Human Values & Professional Ethics

Common to all branches

Course Code - Category: IT 129 - HS **Credits: 0**

L	T	P	E	O
3	0	0	0	1

Sessional Marks:50

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others.
- To create awareness on assessment of safety and risk

Course outcomes:

By the end of the semester, the student will be able to:	
CO1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO2	Identify the multiple ethical interests at stake in a real-world situation or practice
CO3	Articulate what makes a particular course of action ethically defensible
CO4	Assess their own ethical values and the social context of problems
CO5	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human
CO6	Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

Unit I: HUMAN VALUES:

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others –Living Peacefully –Caring –Sharing –Honesty -Courage-Cooperation– Commitment – Empathy –Self Confidence Character –Spirituality-Case Study.

LEARNING OUTCOMES:

1. learn about morals, values & work ethics.
2. learn to respect others and develop civic virtue.
3. develop commitment
4. learn how to live peacefully

Unit II: ENGINEERING ETHICS:

Senses of 'Engineering Ethics-Variety of moral issued –Types of inquiry –Moral dilemmas – Moral autonomy –Kohlberg's theory-Gilligan's theory-Consensus and controversy –Models of professional roles-Theories about right action-Self interest -Customs and religion –Uses of Ethical theories –Valuing time –Co operation –Commitment-Case Study

LEARNING OUTCOMES:

1. learn about the ethical responsibilities of the engineers.
2. create awareness about the customs and religions.
3. learn time management
4. learn about the different professional roles.

Unit III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering As Social Experimentation –Framing the problem –Determining the facts –Codes of Ethics –Clarifying Concepts –Application issues –Common Ground -General Principles –Utilitarian thinking respect for persons-Case study

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LEARNING OUTCOMES:

1. demonstrate knowledge to become a social experimenter.
2. provide depth knowledge on framing of the problem and determining the facts.
3. provide depth knowledge on codes of ethics.
4. develop utilitarian thinking

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK:

Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety-Intellectual Property rights(IPR)-.

LEARNING OUTCOMES:

1. create awareness about safety, risk & risk benefit analysis.
2. engineer's design practices for providing safety.
3. provide knowledge on Intellectual Property Rights.

UINIT V: GLOBAL ISSUES

Globalization –Cross culture issues-Environmental Ethics –Computer Ethics –Computers as the instrument of Unethical behavior –Computers as the object of Unethical acts –Autonomous Computers-Computer codes of Ethics –Weapons Development -Ethics and Research –Analyzing Ethical Problems in research- Case Study

LEARNING OUTCOMES:

1. Develop knowledge about global issues.
2. Create awareness on computer and environmental ethics
3. Analyze ethical problems in research.
4. Give a picture on weapons development.

Text Books:

1. **M.Govindarajan, S.Natarajananad, V.S.SenthilKumar** "*Engineering Ethics includes Human Values*" -PHI Learning Pvt. Ltd-2009
2. **Harris, Pritchard and Rabins** "*Engineering Ethics*", CENGAGE Learning, India Edition, 2009.
3. **Mike W. Martin and Roland Schinzinger** "*Ethics in Engineering*" Tata McGraw-Hill–2003.
4. **Prof.A.R.Aryasri, DharanikotaSuyodhana** "*Professional Ethics and Morals*" Maruthi Publications.
5. **A.Alavudeen, R.KalilRahman and M.Jayakumaran** "*Professional Ethics and Human Values*" -LaxmiPublications.
6. **Prof.D.R.Kiran** "*Professional Ethics and Human Values*"
7. **PSR Murthy** "*Indian Culture, Values and Professional Ethics*" BS Publication

ENGINEERING MATHEMATICS-II

Ordinary Differential Equations & Numerical Methods

Common to all branches

Course Code - Category: IT 121 - BS **Credits:3**

L	T	P	E	O
3	**0**	**0**	**1**	**6**

Sessional Marks:40

End Exam: 3 Hours End Exam Marks:60

Course Objective:

Create and analyze mathematical models using first and higher order differential equations to solve application problems such as electrical circuits, orthogonal trajectories and Newton's law of cooling and also familiarize the student in various topics in numerical analysis such as interpolation, numerical differentiation, integration and direct methods for solving linear system of equations**.**

