SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to SavitribaiPhule Pune University, Pune)

F.Y. B. Tech (Common) *(2024 Pattern)*

Sem-I

2401101: Engineering Mathematics-I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 04 hrs/week	Th:04	Theory:	CIA:50
Practical: --hrs/week	Termwork: --		End-Sem:75
		Pract:	---
		Oral:	---
		Termwork	---

Course Objectives: The student is able to

1. Expand the functions using Taylor's and Maclaurin's series and evaluate the limit by L'Hospital's rule .
2. Find the rank of matrix and apply it to solve system of linear equations
3. Find Eigen values and Eigen vectors and apply them to solve engineering problems
4. Understand the concept of partial differentiation
5. Apply the concept of partial differentiation to solve engineering problems
6. Understand the concept of numerical solution of Algebraic and Simultaneous linear equations

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply the Taylors and Maclaurin's series to expand the functions and evaluate the limits by L'Hospital's rule.

CO2: Apply the essential tools of matrices and linear algebra for analysis of system of linear equations

CO3: Determine Eigen values and Eigen vectors and apply it to solve engineering problems.

CO4: Evaluate the derivative of functions of several variables.

CO5: Apply the concept of partial differentiation to solve engineering problems.

CO6: Find the numerical solution of algebraic equations and system of simultaneous linear equations.

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F.Y. B. Tech (Common) *(2024 Pattern)*

Sem-I

2401101:Engineering Mathematics - I

Unit 1: Calculus of Single Variable **(09 Hrs.)**	**CO**
Expansion of functions Taylor's Series and Maclaurin's Series, Indeterminate forms and L' Hospital's Rule.	CO1
Unit 2: Linear Algebra – Matrices and System of Linear Equations **(09 Hrs.)**	CO2
Rank of a Matrix, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations.	
Unit 3: Linear Algebra - Eigen Values, Eigen Vectors and Diagonalization **(10 Hrs.)**	CO3
Eigen Values and Eigen Vectors, Cayley Hamilton theorem, Diagonalization of a matrix, Reduction of Quadratic forms to Canonical form by Linear and Orthogonal transformations.	
Unit 4: Partial Differentiation **(09 Hrs.)**	
Introduction to functions of several variables, Limit, Continuity and Partial Derivatives. Euler's Theorem on Homogeneous functions, Partial derivative of Composite Function.	CO4
Unit 5: Applications of Partial Differentiation **(09 Hrs.)**	
Jacobian and its applications, Errors and Approximations, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers and Applications to problems in Engineering.	CO5
Unit 6: Numerical Methods **(10 Hrs.)**	
Numerical solutions of Algebraic Equation- Bisection Method, Regula Falsi Method, Newton Raphson Method ,Numerical solutions of Simultaneous Linear Equations- .Gauss Elimination method, Cholesky method , Gauss Seidal Iteration Method.	CO6

Textbooks:

1. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication)
2. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill)

Reference books:

1. 1 Advanced Engineering Mathematics by M. D. Greenberg (Pearson Education)
2. Advanced Engineering Mathematics by Peter V. O'Neil (Thomson Learning)
3. Thomas' Calculus by George B. Thomas, (Addison-Wesley, Pearson)
4. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)
5. Applied Mathematics (Vol. I & Vol. II) by P. N. Wartikar and J. N. Wartikar Vidyarthi Griha Prakashan, Pune.
6. Elementary Linear Algebra. by Ron Larson and David C. Falvo (Houghton Mifflin Harcourt Publishing Company.

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F.Y. B. Tech (Common) *(2024 Pattern)*

Sem-I/II

2401102: Engineering Physics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3hrs./week	Th:03	Theory:	CIA: 50
Practical: 2hrs./week	Term work: 01		End-Sem: 75
		Practical :	--
		Oral:	--
		Term work	25

Course Objectives: The student is able to

1. Provide basic concepts to resolve many engineering and technological problems.
2. After completing this course student will be able to appreciate and use the methodologies to analyse and design a wide range of engineering systems.
3. Understand the recent trends and advances in technology, this requires precise control over dynamics of microscopic engineering systems.
4. Basic sciences like physics also invoke manipulation of processes over micro and even Nano scale level as there is a growing demand of solid understanding the principles of basic sciences.
5. Physics provides the basic ideas and gives the solution for developing mathematical and analytical abilities with higher precision.
6. impart the knowledge of fundamentals of physics through hands on experiments and extend it to relevant engineering applications.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply the mathematical skill to resolve optical problems in the field of engineering.

CO2: Apply the concepts of physics for Ultrasonic & Non Destructive Testing. Examine its applications in various field.

CO3: Examine the applications related with Laser and Optical Fibre in engineering field.

CO4: Analyse the behaviour of semiconductor & semiconducting devices regarding their conductivity.

CO5: Explain the phenomenon of Magnetism and Superconductivity and estimate engineering applications.

CO6: Examine the properties of nanoparticles and extend it to various engineering applications.

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F.Y. B. Tech (Common) *(2024 Pattern)*

Sem-I/II

2401102: Engineering Physics

Unit 1: Wave Optics **(08 Hrs.)**	**CO**
Interference – Introduction to interference, Types of Interference, Interference due to thin film of uniform thickness (with derivation), applications: anti-reflection coating using interference of light, Numerical on uniform thin film. Interference due to wedge shaped film (qualitative discussion), band width derivation, Applications: Flatness of surface, Numerical on band width, wedge angle, etc. Diffraction – Definition, types of diffraction, Fraunhofer's diffraction at single slit, conditions for maxima and minima, intensity pattern, Fraunhofer diffraction from a diffraction grating, Conditions for Principal maxima, minima, Numerical on diffraction grating. Rayleigh's criterion, resolving power of grating, resolving power of telescope.	CO1
Unit 2: Ultrasonic and Non Destructive Testing **(07 Hrs.)**	CO2
Ultrasonic – Characteristics and properties of ultrasonic waves, Generation of ultrasonic waves by inverse piezoelectric effect (using transistor); Engineering applications - thickness measurement, flaw detection and related numerical problems. Non Destructive Testing – Classification of Non-destructive testing methods, Principles of physics in Non-destructive Testing, Advantages of Non-destructive testing methods, Radiography testing, Acoustic Emission Testing.	
Unit 3: Laser and Fiber Optics **(07 Hrs.)**	CO3
Laser - Basics of laser and its mechanism, Metastable state, Population inversion, active medium and active center, characteristics of laser, Ruby laser, and Gas laser: CO2 laser: construction and working, Applications of lasers: Holography (recording & reconstruction), industrial, medical. Optic Fiber - Introduction, parameters: Acceptance Angle, Acceptance Cone, Critical angle Numerical Aperture, total internal reflection, Types of optical fiber- step index and graded index, Attenuation and reasons for losses in optic fibers (qualitative), Communication system: basic building blocks, Advantages of optical fiber communication over conventional methods. Numerical on Numerical Aperture	
Unit 4: Semiconductor Physics **(07 Hrs.)**	
Band theory, Classification of solid on the basis of band theory, Electrical conductivity of conductors and semiconductors, Numerical on conductivity of conductor and semiconductor. Fermi Dirac probability distribution function, Fermi energy and Fermi level, position of Fermi level in intrinsic semiconductors (with derivation) & in extrinsic semiconductors, Energy band picture of p-n junction. Solar cell and its applications. Hall effect: Derivation for Hall voltage, Hall coefficient, applications of Hall effect, Numerical on Hall Effect.	CO4

Unit 5: Magnetism and Superconductivity (07 Hrs.)	
Magnetism - Origin of magnetism, Classification of magnetism on the basis of permeability (qualitative), Applications of magnetic devices: transformer cores, magnetic storage, magneto-optical recording Superconductivity - Introduction to superconductivity; Properties of superconductors: zero electrical resistance, critical magnetic field, Meissner effect and perfect diamagnetism: Type I and Type II superconductors, Numerical problems on critical magnetic field, AC and DC Josephson effect, SQUID: basic construction and principle of working and applications, Engineering applications: electronics, principle of Maglev train.	CO5
Unit 6: Physics of Nanoparticles (06 Hrs.)	
Introduction of nanoparticles, basics of nanotechnology, Quantum confinement and its effect on properties of nanoparticles, Properties of nanoparticles (optical, electrical, mechanical, magnetic) Applications of nanotechnology: Medical field (targeted drug delivery), electronics, automobile, environmental and energy, space and defense.	CO6

LIST OF PRACTICALS (Perform any 8 experiments)

