge Friction. 6(L)

**UNIT 5: Principle of Virtual work and Energy-** Strain Energy, Virtual Displacement, Principle of Virtual work, Mechanical Efficiency, Work of a force/couple (springs etc.), Potential Energy and equilibrium, stability. 6(L)

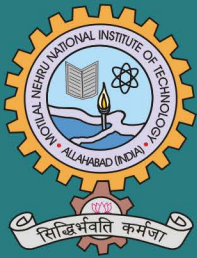
**UNIT 6: Kinematics and Kinetics of Rigid Bodies-** Introduction, Types of motions in plane and space, Rotation of rigid bodies, General Plane motion, D'Alemberts Principle, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, Gyroscopic motion. 6(L)

**UNIT 7: Vibration-** Introduction, Free and Forced Vibration, Vibration of rigid bodies. 4(L)

### Text / Reference Books:

- Beer F.P. and Johnston E.R., Mechanics for Engineers-Volume I -Statics, Volume-II -Dynamics, McGraw Hill, New York.
- Merriam J.L. and Kraige L.G., Engineering Mechanics, Volume I-Statics, Volume-II -Dynamics, John Wiley & Sons, New York.
- Shames L.H., Engineering Mechanics, Prentice Hall, New Delhi.
- R. C. Hibler, Engineering Mechanics, Vol I and II, Pearson Press, 2002.





### COMMUNICATION SKILL WORKSHOP (HS 1102 / HS-1202)

Credit: 2

**UNIT 1: Communication theory-** Definition of communication, good and effective communication, barriers and filters, exercise, body language, activity on body language, non-verbal behaviour interpretation, listening skills: active and passive listening, activity on listening skills, feedback mechanism: giving and receiving feedback activity, 4(L)

**UNIT 2: Dealing with feelings-** Activity on how to deal with feelings and complex feeling, assertiveness, activity, developing assertiveness, activity, self- confidence, quiz on self confidence, strategies for developing confidence, 6(L)

**UNIT 3: The Team concept -** Elements of teamwork, activity, effective team, essential building blocks of effective team, team player styles, group discussions, types of group discussion: structured and unstructured discussions, strategies for improving decisions, presentation technique, 4(L)

**UNIT 4: Business communication-** Business communication, writing business letters and applications, minutes and memorandum, resume writing. 6(L)

**UNIT 5: Corporate grooming-** Appearing for interview, corporate dressing and grooming, dining etiquette, communication media etiquette, ethics, exercise on ethical dilemmas, exercise on mock-interview. 4(L)

#### Text / References Books:

- Communication by C.S. Raayudu, Himalaya Publications.
- Developing Communication Skills by Krishna Mohan, Macmillan India Limited
- Corporate Grooming and Etiquette by Sarvesh Gulati, Rupa publications.
- Group Discussions and Interviews by Priyadarshi Patnayak, foundation books publications

### MATHEMATICS-I (MA-1101)

**UNIT 1: Infinite series & Mean Value Theorems-** Sequences and series, Convergence, Comparison test, Integral test, D'Alembert ratio test, Rabbe's test, logarithmic test, Cauchy root test, Leibnitz's rule, Rolle's Theorem, Lagrange and Cauchy Mean Value Theorem. 6(L)

**UNIT 2: Function of Several Variables-** Limit, Continuity ( $\epsilon$ - $\delta$  definition) and Differentiability, Partial differentiation, Homogeneous Functions- Euler's theorem, change of variables, Jacobian, Taylor's theorem for functions of several variables. Extrema of functions of multi-variables, saddle points, Lagrange method of undetermined multipliers. 7(L)

**UNIT 3: Integral Calculus-** Multiple integrals (Double & Triple Integral), change of order of integration, Area of bounded region, arc length of curve, volume and surface area of solid of revolution, multiple integral by change of variables, Dirichlet integrals, Moment of inertia, Center of gravity. 7(L)

**UNIT 4: Beta and Gamma Functions-** Improper integrals, Beta Function, Gamma functions, Improper Integrals involving a parameter. 3(L)

**UNIT 5: Vector Calculus-** Gradient, Directional derivatives, Divergence and Curl, line integral and Green's theorem, surface and volume integrals, Gauss, Stoke's theorems and their applications. 8(L)

**UNIT 6: Ordinary Differential Equation-** Existence and Uniqueness of solutions of First order ODE, Exact Differential Equation, Solution of Linear Differential Equation, Higher order Linear Differential Equation, Solutions of Homogeneous and Non-homogeneous ODE (CF+PI), Variation of parameters, Undetermined coefficients, Power series method, System of linear simultaneous ODE. 8(L)

#### Text/ Reference Books:

- Jain and Iyenger, Advanced Engineering Mathematics, Narosa Pub. House
- Thomas and Finney, Calculus, Addison Wesley
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.



