Shirpur Education Society's

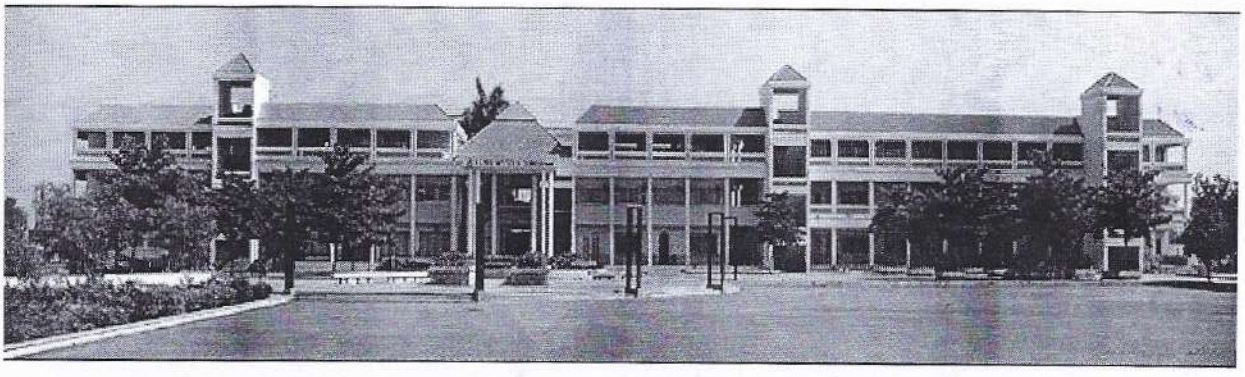
R. C. Patel Institute of Technology, Shirpur

(An Autonomous Institute)

Course Structure

First Year B.Tech (All Branches)

with efffect from Year 2020-21



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
Ph: 02563 259 802, Web: www.rcpit.ac.in

Semester-I

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment				ESE	Total	
				L L	T T	P P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	BSFY1010T	Engineering Mathematics-I	4	1		20	15	15	15	65	100	5
2	BS	BSFY1020T	Engineering Physics-I	2			20	15	15	15	65	100	2
3	BS	BSFY1030T	Engineering Chemistry-I	2			20	15	15	15	65	100	2
4	BS	BSFY1020L	Engineering Science-I Laboratory			2	25				25	50	1
5	ES	ESFY1040T	Engineering Mechanics	3	1		20	15	15	15	65	100	4
6	ES	ESFY1040L	Engineering Mechanics Laboratory			2	25				25	50	1
7	ES	ESFY1050T	Basic Electrical Electronics Engineering	3			20	15	15	15	65	100	3
8	ES	ESFY1050L	Basic Electrical Electronics Engineering Laboratory			2	25				25	50	1
9	HM	HMFY1060L	Language Proficiency- English			2	25				25	50	1
10	ES	ESFY1070L	Workshop @			2	50					50	1@
			Total	14	2	8	200			75	425	700	20

@ For Computer Engineering, Data Science, Electrical Engineering ; Credit to be given at the end of the same academic year.

Checked by

Head of the Department

HOD, Applied Science
R. C. Patel Institute of Technology
Shirpur, Dist: Dhule (MS)

COE

Controller of Examination
R.C.Patel Institute of Technology
Shirpur Dist.Dhule (MS)

Dy. Director

Deputy Director
R.C.Patel Institute of Technology
Shirpur, Dist. Dhule (MS)

Director

DIRECTOR
R.C. Patel Institute of Technology
Shirpur Dist Dhule (MS)

Semester-II													
Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment				ESE	Total	
				L L	T	P P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	BSFY2010T	Engineering Mathematics-II	4	1		20	15	15	15	65	100	5
2	BS	BSFY2020T	Engineering Physics-II	2			20	15	15	15	65	100	2
3	BS	BSFY2030T	Engineering Chemistry-II	2			20	15	15	15	65	100	2
4	BS	BSFY2020L	Engineering Science -II Laboratory			2	25				25	50	1
5	ES	ESFY2040T	Engineering Graphics	2			20	15	15	15	65	100	2
6	ES	ESFY2040L	Engineering Graphics Laboratory			2	25				25	50	1
7	ES	ESFY2050T	Computer Programming	3			20	15	15	15	65	100	3
8	ES	ESFY2050L	Computer Programming Laboratory			2	25				25	50	1
9	HM	HMFY2060T	Effective Communication Skills	2			20	15	15	15	65	100	2
10	HM	HMFY2060L	Effective Communication Skills Laboratory			2	25				25	50	1
11	ES	ESFY2070L	Workshop @			2	50					50	1
			Total	15	1	10	270			90	490	85 0	21
@ For Electronics and Telecommunication Engineering, Civil Engineering, Mechanical Engineering.													

Checked by

Head of the Department
HOD, Applied Science
R. C. Patel Institute of Technology
Shirpur, Dist: Dhule (MS)

COE
Controller of Exami
R.C.Patel Institute of
Shirpur Dist.Dhule 42

Dy. Director
Deputy Director
R. C. Patel Institute of Technology
Shirpur, Dist. Dhule (MS)

Director
DIRECTOR
R C Patel Institute of Technology
Shirpur Dist Dhule (MS)

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Engineering Mathematics-I (BSFY1010T)		

Prerequisite: Knowledge of

1. Inverse of a matrix, addition, multiplication and transpose of a matrix
2. Algebra of Complex Number. Cartesian, polar and exponential form of complex number

Course Objectives

1. To develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience using SCILAB software to handle real life problems.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the concepts of matrix operations, rank, and echelon forms to solve systems of linear equations.	L3	Apply
CO2	Explain the fundamental concepts and properties of complex numbers.	L3	Apply
CO3	Apply the knowledge of complex numbers to solve problems involving hyperbolic and logarithmic functions.	L3	Apply
CO4	Explain and apply the basic principles of partial differentiation to mathematical problems.	L3	Apply
CO5	Analyze functions to determine maxima, minima, and perform successive differentiation.	L3	Apply
CO6	Develop and apply SCILAB programming techniques for solving linear and simultaneous algebraic equations.	L3	Apply

Engineering Mathematics-I (BSFY1010T)

Course Contents

Unit-I Matrices 11 Hrs.

Prerequisite: *Inverse of a matrix, addition, multiplication and transpose of a matrix*

Types of Matrices (Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, Unitary,Orthogonal Matrices and properties of Matrices), Rank of a matrix using Echelon forms, reduction to normal form and PAQ form, System of homogeneous and non – homogeneous equations, their consistency and solutions, Linear dependent and independent vectors, Application of inverse of a matrix to coding theory.

Unit-II Complex Numbers 08 Hrs.

Prerequisite: *Definition, algebra, polar and exponential form of complex numbers*

Statement of D'Moivre's Theorem, Expansion of $\sin^n\theta$, $\cos^n\theta$ in terms of sines and cosines of multiples of θ and Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, and $\cos\theta$, Powers and Roots of complex number.

Unit-III Hyperbolic function and Logarithm of Complex Numbers 07 Hrs

Prerequisite: *Trigonometric functions,logarithm of real number*

Circular functions of complex number and Hyperbolic functions, Inverse Circular and Inverse Hyperbolic functions, Separation of real and imaginary parts of all types of functions, Logarithmic Functions, Separation of real and Imaginary parts of Logarithmic Functions.

Unit-IV Successive differentiation and Partial Differentiation 12 Hrs

Prerequisite: *Limit, Derivative*

Successive differentiation: n^{th} derivative of standard functions, Leibnitz's theorem (without proof) and problems

Partial Differentiation: Function of several variables, Partial derivatives of first and higher order, Differentiation of composite function, Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with two and three independent variables (with proof), Deductions from Euler's theorem.

Unit-V Applications of Partial Differentiation and Expansion of Function 12 Hrs.

Prerequisite: *Maxima and Minima of single variable function, Partial derivatives*

Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint, Jacobian's of two and three independent variables, Taylor's Theorem (Statement only) and Taylor's series, Maclaurin's series (Statement only), Expansion of standard functions, Indeterminate forms, L-Hospital Rule, problems involving series.

Unit-VI Numerical Solutions of Transcendental Equations and System of Linear Equations 06 Hrs.

Prerequisite: *Solution of system of equations*

Solution of Transcendental Equations: Solution by (i) Newton Raphson Method, (ii) Regula –Falsi Method.

Solution of system of linear algebraic equations by (i) Gauss Jacobi Iteration Method, (ii) Gauss Seidal Iteration Method, (iii) Gauss Elimination Method, (iv) Gauss Jordan Method.