Course outcome:

By the end of the semester, the student will be able to:	
CO1	Demonstrate solutions to first order differential equations by various methods and solve basic application problem related to electrical circuits, orthogonal trajectors and Newton's law of cooling.
CO2	Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients
CO3	Apply various numerical methods to solve linear and non-linear equations
CO4	Familiar with numerical integration and differentiation
CO5	Understand Laplace transforms and its properties and finding the solution of ordinary differential equations

Unit - I: Ordinary Differential equations of ftrst order and its applications 12 Periods

First order linear differential equations, Bernoulli's equations, exact differential equations, equations reducible to exact equations, orthogonal trajectories, simple electric circuits (L –R circuit problems), Newton's law of cooling.

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

- Solve the first order differential equations and solve basic application problems described by first order differential equations.

Unit - II: Higher order Linear Differential Equations and its applications 10 Periods

Definitions, rules for finding the complementary function, rules for finding the particular integral, method of variation of parameters, equations reducible to linear equations with constant coefficient, Cauchy's homogeneous linear equation, Legendre's linear equation. Applications: L – C – R circuit problems.

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

- Solve the complete solution of linear differential equations with constant coefficient
- Solve basic application problems described by second order linear differential equations with constant coefficients.

Unit - III: Numerical solutions of algebraic and transcendental equations **10 Periods**

Solution of algebraic equation by Bisection method, Newton-Raphson, Regula-Falsi methods. Solution of simultaneous linear algebraic equations, Gauss elimination, Gauss Jordan, Gauss Seidel.

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

- Find numerical solution to a system of equations by using different methods.

Unit - IV: Interpolation, Numerical Differentiation & Integration **12 Periods**

Interpolation, Newton forward and backward interpolation formula, Lagrange's formula for unequal intervals. Numerical differentiation - Newton's forward and backward differences to compute first and second derivatives. Numerical integration - Trapezoidal rule, Simpson's one third rule and three eighth rules.

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

- Find derivative and integral of a function by using different numerical methods.

Unit - V: Laplace Transforms and its application **16 Periods**

Introduction, definitions, transforms of elementary functions, properties of Laplace transforms, transforms of periodic functions, transforms of derivatives, transforms of integrals, Multiplication by t, division by t, evaluation of integrals by Laplace transforms. Inverse Laplace transforms – other methods of finding inverse transforms (excluding residue method), Convolution theorem (without proof), application's to differential equations, unit step function (without proof) and unit Impulsive functions (without proof).

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

- Examine the properties of Laplace transformation.
- Apply the Laplace and inverse Laplace transformations for different types of functions.
- Evaluate ordinary differential equations by using Laplace transformation technique.

Textbooks:

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

References:

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

ENGINEERING PHYSICS

(Common to all branches)

Course Code - Category: IT 122 - BS **Credits:3**

L	T	P	E	O
3	0	0	1	4

Sessional Marks:40

End Exam: 3 Hours

End Exam Marks:60

Course Objectives

- To impart knowledge in basic concepts of physics relevant to engineering applications
- To introduce advances in technology for engineering applications

Course Outcomes

The students will be able to

CO1	Interpret the relation between heat, work and entropy with thermodynamic laws.
CO2	Explain and analyze the relation between electric current and magnetic fields, production and applications of ultrasonics.
CO3	Apply the optical phenomena like Interference, Diffraction and Polarization to various fields.
CO4	Explain the working principle and applications of lasers and fiber optics.
CO5	Interpret the microscopic behavior of matter with quantum mechanics.

SYLLABUS

UNIT – I **10 periods**

Thermodynamics:

Heat and work, first law of thermodynamics and its applications, reversible and irreversible processes, heat engine, Carnot cycle and its efficiency, Carnot's theorem, second law of thermodynamics, entropy – entropy change in reversible and irreversible processes, entropy and second law, entropy and disorder, entropy and probability, third law of thermodynamics.

Learning Outcomes:

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

- Explain the relation between heat and work.
- Recognize how much heat is converted into work.
- Identify the relation between entropy and different thermodynamic phenomena.