## MATHEMATICS II (MA-1201)

**UNIT 1: Partial Differential Equation-** First order PDE, Formation of PDE, Classification of solution: Complete, General and Particular solution, Lagrange's linear PDE, Non-Linear First Order PDE, Some Standard form -I, II, III, IV. Charpit's method. Higher Order Homogeneous linear PDE with constant coefficients, C. F. & P.I., Non-homogeneous PDE with constant coefficients, C. F. & P. I. 7(L)

**UNIT 2: Application of Partial Differential Equation-** Classification of Linear PDE of second order: Elliptic, Parabolic and Hyperbolic, Solution of separation of variables. Interior and Exterior BVP: Heat & Wave equation, Laplace Equation. 6(L)

**UNIT 3: Laplace Transform-** Laplace transformation and its properties, Unit – step, Impulse and Periodic functions, Error Function, Inverse Laplace Transform, Convolution Theorem, Evaluation of Integral by Laplace Trans-form, Application of Laplace transform to solution of ODE & PDE. 7(L)

**UNIT 4: Fourier Series & Fourier Transform-** Fourier series, Convergence of Fourier Series, Half range series. Fourier Integral, Fourier sine and Cosine Integral, Complex form of Fourier Integral. Fourier Transform, Fourier Sine and Cosine Transform, Finite sine and cosine transform, Convolution theorem, Application of Fourier Transform to boundary value problems. 7(L)

**UNIT 5: Linear Algebra and Matrices-** Vector spaces, Subspaces, Linear dependence and independence, Basis and dimension, Dimension theorem. Linear Transformation, Rank – Nullity Theorem (Statement only), Computation of Rank and nullity of LT, Solution of linear simultaneous algebraic equations. 6(L)

**UNIT 6: Eigen Values and Eigen Vectors-** Eigen values and Eigen vectors, Cayley-Hamilton theorem, Application of Eigen Values and Eigen Vectors: Quadratic form, Diagonalization, Canonical forms and Solving system of first order differential equations. 6(L)

### Text/ Reference Books:

- Jain and Iyenger, Advanced Engineering Mathematics, Narosa Pub. House
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

## ENVIRONMENT AND ECOLOGY (CE-1201)

**UNIT 1: Introduction-** Introduction and scope, Indian Scenerio of Natural Resources, Conservation of natural resources. 4(L)

**UNIT 2: Ecosystem-** Ecosystem and its basic concept, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids, Ecological succession. 5(L)

**UNIT 3: Biodiversity-** Biodiversity and its conservation, types of biodiversity, Hot spots and threats to biodiversity, National and global scenario, Biodiversity conservation. 3(L)

**UNIT 4: Environmental Pollution-** Environmental Pollution: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards. 6(L)

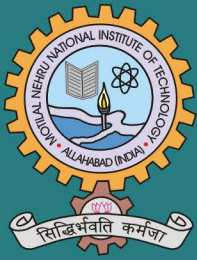
**UNIT 5: Social Issue-** Sustainable development, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, Wasteland reclamation. 4(L)

**UNIT 6: Environmental Laws-** Environmental laws/Acts, EPA. Act. 1986, Water Act. etc. 2(L)

### Text/ Reference Books:

- A Basic Course in Environmental Studies. Deswal & Deswal. Pub. Dhanpat Rai & Sons
- Environmental Studies. Bharucha. Pub. University of Press
- Ecology. Odum. Pub. Oxford & IBH
- Environmental Engineering. Peany et.al. Pub. McGraw Hill
- A Text Book of Environmental Engg. Venugopal Rao. Pub. PHI