Sr. No.	Title	CO
1.	Experiment based on Newton's rings (determination of wavelength of monochromatic light, determine radius of curvature of Plano-convex lens).	**CO1**
2.	To determine unknown wavelength by using plane diffraction grating.	**CO1**
3.	To determine number of lines on grating surface.	**CO1**
4.	To Study the position of diffraction minima by studying diffraction at a single slit.	**CO1**
5.	To find out Resolving power of Diffraction Grating/Telescope.	**CO1**
6.	To measure the distance by using principle of ultrasonic.	**CO2**
7.	Experiment based on Laser (To determine diameter of thin wire).	**CO3**
8.	To determine band gap of given semiconductor.	**CO4**
9.	To study I-V characteristics and determine Fill factor of solar cell	**CO4**
10.	To determine Hall coefficient and charge carrier density.	**CO4**

Textbooks:

1. Engineering Physics, Avadhanulu, Kshirsagar, S. Chand Publications
2. A textbook of optics – N Subrahmanyam and BriLal, S. Chand Publications
3. Engineering Physics, Gaur, Gupta, Dhanpat Rai and Sons Publications

Reference books:

1. Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons)
2. Optics, Jenkins and White (Tata Mcgraw Hill)
3. Principles of Physics, Serway and Jewett (Saunders college publishing)
4. Introduction to Solid State Physics, C. Kittel (Wiley and Sons)
5. Principles of Solid State Physics, H. V. Keer, New Age International
6. Laser and Non-Linear Optics, B. B. Laud (Oscar publication) 7
7. . Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni (Capital Publishing Company)

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2401103: Engineering Chemistry

Teaching Scheme:	Credits	Examination Scheme	
Theory: 03 hrs/week	Th: 03	Theory:	CIA:50
Practical: 02 hrs/week	Termwork: -01		End-Sem:75
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: The student is able to

1. Understand different aspects in the analysis and improving quality of water as commodity.
2. Gain knowledge about conventional fuels used and future fuels.
3. Aware the students about various electro-analytical techniques used for the study of materials.
4. Develop consciousness about corrosion and its prevention.
5. Understand structure, properties and applications of engineering materials.
6. Study the chemical composition using spectroscopic methods.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: **Employ** different methods for analysis of water and techniques used for purification of water.

CO2: **Examine** various types of conventional and alternative fuels. .

CO3: **Select** the appropriate instrumental method for analysis of materials.

CO4: **Analyze** the different methods of corrosion control for corrosion prevention.

CO5: **Illustrate** the structure and properties of engineering materials for various engineering applications.

CO6: **Apply** spectroscopic methods to analyze the molecular structure and compounds.

2401103: Engineering Chemistry

Unit 1: Water Technology **(7 Hrs.)**	**CO**
Sources, conservation of water, impurities in water and their effects. Hardness of water: Types, Units and Numericals. Determination of hardness (by EDTA method using molarity concept) and alkalinity, numerical, Boiler troubles – priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge, causes and effects, methods of prevention. Water treatment: i) Zeolite method and numericals ii) Demineralization method, Softening of water, ion-exchange process and numerical	CO1
Unit 2: Fuels & Combustion **(7 Hrs.)**	CO2
Introduction (Definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel),Calorific value (CV): Gross calorific value (GCV) and Net calorific value (NCV) Solid fuel – Coal: Analysis of Coal-Proximate and Ultimate analysis, numerical Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition, boiling range and uses of various fractions. Gaseous fuel: Composition, properties and applications of CNG, Hydrogen gas as a future fuel	
Unit 3: Electro-analytical Techniques **(07 Hrs.)**	CO3
Types of reference electrode (calomel electrode), indicator electrode (glass electrode), Conductometry: Introduction, conductivity cell, Conductometric titrations of acid versus base with titration curve. pH-metry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base, weak acid versus strong base with titration curve.	
Unit 4: Corrosion & its prevention **(07 Hrs.)**	
Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films, Pilling Bedworth rule, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, galvanic cell corrosion, Factors affecting rate of corrosion. Methods of corrosion control and prevention i) Using inhibitors, ii) Cathodic protection-sacrificial anode and impressed current methods iii) Protective coatings-metal coatings-galvanizing and tinning.	CO4

2401103: Engineering Chemistry

Unit 5 Engineering Materials (07 Hrs.)	
Polymers- Introduction, Monomer, functionality of monomer, classification of polymers. Specialty polymers- Introduction, preparation, properties and applications- i) Engineering thermoplastics-Polycarbonats ii) Biodegradable polymers- PHBV iii) Conducting polymers- ICP, DCP.	CO5
Unit 6: Spectroscopic methods (07 Hrs.)	CO6
Introduction, Electromagnetic radiations, Interaction of Electromagnetic radiations with matter. UV-Visible spectroscopy- Principle, Lambert-Beer's law, Electronic transitions, Instrumentation-Single beam UV-Visible spectrophotometer, applications. Infrared Spectroscopy- Principle, Molecular vibrations.	

LIST OF PRACTICALS

Sr. No.	Title	CO
1	To determine hardness of water by EDTA method	CO1
2	To determine alkalinity of water	CO1
3	Proximate analysis of coal.	CO2
4	To determine strength of strong acid using pH meter	CO3
5	Titration of a mixture of weak acid and strong base using digital conductivity meter.	CO3
6	To coat copper and zinc on iron plate using electroplating.	CO4
7	Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin	CO5
8	To determine maximum wavelength of absorption of $CuSO_4$, verify Beer's law and find unknown concentration of given sample.	CO6

2401103: Engineering Chemistry

Textbooks

1. Engineering Chemistry, Dr. S. S. Dara, Dr.S.S.Umare, S. Chand Publications.
2. Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing, 15th Edn.
3. Engineering Chemistry, B. Sivasankar, Tata Mcgraw-Hill Publishing Company Ltd.

Reference books

1. Engineering Chemistry, Wiley India Pvt. Ltd.
2. Inorganic Chemistry, 5 Edn by Shriver and Atkins, Oxford University Press.
3. Basic Concept of Analytical Chemistry, 2ed , S. M. Khopkar, New Age-International Publisher
4. Instrumental Methods of Chemical Analysis, G. R. Chatwal& S. K. Anand, Himalaya Publishing House.
5. Spectroscopy of organic compounds, 2 ed, P. S. Kalsi, New Age-International Ltd., Publisher
6. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadevSreedhar, Wiley Eastern Limited.

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2414104: Engineering Mechanics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	In-Sem: 25
Practical: 2 hrs/week	Practical: 01		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: The student should be able

1. To gain knowledge about force systems and resultant of force system.
2. To gain knowledge about types of supports and reactions and to determine reaction of beams
3. To understand centroid of plane area and concept of friction.
4. To undertand concept of motion under constant acceleration and motion under gravity

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Determine resultant of various force systems

CO2: Draw free body diagram and Determine reactions of beams

CO3:. Determine centroid and solve problems related to friction

CO4: Calculate position, velocity and acceleration of particle using principles of kinematics

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2414104: Engineering Mechanics

Unit 1: Resolution and Composition of Forces **7 hrs**	**CO**
Principle of statics, Force system, Resolution and composition of forces, Resultant of concurrent forces. Law of Parallelogram, Moment of a force, Couple, Varignon's theorem, resultant of parallel force system, Resultant of parallel general force system.	CO1
Unit 2: Equilibrium **7 hrs**	CO2
Free body diagram Equilibrium of concurrent, parallel forces in a plane Equilibrium of general forces in a plane Equilibrium of three forces in a plane, Types of beams, Type of supports and reaction, Analysis of simple beams	
Unit 3: Distributed Forces and Friction **7 hrs**	CO3
Moment of area, Centroid of plane lamina Friction- Laws of friction, Block friction, Ladder friction, Belt friction	
Unit 4: Kinematics of Particle **7 hrs**	CO4
Kinematics of linear motion- Basic concepts Equation of motion for constant acceleration, Motion under gravity. Kinematics of curvilinear motion- Basic Concepts Equation of motion in Cartesian coordinates, Equation of motion in path coordinates	

Text Books:

1. Vector Mechanics for Engineers, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication
2. Engineering Mechanics by R. C. Hibbeler, Pearson Education
3. D. S. Kumar, "Engineering Mechanics – Statics and Dynamics", S. K. Kataria and Sons Publication

Reference Books:

1. Engineering Mechanics by S. P. Timoshenko and D. H. Young, McGraw- Hill publication
2. Engineering Mechanics by J. L. Meriam and Craige, John Willey
3. Engineering Mechanics by F L Singer, Harper and Rowe publication
4. Engineering Mechanics by A. P. Boresi and R. J. Schmidt, Brooks/Cole Publication

Term work	CO
Journal consist of the following **A. Compulsory experiments as per following list** 1. To Verify the law of Polygon of forces	CO1
2. To determine the support reaction of beam	CO2
3. To determine the coefficient of friction for flat and V-belt	CO3
4. To study Curvilinear motion of rigid body	CO4
B. Compulsory assignments as per following list	
1. Assignment on Unit 1(Minimum 8 No numericals to be solved in class)	CO1
2. Assignment on Unit 2(Minimum 8 No numericals to be solved in class)	CO2
3. Assignment on Unit 3 (Minimum 8 No numericals to be solved in class)	CO3
4. Assignment on Unit 4 (Minimum 8 No numericals to be solved in class)	CO4

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2012105: Engineering Graphics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory:	CIA: 25
Practical: 2 hrs/week	Term work: 01		End-Sem: 50
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: The student is able to

1. To develop the manual drawing skill, drawing interpretation skill.
2. To understand the Orthographic and Isometric projections
3. To understand the projections of lines and planes.
4. To understand the engineering curves
5. To understand the lateral development of solids.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.