UNIT-II **10 periods**

Electromagnetism:

Faraday's law of induction , Lenz's law, Integral and differential forms of Faraday's law, self-inductance, energy stored in electric and magnetic fields, Poynting vector, displacement

current, Maxwell's equations in integral form (no derivation), wave equation, propagation of electromagnetic waves in free space.

Ultrasonics: Properties of ultrasonic waves, production of ultrasonic waves by magnetostriction and piezoelectric methods, applications of ultrasonics.

Learning Outcomes:

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

- Explain how to generate electric current by electromagnetic induction Phenomena.
- Evaluate Maxwell's displacement current and correction in ampere's law.
- Assess electromagnetic wave propagation in free space and its power.
- Recognize the properties and production of ultrasonics.
- Identify the use of ultrasonics in different fields

UNIT–III **10 periods**

Optics

Interference: Introduction, principle of superposition, coherence, Young's double slit experiment, conditions for interference, interference in thin films by reflection, wedge shaped film and Newton's rings

Diffraction: Introduction, Fresnel and Fraunhofer diffraction, diffraction at a single slit

Polarisation: Introduction, types of polarized light, double refraction in uniaxial crystals, Nicol's prism, quarter and half-wave plate, production and detection of plane, circular and elliptically polarized light.

Learning Outcomes:

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

- Explain various types of coherent sources.
- Outline the conditions for sustained interference.
- Analyze the differences between interference and diffraction.
- Illustrate the concept of polarization of light and its applications.
- Classify the production and detection of different polarized light.

UNIT–IV **10 periods**

Lasers: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, semiconductor laser, applications of lasers

Fibre optics: Introduction to optical fibers, principle of propagation of light in optical fibers,, acceptance angle and acceptance cone, numerical aperture, types of optical fibers, modes of propagation and refractive index profiles, attenuation in optical fibers, advantages of optical fibers in communications, fiber optics communication system, applications of optical fibers, fiber optic sensors

Learning Outcomes:

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

- Explain the working principle and properties of lasers
- Analyze the production and applications of lasers.
- Explain the working principle of optical fibers and its classification based on refractive index profile and mode of propagation.
- Identify the applications of optical fibers in medical, communication and other fields.

UNIT–V **10 periods**

Quantum mechanics:

Planck's hypothesis, wave-particle duality, introduction to quantum theory, de-Broglie concept of matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent and time dependent wave equations, physical significance and properties of the wave function ψ , application of Schrodinger wave equation for a particle in one dimensional well – Eigen wave functions and energy Eigen values of the particle

Elements of Statistical mechanics: Elementary concepts of Maxwell-Boltzman , Bose-Einstein and Fermi-Dirac statistics (no derivation)

Learning Outcomes:

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

- Explain the dual nature of radiation and matter.
- Realize de Broglie concept of matter waves and Heisenberg uncertain principle.
- Identify Schrodinger wave equation to solve the problems.
- Explain the importance of fundamentals of statistical mechanics

Text Books :

1. **M.N.Avadhanulu & P.G.Kshirasagar**, "*A Text Book of Engineering Physics*" – IX Edition, S.Chand Publications, 2014.
2. **S.L.Gupta & Sanjeev Gupta**, "*Modern Engineering Physics*" -- Dhanpat Rai Publications, 2011.

Reference Books:

1. **V. Rajendran**, "*Engineering Physics*", McGrawHill Education Private Ltd, 2011.
2. **S.O.Pilai, Sivakami** , "*Engineering Physics*" – IV Edition, New Age International Publishers , 2011.
3. **Young & Freedman**, "*University Physics*" – XI Edition, Pearson Education, 2004.
4. **A.Marikani**, "*Engineering Physics*" - PHI Learning Private Limited, 2009.
5. **Resnick & Halliday**, "*Physics Volume II"* – VI Edition,WileyIndia Publications 2001.
6. **R K Gaur, S L Gupta**, "*Engineering Physics*" – VIII Edtion, Dhanpat Rai Publications, 2001.
7. **D.K.Bhattacharya,Poonam Tandon**, "*Engineering Physics*" – Oxford University Press, 2010.