### ENGINEERING GRAPHICS (ME-1101 / ME-1201)

1. Introduction to engineering graphics, basics of sheet sizes and choice of scale, title block, types of lines & geometric constructions, proper layout (spacing) of problems on the drawing sheet. Lettering, dimensioning details. 2(L)
2. Orthographic projection of points, projection of lines, Orthographic views. 2(L)
3. Sectioning of solids. 1(L)
4. Details of fasteners (e.g. bolt, nut, stud, screw etc), terminology of threads, types (e.g. V, square, acme, single/multi start, left/right handed etc). 1(L)
5. Elementary idea of joints (e.g. riveted, welded, soldered, adhesive etc), other joints (like cotter, knuckle etc.) along with their relative advantages and disadvantages and application areas, various couplings and their applications. 4(L)
6. Introduction to Modeling Software. 3(L)

#### Text/ Reference Books:

- Machine Drawing, by K.L.Narayana, P. Kanniah & K.VenkataReddy New Age International publishers.
- Machine Drawing includes AutoCAD, by Ajeet Singh, Tata McGraw Hill Publishing Company Ltd.
- Elementary Engineering Drawing, by Bhatt ND, Charotar Publishing.
- Machine Drawing by Bhatt ND Charotar Publishing.
- Engineering Drawing, by M. B. Shah & B. C. Rana Pearson Education India.
- Engineering Drawing, by Jolhe D. A. Tata McGraw Hill Education.

### WORK SHOP (ME-1102/ME-1202)

#### COURSE DESCRIPTION AND OBJECTIVE

**UNIT 1: Concept of Manufacturing-** Manufacturing definition; **Role of materials, processes and systems in manufacturing; Classification and brief introduction** of engineering materials such as metals & alloys, Ceramics and Glasses, and Plastics; Classification and brief introduction of manufacturing processes, Guide to processing of metals & alloys 4L

**UNIT 2: Casting Processes-** Elements of Green Sand Mould; Method of Preparation of Green Sand Mould; Casting Defects 3L

**UNIT 3: Metalworking Processes-** Classification of Metalworking Processes-brief introduction of bulk and sheet metal processes, Hot Vs Cold Working; Hot and Cold Rolling; Types of Rolling Mills, Hot and Cold Forging, Hot and Cold Extrusion, Cold Drawing 3L

**UNIT 4: Machining Processes-** Classification of machining processes & machine tools; Construction, Specification and Working of Lathe Machine and Drilling Machine; Study about Facing, Turning, Parting, Grooving, Threading and Knurling, and Drilling and other hole related operations 5L

**UNIT 5- Fabrication Processes-** Classification of Welding Operations, Types of Joints & Welding Positions; Brief description of Arc, Resistance and Gas welding techniques. Brazing and Soldering 4L

**UNIT 6- Brief introduction of Newer Machining Processes-** such as EDM, ECM, USM, and LBM.

Modern Trends in Manufacturing- Automation, Concept of CAD, CAM and CIM. 5L

#### Text/ Reference Books:

- Workshop Technology (Vol. I & II) by Hajra, Choudhury and Roy (Manufacturing Processes)
- Workshop Technology (Vol. I & II) by Raghuvansi (Manufacturing Processes)
- Workshop Technology by Khurmi and Gupta (Manufacturing Processes)





### PHYSICS LAB (PH-1151 / PH-1251)

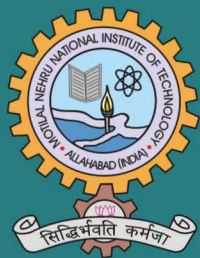
#### List of Experiments

1. Height of a building by Sextant
2. Co-efficient of thermal conductivity of rubber by Lee's disc method
3. Focal length of combination of two thin lenses by Nodal slide assembly
4. Determination of Boltzman Constant
5. Interference of light: Newton's ring
6. Interference of light: Fresnel's biprism
7. Fraunhofer diffraction: Double slit
8. Diffraction by a plane transmission grating
9. Specific rotation of sugar using Polarimeter
10. Specific resistance of a wire by Carry-Foster's Bridge
11. Verification of Stefan's law
12. Variation of magnetic field along the axis of a current carrying coil
13. Hysteresis loop for a ferromagnetic material (M-B) curve.
14. Determination of Plank's Constant.
15. Electromagnetic Induction.
16. To calculate the current and voltage sensitivities of a moving coil galvanometer.
17. To measure the Susceptibility of paramagnetic solution by Quinck's Tube Method.
18. To determine resistivity by four probe method.