CO2: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

CO3: Draw the projections of lines and projections of planes.

CO4: Draw the Engineering Curves and development of lateral surfaces for solids.

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2012105: Engineering Graphics

Units		CO
Unit-1	**Orthographic Projections** **(6 Hrs.)**	**CO1**
Content – Principle of Projections, Introduction to First and Third Angle Method of Projections, Orthographic Projections of Machine Element/Parts, Sectional Orthographic Projection.		
Unit-2	**Isometric Projections** **(6 Hrs.)**	**CO2**
Content – Introduction to Isometric Projections and Isometric View, Isometric Projections from Given Orthographic View.		
Unit-3	**Projections of Lines and Projection of Plane** **(10 Hrs.)**	**CO3**
Projections of points, projections of lines, lines inclined to one reference plane, lines inclined to both reference planes. (Lines in First Quadrant Only). Projection of planes, inclination of the plane with HP and VP. (Planes in First Quadrant Only).		
Unit-4	**Engineering Curves and Development of Lateral Surfaces** **(6 Hrs.)**	**CO4**
Introduction to conic sections and its significance, various methods to construct the conic section. Helix for cone and cylinder, rolling curves (Involutes and Cycloid) and spiral. Introduction to development of lateral surfaces and its applications. Draw the development of lateral surfaces for cut section of cone, pyramid, prism etc..		

Term Work:- Sheet No. 1 to 4 on A2 (594X420mm) Half Imperial Size Drawing Sheet.		**CO**
Sheet No. 1	To Draw Orthographic Projections (Two Problems)	**CO1**
Sheet No. 2	To Draw Isometric Projections (Two Problems)	**CO2**
Sheet No. 3	To Draw Projections of Lines and Planes (Two Problems)	**CO3**
Sheet No. 4	To Draw Engineering Curve and Development of Lateral Surface of Solid (Two Problems)	**CO4**

2012105: Engineering Graphics

Textbooks:

1. Bhatt, N. D. and Panchal, V. M., (2016), "Engineering Drawing", Charotar Publication, Anand, India
2. K. Venugopal, K, (2015), "Engineering and Graphics", New Age International, New Delhi
3. Jolhe, D. A., (2015), "Engineering Drawing with introduction to AutoCAD", Tata McGraw Hill, New Delhi
4. Rathnam, K., (2018), "A First Course in Engineering Drawing", Springer Nature Singapore Pte. Ltd., Singapore

Reference Books:-

1. Madsen, D. P. and Madsen, D. A., (2016), "Engineering Drawing and design", Delmar Publishers Inc., USA
2. Bhatt, N. D., (2018), "Machine Drawing", Charotor Publishing House, Anand, India
3. Dhawan, R. K., (2000), "A Textbook of Engineering Drawing", S. Chand, New Delhi
4. Luzadder, W. J. and Duff, J. M., (1992), "The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production", Peachpit Press, USA
5. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T., (1990), "Principles of engineering graphics", McMillan Publishing, USA
6. Jensen, C., Helsel, J. D., Short, D. R., (2008), "Engineering Drawing and Design", McGraw-Hill International, Singapore

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2311105: Elements of Electrical Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: 02 hrs/week	Termwork: 01		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: To understand

1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4. To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.

CO2: Apply and analyze the resistive circuits using KVL, KCL under DC supply, series, parallel capacitor as well as characteristics parameters of alternating quantity, suggest applications of various batteries, concept of charging and discharging and depth of charge.

CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.

CO4: Relate phase and line electrical quantities in poly phase networks.

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Sem-I/II

2311105: Elements of Electrical Engineering

Unit 1: Electromagnetism **(7 Hrs)**	**CO**
Resistance, Effect of temperature on resistance, resistance temperature coefficient, insulation resistance. Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule, Concept of mmf, flux, flux density, reluctance, permeability and field strength, their units and relationships.	CO1
Simple series magnetic circuit, Introduction to parallel magnetic circuit(Only theoretical treatment), comparison of electric and magnetic circuit,	
Faradays laws of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced e.m.f, self and mutual inductance, coefficient of couplings. Energy stored in magnetic field.	
Unit 2: Electrostatics and Batteries **(7 Hrs)**	CO2
A) Electrostatics: Electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance. Capacitor, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors (no derivation) and time constant. B) Batteries :Kirchhoff's law (DC Circuit), Different types of batteries (Lead Acid and Lithium Ion), construction, working principle, applications, ratings, charging and discharging, maintenance of batteries, series -parallel connection of batteries	
Unit 3: AC Fundamentals and Single Phase AC Circuit **(07 Hrs)**	CO3
A) AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak(maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasor.	
B) Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, resonance in series RLC circuits, concept of impedance, concept of active, reactive, apparent, complex power and power factor, Parallel AC circuits (No numerical), concept of admittance.	
Unit 4: Polyphase A.C. Circuits and Electrical Installations: **(07 Hrs)**	
A) Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. Balanced and unbalanced load, Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams.	CO4
B) Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Earthing. Elementary calculations for energy consumption:	

LIST OF PRACTICALS (Min 08)

Sr. No.	Title
1	To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors
2	To demonstrate Faradays laws of Electromagnetic Induction Principle
3	To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current.
4	To Verify KVL and KCL.
5	To Study the different types of batteries, their rating and Testing.
6	To verify the relation between phase and line quantities in three phase balanced star and delta connections of load.
7	To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, and ELCB.
8	To study pipe, plate and strip Earthing
9	To study calculation of LT electricity bill.

Textbooks

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989
2. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication
3. V.K. Mehta, Rohit Mehata Basic Electrical Engineering, S Chand Publications
4. B.L. Theraja, A text book on electrical technology Vol-I

Reference books

1. H Cotton, Electrical technology, CBS Publications
2. L. S. Bobrow, ―Fundamentals of Electrical Engineering‖, Oxford University Press, 2011.
3. E. Hughes, ―Electrical and Electronics Technology‖, Pearson, 2010.
4. D. C. Kulshreshtha, ―Basic Electrical Engineering‖, McGraw Hill, 2009.

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(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech (Common) *(2024 Pattern)*

Sem-I/II

2317106: Elements of Electronics Engineering

Teaching Scheme:	**Credits - 03**	**Examination Scheme**	
Theory: 02 hrs/week	**Th: 02**	**Theory**	**CIA:25**
Practical: 02 hrs/week	**Practical: 01**		**End-Sem:50**
		Termwork:	**25**

Course Objectives:

1. To explain the working principle of P-N junction diode and special purpose diodes.
2. To explain the working principle of BJTand OP-AMP as an amplifier.
3. To outline number systems, logic gates, digital circuits and its applications.
4. To explore the working principle of wired and wireless communication system.

Course Outcomes: On completion of the course, learner will be able to--

CO1: Select appropriate diodes as per applications.

CO2: Design a circuit using BJTand OP-AMP as an amplifier.

CO3: Develop and verify the truth table for combinational and sequential circuits.

CO4: Compareand contrast the wired and wireless communication system.