ENGINEERING CHEMISTRY

Common for all branches

Course Code - Category: IT 123 - BS **Credits:3**

L	**T**	**P**	**E**	**O**
3	**0**	**0**	**1**	**4**

Sessional Marks:40

End Exam: 3 Hours End Exam Marks:60

Course Objectives:

- To familiarize Engineering Chemistry and its applications
- To provide knowledge on problem associated with impure water and various treatment technologies
- To train the students on the principles and applications of electrochemistry,
- To introduce nano, smart and composite materials

Course Outcomes:

By the end of the semester, the student will be able to:	
CO1	**Identify** the problems associated with raw water in various applications and can **adopt** suitable technologies for domestic and industrial feed waters.
CO2	**Understand** the concepts of electro chemistry for **design** of suitable batteries and solar energy in view of environmental protection.
CO3	**Select and design** of suitable materials to prevent corrosion and to protect various parts from corrosion.
CO4	**Generalize** the properties of semiconducting and ceramic materials, can **select** suitable materials for specific applications.
CO5	**Analyze** the importance of nano, composite and smart materials.

SYLLABUS

UNIT I **12 Periods**

Water Chemistry: Introduction- Impurities in water; Hardness of water – types of Hardness, units and calcium carbonate equivalents, problems, disadvantages of hard water; Boiler troubles-Scale & Sludge formation, prevention- Internal treatment - (Phosphate, Carbonate and Calgon conditioning) ,Caustic embrittlement

Water treatment techniques: Softening of water by ion exchange method- Principle, Process, advantages; Desalination of water – Reverse Osmosis and Eelectrodialysis; WHO standards for drinking water, Municipal water treatment - Sedimentation, Coagulation, Chlorination-Break point chlorination.

Learning Outcomes:

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

- **List** the differences between temporary and permanent hardness of water (L1)
- **Illustrate** the problems associated with hard water (L2)
- **Explain** the principles of reverse osmosis, electrodialysis and municipal water treatment processes (L2)
- **Solve** problems associated with hard water - scale and sludge (L3)

UNIT-II **10 Periods**

Electrochemical cells: Electrode potential, Nernst equation, reference electrodes-SHE and Calomel electrode, Electrochemical series, Electrochemical cell, Cell potential; Primary cells – Dry cell, alkaline battery, hydrogen-oxygen, methanol fuel cells – working of the cells; Secondary cells – lead acid, lithium ion batteries- working of the batteries including cell reactions.

Solar Energy: Photovoltaic cell -Working & applications, Photo galvanic cells with specific examples

Learning Outcomes:

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

- **Apply** Nernst equation for calculating electrode and cell potentials (L3)
- **Explain** the theory and construction of battery and fuel cells (L2)
- **Identify** the applications of solar energy (L2)
- **Construct** different cells (L3)

UNIT – III **10 Periods**

Corrosion Chemistry: Definition, Theories of corrosion-Chemical corrosion, metal oxide formation, Pilling Bedworth rule, Electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion; Factors affecting corrosion

Prevention and control: Protection- cathodic protection, Corrosion inhibitors, electroplating of Copper and electroless plating of Nickel, organic coatings-paint and varnish

Learning Outcome:

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

- **Apply** Pilling Bedworth rule for corrosion and corrosion prevention (L3)
- **Demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **Develop** the corrosion resistant materials for industrial and marine applications (L5)
- **Identify** different organic coatings (L3)

UNIT IV **10 Periods**

Semiconducting Materials: Band theory of solids – band diagrams for conductors, semiconductors and insulators, Role of doping on band structures. Organic semiconductors and applications.

Ceramic Materials: Cement – raw materials, Manufacturing process, Setting and hardening of cement (hydration and hydrolysis equations); Refractories- classification; engineering applications of ceramics

Learning Outcome:

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

- **Explain** the manufacturing of portland cement (L2)
- **Enumerate** the reactions at different temperatures in the manufacture of cement (L2)
- **Describe** the mechanism of conduction in conducting polymers (L2)
- **List out** the applications of ceramics (L2)

UNIT V **10 Periods**

Nanomaterials: Introduction to Nanomaterial- nanoparticles, nanocluster, carbon nanotube (CNT); Chemical synthesis of nanomaterials- sol-gel method; Characterization- Principle and applications of Scanning electron microscope (SEM) and Transmission electron microscope (TEM).