Reference Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
2. Applied Numerical Methods with MATLAB for Engineers and Scientists, Steven Chapra, Mc-Graw Hill.
3. Advanced Engineering Mathematics, Dennis G. Zill, Warren S. Wright,CBS Publishers, New Delhi.
4. Linear Algebra, Hadly G, Narosa Publication
5. Matrix and Linear Algebra : aided with Matlab, Datta Kanti Bhushan, PHI,New Delhi.

Text Books

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication.
2. Advanced Engineering Mathematics, H. K. Dass, 28th edition, S. Chand 2010.
3. Engineering Mathematics,Ravish Singh, Mukul Bhatt, TMH New Delhi.

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Engineering Physics -I (BSFY1020T)		

Prerequisite: Basic foundations of physics and mathematics till HSc or equivalent is necessary to comprehend engineering physics curriculum in a lucid way

Course Objectives

1. To Identify and understand the fundamental physical principles underlying engineering technologies a prerequisite to become successful engineer.
2. To provide inclusive knowledge of fundamental physical principles encouraging engineering students to venture in research field.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Comprehend the concepts of solid state physics and apply them in designing solid state devices.	L2, L3	Understand, Apply
CO2	Relate the scope and foundation of quantum mechanics and its role in development of modern technology.	L3, L4, L5	Apply, Analyze, Evaluate
CO3	Assimilate the wide scope of Nanotechnology in modern developments and its role in emerging innovative applications..	L2, L3	Understand, Apply
CO4	Employ the concepts of optics in precision measurements.	L1, L2	Remember, Understand

Engineering Physics -I (BSFY1020T)

Course Contents

Unit-I Solid State Physics 08 Hrs.

Prerequisite: *Crystal Physics (Unit cell, Space lattice, Crystal structure, Simple Cubic, Body Centered Cubic, Face Centered Cubic, Production of X-rays, Intrinsic and extrinsic semiconductors, Energy bands in conductors, semiconductors and insulators, Semiconductor diode, I-V characteristics in forward and reverse bias*

Introduction

Miller indices; Interplanar spacing

X-ray diffraction and Bragg's law; Determination of Crystal structure using Bragg's spectrometer

Direct & indirect band gap semiconductor; Fermi level; Fermi dirac distribution; Fermi energy level in intrinsic & extrinsic semiconductors; effect of impurity concentration and temperature on fermi level; mobility, current density; Hall Effect; Fermi Level diagram for p-n junction (unbiased, forward bias, reverse bias)

Semiconductor devices: LED, Zener diode as a voltage regulator, Solar cell.

Unit-II Quantam Physics 07 Hrs.

Prerequisite: *Dual nature of radiation, Photoelectric effect, Matter waves-wave nature of particles, de-Broglie relation, Davisson-Germer experiment*

Introduction

De Broglie hypothesis of matter waves; properties of matter waves

Wave packet, phase velocity and group velocity

Heisenberg uncertainty principle; Single slit electron diffraction experiment; nonexistence of electron in nucleus

Schrodinger's time dependent wave equation; time independent wave equation; Particle trapped in one dimensional infinite potential well

Fundamentals of Quantum Computing.

Unit-III Nanoscience & Nanotechnology 06 Hrs.

Prerequisite: *Scattering of electrons, Tunnelling effect, Electrostatic focusing, magneto static focussing*

Introduction

Dimensional classification of Nanomaterials

Properties of Nanomaterials

Synthesis of Nanomaterials

Properties of carbon allotropes (CNT, Fullerenes, Graphene)

Applications of Nanotechnology

Characterization techniques: Scanning Electron Microscope (SEM), Transmission Electron Micro-

scope (TEM), Atomic Force Microscope (AFM), Scanning Tunnelling Microscope (STM)

Unit-IV Optics-I 07 Hrs

Prerequisite: *Wave front and Huygen's principle, reflection and refraction, Interference by division of wave front, Youngs double slit experiment*

Interference by division of amplitude, Stoke's Relation

Interference in thin film of constant thickness due to reflected and transmitted light; origin of colours in thin film

Interference in Wedge shaped film

Formation of Newton's rings

Applications of interference - Determination of thickness of very thin wire or foil;determination of refractive index of liquid; wavelength of incident light; radius of curvature of lens; testing of surface flatness; Anti-reflecting and Highly reflecting films.

Reference Books

1. Fundamentals of optics by Jenkins and White, McGrawHill
2. Solid State Electronic Devices- B. G. Streetman, Prentice Hall Publisher
3. Concepts of Modern Physics- Arther Beiser, Tata McGraw Hill
4. Introduction to Solid State Physics- C. Kittel, John Wiley & Sons publisher
5. Advances in Nano Materials And Applications: History of Nanotechnology From Pre-Historic to Modern Times, Madhuri Sharon, Wiley, USA

Text Books

1. A text book of Engineering Physics-Avadhanulu & Kshirsagar, S. Chand
2. A Text Book of Engineering Physics, S. O. Pillai, New Age International Publishers.
3. textbook of Optics - N. Subramanyam and Brijlal, S.Chand
4. Modern Engineering Physics – Vasudeva, S.Chand
5. Engineering Physics – R K Gaur & S L Gupta, Dhanpat Rai Publications
6. Engineering Physics – Shatendra Sharma & Jyotsna Sharma, Pearson publications
7. Engineering Physics – D. K. Bhattacharya & Poonam Tandon, Oxford publications
8. Engineering Physics – V Rajendran, McGraw Hill Educations
9. Nano: The essentials, understanding Nanoscience and Nanotechnology, T. Pradeep, Tata Mc Graw Hill, 2007

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Engineering Chemistry-I (BSFY1030T)		

Prerequisite: Knowledge of

1. Electronic configuration, hybridization, bond formation, homogenous and heterogeneous systems.
2. Basic process of polymerization and fundamental properties of water.

Course Objectives

1. To obtain a strong hold on basic concepts of chemistry that form fundamental principles of technology.
2. To give exposure to recent development in the course related topics.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze microscopic chemistry in terms of atomic and molecular orbitals and aromaticity of organic molecules.	L4	Analyze
CO2	Rationalize various phase transformation using thermodynamics.	L2, L5	Understand, Evaluate
CO3	Apply the knowledge of polymers, fabrication methods, conducting polymers in various industrial fields.	L3	Apply
CO4	Analyze the quality of water and suggest suitable methods of treatment.	L3, L4	Apply, Analyze

Engineering Chemistry-I (BSFY1030T)

Course Contents

Unit-I Atomic and Molecular Structure 07 Hrs.

Prerequisite: *Basics theories of Atomic and Molecular structures, Shapes of orbitals, Bonding.*

Atomic orbitals (s,p,d,f) orbital shapes, Electronic Configuration.

Molecular orbital theory (MOT), bonding and anti-bonding orbitals.

Molecular orbital diagrams of Homonuclear and Heteronuclear diatomic molecules- H2, Li2, Be2, O2, CO, NO, their bond order and magnetic properties.

Aromaticity, Huckel's rule.

Structure and bonding of benzene and pyrrole.

Unit-II Intermolecular Forces and Phase Rule 07 Hrs.

Prerequisite: *Diplole moment,Types of Intermolecular forces,Phases*

Ionic, dipolar, Hydrogen bonding and Vander Waal's interactions.

Phase Rule-Gibb's Phase Rule, Terms involved with examples.

One Component System (Water).

Reduced Phase Rule, Two Component System (Pb- Ag).

Advantages and Limitations of Phase Rule.

Numerical based on Phase rule.

Unit-III Polymers 07 Hrs.

Prerequisite: *Molecular weight, Monomer, Free radical, Chain reaction, Catalyst, Types of Reactions.*

Introduction: Definition- Polymer, polymerization, classification.

Molecular weight (Number average and Weight average), Numerical problems on molecular weight.

Effect of heat on polymers (glass transition temperature), Viscoelasticity.Classification-Thermoplastic and Thermosetting polymers.

Compounding of plastic, Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding.

Preparation, properties and uses of PMMA, Kevlar, Phenol-Formaldehyde, Urea Formaldehyde.

Conducting Polymers.Polymers in medicine and surgery.

Unit-IV Water 07 Hrs

Prerequisite: *Proeprties of Water, Chemical Composition, Sources, Types of Impurities.*

Introduction - Impurities in water.

Hardness of water- units (no conversions), types and numerical problems.

Determination of hardness of water by EDTA method and numerical problems.