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Sem-I/II

2317106: Elements of Electronics Engineering

Unit 1: Diodes and Circuits **6 hrs**	**CO**
Introduction to Semiconductor: Intrinsic, Extrinsic, N-type and P-type Semiconductors, P-N Junction Diode: Construction, working principle in forward and reverse biasing, V-I Characteristics. Rectifier: Circuit diagram, modes of operation and input-output waveform of Half Wave Rectifier (HWR) and Full Wave Rectifier (FWR), Rectifier: Circuit diagram, modes of operation and input-output waveform of Bridge configuration, Comparison among HWR, FWR and Bridge configuration rectifier. Zener Diode: symbol, working principle in forward and reverse biasing with circuit diagram, V-I Characteristics and specifications. Light Emitting Diode (LED): symbol, construction, working principle in forward and reverse biasing with circuit diagram, V-I Characteristics.	CO1
Unit 2: Bipolar Junction Transistor and Operational Amplifier **8 hrs**	CO2
Working principle of transistor and its types (NPN, PNP), Bipolar Junction Transistor (BJT): symbol, construction, operation of NPN type transistor, Types of configuration (CE, CB and CC), BJT (NPN type) Common Emitter Circuit diagram and its working, input and output V-I characteristics, Modes of operation of BJT CE configuration on output characteristics with its applications. Performance parameters of BJT: α_{dc} and β_{dc}, Relation between α_{dc} & β_{dc} and numerical on it, Applications of Amplifier: Voltage divider biased single stage BJT (NPN) CE Amplifier: Circuit diagram and function of each component used in circuit. Operational Amplifier (OP-AMP): symbol, block diagram and its working, OP-AMP performance parameters (ideal and practical for IC 741): input offset voltage, input offset current, input bias current, slew rate, Common Mode Rejection Ratio (CMRR), Applications of OP-AMP: (i) Inverting Amplifier, (ii) Non-inverting Amplifier: Circuit diagram, derivation of output voltage, input-output voltage waveform.	

Unit 3: Digital Electronics **7 hrs**	CO3
Number Systems: Binary, Octal Decimal, Hexadecimal and its Conversion, Logic Gates: Symbols, Boolean expressions, Truth Table of NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR Gates, De-Morgan's Theorem and implementation using Logic Gates, Introduction to Combinational Circuits and Sequential Circuits. Half Adder and Full Adder: Block schematic, Truth Table, K-map and implementation using Logic gates. Concept of Flip flop, Logic Symbol and Truth Table of D, T, S-R and J-K Flip Flop, Application of Flip Flops	
Unit 4: Communication System 7 **hrs**	CO4
Typical Electronic Communication System and its Block Diagram and its Functional block diagram. Types of Communication media: Wired and Wireless, Twisted Pair, Co-axial Cable and Fiber Optic Cable: working, advantages, limitation and applications, Compare and Contrast wired and wireless communication system. Wireless Media: IEEE Electromagnetic Frequency Spectrum: enlist applications as per frequency and wavelength. Concept of Cellular System, Block diagram of basic cellular system, Global System for Mobile (GSM): Block Diagram, Elements of Architecture, Features. Evolution of Wireless Network: Introduction to 2G, 3G, 4G and 5G wireless network.	

List of Practical: ***(Perform any 4 practical)***	**CO**
1. Implement the Bridge configuration rectifier circuit using 1N4007 diodes on breadboard and observe the input-output voltage waveform.	CO1
2. Build and test and simulate single stage BJT CE amplifier on breadboard and observe the output voltage waveform. Determine the value of voltage gain.	CO2
3. Build and test and simulate) the inverting and non-inverting amplifier using OP-AMP and determine the value of voltage gain. Compare the practical value with theoretical one.	CO2
4. Design, build and test Half Adder and Full Adder Circuits using logic gates on breadboard and verify its truth table.	CO3

5. Study the use cases of ***any two*** 4G / 5G Wireless Networks (viz. Healthcare, Education, Entertainment, Smart Cities, Autonomous Vehicles, Agriculture, Internet of Things etc.)	CO4
6. Perform the experiments using Virtual Lab: V-I characteristics of diode. Link: http://vlabs.iitkgp.ernet.in/be/	CO1

Textbooks

1. Thomas. L. Floyd, "Electronics Devices", 9th Edition, Pearson.
2. R.P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill.
3. Kennedy & Davis, "Electronic Communication Systems", 4th Edition, Tata McGraw Hill.
4. M. Schwartz, "Mobile Wireless Communication", Cambridge University Press.
5. Saro Velrajan, "An Introduction to 5G Wireless Networks: Technology, Concepts and Use- cases".

Reference books

1. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory", 11th Edition, Pearson.
2. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 4th Edition, Pearson.
3. J. Schiller, "Mobile Communication", 2nd Edition, Pearson.
4. Donald Neaman, "Electronic Circuit Analysis and Design", 3rd Edition, Tata McGraw Hill.

MOOC / NPTEL Courses:

1. NPTEL Course on "Basic Electronics" by Prof. Mahesh B. Patil, IIT Bombay
   Link: https://nptel.ac.in/courses/108101091
2. NPTEL Course on "Basic Electronics" by Dr. Pramod Agarwal, IIT Roorkee
   Link: https://nptel.ac.in/courses/117107095
3. NPTEL Course on "Basic Electronics" by Prof. Chitralekha Mahanta, IIT Guwahati
   Link: https://nptel.ac.in/courses/117103063

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Sem-I/II

2317106: Elements of Electronics Engineering

Virtual Lab Links:

1. Basic Electronics Virtual Lab developed by IIT Kharagpur:
   Link: http://vlabs.iitkgp.ernet.in/be/
2. Digital Electronics Virtual Lab developed by IIT Roorkee:
   Link: https://de-iitr.vlabs.ac.in/List%20of%20experiments.html
3. Digital Electronics Virtual Lab developed by IIT Guwahati:
   Link: https://www.iitg.ac.in/cseweb/vlab/Digital-System-Lab/index.php
4. Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
   Link: https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2415108: Fundamental of C Programming

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory:	CIA: 25
Practical: --	Termwork: --		End-Sem: 50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student is able to

1. Get acquainted with the fundamental concepts of C programming
2. Learn problem solving techniques writing algorithm and flowchart
3. Understand data types, control structures and functions in C
4. Build the programming skills using C to solve a problem

Course Outcomes:

On completion of the course, learner will be able to–

- **CO1:** Illustrate the concepts of Computational thinking, algorithm flowchart and errors for a given problem
- **CO2:** Apply fundamentals of C programming and Conditional Algorithmic Constructs to solve a given problem
- **CO3:** Formulate simple algorithms for arithmetic and logical problems.
- **CO4:** Build a solution for a given problem using C Programming skills.

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2415108: Fundamental of C Programming

Unit 1: Introduction to Programming Languages **(7 Hrs.)**	**CO**
Computational Thinking (CT): What is CT? Purpose of CT, Logical Thinking, CT and Problem Solving Strategies. **Program planning tools**- Algorithm, flowchart and pseudo code, Introduction to top-down structured programming. **Types of Program Errors:** Syntax, logical, runtime, debugging.	CO1
Unit 2: Fundamentals of 'C' **(7 Hrs.)**	CO2
Introduction to 'C' Programming: Identifiers, Data Types, Variables, Constants, Input / Output. **Operators:** Arithmetic, relational, logical, bitwise, Expressions, Precedence and associatively, Type conversions.	
Unit 3: Conditional and Iterative Algorithmic Constructs **(7 Hrs.)**	CO3
Conditional Algorithmic Constructs: if, if-else, nested if-else, cascaded if-else and switch statement. **Iterative Algorithmic Constructs**: Construction of loops, Establishing initial condition, "for", "while", "do-while" statements, nested loops, Continue, break statements.	
Unit 4: Arrays and Functions **(7 Hrs.)**	CO4
Arrays: 1D, 2D, Character Array and Strings. Basic Searching and Sorting Algorithm (Bubble, Selection and Insertion). **Function types:** Library functions (math, string), user-define functions: Function definition, function declaration, arguments, function calls and return.	

Textbooks:

1. Yashavant Kanetkar, "Let Us C" – Seventh Edition, BPB Publications, 2007
2. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 2002
3. Karl Beecher, "Computational Thinking, A Beginner's guide to Problem solving and
4. Programming", BCS Learning & Development Ltd, 2017

Reference books:

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education, 1988
2. Computer Science: A Structured Programming Approach Using C, B. A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2412109: Workshop Practice

Teaching Scheme:	Credits	Examination Scheme	
Theory: -- hrs/week	Th:--	Theory:	CIA: --
Practical: 04 hrs/week	Termwork: 02		End-Sem: --
		Pract:	--
		Oral:	50
		Term work	50

Course Objectives: The student is able to

1. To understand industrial safety norms and working of machine tools and functions of its parts.
2. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes.

Course Outcomes:

On completion of the course, learner will be able to–

- **CO1:** Familiar with safety norms to prevent any mishap in workshop.
- **CO2:** Handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
- **CO3:** Understand the construction, working and functions of machine tools and their parts.
- **CO4:** Understand the conventional and advanced manufacturing processes.