Polymer Composites: Definition, constituents of composites, types - Fiber Reinforced Plastics, Particulate composites, Layer composites, engineering applications of composites;

Smart polymers: Introduction, types of smart polymers and applications

Learning Outcome:

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

- **Classify** nanomaterials (L2)
- **Explain** the synthesis and characterisation of nanomaterials (L2)
- **Explain** the different types of composites and their applications (L2)
- **Identify** different types of smart materials (L2)

Prescribed Text Book

1. **P.C. Jain and M. Jain** "*Engineering Chemistry"* 16th edition, - DhanapathiRai& Sons, Delhi. 2015.
2. **S.S. Dara** "*A text book of Engineering Chemistry*" 15 th edition, S. Chand& Co. New Delhi, 2014**.**

Reference books

1. **O.G.Palanna** "*Engineering Chemistry*" Tata McGraw Hill Education pvt ltd, New Delhi, 2009.

2. **V.Raghavan** "*A Material Science and Engineering*" 5th edition, Printice Hall India Ltd, 2011.

Digital Logic Design

Course Code - Category: IT 124 - ES **Credits: 3**

L	T	P	E	O
3	0	0	1	6

Sessional Marks:40

End Exam: 3 Hours End Exam Marks:60

Course Objectives:

- To identify various number systems and work with Boolean algebra.
- To understand the concepts of Boolean Algebra various logic gates.
- To simplify the Boolean expression using K-Map and Tabulation techniques.
- To analyze various types of flip flops used for designing registers and counters.

SYLLABUS

UNIT I 8 Periods

BINARY SYSTEMS:

Digital Computers and digital systems – Binary Numbers – Number Base conversions – Octal, Hexadecimal. Numbers Complements – . Complement Arithmetic; n's complement and (n-1)'s complement. Representation of signed binary numbers , Binary Codes-Decimal Codes- BCD, NBCD, Excess-3 BCD, Error- Detection Codes, The Reflection Code, Alphanumeric Codes, Registers, Register Transfer. Binary Logic, Truth table, logic operations- AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR. De Morgan's theorem.

UNIT II 12 Periods

BOOLEAN ALGEBRA & Logic Gates: Basic Definitions, Basic Properties of Boolean algebra, Boolean functions, Boolean Algebra – Basic Theorems and properties – Boolean Functions – Canonical and Standard Forms, Other logical operations, Digital Logic gates.

UNIT III 10 Periods

SIMPLIFICATION OF BOOLEAN FUNCTIONS

The Map Method-Karnaugh Map Simplification – Two, Three, Four and Five Variables Maps, Product of Sums simplification, NAND and NOR Implementation , Don't Care Conditions, The Tabulation Method, Determination of prim- implicants, Selection of Prime implicants.

UNIT IV 10 Periods

COMBINATIONAL LOGIC CIRCUITS

Combinational Circuits – Adder - Subtractor – Design and Analysis procedures – Binary Parallel Adder – Decimal Adder – Encoder – Decoder – Multiplexer – Demultiplexer – Magnitude comparators – Read Only Memory (ROM)

UNIT V **10 Periods**

SEQUENTIAL LOGIC CIRCUITS

Sequential circuits – Latches – Flip-flops – Triggering of Flip-Flops – Analysis of clocked sequential circuits – State reduction and state assignment – Design procedure of clocked sequential circuits – Design of counters – Registers – Shift registers – Ripple counter and Synchronous counter.

Text Books:

1. **Morris Mano M**., "*Digital Logic and Computer Design*", [UNIT 1 - Chapter 1 , UNIT 2 – Chapter 2 , UNIT 3 – Chapter 3, UNIT 4 – Chapter 4 & 5, UNIT 4 – Chapter 6& 7] Pearson Education, 1/e, 2010.

Reference Books:

1. **Raj Kamal** "*Digital Systems Principles and Design*" First Edition, Pearson Education, 2007.
2. **Charles H.Roth, Jr. and Larry L. Kinney**, "*Fundamentals of Logic Design*", Seventh Edition, CL Engineering, 2013.