Softening of water by Ion Exchange process and numerical problems.

BOD, COD- definition, significance and Numerical problems.

Water purification-membrane technology- Electrodialysis, Reverse osmosis, and Ultra filtration.

Sewage treatment by activated sludge process.

Reference Books

1. Engineering Chemistry - Wiley India (ISBN – 9788126519880)
2. A Text Book of Engineering Chemistry - Shashi Chawla (DhanpatRai).
3. Concise Inorganic Chemistry - J D LEE.
4. Essentials of Physical Chemistry - B S Bahl, Arun Bahl, G D Tuli.

Text Books

1. Engineering Chemistry - Jain & Jain (DhanpatRai).
2. Engineering Chemistry - Dara & Dara (S Chand).

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Engineering Mechanics (ESFY1040T)		
Engineering Mechanics Laboratory (ESFY1040L)		

Prerequisite: Knowledge of

1. Basics of Trigonometry
2. Newton's Laws of motion

Course Objectives

1. To acquaint the concept of equilibrium.
2. To study and analyze motion of moving particles/bodies..

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Illustrate the effect of force and moment and apply the same along with the concept of equilibrium systems with the help of FBD	L3	Apply
CO2	Demonstrate the understanding of Centroid and its significance and locate the same	L3	Apply
CO3	Correlate real life application to specific type of friction and estimate required force to overcome friction	L5	Evaluate
CO4	Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the relation	L4	Analyze
CO5	Analyze general plane motion of rigid bodies using Instantaneous centre	L4	Analyze
CO6	Analyze particles in motion using force and acceleration, work energy and impulse-momentum principles	L4	Analyze

Engineering Mechanics (ESFY1040T)

Course Contents

Unit-I System of Coplanar Forces & Centroid 08 Hrs.

Prerequisite: *Physics from 12th*

System of Coplanar Forces: Classification of force systems, Principle of transmissibility, composition and resolution of forces. Resultant of coplanar force system (Concurrent forces, parallel forces and nonconcurrent Non-parallel system of forces). Moment of force about a point, Couples, Varignon's Theorem. Force couple system.

Centroid: First moment of Area, Centroid of composite plane Laminas.

Unit-II Equilibrium of System of Coplanar Forces, Beams 09 Hrs.

Prerequisite: *Physics from 12th*

Equilibrium of System of Coplanar Forces: Conditions of equilibrium for concurrent forces, parallel forces and non-concurrent non-parallel general forces and Couples. Equilibrium of rigid bodies-free body diagrams.

Equilibrium of Beams: Types of beams, simple and compound beams, type of supports and reaction: Determination of reactions at supports for various types of loads on beams. (Excluding problems on internal hinges).

Unit-III Friction 08 Hrs.

Prerequisite: *Physics from 12th*

Friction: Revision of Static Friction, Dynamic/ Kinetic Friction, Coefficient of Friction, Angle of Friction, Laws of friction. Concept of Cone of friction. Equilibrium of bodies on inclined plane. Application to problems involving wedges and ladders.

Unit-IV Kinematics of Particle & Rigid Body 09 Hrs.

Prerequisite: *Physics from 12th.*

Kinematics of Particle: Rectilinear motion. Motion curves (a-t, v-t, s-t curves). Motion along plane curved path. Tangential & Normal component of acceleration.

Kinematics of Rigid Body: Translation, Rotation and General Plane motion of Rigid body.

The concept of Instantaneous center of rotation (ICR) for the velocity. Velocity analysis of rigid body using ICR.

Unit-V Kinetics of Particle 08 Hrs.

Prerequisite: *Physics from 12th.*

Kinetics of a Particle: Force and Acceleration: D'Alemberts Principle, concept of Inertia force, Equa-

tions of dynamic equilibrium, Newton's second law of motion. (Analysis limited to simple rectilinear systems only).

Kinetics of a Particle: Work and Energy: Work Energy principle for a particle in motion. Application of Work – Energy principle to a system consisting of connected masses and Springs.

Kinetics of a Particle: Impulse and Momentum: Principle of linear impulse and momentum. Impact and collision: Law of conservation of momentum, Coefficient of Restitution. Direct Central Impact and Oblique Central Impact. Loss of Kinetic Energy in collision of inelastic bodies.

Engineering Mechanics Laboratory (ESFY1040L)

List of Laboratory Experiments (Any 06)

1. Graphical Work-Statics (Polygon Law of Forces, Law of Parallelogram, Triangle Law)
2. Problems on Beam Reaction by Graphics Statics Method
3. Centroid of Irregular Shaped Bodies
4. Determination of Support reaction for beam
5. Determination of coefficient of friction using Inclined plane
6. Determination of coefficient of friction using Inclined plane
7. Verification of Lami's theorem using Jib crane
8. Verification of Law of Machine Using Screw Jack
9. Verification of Law of Machine Using Single Purchase Winch Crab
10. Study of Compound Pendulum
11. Graphical Work-Dynamics

Reference Books

1. F.P. Beer and E.R. Johnson, "Mechanics for Engineers", McGraw Hill Education (India),5th Edition. ISBN-10: 0077687302
2. R.C. Hibbeler, "Engineering Mechanics- Statics and Dynamics", 11 th Edition, Mc Millan Publication, New Delhi. ISBN 978-81-317-2699-0
3. Timoshenko and Young, "Engineering Mechanics, McGraw Hill Co. Ltd.
4. F.L. Singer, "Engineering Mechanics, Harper and Row Publishers, USA
5. J.L.Meriam and L.G. Kraige, "Engineering Mechanics, Vol.1 and Vol. 2", Wiley Publication

Text Books

1. A.K. Tayal, "Engineering Mechanics", Umesh Publications. ISBN 978-93-80117-38-6
2. S. Ramamrutham, "Engineering Mechanics", Dhanpat Rai Publication, New Edition, New Delhi
3. S.S.Bhavikatti, "Engineering Mechanics", New Age International Publications, 4th Edition. ISBN 81 -224-0671-3

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Basic Electrical and Electronics Engineering (ESFY1050T)		
Basic Electrical and Electronics Engineering Laboratory (ESFY1050L)		

Prerequisite: Knowledge of

1. Concepts of charge, current and voltage.
2. Concepts of electrical circuit elements (R, L and C).
3. Concepts of Ohm's law, resistivity and series & parallel connections.
4. Concepts of semiconductors and P-N junction.

Course Objectives

1. To implement the fundamentals of DC circuits and apply knowledge for analysing network Theorems in DC circuits.
2. To analyze single phase as well as three phase AC circuits.
3. To analyze the performance of single phase transformer and three phase systems.
4. To study the characteristics of basic PN diode and implement the basic circuits like rectifiers, clippers and clampers using PN diode.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze DC and AC Electric circuits.	L4	Analyze
CO2	Explain the basic principles of single phase and three phase Circuits.	L2	Understand
CO3	Interpret basic concepts of R, L, C, circuits.	L2	Understand
CO4	Analyze the star and delta connection with its application.	L4	Analyze
CO5	Explain the basic principles of Diode , Rectifier ,Clipper Clamper.	L2	Understand

Basic Electrical and Electronics Engineering (ESFY1050T)

Course Contents

Unit-I DC Circuits 08 Hrs.

Prerequisite: *Concepts of charge, current and voltage*

: Introduction to ideal and practical voltage and current sources, Kirchhoff's current and voltage laws, Mesh and Nodal analysis, Supernode and Supermesh analysis, Introduction to dependent sources and examples using Mesh and Nodal analysis.

Unit-II DC Network Theorems 06 Hrs.

Prerequisite: *Concept of Electrical circuit*

Source transformation and star – delta connections,Thevenin's Theorem and Norton's Theorem, Superposition Theorem and Maximum Power Transfer Theorem.

Unit-III AC Circuits 12 Hrs.

Prerequisite: *Concepts of electrical circuit elements (R, L and C).*

Generation and representation of alternating voltage and currents, RMS and Average value, phasor representation, AC through resistance, inductance and capacitance, R-L , R-C and R-L-C series and parallel circuits, phasor diagrams. Analysis of real power, reactive power, apparent power, power factor, Series and parallel resonance, Q-factor and bandwidth..

Unit-IV Electrical Systems 10 Hrs

Prerequisite: *Concepts of Ohm's law, resistivity and series & parallel connections*

Three-phase balanced circuits, voltage and current relations in star and delta connections, Construction, working principle, emf equation, ideal and practical transformer, transformer on no load and on load, phasor diagrams, equivalent circuit, regulation and efficiency.