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Sem-I/II

2412109: Workshop Practice

LIST OF PRACTICALS		
Sr. No.	**Title of Experiment**	**CO**
1	Study of Safety on the Manufacturing shop and Industrial safety norms.	CO1
2	Lathe Machine- Demonstration and Working Principle: Introduction, Working Principle, Main Parts of lathe machine and machine accessories, Operations of Lathe Machine, Specification Functions of lathe Machine (At least one turning job is to be demonstrated).	CO2, CO3, CO4
3	Drilling Machine- Demonstration and Working Principle: Definition, Types, Parts, Working Principle, Operations on Vertical drilling machine/Radial drilling machine, Drilling tool, Tool holding devices, Concept of speed, feed and depth of cut.	CO2, CO3, CO4
4	Milling machine- Demonstration and Working Principle: What is milling machine, Milling machine Parts, Operation, Working Principle, Construction, Table movements, Indexing and Multipoint cutter and Gear Cutting Operation.	CO2, CO3, CO4
5	Grinding/ Shaper machine- Demonstration (Any one) : Grinder: Surface grinding machines, Tool and cutter grinding machines. Shaper: Shaping Machine Working Principle, Mechanism used in Shaper machine.	CO2, CO3, CO4
6	Injection Moulding Machine- Demonstration and Working Principle: Basics of Injection Moulding Process, machine parts and its function	CO2, CO3, CO4
7	CNC Turning Machine- Demonstration: Basics of CNC manufacturing and CNC programming.	CO2, CO3, CO4
8	Study of Advance Manufacturing Process: Ultrasonic Machining, Electrochemical Machine, Abrasive jet Machining, Electric Discharge Machining etc..	CO2, CO3, CO4
9	One job using different welding operations : Study and demonstration of metal joining processes using Arc Welding, Gas Welding and Spot Welding machines.(Any one)	CO4
10	One job using different sheet Metal operations: Sheet metal working and Brazing Use of sheet metal, working hand tools, cutting, punching, blanking, bending, spot welding	CO4
11	Fitting Shop- One job involving following operations: marking, filing to size, centre punching, drilling, tapping, one simple male- female joint.	CO4
12	Carpentry Shop- One carpentry job involving wood turning .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.	CO4

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2410110:Problem Solving and Programming using Python

Teaching Scheme:	Credits	Examination Scheme	
Theory: -- hrs/week	Th:--	Theory:	CIA: --
Practical: 04 hrs/week	Termwork: 02		End-Sem: --
		Pract:	--
		Oral:	50
		Term work	50

Course Objectives: The student is able to

1. Learn Core Python Programming.
2. Give Idea about real world applications of Python.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Acquire the knowledge of Mathematics Science and Engineering field through the course.

CO2: Develop a Competency to Analyze and design solutions for complex problems through the Sessions of the course. Understand the construction, working and functions of machine tools and their parts.

CO3: Use or apply the modern engineering tool /Software /techniques for any Engineering practice through the course.

CO4: Apply and ethically resolve contemporary social issues and also acquire life-long learning.

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Sem-I

2410110:Problem Solving and Programming using Python

LIST OF PRACTICALS		
Sr. No.	**Title of Experiment**	**CO**
1	To calculate salary of an employee given his basic pay (take as input from user). Calculate gross salary of employee. Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employee pay professional tax as 2% of total salary. Calculate net salary payable after deductions.	CO1
2	To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as $e=mc^2$ where m is the mass of the object and c is its velocity.	CO2, CO3, CO4
3	To accept N numbers from user. Compute and display maximum in list, minimum in list, sum and average of numbers.	CO2
4	To accept student's five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.	CO2, CO3
5	To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.	CO2, CO3, CO4
6	To simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing x^y and x!.	CO2, CO3, CO4
7	To accept the number and Compute a) square root of number, b) Square of	CO2, CO3,

	number, c) Cube of number d) check for prime, d) factorial of number e) prime factors	CO4
8	To accept two numbers from user and compute smallest divisor and Greatest Common. Divisor of these two numbers.	CO2, CO3, CO4
9	To accept a number from user and print digits of number in a reverse order.	CO4
10	To generate pseudo random numbers.	CO4
11	To accept list of N integers and partition list into two sub lists even and odd numbers.	CO4
12	To input binary number from user and convert it into decimal number.	CO4

Textbooks:

1. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6
2. R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3L

Reference books:

1. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN10: 8131705625, ISBN-13: 978-8131705629 Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645
2. Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712
3. Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN:978-93-5213-482-3
4. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943
5. Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2401111: Professional Communication Skills

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory:	CIA: 25
Practical: -- hrs/week	Termwork: --		End-Sem: 50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives:

1. To introduce students to various forms of professional communication (Oral, Written, Non- verbal).
2. To familiarize students with the principles of effective interpersonal and group communication and barriers in a professional context
3. To develop students' ability to create clear, concise, and professional business correspondence
4. To train students in delivering professional presentations and public speaking.
5. To enhance students' ability to work in teams and communicate effectively in multicultural settings.

Course Outcomes:

On completion of the course, learner will be able to–

- **CO1:** Communicate effectively (oral / written) in various formal and informal situations minimizing the barriers
- **CO2:** Write Notices, Circulars, Memos, and Minuets of a Meeting
- **CO3:** Draft Inquiry Letter, Order Letter, Complaint Letter, Job Application with Resume / C. V.
- **CO4:** Write Industrial Reports

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2401111: Professional Communiation Skills

Unit 1: Professional Communication: An Overview (09 Hrs.)	**CO**
Definition of Communication: Importance, Relevance, Elements and Process of Communication, Types of Communication: Oral, Written, Formal, Informal, Vertical, Horizontal, Diagonal, Barriers to Communication: Physical, Psychological, Mechanical, Linguistic and Cultural, Mannerism, 7 C's of Effective Communication (Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness)	CO1
Unit 2: Office Drafting (05 Hrs.)	CO2
Format of Notice and Circular, Drafting Memorandum, Drafting Agenda, Preparing Minutes of a Meeting	
Unit 3: Writing Skills (07 Hrs.)	
Job Application with Resume / CV, Drafting Inquiry, Order, Complaint, Adjustment Letter	CO3
Unit 4: Report Writing (07 Hrs.)	
Introduction to Report Writing, Accident Report, Investigation Report, Fall in Production / Consumption Report, Progress Report	CO4

Textbooks:

1. Effective Communication Skills, M. Ashraf Rizvi, Tata McGraw Hill Publication ISBN-0070599521, 9780070599529.
2. Communication Skills, Sanjay Kumar and Pusha Lata, Oxford University Press.
3. Effective Communication Skills, Robert King, ISBN-978181667009742.
4. English for Technical Communication, N. P. Sudarshana and C. Savitha Cambridge ISBN-9781316640081.

Reference Books:

1. Technical Communication: Principles and Practice, Meenakshi Raman, Sangeeta Sharma, Oxford University Press ISBN-97813166400.
2. Communication Skills for Engineers, C. Muralikrishna, Sunita Mishra, Pearson ISBN-9788131733844.
3. Business Communication, K. K. Sinha, Galgotiya Publishing Company, New Delhi ISBN-9789356227064.
4. Essentials of Business Communication, Rajendra Pal, J. S. Korlahalli Sultan Chand and Sons, New Delhi ISBN-9788180547294.

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Sem-I/II

2300115: Physical Education and Yoga

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:--	Theory	CIA: --
Practical: 4 hrs/week	Practical: 02		End-Sem:--
		Pract:	--
		Oral:	--
		Termwork	50

Course Aim and Objectives: **56 hrs**

Introduction to Physical Education and Yoga

· · **Introduction to Yoga -** History of Yoga**,** Introduction to Ashtanga Yoga.

· **Mobility exercises – Neck up & down, Side to side, shoulder rotation, Twisting, Squats.**

· **Practice of Prone and Supine Asanas**

A student will have to perform standing and seating asanas, Pavanmuktasana, Shavasana, Setubandhasana, · Ardha Halasana, Salabhasana, Bhujangasana, Halasana, Makarasana, Dhanurasana

The following points to be covered:

- Benefits &Contraindication of each asana

Practice of Sitting and Standing Asanas:-

A student will have to perform sitting and standing asana

Vajrasana, Dandasan, Vakrasana, Ushtrasana, Uttanmandukasana, Bhadrasan, Vrikshasana, Shashankasan, Trikonasana, Padahastasana, Chakrasana - sideward, Tadasana

The following points to be covered:

- Benefits & Contraindication of each asana

Course Outcomes: The outcomes of the course are to create awareness among students about Yoga, and to facilitate knowledge about Asanas, This will help them to incorporate yogic practices in their lifestyle.