### CHEMISTRY LAB (CY-1152 / CY-1252)

#### List of Experiments

- A) General introduction and description of Balance operation.
- B) Volumetric titrations:
1. Determination of available chlorine in a supplied bleaching powder sample by iodometry.
  2. Determination of type and extent of alkalinity in a supplied water sample by titrating with standard sulphuric acid solution.
  3. Determination of total and permanent hardness in a supplied water sample by titrating with standard EDTA solution.
  4. Determination of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  hardness in a supplied water sample by titrating with standard EDTA solution.
  5. Determination of  $\text{Fe}^{2+}$  in a supplied solution by titrating with standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution using ferrous ammonium sulphate as intermediate solution and diphenylamine as internal indicator.
  6. Determination of  $\text{Fe}^{2+}$  in a supplied solution by titrating with standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution using ferrous ammonium sulphate as intermediate solution and Potassium Ferricyanide as external indicator.
- C) Engineering experiments:
1. Determination of flash point of a lubricating oil using Pensky-Martin's apparatus.
  2. Determination of flash point of a lubricating oil using Abel's apparatus.
  3. Determination of aniline point of a lubricating oil using Aniline point apparatus.
  4. Determination of viscosity of a lubricating oil using Redwood viscometer.
  5. Determination of steam emulsion number of a lubricating oil.
  6. Determination of viscosity of a solution containing polymer.



### ENGINEERING MECHANICS LAB (AM-1153 / AM-1253)

#### List of Experiments:

1. Determination of Coefficient of friction of Sliding boxes of different materials on wooden inclined plane.
2. Determination of Coefficient of friction of roller on wooden inclined plane.
3. Determination of Coefficient of friction between rope and a fixed pulley.
4. Determination of mass moment of inertia of a fly-wheel.
5. Determination of forces in fixed and moving arm of a truss.
6. Determination of velocity ratio, mechanical advantage and efficiency of a screw jack.
7. Verification of law of Polygon of forces.
8. Verification of resultant and moment of forces by parallel for apparatus

### LANGUAGE LAB (HS-1154/HS-1254)

#### Unit 1 : The Description of Speech Sounds

- 1.1 Vowels and Consonants
- 1.2 Description of Consonants
- 1.3. Use of Phonetic Symbol

#### Unit 2: The Sounds of English- Vowels

- 2.1 Vowels in British Received Pronunciation
- 2.2 Vowels in General Indian English
- 2.3 Differences between the Vowels system of British R.P. and General Indian English
- 2.4 Description of the Vowels

#### Unit 3 : The Sound of English – Consonants

- 3.2 Plosives
- 3.3 Affricates
- 3.4 Fricatives
- 3.5. Nasals
- 3.6 Lateral
- 3.7 Post-Alveolar Frictionless Continuant
- 3.8 Semi – Vowels
- 3.9 Consonant Clusters
  - 3.9.1 Initial Clusters
  - 3.9.2 Final Clusters

#### Unit 4: Word Accent:

- 4.1 Word Accent
- 4.2 Stress Shift
- 4.3 Compound Words
- 4.4 Word Accent in Indian English
- 4.5 Rules of Accentual Patterns

#### Unit 5 : Features of Connected Speech

- 5.1 Accent in Connected Speech Rhythm
- 5.2 Weak Forms
- 5.3 Intonation





## COMPUTER PROGRAMMING LAB (CS-1155 / CS-1255)

### Course Outline-

1. Introduction, LINUX Commands, editors, Files & Directories, Design of algorithms. 4(L)
2. Writing a Simple Program: Learning the form of a C program, Declaring variables, designing program flow and control, using standard terminal I/O functions. 4(L)
3. Fundamental Data Types and Storage Classes, Operators and Expressions Conditional Program Execution Loops and Iteration, Introduction to Abstraction, functions. 6(L)
4. Arrays, Pointers, Structures. 6(L)
5. Introduction to Object Oriented Programming concepts, Classes and Objects, Important C++ constructs. 6(L)
6. The Standard C/C++ Preprocessor, The Standard C/C++ Library. 4(L)

### Text/ Reference Books:

- How to solve it by Computer by R. J. Dromey
- The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie
- On to C++ by PH Winston (also available online)
- Structure and Interpretation of Computer Programs by Harold Abelson and Gerald Sussman with Julie Sussman, (Also available online)
- Herbert Schild, Complete reference in C.