Unit-V Electronics 06 Hrs.

Prerequisite: *Concepts of semiconductors and P-N junction.*

P-N Junction diode, application of diodes as rectifiers: half wave rectifier, full wave rectifier, bridge rectifier (resistive load), Introduction to clipper and clamper circuits using diodes. .

Basic Electrical and Electronics Engineering Laboratory (ESFY1050L)

List of Laboratory Experiments (Any 07)

1. Mesh and Nodal analysis.
2. Verification of Superposition theorem.
3. Verification of Thevenin's Theorem.
4. Verification of Norton's theorem
5. Verification of Maximum Power Transfer theorem.
6. Study of R-L series and R-C series circuit.
7. R-L-C series resonance circuit.
8. R-L-C parallel resonance circuit.
9. Rectifiers: HWR and FWR.
10. Clipper/clamper circuits.

Reference Books

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
4. V.D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

Text Books

1. Ravish Singh, "Basic Electrical Engineering", Tata McGraw Hill, 2018
2. B. R. Patil, "Basic Electrical Engineering", Oxford Higher Education, 2016. item R. S. Sedha, "A textbook of Electronis Devices and Circuits", S. Chand, 2002

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Engineering Science-I Laboratory (BSFY1020L)		

Course Objectives

1. To provide hands-on experience of basic physics instruments.
2. To introduce students to the modern equipment's, precision techniques and experimental methods for observing, understanding and verifying laws optics.
3. To provide students with a basic understanding of the Physics concept through experiments that may be required by engineers in the course of their careers.
4. To introduce the learners with the basics of light wave and electron conduction in semiconductor to facilitate his learning of the concepts in modern physics.
5. Remember the fundamental rules, laws and theorems of Chemistry.
6. To learn and understand the basic concepts and use of water quality parameters.
7. To develop competency of synthesis and analysis.
8. Apply the knowledge of chemistry to understand the properties and applications of engineering materials

Group- I

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Comprehend the concepts of solid state physics and apply them in designing solid state devices.	L2, L3	Understand, Apply
CO2	Relate the scope and foundation of quantum mechanics and its role in development of modern technology.	L3, L4, L5	Apply, Analyze, Evaluate
CO3	Assimilate the wide scope of Nanotechnology in modern developments and its role in emerging innovative applications..	L2, L3	Understand, Apply
CO4	Employ the concepts of optics in precision measurements.	L1, L2	Remember Understand

Group- II

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze microscopic chemistry in terms of atomic and molecular orbitals and aromaticity of organic molecules.	L4	Analyze
CO2	Rationalize various phase transformation using thermodynamics.	L2, L5	Understand, Evaluate
CO3	Apply the knowledge of polymers, fabrication methods, conducting polymers in various industrial fields.	L3	Apply
CO4	Analyze the quality of water and suggest suitable methods of treatment.	L3, L4	Apply, Analyze

Engineering Science -I Laboratory (BSFY1020L)

List of Laboratory Experiments

Group-I

Perform any 5 experiments from the following list of experiments

1. Determination of radius of curvature of a lens using Newton's ring set up.
2. Determination of wavelength of monochromatic light by using Newton's ring set up.
3. Study of Miller Indices.
4. Study of Cubical crystal structure.
5. Determination of energy band gap of semiconductor.
6. Study of Zener diode as voltage regulator.
7. Study of I/V characteristics of LED
8. Study of I / V characteristics of semiconductor diode

Group-II

Perform any 5 experiments from the following list of experiments

1. To determine chloride content of water by Mohr's method.
2. To determine total, temporary and permanent hardness of water sample by EDTA method.
3. To determine pH of different solutions using pH meter.
4. Determination of percent of Zn/Cu in brass.
5. Molecular weight determination of polymers by Oswald Viscometer.
6. Synthesis of UF, PF, Nylon 66.
7. Determination of COD.
8. Determination of surface tension of a given liquid at room temperature using Stalgmometer by drop number method.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Reference Books

1. B.Sc Practical Physics: Harnam Singh, Hemne P.S, S Chand Publication.
2. Fundamentals of Physics: Halliday and Resnick, 10th ed, Wiley, 2013.
3. Engineering Chemistry Lab Manual by Shuchi Tiwari (2010), SCITECH Publications.
4. Vogel's Text Book of Quantitative Chemical Analysis, 6th Edition by G. J. Jeffery, J. Bassett, Mendham, R.C. Denney, Longman Scientific & Technical Publications, New York.
5. A Text Book of Engineering Chemistry by R. N. Goyal and H. Goel, Ane Books (P) Ltd. (2009).
6. A Text Book on experiments and calculations Engineering by S.S. Dara, S. Chand & Company Ltd. (2003).
7. Instrumental methods of Chemical Analysis, Gurudeep R, Chatwal Sham, K. Anand, Latest Edition (2015), Himalaya Publications.

Text Books

1. Practical Engineering Chemistry by K.Mukkanti, etal. B.S.Publications, Hyderabad (2011).
2. Lab Manual on Engineering Chemistry by Sudharani, Dhanpat Rai Publications, Co., New Delhi, (2009).

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Language Proficiency- English (HMFY1060L)		

Course Objectives

1. To enhance their English vocabulary.
2. To construct grammatically sound and meaningful sentences for effective communication.
3. To be effective listener and reader.
4. To use English with appropriate accent.
5. To make the student proficient English speaker.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Use apt vocabulary with its proper application as per the context.	L3	Apply
CO2	Analyze the various sentence structures and will implement effectively in formal communication.	L3,L4	Apply, Analyze
CO3	Differentiate the various realizations of the English sounds and will utter accordingly.	L3	Apply
CO4	Listen, speak, read and write effectively in business correspondence.	L3	Apply
CO5	Overcome inhibitions by actively participating in GD, Debate, presentations, etc.	L3	Apply

Language Proficiency- English (HMFY1060L)

Course Contents

Unit-I Introduction to English as a Language 5 Hrs.

Prerequisite: *Signs, Symbols, Basics of English*

Introduction and Definitions of Language, Features and Functions of Language, Growth and Development of English, English as World Language for Business, English as a Second Language (ESL)

Unit-II English Vocabulary 5 Hrs.

Prerequisite: *Reading of Dictionary, Glossary.*

The Concept of Word Formation & Various Techniques, Acquaintance with Prefixes and suffixes in English to form Derivatives, Synonyms, Antonyms, One Word Substitute and Standard Abbreviations, Formal and Informal Vocabulary, Root words from Foreign Languages and their use in English, Use of Thesaurus for Contextual Expertise.

Unit-III Application of English Grammar 7 Hrs.

Prerequisite: *High school English Grammar.*

Sentence Structures, Parts of Speech, Tenses, Voice, Degree, Positive & Negative Sentences, Framing Questions.

Unit-IV Phonetics 6 Hrs.

Prerequisite: *Alphabets, Oral Communication, Speech and sounds.*

Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script: Consonants, Vowels & Clusters, Articulation of Different Sounds in English.

Unit-V Think and Express in English 5 Hrs.

Prerequisite: *Positive Attitude, Active Participation.*

Inhibitions & Embarrassment for ESL Learners, Ways to overcome Shyness as a ESL User, ESL Speaking Activities and Games, Ways to Study English Outside the Classroom.

List of Assignments

1) Functions of Language: 01
2) Word Formation: 01
3) Use of Thesaurus: 01
4) Application of Grammar: 01
5) Phonetics: 02

6) Presentation Skills: 02

Reference Books

1. Wren & Martin, Highschool English Grammar & Composition, S.Chand & Company, New Delhi.
2. Z.N.Patil, B.S.Valke, Ashok Thorat, Zeenat Merchant, English for Practical Purposes, Macmillan India Ltd.
3. R.K. Bansal, J.B Harrison, Spoken English A manual of Speech and Phonetics, Orient Blackswan
4. Thomas N. Huckin & Leslie A. Olsen, Technical Writing & Professional Communication for non-native speakers of English,McGraw –Hill.
5. CIEFL, Hyderabad, Exercises in Spoken English. Parts. I-III, Oxford University Press.
6. Raymond Murphy, Essential English Grammar, CUP (2016).
7. Raymond Murphy, Intermediate English Grammar, CUP (2016).
8. Raman, Meenakshi & Sangeetha Sharma, Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2015

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Workshop Practice (ESFY1070L/ESFY2070L)		

Prerequisite: None

1.