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Sem-I/II

2300116: Physical Education and Sports

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	Th:00	Theory	CIA: --
Practical: 4 hrs/week	Practical: 02		End-Sem:--
		Pract:	--
		Oral:	--
		Termwork	50

Course Aim and Objectives:

1. The aim of the scheme is to make Physical Education as an integral part of Educational System. Students studying in the colleges should have the benefit of Physical Education to improve their health during the course of college education. It is designed to ensure that on completion of this training they would attain the minimum prescribed standard.
2. The object of the scheme is to enhance physical efficiency and maintain fitness of mind, body and character, which would help the student to be mentally alert and physically efficient to withstand the strain and fatigue of daily life. It would prepare them for the strenuous training which will help them to be fit to face the different barriers in life. The students will undergo this scheme for the first year of his/her under graduate Course education.

Course Outcomes:

To enhance physical efficiency and maintain fitness of mind, body and character, which would help the student to be mentally alert and physically Efficient to withstand the strain and fatigue of daily life.

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Sem-I/II

2300116: Physical Education and Sports

Participation in the scheme: 56 hrs

Compulsory Activities: Under this category, a student shall have to choose total three activities, at least one from each part of group B (Running, Jumping, Endurance and Strength) during the sem, and have to participate in them throughout the sem. Whatever may be choices according to the availability, students shall have to show sufficient skill and have to achieve minimum prescribed target at the end of the SEM.

The Scheme: Choices for Compulsory Activities and tests for its evaluation: (Opt any three activities, out of which one from each selected parts i.e. Part A/B/C/D/)

List of Activities and tests:-

PART	EVENT	STUDENT	TESTS FOR EVALUATION
Part A	100 m. Run	(Male and Female)	50 yard dash (150 feet)
	400 m. Run	(Male and Female)	
Part B	High Jump or Pole Vault	(Male and Female)	Standing Vertical Jump
	Long Jump	(Male and Female)	
	Triple Jump	(Male and Female)	
Part C	12.5 Km. Cross Country	(Male)	Cooper's Test (12 minutes run and walk test)
	5 Km. Cross Country	(Female)	
	1500 m. Run	(Male)	
Part D	Rope Climbing	(Male)	Medicine Ball put for male and Sit Ups test for female
	Chin Ups/Flex Arm hang	(Male and Female)	
	Sit Ups	(Male and Female)	
	Push Ups and Modified push ups	(Male and Female)	

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Sem-I/II

2300116: Physical Education and Sports

1. Optional Activities:

The Scheme: Optional Activities (Opt any Two, out of which one from individual event and one from team event)

A student shall have to participate in two types of physical activities viz.

Group (A) - Optional Activities (Opt any Two, out of which one from individual event and one from team event)

Name of Individual Event	**Individual Events Test for Evaluation**
Gymnastics	Flex arm Hang Test for Girls Vertical Reach Test for Boys
Judo	Pushups and 12 Minutes run and walk test
Malkhamb/Rope Malkhamb	Flex arm Hang Test for Girls Vertical Reach Test for Boys
Table Tennis	Eye-hand Coordination Test
Tennis	Dyer's Tennis Test
Weight Lifting and Power Lifting	Sit ups, Pushups, Standing Vertical Jump
Wrestling	Pushups and 12 Minutes run and walk test
	Sit and Reach Test
Name of Team Event	**Team Events Test for Evaluation**
Basketball	Johnson's Basketball Test
Football	Mc Donald's Soccer Skill Test
Hockey	SAI Hockey Skill test
Kabaddi	6X10 M. Shuttle Run Test
Kho –Kho	6X10 M. Shuttle Run Test
Volleyball	SAI Volleyball Skill test

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Sem-II

2401114 : Engineering Mathematics-II

Teaching Scheme:	Credits	Examination Scheme	
Theory: 04 hrs/week	Th:04	Theory:	CIA:50
Practical: -- hrs/week	Termwork: --		End-Sem: 75
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student is able to

1. Understand the different methods to solve ordinary differential equations.
2. Mathematical modelling of physical systems using differential equations and solve them.
3. Understand the concept of finite differences and interpolation.
4. Familiarize multiple integrals and their applications.
5. Understand the fundamental concept of Statistics.
6. Understand the fundamental concept of probability and probability distribution.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Solve first order ordinary differential equations.

CO2: Apply the solutions of ordinary differential equations to different engineering problems.

CO3: Apply the concept of finite differences and interpolation to solve various engineering problems.

CO4: Evaluate multiple integrals and apply it to find area bounded by curves and volume bounded by surfaces

CO5: Solve engineering problems by statistical methods.

CO6: Apply the concept of probability distribution to solve engineering problems.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Common) *(2024 Pattern)*

Sem- II

2401114: Engineering Mathematics - II

Unit 1: First Order Ordinary differential Equation **(09 Hrs.)**	**CO**
Introduction to Differential Equation, Formation of differential Equation ,Exact differential equations, Equations reducible to exact form. Linear differential equations, Equations reducible to linear form.	CO1
Unit 2: Applications of Differential Equations **(09 Hrs.)**	CO2
Applications of Differential equations to Orthogonal Trajectories, Newton's Law of Cooling, Kirchhoff's Law of Electrical Circuits, One dimensional Conduction of Heat, Rectilinear motion .	
Unit 3: Finite Differences and Interpolation **(10 Hrs.)**	CO3
Finite Differences -Forward difference, Backward difference, Central difference, Difference Operators & relation between Difference operators. **Interpolation** - Newton's forward and Backward Interpolation Formulae, Stirling's Interpolation Formula, Lagrange's Interpolation formula	
Unit 4: Multiple Integrals and Applications **(10 Hrs.)**	CO4
Double and Triple integrations, change of order of integration, Applications to find Area, Volume.	
Unit 5: Statistics **(09 Hrs.)**	CO5
Measures of Central tendency , Standard Deviation, Coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression.	
Unit 6: Probability and Probability Distribution **(09 Hrs.)**	CO6
Probability- Basic terminology, Definition, Theorems on Probability ,Conditional Probability, Baye's theorem **Probability Distribution** –Binomial distribution, Poisson distribution, Normal distribution.	

Textbooks:

1. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication)
2. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill)

Reference books:

1. Advanced Engineering Mathematics by M. D. Greenberg (Pearson Education)
2. Advanced Engineering Mathematics by Peter V. O'Neil (Thomson Learning)
3. Thomas' Calculus by George B. Thomas, (Addison-Wesley, Pearson)
4. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)

5. Applied Mathematics (Vol. I & Vol. II) by P.N.Wartikar and J.N.Wartikar Vidyarthi Griha Prakashan, Pune.
6. Elementary Linear Algebra. by Ron Larson and David C. Falvo (Houghton Mifflin Harcourt Publishing Company.
7. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I/II

2414115: Basics of Civil Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	In-Sem: 25
Practical: --	Practical: --		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. gain knowledge about various streams of civil engineering.
2. gain knowledge about types of substructure and superstructure.
3. understand determination of reduced levels of points using HOI, Rise and fall method.
4. undertand principles of building planning.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Demonstrate knowledge about various streams of civil engineering.

CO2: Demonstrate knowledge about types of substructure and superstructure.

CO3: Demonstrate knowledge of determination of reduced levels of points using HOI, Rise and fall method.

CO4: Demonstrate knowledge of principles of building planning.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Civil Engineering) *(2024 Pattern)*

Sem-II

2414115: Basics of Civil Engineering

Unit 1: Introduction to civil engineering **(7 hrs)**	**CO**
a) Introduction to structural engineering, geotechnical engineering, Construction technology, hydraulics, water resources and irrigation engineering, transportation engineering, environmental and sanitary engineering, GIS, earthquake engineering.	CO1
b) Role of Civil Engineers in the development of the nation. Role of Civil Engineer in the construction of buildings, dams, expressways, and infrastructure projects for 21st century. Importance of an interdisciplinary approach in civil engineering.	
Unit 2: Materials and construction **(7 hrs)**	CO2
a) Basic materials for construction –Requirement, types, uses, properties, and importance of Civil Engineering materials like, Stone, brick, wood, glass, aluminum, cement, aggregates, concrete, steel, RCC, PSC, recycling of materials.	
b) *Substructure:* Definition and function of foundation (only concepts of settlement and bearing capacity of soils) Types of shallow foundations, deep foundations (only concept of friction and end bearing pile)	
c) *Superstructure:* Types of loads –dead load and live load, wind loads, earthquake considerations. Types of construction –Load bearing, framed, composite. Fundamental requirement of masonry.	
Unit 3: Surveying, Levelling and Mapping **(7 hrs)**	CO3
a) Introduction: Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, Units of measurement.	
b) Aims and applications, Definition of various terms, Instruments for leveling, Methods of leveling, Recording observations in level-book, Computing reduced levels by Height of Instrument and rise & fall method, Definition of contour, Characteristics of contours of different terrains and application of contour maps, Introduction to planimeter, Introduction to Global positioning system (GPS), remote sensing (RS) and Geographical information system (GIS).	
Unit 4: Planning for built environment **(7 hrs)**	
a) Definition and concept of plan of a simple residential building, Elementary principles and basic requirements for building planning, elevation, and section of a residential building.	CO4
b) Role of by-laws in regulating the environment, concept of built –up area, carpet area, plinth area, plot area, FSI. Numericals using concept of FSI and built up area.	
c) Use of various eco-friendly materials in construction, Concept of green buildings. Concept of an integrated built environment – natural and manmade.	