ENGINERING DRAWING

(Common for all branches)

Course Code - Category: IT 125 - ES **Credits:3.5**

L	T	P	E	O
2	0	3	1	4

Sessional Marks:40

End Exam: 3 Hours End Exam Marks:60

Course Objectives:

- The course is designed to introduce fundamentals of engineering drawing and apply the principles to draw engineering curves, orthographic projections and isometric projections.

Course Outcomes:

By the end of the course, the student will be able to:	
CO 1	Draw conic sections by different methods and construct cycloidal and involute curves.
CO 2	Project orthographically the points and lines in various positions.
CO 3	Produce orthographic projections of plane surfaces
CO 4	Draw orthographic projections of solids in various orientations.
CO 5	Construct isometric views and isometric projections of simple solids.

SYLLABUS

UNIT I

Introduction to Engineering drawing & basics of geometrical construction. General Construction of conic sections, Ellipse - concentric circle and arcs of circle method, Parabola- rectangle and tangential method Hyperbola - Rectangle hyperbola, Construction of cycloidal curves (cycloid, epicycloid, and hypocycloid), Involute(thread length equal to circumference/ perimeter) - circle and regular polygon.

UNIT II

Orthographic projections – projections of points – projections of straight lines (lines parallel to both HP&VP, lines parallel to one and inclined to other, lines inclined to both the planes)

UNIT III

Projections of regular polygon planes – inclined to one plane, inclined to both the planes.

UNIT IV

Projection of solids: Prisms – Cylinder– Pyramids &Cones –simple positions & axis inclined to one plane, inclined to both the planes.

UNIT V

Isometric projections –Isometric scale, Isometric view & projection of prisms, pyramids, cone, cylinder, sphere, and their combination.

TEXT BOOK:

1. **N. D. Bhatt** "*Engineering Drawing"* Charotar Publishing House Pvt.Ltd, 53rd Edition : 2014

REFERENCE BOOKS:

1. **K. L. Narayana& P. Kanniah** "*Engineering Drawing"*
2. **R. B. Choudary** "*Engineering Graphics* with Auto CAD"
3. **TrymbakaMurty** "*Computer Aided Engineering Drawing"*

ENGINEERING PHYSICS LAB

Common for all branches

Course Code - Category: IT 126 - BS **Credits:1.5**

L	T	P	E	O
0	**0**	**3**	**0**	**1**

Sessional Marks:50

End Exam: 3 Hours End Exam Marks:50

Course Objectives

- To enable the students to acquire skill, technique and utilization of the Instruments

Course Outcomes

At the end of this course, the students will be able to	
CO1	Design and conduct experiments as well as to analyze and interpet data
CO2	Apply experimental skills to determine the physical quantities related to heat, electromagnetism and optics

List of experiment (any eight to ten experiments have to be completed)

1. Determination of coefficient of thermal conductivity of a bad conductor- Lee's method.
2. Determination of radius of curvature of a convex lens - Newton's rings.
3. Determination of wavelengths of spectral lines in mercury spectrum-using diffraction grating in normal incidence position.
4. Determination of Cauchy's constants of the material of the prism using spectrometer.
5. Determination of thickness of a thin paper by forming parallel interference fringes-Wedge method.
6. Study of variation of magnetic field along the axis of a current carrying circular coil – Stewart and Gee's apparatus.
7. Calibration of a low-range voltmeter using potentiometer.
8. Verification of laws of resistance and determination of specific resistance of wire by using Carey- Foster's bridge.
9. Determination of refractive indices o-ray and e-ray in quartz crystal (double refraction)
10. Determination of the frequency of an electrically maintained tuning fork - Melde's experiment.
11. Determination of Rydberg constant using hydrogen discharge tube.
12. Characteristics of photo cell and determination of Planck's constant –Photoelctric effect.
13. Determination of e/m of an electron by Thomson's method
14. Determination of band gap of semiconductor.

Learning Outcomes:

The students will be able to

- **Handle** optical instruments like microscope and spectrometer
- **Determine** thickness of a hair/paper with the concept of interference
- **Estimate** the wavelength and resolving power of different colors using diffraction grating
- **Plot** the intensity of the magnetic field of circular coil carrying current with varying distance
- **Determine** the band gap of a given semiconductor
- **Determine** thermal conductivity of good and bad conductors
- **Determine** resistance and resistivity of the given material
- **Determine** the accuracy of low range voltmeter using potentiometer
- **Evaluate** the refractive index using double refraction phenomena
- **Determine** frequency of electrical tuning fork

Prescribed Book

1. "*Physics Laboratory Manual"* Prepared by Department of Physics ANITS

Reference books

1. **D.P Siva Ramaiah and V. Krishna Murthy** "*Practical physics*" Maruti book Depot
2. **A.R Vegi** "*Comprehensive practical Physic"s* by Vegi Publishers Pvt.Ltd.