Course Objectives

1. Get oriented to an engineering workshop environment and will learn to conduct oneself adhering to the safety norms and set procedures.
2. Get familiarized with various methods of commonly used fabrication techniques and the type of hand tools required to perform such of these techniques.
3. Prepare simple jobs like joints, component of simple shape etc. as per component drawings with reasonable degree of tolerance.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Illustrate the concepts of industrial safety and the importance of working safely.	L2	Understand
CO2	Apply basic engineering blueprints to determine manufacturing requirements.	L3	Apply
CO3	Relate the use of hand tools to specific fabrication processes.	L2	Understand
CO4	Categorize various fabrication processes and machine protocols.	L4	Analyze
CO5	Operate basic machine tools during hands-on fabrication tasks.	L3	Apply

Workshop Practice (ESFY1070L/ESFY2070L)

Course Contents

Unit-I **Fitting Shop** **12 Hrs.**

Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping.

Unit-II **Carpentry** **12 Hrs.**

Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.

Unit-III **Welding** **08 Hrs.**

Edge preparation for welding jobs. Arc welding for different job like, Lap welding of two plates, butt welding of plates with simple cover, arc welding to join plates at right angles

Unit-IV **Sheet Metal Practice** **08 Hrs**

Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.

Unit-V **Plumbing** **08 Hrs.**

Use of plumbing tools, spanners, wrenches, threading dies, demonstration of preparation of a domestic line involving fixing of a water tap and use of coupling, elbow, tee, and union etc.

Unit-VI **PCB** **08 Hrs.**

Layout drawing: Positive and negative, PCB etching and drilling, Tinning and soldering technique.

List of Laboratory Experiments:

1. To study various types fitting tools and make a V-fitting/T-fitting from the given two M.S pieces.
2. To study various types of carpentry tools and prepare half-lap joint or T-lap joint.
3. To study various welding techniques and make a V-butt or Lap-joint, using the given mild steel pieces by arc welding
4. To study various types of sheet metal tools and make square or rectangular tray.
5. To study plumbing tools and joints, and make one job containing various pipe fitting.
6. To make printed circuit board as per the given drawing.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Reference Books

1. Manufacturing Processes and Systems,9th Edition, P.F.Ostwald, John Willy & Sons INC. UK, 2008
2. Electrical Workshop: Safety, Commissioning, maintenance and testing of electrical equipment, 3rd Edition, R.P. Singh, IK International Publishing House Pvt. Ltd. 2012

Text Books

1. Mechanical Workshop Practice, 2nd Edition, K.C. John, PHI Learning Pvt.Ltd.2014.
2. Manufacturing Technology-Vol I, 4th Edition, P.N. Rao, Tata McGraw Hill, 2014.
3. Printed Circuit Boards: Design, Fabrication, assembly and testing, 1st Edition, R.S. Khandpur, Tata McGraw Hill, 2005

Evaluation Scheme:

Term work shall consist of minimum one main job and two group jobs The distribution of marks for term work shall be as follows: Laboratory work (Performance of Experiments): 25 Marks

One main Job (Job No. 1 or Job No. 2) : 15 marks

Two Group Jobs (Any two job from Job No. 3 to Job No.6) : 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Program: Common for all courses	F. Y. B.Tech.	Semester: I
Engineering Mathematics-II (BSFY2010T)		

Prerequisite: Knowledge of

1. Methods of integration
2. Methods of differentiation
3. Basics of differential equations

Course Objectives

1. The course is aimed to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.
2. To provide hands on experience in using SCILAB software to handle real life problems.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Illustrate the concepts and applications of Beta and Gamma functions, DUIS, and rectification in engineering problems.	L3	Apply
CO2	Apply the concepts of double integration to evaluate areas and volumes in engineering and physical contexts.	L3	Apply
CO3	Apply the concepts of triple integration to compute volumes and mass of solids in three-dimensional regions.	L3	Apply
CO4	Solve various types of first-order differential equations arising in engineering and applied sciences.	L3	Apply
CO5	Solve higher-order linear differential equations with constant coefficients and apply them to model physical systems.	L3	Apply
CO6	Apply numerical methods to solve differential equations and perform numerical integration analytically and using SCILAB software.	L3	Apply

Engineering Mathematics-II (BSFY2010T)

Course Contents

Unit-I Beta and Gamma Function, Differentiation under Integral sign and Rectification 11 Hrs.

Prerequisite: *Derivative, Integration*

Beta and Gamma functions and its properties.

Differentiation under integral sign with constant limits of integration.

Tracing of curves – Cardioid, Strophoid, Bernoulli's Lemniscate, Astroid, Cycloid, 3D Solids – Sphere, Cone, Cylinder, Paraboloid.

Rectification of plane curves in Cartesian form.

Rectification of curve in Parametric and Polar forms.

Unit-II Double Integration 12 Hrs.

Prerequisite: *Integration*

Double Integration- Introduction, Evaluation of Double Integrals. (Cartesian & Polar).

Evaluation of double integrals by changing the order of integration.

Evaluation of integrals over the given region. (Cartesian & Polar).

Evaluation of double integrals by changing to polar coordinates.

Application of double integrals to compute Area and Mass.

Unit-III Triple Integration 06 Hrs.

Prerequisite: *Unit-II*

Triple integration - Introduction and evaluation of integral using Cartesian co – ordinate system.

Problems of triple integration using cylindrical and spherical polar coordinates

Application of triple integral to compute volume.

Unit-IV Differential Equations of First Order and First Degree 09 Hrs

Prerequisite: *Differential Equation, Variable separable form*

Exact differential Equations, Equations reducible to exact form by using integrating factors.

Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation.

Simple application of differential equation of first order and first degree to Engineering problem.

Unit-V Linear Differential Equations with Constant Coefficients and Variable Coefficients of Higher Order 10 Hrs.

Prerequisite: *Solution of Differential equation, Roots of quadratic and Cubic equation*

Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type $f(D)y = X$ where X is $e^{ax}, \sin(ax+b), \cos(ax+b), e^{ax}V, xV$.

Method of variation of parameters.

Cauchy's homogeneous linear differential equation and Legendre's differential equation

Applications of Higher order differential equation.

Unit-VI Numerical solution of ordinary differential equations of first order and first degree, and, Numerical Integration 08 Hrs.

Prerequisite: *Solution of Differential Equation*

Numerical solution of ordinary differential equation using (a) Euler's method (b) Modified Euler method, (c) Runge Kutta method of order four (d) Taylor series method.

Numerical integration by (a) Trapezoidal rule (b) Simpson's $1/3^{rd}$ rule (c) Simpson's $3/8^{th}$ rule (all without proof).

Reference Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
2. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven Chapra, McGraw Hill.
3. Dennis G. Zill, "A First Course in Differential Equations with Modelling Applications.
4. Thomas & Finney, "Calculus & Analytic Geometry", 9th edition, Addison Wesley.
5. Dennis G. Zill, Warren S. Wright, "Advanced Engineering Mathematics".

Text Books

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication
2. Advanced Engineering Mathematics by H. K. Dass, 28th edition, S. Chand 2010.
3. Engineering Mathematics,Ravish Singh, Mukul Bhatt, TMH New Delhi.

Program: Common for all courses	F. Y. B.Tech.	Semester: II
Engineering Physics -II (BSFY2020T)		

Prerequisite: Knowledge of Engineering Physics - I curriculum along with the basic foundations of physics and mathematics till H.Sc. or equivalent is necessary to comprehend Engineering Physics - II course effectively.

Course Objectives

1. To obtain a strong hold on basic concepts of Physics that form fundamental principles of technology that prepare students to tackle complex problems faced by society.
2. To provide inclusive knowledge of fundamental physical principles encouraging engineering students to venture in research field.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the foundations of Optics and Photonics in development of modern communication technology..	L3	Apply
CO2	Relate the basics of Electrodynamics which are prerequisite for Signal Communications, Antenna Theory etc.	L4	Apply, Analyze
CO3	Comprehend the essential properties of engineering materials for their current and futuristic frontier applications.	L2	Understand
CO4	Interpret and explore basic sensing techniques for physical measurements in modern instrumentation..	L2	Understand

Engineering Physics -II (BSFY2020T)

Course Contents

Unit-I Optics-II 08 Hrs.

Prerequisite: *Wave front and Huygen's principle, reflection and refraction, diffraction, comparison of Fresnel diffraction and Fraunhoffer diffraction, Absorption, recombination, energy bands of p-n junction, refractive index of a material, Snell's law, Total internal reflection*

Diffraction: Fraunhoffer diffraction at single slit, Diffraction Grating, Absent spectra,Resolving power of a grating; Applications of diffraction grating; Determination of wavelength of light using plane transmission grating.