Textbooks

1. Surveying and levelling by Kanetkar, Kulkarni- Pune Vidyarthi Prakashan
2. Build planning and build environment by Shah Kale,Patki-Tata MC Gaw Hill
3. Civil engineering materials by Dr S.V. Devdhar -Khanna Publications

Reference books

1. Basic Civil Engineering by M. S. Palanichamy Tata Mc-Graw Hill Publishing Co. Ltd.
2. Basic Civil Engineering B. Y. Shatheesh Gopi-Pearson
3. Elements of Civil Engineering and Engg Mech by R. V. Raikr– PHI Learning Pvt. Ltd.
4. Civil Engg. Drawing by S. C. Rangwala, Publication: Charotar Pub. House Anand
5. Surveying Vol. I & II by Dr. B. C. Punmia, Publication: Laxmi Publication Delhi
6. Surveying Vol. I and II, Author: S. K. Duggal, Publisher: Tata Mc-Graw hill Publication New Delhi
7. Building Construction, Author: Dr. B. C. Punmia, Publisher: Laxmi Pub. Delhi
8. Engineering Material, Author: Dr. S. C. Rangwala, Publisher: Charotar Pub. House
9. Environmental Engineering-1: Water Supply Engineering, B. C. Punmia, Ashok Jain and Arun Jain. Laxmi Publications (P) Ltd.
10. Elements of Civil Engineering Author: Dr. R. K. Jain and Dr. P. P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
11. Highway Engineering Author: Khanna S. K. and Justo C. E. G. Publisher: Nemchand and Brothers

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Mechanical Engineering) *(2024 Pattern)*

Sem - II

2412115: Basics of Mechanical Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory:	CIA: 25
Practical: -- hrs/week	Termwork: --		End-Sem: 50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student is able to

1. To understand different power transmitting elements.
2. To explain the basic concept of engineering thermodynamics and its application. To identify the sources of energy and their conversions
3. To identify different power producing and absorbing devices as per applications.
4. To Classify different manufacturing processes.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Illustrate and elaborate different power transmitting elements.
CO2: Interpret basic governing laws in thermal engineering. Compare different energy resources and their applications
CO3: Identify different power producing and absorbing devices as per applications.
CO4: Classify different manufacturing processes.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Mechanical Engineering) *(2024 Pattern)*

Sem - II

2412115: Basics of Mechanical Engineering

Units		
Unit-1	**Elements of Power Transmission System** **(06 Hrs.)**	**CO**
Mechanical Elements: Function, sketch, description, use of - Shaft, axle, key, coupling(rigid flange coupling), bearing(ball bearing), clutch-single plate clutch, brake (disc brake and Drum Brake) ***Power transmission devices*** - construction, working, comparison and application of belt drive (flat and V belt), chain drive and spur gear drive arranged with simple gear train		**CO1**
Unit-2	**Introduction to Thermal Engineering** **(08 Hrs.)**	**CO2**
Laws of Thermodynamics, heat engine, heat pump, refrigerator *(simple numerical)* Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. *(Simple numerical),* Two stroke and Four stroke engines (Petrol, Diesel and CNG engines) ***Energy Sources & its Conversion*** Thermal energy, Hydropower energy, Nuclear energy, Solar energy, Wind energy, Hydrogen energy.		
Unit-3	**Applied Thermal Engineering** **(6 Hrs.)**	**CO3**
Power producing devices: Boiler (water tube and fire tube), Turbines-impulse and reaction ***Power absorbing devices***: Pumps - reciprocating and centrifugal, compressors (single acting single stage reciprocation air compressor), refrigeration-vapour compression refrigeration process, household refrigerator, window air conditioner (working with block diagram)		
Unit-4	**Basic Manufacturing Processes** **(06 Hrs.)**	**CO4**
Introduction to Manufacturing Processes (Casting, Forging, Sheet Metal Working), Metal Joining Processes - Welding, Soldering and Brazing, Centre Lathe Machine Operations, Drilling Operations.		

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Mechanical Engineering) *(2024 Pattern)*

Sem - II

2412115: Basics of Mechanical Engineering

Text Books:

1. Nag, P. K., “Engineering Thermodynamics," Tata McGraw-Hill Publisher Co. Ltd.
2. Chaudhari and Hajra, “Elements of Workshop Technology”, Volume I and II, Media Promoters and Publishers, Mumbai
3. Agrawal, Basant and Agrawal, C. M., (2008), “Basics of Mechanical Engineering”, John Wiley and Sons, USA
4. Rajput, R.K., (2007), “Basic Mechanical Engineering”, Laxmi Publications Pvt. Ltd.
5. Pravin Kumar, (2018), “Basic Mechanical Engineering, 2nd Ed.”, Pearson (India) Ltd.
6. Moran, M. J., Shapiro, H. N., Boettner, D. D., and Bailey, M. “Fundamentals of Engineering Thermodynamics”, Wiley
7. Surinder Kumar, (2011), “Basic of Mechanical Engineering”, Ane Books Pvt. Ltd. New Delhi

Reference Books:

1. Khan, B. H., “Non-Conventional Energy Sources, Tata McGraw-Hill Publisher Co. Ltd.
2. Boyle, Godfrey, “Renewable Energy”,2nd Ed., Oxford University Press
3. Khurmi, R.S. ,and Gupta, J. K.,“A Textbook of Thermal Engineering”, S. Chand & Sons
4. Incropera, F. P. and Dewitt, D.P., (2007), “Fundamentals of Heat and Mass Transfer, 6th Ed., John Wiley and Sons, USA
5. Groover, Mikell P., (1996), “Fundamentals of Modern Manufacturing: Materials, Processes, and Systems”, Prentice Hall, USA
6. Norton, Robert L., (2009), “Kinematics and Dynamics of Machinery”, Tata McGrawHill
7. Cleghorn, W. L., (2005), “Mechanisms of Machines”, Oxford University Press
8. Juvinal, R. C., (1994), “Fundamentals of Machine Component Design”, John Wiley and Sons, USA
9. Ganeshan, V., (2018), “Internal Combustion Engines”, McGraw Hill

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Automation & Robotics)

(2024 Pattern)

Sem-II

2413115: Introduction to Drone Technology

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs./week	Th:02	Theory:	CIA: 25
Practical: --	Term work: --		End-Sem: 50
		Pract:	--
		Oral:	--
		Term work	--

Course Objectives: The student is able to

1. Identify and describe common components of drone
2. Understand and design the application specific drone.
3. 3.Understand and explain basics of aerodynamics

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of drone in present, past and future society

CO2: Interpret knowledge of drone flight dynamics to various flight scenarios.

CO3: Implement the principles and applications of various sensors used in drones.

CO4: Explain the principles and components of propulsion systems in drones.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Automation & Robotics)

(2024 Pattern)

Sem-II

2413115: Introduction to Drone Technology

Unit 1: Introduction to drones and their applications (7 Hrs.)	**CO**
Definition of drones, History of drones, India and drones, Tinkering and drones, Do's and Don'ts, Classification of drones based on structure, size, range and payload capacity, Application of drones, Drone Anatomy	CO1
Unit 2: Dynamics, stability and control of an aerial system (7 Hrs.)	CO2
Forces of flight, Principal axes and rotation of aerial systems: Longitudinal axis, Lateral (transverse) axis & Perpendicular axis, Equilibrium, Stability: Stable system, Unstable system & Neutrally stable system, Control: Roll, Pitch, Yaw & Throttle	
Unit 3: Drone Sensors (7 Hrs.)	CO3
Sensor: Accelerometer, Barometer, Gyro Sensor & Magnetometer; Other sensors: Distance sensors, Time of Flight Sensors, Thermal sensors and Chemical Sensors	
Unit 4: Propulsion and battery of a drone (7 Hrs.)	CO4
Propulsion, Propeller, Parameters of a standard propeller, Propeller Materials, Battery, Types of batteries and Motors.	