ENGINEERING CHEMISTRY LAB

Common for all branches

Course Code - Category: IT 127 – BS **Credits:1.5**

L	T	P	E	O
0	**0**	**3**	**0**	**1**

Sessional Marks:50

End Exam: 3 Hours End Exam Marks:50

Course Objectives:

- To improve skills in analyzing samples through titration procedures
- To get an idea over instrumental methods of analysis for more accuracy

At the end of this course, the students will be able to	
CO1	Apply experimental skills in analysing samples through titration procedures
CO2	Select and use a suitable instrumental technique for the quantitative analysis for more accuracy

List of Experiments (any ten experiments)

1. i) Preperation of primary standard solution.
   ii) Preparation and Standardization of Hydrochloric acid solution.
2. Determination of total Hardness present in the given water sample.
3. Estimation of Iron(II) by permonganate.
4. Estimation of amount of calcium present in the Portland cement by titrimetrically.
5. Estimation of amount of Zinc by EDTA.
6. Estimation of amount of Copper by using Sodium thiosulphate.
7. Determine the strength of acid (lead acid battery) by titrating with strong base using **pH meter**.
8. Estimate the individual strength of acids present in the acid mixture by titrating with strong base using **conductivity meter.**
9. Estimate the amount of Mohr's salt present in the given solution by titrating with potassium dichromate using **potentiometer.**
10. To determine the viscosity of liquid by Ostwald viscometre
11. **Spectrophotometric** estimation of Fe(III) by Potassium thiocyanate.

Demo Experiments

1. Thin layer chromotography and Gas chromatography
2. Preperation of Bakelite
3. Particle size distribution by PSD analyser(Demo-Outsource)
4. Elemental analysis by ICPMS (Demo-Outsource)
5. Introduction of Reaction colourimetry (for Chemical Engineering)

Learning Outcomes:

1. Measure the strength of an acid present in secondary batteries
2. Calculate the hardness of water sample
3. Determine the Potential and conductance of solutions
4. Analyse the cement for Iron and Calcium contents
5. Prepare polymer materials

Prescribed Books

1. **S.K. Bhasin and SudhaRani** *"Laboratory manual on Engineering chemistry"* third edition; DhanpatRai Publishing Company.

Reference Books

1. **S.S. Dara "***Experiments and calculations in Engineering chemistry***"** 9^{th} edition; S. Chand & Company ltd.

ENGINEERING WORKSHOP

(Common for all branches except for ECE)

Course Code - Category: IT 128 - ES **Credits:1.5**

L	T	P	E	O
0	**0**	**3**	**0**	**1**

Sessional Marks:50

End Exam: 3 Hours End Exam Marks:50

Course Objectives:

- To provide training and hands on experience to the students on basic Engineering related skills like carpentry, fitting, tin smithy, house wiring and soldering.

Course Outcomes:

By the end of the course, student will be able to:	
CO1	Make different carpentry joints.
CO2	Make simple fitting jobs.
CO3	Make simple jobs like funnel, elbow etc. using sheet metal.
CO4	Understand and build circuits for different types of applications like stair case wiring, godown wiring.
CO5	Make simple circuits on bread board using soldering kit

LIST OF EXPERIMENTS

Minimum of two exercises has to be conducted from each trade.

Trade:

Carpentry
1. Cross Lap Joint
2. Dovetail Joint
3. Mortise and Tennon Joint
4. Briddle Joint

Fitting
1. V Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Elbow
4. Funnel

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Godown wiring

Soldering
1. LED bulb
2. Dc motor with pot
3. De soldering PCB

Reference book:

1. **S.K.Hajra Choudhury** "*Elements of Workshop Technology" Vol I Manufacturing Processes*, ISBN: 8185099146(2017)