Laser: Spontaneous emission and Stimulated emission; Metastable state, Population inversion, Types of pumping, Resonant cavity, Einsteins's equations; Helium Neon laser;Nd:YAG laser; Semiconductor laser,

Applications of laser- Holography.

Fibre optics: Structure of optical fibre, Types of optical fibres: Glass fibres, Plastic fibres,Plastic clad silica fibres, Single mode & Multimode, Step index & Graded index, Numerical Aperture for step index fibre.

Unit-II Engineering Materials and Applications 07 Hrs.

Prerequisite: *Electrical resistivity and conductivity, Temperature dependence of resistance, Magnetic materials, Crystal physics, Dielectrics and electric polarisation, capacitors and capacitance*

Superconductors: Superconductivity, Critical temperature, Critical magnetic field, BCS theory, Meissner's effect, Type I and Type II and high Tc superconductors

De Broglie hypothesis of matter waves; properties of matter waves

Metallic glasses: Principle, Properties & Applications

Shape Memory Alloys: Principle, Properties & Applications

Non-linear materials: Principle, Properties & Applications

Unit-III Electrodynamics 07 Hrs.

Prerequisite: *Coulomb's law-force between two point charges, Electric field, electric field due to a point charge, electric field due to a dipole, Gauss's law, Faraday's law, Cartesian co-ordinate system, Cylindrical co-ordinate system, Spherical co-ordinate system*

Scalar and Vector field, Physical significance of gradient, curl and divergence in Cartesian co-ordinate system

Gauss's law for electrostatics, Gauss's law for magnetostatics, Faraday's Law and Ampere's circuital law, Divergence theorem, Stoke's theorem

Maxwell's equations (Free space and time varying fields), Plane electromagnetic wave equation in free

space, Physical significance and Applications of Maxwell's equations.

Unit-IV Physics of Sensors 06 Hrs

Prerequisite: *Transducer concept, meaning of calibration, piezoelectric effect*

Pressure sensor: Concept of pressure sensing, Capacitive and piezoresistive pressure sensors.

Piezoelectric transducers: Concept of piezoelectricity, use of piezoelectric transducer as ultrasonic generator and application of ultrasonic transducer for distance measurement.

Optical sensor: Photodiode, construction and use of photodiode as ambient light measurement and flux measurement, Pyroelectric sensors

Reference Books

1. Fundamentals of optics by Jenkins and White, McGrawHill
2. Introduction to Electrodynamics- D. J. Griffiths, Pearson publication
3. Concepts of Modern Physics- Arther Beiser, Tata McGraw Hill
4. Instrumentation & Measurement Techniques by Albert D. Helfrick & William D. Cooper (PHI) Edition
5. Handbook of Modern Sensors Physics design and application- Jacob Fraden, Springer, AIP press.

Text Books

1. A text book of Engineering Physics-Avadhanulu & Kshirsagar, S. Chand
2. A Text Book of Engineering Physics, S. O. Pillai, New Age International Publishers.
3. textbook of Optics - N. Subramanyam and Brijlal, S.Chand
4. Optics - Ajay Ghatak, Tata Mc Graw Hill
5. Engineering Physics – R K Gaur & S L Gupta, Dhanpat Rai Publications
6. Engineering Physics – Shatendra Sharma & Jyotsna Sharma, Pearson publications
7. Engineering Physics – D. K. Bhattacharya & Poonam Tandon, Oxford publications
8. Engineering Physics – V Rajendran, McGraw Hill Educations
9. Electronic Instrumentation –H.S. Kalsi, Tata Mc Graw-Hill Education

Program: Common for all courses	F. Y. B.Tech.	Semester: II
Engineering Chemistry-II (BSFY2030T)		

Prerequisite: Knowledge of

1. Properties of light and spectrum, wavelength and wave number.
2. Basic electrochemical process and fractional distillation technique.

Course Objectives

1. To obtain a strong hold on basic concepts of chemistry that form fundamental principles of technology.
2. To give exposure to recent development in the course related topics.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	L4	Analyze
CO2	Identify different types of corrosion and suggest control measures in industries.	L3, L4	Apply, Analyze
CO3	Illustrate the principles of green chemistry and study environmental impact.	L2, L5	Understand, Evaluate
CO4	Analyze the quality of fuel and quantify the oxygen required for combustion of fuel.	L3, L4, L5	Apply, Analyze, Evaluate

Engineering Chemistry-II (BSFY2030T)

Course Contents

Unit-I Spectroscopic Techniques and Applications: 06 Hrs.

Prerequisite: *Properties of light and spectrum, wavelength and wave number.*

Introduction: Definition, electromagnetic radiation (Numerical). Electromagnetic spectrum.

Principle of spectroscopy, Classification of spectroscopy, Types of spectroscopy.

Flame Photometry: Principle, Instrumentation, working, Applications, interferences, advantages and disadvantages.

Jablonski diagram, Introduction to florescence and phosphorescence, application of fluorescence in medicine only.

Unit-II Electrochemistry and Corrosion: 08 Hrs.

Prerequisite: *Basic electrochemical process- Elctolysis, Elctrochemical.*

Introduction- Concept of electrode potential and standard electrode potential, electrochemical and galvanic series, Nernst equation (Numerical).

Mechanism of Corrosion:

(I) Dry or Chemical Corrosion:

i) Due to oxygen ii) Due to other gases.

(II) Wet or Electrochemical corrosion: Mechanism:

i) Evolution of hydrogen type ii) Absorption of oxygen.

Types of Corrosion: Galvanic cell corrosion, Concentration cell corrosion (differential aeration principle), Pitting corrosion, Intergranular corrosion, Stress corrosion.

Factors affecting the rate of corrosion:

(i) Nature of metal,

(ii) Nature of corroding environment.

Methods of corrosion control:

(I) Cathodic protection:

i) Sacrificial anodic protection

ii) Impressed current method.

(II) Metallic coatings: Hot dipping (tinning and galvanising), metal cladding, metal spraying, cementation.

(III) Organic coating: Paint.

Unit-III Green Chemistry and Synthesis of drugs : 06 Hrs.

Prerequisite: *Plloution, Benefits of green synthesis, Renewable Energy Sources.*

Introduction: Definition, significance.

Twelve Principles of Green chemistry.

Conventional and green synthesis of :

(i) Adipic acid, (ii) Indigo, (iii) Carbaryl, (iv) Benzimidazole.

Percentage atom economy (Numericals).

Green fuel: Biodiesel.

Green solvents: CO_2.

Unit-IV Fuels and Combustion 08 Hrs

Prerequisite: *Types of Fuels, General Composition , Fractional Distillation*

Introduction: Definition, classification, characteristics of a good fuel.

Calorific value: Definition, Units, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & numerical for calculations of Gross and Net calorific values.

Solid fuels: Analysis of coal- Proximate and Ultimate Analysis (theory and numericals).

Liquid fuels: Petrol- Knocking, Octane number, Cetane number, Antiknocking agents,Power alcohol.

Combustion: Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.

Reference Books

1. Green Chemistry: A textbook - V.K.Ahluwalia, Alpha Science International.
2. Fundamentals of Molecular Spectroscopy (4th Edition) - C.N.Banwell, Elaine M. McCash, Tata McGraw Hill.
3. Elementary Organic Spectroscopy- Y.R.Sharma, S.Chand and Co.
4. A Text Book of Engineering Chemistry - Shashi Chawla, Dhanpat Rai.

Text Books

1. Engineering Chemistry - Jain & Jain (DhanpatRai).
2. Engineering Chemistry - Dara & Dara (S Chand).

Program: Common for all courses	F. Y. B.Tech.	Semester: II
Engineering Graphics (ESFY2040T)		
Engineering Graphics Laboratory (ESFY2040L)		

Prerequisite: Knowledge of Basics of geometrical constructions

Course Objectives

1. Students should be able to visualize the objects.
2. They should be able to understand and read drawing.
3. To impart and inculcate proper understanding of the theory of projection.
4. They should be able to present the same.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Recognize the value of engineering graphics, as a language of engineers	L2	Remember
CO2	Construct orthographic views of lines, and basic shapes of solids	L3	Apply
CO3	Interpret and sketch orthographic and sectional orthographic views of various machine components	L3	Apply
CO4	Visualize objects, and draw isometric views	L4	Analyse
CO5	Build 2D sketches using Auto CAD	L4	Analyse

Engineering Graphics (ESFY2040T)

Course Contents

Unit-I Introduction to Engineering Graphics & Orthographic Projections 8 Hrs.

Prerequisite: *Fundamental Knowledge of High School Geometry.*

Introduction to Engineering Graphics: Introduction to Engineering Drawing. Types of Lines, Dimensioning Systems as per IS conventions. Orthographic Projections: Different views of simple machine parts as per the first angle projection method recommended by I.S. Full Sectional views of Simple Machine parts.

**Drawing of orthographic projections using Auto CAD

**Introduction to Auto CAD: - Basic Drawing and Editing Commands. Knowledge of setting up layers, Dimensioning, Hatching, plotting and Printing.

Unit-II Isometric Views and Engineering Curves 6 Hrs.

Prerequisite: *Basic High School Geometry and principles of Orthographic Projections.*

Isometric Views: Isometric Views/Drawings of blocks (plain and cylindrical, excluding spheres).

**Drawing of Isometric Views using Auto CAD.

@ Engineering Curves: Involute of circle (problems on string only). Cycloid – Plane cycloid (circle rolling in one direction only).

Unit-III Projection of Points and Lines 3 Hrs.

Prerequisite: *Principles of Orthographic Projections*

Projection of Points and Lines:-Lines inclined to both the Reference Planes. (Excluding Traces) First Quadrant only.

Unit-IV Projection of Solids 5 Hrs.

Prerequisite: *Principles of Orthographic Projections and Projection of Points, Lines.*

**Projection of Solids: - (Prism, Pyramid, Cylinder & Cone only) Projections of Solids with the axisinclined to HP and VP. (Exclude Spheres, Composite, Hollow solids and frustum). Use change of position or Auxiliary plane method

Unit-V Section of Solids and Development of Surfaces 6 Hrs.

Prerequisite: *Principles of Orthographic Projections and Projection of Solids*

@ Section of solids: - Sections of Prism, Pyramids, Cylinder & Cone, cut by plane perpendicular at least one reference plane. (Exclude Curved Section Plane). Use change of position or Auxiliary plane method.

@ Development of Surfaces:- Lateral surface development of Prism, Pyramid, Cylinder, Cone with section plane inclined to HP or VP only. (Exclude Reverse Development)

**** Should be covered during Auto CAD Practical.**

@ Should be covered only in continuous assessment. (i.e. Questions will not be asked for the End Semester Examination).

Engineering Graphics Laboratory (ESFY2040L)

List of Laboratory Experiments (Any 08)

Component – 1

1. Orthographic projections. (03 problems)
2. Sectional Orthographic projections. (02 problems)
3. Isometric Views. (02 problems)
4. Projection of solids. (02 problems)
5. Section of solids and Development of lateral surfaces. (02 problems)
6. Projection of lines and Engineering Curves. (04 problems)

Component – 2

Assignment on A-3 size sketch book/ sheet (minimum 2 problems on each topic):

1. Orthographic/Sectional Orthographic projections.
2. Isometric Projections.
3. Engineering Curves.
4. Projection of lines.
5. Projection of solids.
6. Section of solids and Development of lateral surfaces.

Component – 3

AutoCAD Printouts of each from:

1. Orthographic Projections – 2 problems.
2. Orthographic Projections with section– 2 problems.
3. Isometric Views – 2 problems.
4. Projection of solids (Prism and Pyramid only) - 2 problems.

The distribution of marks for continuous assessment shall be as follows: Laboratory work (Sheets, Assignment and AutoCAD Printouts): **25 Marks**

Reference Books

1. K.Venugopal (2007), 'Engineering Drawing and Graphics + AutoCAD', New Age International Publishers.
2. M.L.Dabhade (2004), 'Engineering Drawing', Vision Publications
3. Dhananjay A. Jolhe 'Engineering Drawing with an Introduction to AutoCAD', Tata McGraw Hill Education Private Limited

Text Books

1. N.D.Bhatt , 'Engineering Drawing', Charotar Publishing House,
2. M.B.Shah & B.C.Rana 'Engineering Drawing', Pearson Education.

Program: Common for all courses	F. Y. B.Tech.	Semester: II
Computer Programming (ESFY2050T)		
Computer Programming Laboratory (ESFY2050L)		

Course Objectives

1. To familiarise the logic of Computer Programming.
2. To provide exposure in developing algorithm, flowchart and thereby writing efficient codes for user defined problem.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Illustrate the basic terminology used in computer programming.	L2	Understand
CO2	Illustrate the concept of data types, variables and operators in C.	L2, L3	Understand, Apply
CO3	Design and Implement control statements and looping constructs in C.	L3, L6	Apply, Create
CO4	Apply the concept of functions to solve problem statements.	L2, L3	Understand, Apply
CO5	Demonstrate the use of arrays, strings and structures in C.	L2, L3	Understand, Apply
CO6	Demonstrate the use of pointers.	L2, L3	Understand, Apply

Computer Programming (ESFY2050T)

Course Contents

Unit-I Algorithm and Flowchart 05 Hrs.

Three construct of Algorithm and flowchart: Sequence, Decision(Selection) and Repetition

Unit-II Fundamentals of C-Programming 07 Hrs.

Character Set, Identifiers and keywords, Data types, Constants, Variables.

Operators-Arithmetic, Relational and logical, Assignment, Unary, Conditional,Bitwise, Comma, other operators

Expression, statements, Library Functions, Preprocessor.

Data Input and Output – getchar( ), putchar( ), scanf( ), printf( ), gets( ), puts( ), Structure of C program.

Unit-III Control Structures 09 Hrs.

Decision making with Branching - If statement, If-else Statement, Switch case statement.

Looping – while , do-while, for

Nested control structure

Continue statement, Break statement, Goto statement.

Unit-IV Functions and Parameter 07 Hrs

Function -Introduction of Function, Defining a Function, Accessing a Function, Function Prototype, Passing Arguments to a Function, Recursive function

Storage Classes –Auto , Extern , Static, Register

Unit-V Arrays, String, Structure 07 Hrs.

Array-Concepts, Declaration, Definition, Accessing array element, Onedimensional and Multidimensional array, Passing Arrays to Function

String- Basics of String, Functions in string.h, user defined function for string handling

Structure- Declaration, Initialization, structure within structure, Operation on structures, Array of Structure.

Unit-VI Pointers 07 Hrs.

Pointer : Introduction, Definition and uses of Pointers, Address Operator, Pointer Variables, Pointer Arithmetic

Call by value , call by Reference

Computer Programming Laboratory (ESFY2050L)

List of Laboratory Experiments

1. To calculate simple interest taking principal, rate of interest and number of years as input from user.Write algorithm & Draw flowchart for the same.
2. Write a program to find greatest of three numbers using conditional operator. Write algorithm & Draw flowchart for the same.
3. Write a program to check if the year entered is leap year or not. Write algorithm & Draw flowchart for the same.
4. Write a program to calculate roots of a quadratic equation
5. Write a menu driven program to perform add / subtract / multiply / divide based on the users choice. The user will indicate the operation to be performed using the signs i.e. + for addition, - for subtraction and so on. Write algorithm & Draw flowchart for the same.
6. Write a program to find the sum of seven terms using a for loop for the following series: 1/1!+2/2!+3/3!+.....+7/7!
7. Write a program to read a number, reverse the number and display the sum of digits of number
8. Write a program (using 'for' loop) to display the following asking the user for the number of lines. Write algorithm & Draw flowchart for the same.

A

ABA

ABCBA

ABCDCBA

ABCDEDCBA

9. Write a program to check if the entered number is Armstrong or not. Write algorithm & Draw flowchart for the same.
10. Write a program to display first n elements of Fibonacci series (using 'for')
11. Write a program to find nCr using function. Write algorithm & Draw flowchart for the same.
12. Write a program which will accept n and r and calculate nCr=n!/r!(n-r)! using recursive functions
13. Write a program to initialize an automatic and static variable and increment it in the function. Call this function thrice and print the value of the variable every time after incrementing

14. Write a program to implement bubble sorting algorithm for sorting numbers in ascending order Write algorithm & Draw flowchart for the same

15. Write a program to check whether string is palindrome or not.

16. Write a program to count blank spaces, digits, vowels and consonants in the string.

17. Write a program to multiply two matrices using a function.

18. Define a structure called cricket that will describe the following information –player name, country name best score, batting average. Develop a program that will store information of 25 cricket players around the world using this structure. Also display names of these cricketers in descending order with respect to their batting average.

19. Write a program to swap two numbers using a function. Pass the values to be swapped to this function using call-by-value method and call-by-reference method.

20. Write a program to accept a set of 10 numbers and print the number using pointer

Reference Books

1. "Basics of Computer Science", by BehrouzForouzan , Cengage Learning.

2. "Programming Techniques through C", by M. G. Venkateshmurthy, Pearson Publication.

3. "Programming in ANSI C", by E. Balaguruswamy, Tata McGraw-Hill Education.

4. "Programming in C", by Pradeep Day and Manas Gosh, Oxford University Press.

5. "Let Us C", by YashwantKanetkar, BPB Publication.

Text Books

1. MASTERING C" by K.R.Venugopal and Sudeep R.Prasad , Tata McGraw-Hill Publications.

2. "A Computer Science –Structure Programming Approaches using C", by Behrouz Forouzan, Cengage Learning.

3. Schaum's outlines "Programming with C", by Byron S. Gottfried, Tata McGraw-Hill Publications.

Program: Common for all courses	F. Y. B.Tech.	Semester: II
Effective Communication Skills (HMFY2060T)		
Effective Communication Skills Laboratory (HMFY2060L))		

Course Objectives

1. To acquaint the students with appropriate language skills with the purpose of improving the existing ones LSRW.
2. To make the learners understand the importance and effective use of non-verbal communication.
3. To make the learner proficient in public speaking and presentation skills.
4. To guide and teach the students to utilise the principles of professional business and technical writing for effective communication in the global world.
5. To make the learner capable of creating official content digitally for further communication in the corporate environment.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Evaluate information they listen to and express their ideas with greater clarity	L4	Evaluate
CO2	Speak and respond effectively along the various channels of communication in a business organization	L2	Understand
CO3	Speak convincingly before an audience with the help of an expanded vocabulary and enhanced digital content	L3	Apply
CO4	Read and summarize effectively.	L2	Understand
CO5	Communicate through result oriented writing both within and outside the organization	L3	Apply
CO6	Write a set of effective and easy to understand technical description, instructions and convey the same using global information technology	L3	Apply

Effective Communication Skills (HMFY2060T)

Course Contents

Unit-I Communication Theory 13 Hrs.

Prerequisite: *General experience and observation of everyday communication.*

Concept and Meaning, Communication cycle, Objectives, Barriers to communication (linguistic and semantic, psychological, physical, mechanical, cultural), Methods of communication (verbal and non-verbal), Networks of communication (formal and informal), Language skills (listening, speaking, reading, writing), Corporate communication: Digital Content Creation.

Unit-II Business Correspondence 05 Hrs.

Prerequisite: *Formal Communication and writing skill*

Principles of Business Correspondence, Parts of a business letter, Formats (Complete block and Modified block), Types of letters: Enquiry, Reply to enquiry, Claim, Adjustment and Sales letter.

Unit-III Grammar and Vocabulary 03 Hrs.

Prerequisite: *High School Grammar*

Grammar and Vocabulary: Common errors, Concord (subject- verb agreement), Pairs of confused words, Lexicon (Enriching vocabulary through one-word substitutes, synonyms, antonyms, etc.

Unit-IV Summarization and Comprehension 02 Hrs

Prerequisite: *Reading Skill , Vocabulary*

Passages to test the analytical skills and expression.

Unit-V Technical writing 03 Hrs.

Prerequisite: *Reading of User Manual*

Techniques to define an object, writing instructions, language exercises based on types of expositions (description of an object, explanation of a process)

Unit-VI Information Communication Technology (ICT) enabled communication media 02 Hrs.

Prerequisite: *ICT tools*

E-mail, Blog and Website.

List of assignments:

1. Communication theory: 02
2. Business Correspondence: 02
3. Grammar and vocabulary: 01
4. Summarization & Comprehension: 01
5. Technical writing: 01
6. ICT enabled communication media: 01

Effective Communication Skills Laboratory (HMFY2060L)

List of Laboratory Experiments (Any 8)

1. Self-Introduction
2. Practice of Group Discussion
3. Presentation Skills
4. Interview techniques
5. Elocution
6. Debate
7. Mock Interview
8. Writing Business Documents
9. Writing Job Application with Resume
10. Development of an Idea

Reference Books

1. Communication in Organizations by Dalmar Fisher, Jaico Publishing House
2. Communication Skills by Meenakshi Raman & Sangeeta Sharma,Oxford University Press.
3. Business Correspondence & Report-writing by R.C. Sharma & Krishna Mohan, Tata McGraw-Hill Education.
4. Effective Technical Communication by Ashraf Rizvi, Tata McGraw-Hill.

5. Technical Writing & Professional Communication for non-native speakers of English by Thomas N. Huckin & Leslie A. Olsen, McGraw –Hill.

6. Mastering Communication by Nicky Stanton, Palgrave Master Series

7. www.buisnesscommunicationskills.com

8. www.kcitraing.com

9. Journal of Business Communication

Program: Common for all courses	F. Y. B.Tech.	Semester: II
Engineering Science-II Laboratory (BSFY2020L)		

Course Objectives

1. To provide hands-on experience of basic physics instruments.
2. To introduce students to the modern equipment's, precision techniques and experimental methods for observing, understanding and verifying laws optics.
3. To provide students with a basic understanding of the Physics concept through experiments that may be required by engineers in the course of their careers.
4. To introduce the learners with the basics of diffraction and propagation of light in OFC.
5. Remember the fundamental rules, laws and theorems of Chemistry.
6. Apply the knowledge of chemistry to understand the properties and applications of engineering materials

Group- I

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the foundations of Optics and Photonics in development of modern communication technology	L3	Apply
CO2	Relate the basics of Electrodynamics which are prerequisite for signal communications, Antenna Theory etc.	L4	Apply, Analyze
CO3	Comprehend the essential properties of engineering materials for their current and futuristic frontier applications	L2	Understand
CO4	Interpret and explore basic sensing techniques for physical measurements in modern instrumentation	L2	Understand

Group- II

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques	L4	Analyze
CO2	Identify different types of corrosion and suggest control measures in industries	L4, L3	Analyze, Apply
CO3	Illustrate the principles of green chemistry and study environmental impact	L2, L5	Understand, Evaluate
CO4	Analyze the quality of fuel and quantify the oxygen required for combustion of fuel	L3, L4, L5	Apply, Analyze, Evaluate

Engineering Science -II Laboratory (BSFY2020L)

List of Laboratory Experiments

Group-I

Perform any 5 experiments from the following list of experiments

1. Determination of wavelength using Diffraction grating. (Hg/Na source)
2. Determination of number of lines on the grating surface using LASER Source.
3. Determination of Numerical Aperture of an optical fibre.
4. Determination of wavelength using Diffraction grating (Laser source)
5. Study of divergence of laser beam
6. Determination of width of a slit using single slit diffraction experiment (laser source)
7. Study of I-V characteristics of Photo diode.
8. Determination of velocity of ultrasonic wave in water by using ultrasonic interferometer.

Group-II

Perform any 5 experiments from the following list of experiments

1. Determination of Moisture content of coal.
2. Determination of Ash content of coal.
3. Saponification value of oil.
4. Acid value of oil.
5. Determination of strength of a given solution (acid / base) by using Conductometric titration.
6. Determination of Viscosity of oil by Redwood Viscometer.
7. To determine metal ion concentration using colorimeter.
8. To validate Beer-Lambert law using UV Spectrophotometer/ colorimeter.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Reference Books

1. B.Sc Practical Physics: Harnam Singh, Hemne P.S, S Chand Publication.

2. Fundamentals of Physics: Halliday and Resnick, 10th ed, Wiley, 2013.

3. Engineering Chemistry Lab Manual by Shuchi Tiwari (2010), SCITECH Publications.

4. Vogel's Text Book of Quantitative Chemical Analysis, 6th Edition by G. J. Jeffery, J. Bassett, Mendham, R.C. Denney, Longman Scientific & Technical Publications, New York.

5. A Text Book of Engineering Chemistry by R. N. Goyal and H. Goel, Ane Books (P) Ltd. (2009).

6. A Text Book on experiments and calculations Engineering by S.S. Dara, S. Chand & Company Ltd. (2003).

7. Instrumental methods of Chemical Analysis, Gurudeep R, Chatwal Sham, K. Anand, Latest Edition (2015), Himalaya Publications.

Text Books

1. Practical Engineering Chemistry by K.Mukkanti, etal. B.S.Publications, Hyderabad (2011).

2. Lab Manual on Engineering Chemistry by Sudharani, Dhanpat Rai Publications, Co., New Delhi, (2009).