Textbooks:

1. The future of Drone Use Opportunities and Threats from Ethical & Legal Perspectives
2. DIY Drones for the Evil Genius: Design, Build, and Customize Your Own Drones

Reference Books:

1. Build a Drone: A Step-by-Step Guide to Designing, Constructing, and Flying Your Very Own Drone Barry Davies
2. Drones: An Illustrated Guide to the Unmanned Aircraft that are Filling our Skies

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech (Computer Engineering/ Information Technology/ Artificial Intelligence & Data Science/ Computer Science/ Artificial Intelligence and Machine Learning) *(2024 Pattern)*

Sem-II

2418115: Exploring of C Programming

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory:	CIA: 25
Practical: -- hrs/week	Termwork: --		End-Sem: 50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student is able to

1. Utilizing Arrays and Strings.
2. Exploring Pointers.
3. Implementing Data Structures.
4. Handling File Input and Output.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: declare, initialize, and manipulate arrays and strings, including handling multidimensional arrays and using string manipulation functions from the C Standard Library.

CO2: implement and utilize fundamental data structures such as linked lists, stacks, and queues.

CO3: perform file operations including opening, reading, writing, and closing files, and handle file errors.

CO4: effectively use functions from the C Standard Library to perform common tasks such as mathematical computations, input/output operations, and string manipulation.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech (Computer Engineering/ Information Technology/ Artificial Intelligence & Data Science/ Computer Science/ Artificial Intelligence and Machine Learning) *(2024 Pattern)*

Sem-II

2418115: Exploring of C Programming

Unit 1: Arrays **(7 Hrs.)**	**CO**
Definition and Declaration, Initialization, Accessing Elements, Multidimensional Arrays, Array as Function Arguments, Common Array Operations: Sorting, searching, and traversing arrays.	CO1
Unit 2: Functions **(7 Hrs.)**	CO2
Function Definition and Declaration, Function Prototypes Passing Arguments, Returning Values, Recursive Functions, Scope and Lifetime, Structures and Unions.	
Unit 3: Pointers **(07 Hrs.)**	CO3
Pointer Basics, Pointer Operations, Pointer and Arrays, Function Pointers, Dynamic Memory Allocation, Pointer to Pointer: Understanding pointers to pointers and their applications.	
Unit 4: File Handling **(07 Hrs.)**	CO4
File Operations: Opening, reading, writing, and closing files using functions like fopen(), fclose(), fread(), fwrite(), fprintf(), and fscanf(), File Modes: different file modes (e.g., read, write, append) , Error Handling: Checking for errors during file operations and handling them appropriately, File Pointers: Using FILE* pointers to manage files, Text vs Binary Files: Differences between text and binary file handling and their respective functions., Preprocessor Directives, Error Handling and Debugging.	

Textbooks:

1. The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.
2. "C Programming: A Modern Approach" by K. N. King.
3. "Understanding and Using C Pointers: Essential Skills for C Programming" by Richard Reese.
4. "The Standard C Library" by P.J. Plauger.

Reference books:

1. "The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.
2. "C: The Complete Reference" by Herbert Schildt.
3. "C Programming Absolute Beginner's Guide" by Greg Perry and Dean Miller.
4. "Expert C Programming: Deep C Secrets" by Peter Van der Linden.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to SavitribaiPhule Pune University, Pune)

F.Y. B. Tech(Electronics & Telecommunication Engineering)

(2024 Pattern)

Sem-II

2417115: Sensors & its Applications

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 02 hrs/week	**Th:02**	**Theory:**	**CIA: 25**
Practical: -- hrs/week	**Term work: --**		**End-Sem: 50**
		Pract:	**--**
		Oral:	**--**
		Term work	**--**

Course Objectives: The student is able to

1. understand fundamentals of sensors
2. explore the sensors for its working principle
3. study the sensor technology
4. select the sensors as per the application

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Classify the sensors into their basic categories.

CO2: Understand the working principle of the sensor.

CO3: Select the sensor as per the physical quantity to be sensed.

CO4: Select the sensor as per the application.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech(Electronics & Telecommunication Engineering)

(2024 Pattern)

Sem-II

2417115: Sensors & its Applications

Unit 1: Introduction Sensors (7 Hrs.)	**CO**
Fundamentals of: Sensor, actuator and transducer, Sensor Signals and Systems; Signal conditioning, Sensor Classification: passive and active Sensor, absolute and relative Sensor; Sensor Characteristics: Sensitivity, Accuracy, Range, Resolution. Concept of analog sensor and digital sensor. Difference between analog sensor and digital sensor. Analog to Digital Conversion of sensor data.	CO1
Unit2: Principle of Sensor (7 Hrs.)	CO2
Working Principle of: Mechanical and Electromechanical sensor, Resistive (potentiometric type), Strain gauge, and Inductive sensor. Common types of sensor: Reluctance change type, LVDT, Capacitive Sensors, Thermal Sensors, Magnetic Sensors, Proximity Sensor, and Piezoelectric Sensor.	
Unit 3: Smart Sensor Technologies (07 Hrs.)	CO3
Example of Sensor Calibration using data sheet (Take temperature sensor). Working principle of each sensor, physical quantity to be sensed and its part name: Thermocouples, Strain gauges, Pressure transducers, Accelerometers, Light sensors, Sound sensors, Temperature sensors, Tactile Sensors.	
Unit 4: Sensors in Different Application Area (07Hrs.)	CO4
Sensors to sense Motion and Position; displacement and Level; Velocity and Acceleration; Force, Strain, and Pressure; Vibration and Humidity. Sensors in Data acquisition system (Block diagram only). Explore the case studies of sensors in multidisciplinary applications: Sensors in automotive industry, Sensors in precision agriculture, Sensors in health sector, and Sensors in home automation.	

Textbooks:

1. Sensors and Actuators: Engineering System Instrumentation" by Clarence W. de Silva
2. Introduction to Sensors" by John Vetelino and Aravind Rege.
3. Sensor Systems for Medical Diagnostics" edited by G. J. R. M. and A. F. W.

Reference books:

1. John S. Wilson “Sensor Technology” 4TH edition,Elsevier.2005
2. Jacob Fraden “Sensor Technology Design & Application”4thedition, Springer2010.
3. Ramon P. A. and Webster J. G., “Sensors and Signal Conditioning” 2nd 2001 Ed., John Wiley and Sons.
4. Barney G., “Intelligent Instrumentation”, Prentice-Hall International Editions.
5. Yamasaki H., “Intelligent Sensors”, Elsevier Eastern Limited. 1996John S. Wilson “Sensor Technology” 4TH edition,Elsevier.2005

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech (Electrical Engineering)

(2024 Pattern)

Sem- II

2411115: Electrical Engineering Materials

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory:	CIA: 25
Practical: -- hrs/week	Term work: --		End-Sem: 50
		Pract:	--
		Oral:	--
		Term work	--

Course Objectives: The student is able to

1. Explain classification, properties and characteristics of electrical materials science.
2. Describe applications and measuring methods for parameters of dielectric, insulating, magnetic, conducting and resistive materials.
3. Illustrate solving of simple problems based on dielectric, magnetic and conducting materials.
4. Enable students to create self-learning resource material through active learning based on practical /case study/assignments

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Illustrate classification, properties, characteristics and application of different electrical conducting materials.

CO2: Illustrate classification, properties, characteristics and application of different electrical Magnetic materials.

CO3: Illustrate classification, properties, characteristics and application of different electrical Insulating materials.

CO4: Illustrate classification, properties, characteristics and application of different electrical dielectric materials.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to Savitribai Phule Pune University, Pune)

F.Y. B. Tech (Electrical Engineering)

(2024 Pattern)

Sem- II

2411115: Electrical Engineering Materials

Unit 1: Conducting Materials **(7 Hrs)**	**CO**
General Properties of Conductor, Electrical Conducting Materials - Copper, Aluminum and its applications, Materials of High and Low Resistivity-Constantan, Nickel-Chromium Alloy, Tungsten, Kanthal, Silver and Silver alloys, Characteristics of Copper Alloys (Brass & Bronze), Electrical Carbon Materials. Materials used for Lamp Filaments, Solders, Metals and Alloys for different types of Thermal Bimetal and Thermocouples.	CO1
Unit 2 :Magnetic Materials **(7 Hrs)**	CO2
Introduction, Parameters of Magnetic material [Permeability, Magnetic Susceptibility, Magnetization], Classification of Magnetic Materials, Diamagnetism, Paramagnetism, Ferromagnetism, Ferri-magnetism, Ferro-magnetic behavior below Critical Temperature, Spontaneous Magnetization, Anti-ferromagnetism, Ferrites, Applications of Ferro magnetic Materials, Magnetic materials for Electric Devices such as Transformer Core, Core of Rotating Machines, Soft Magnetic Materials, Hard Magnetic Materials.	
Unit 3:Insulating Materials **(7 Hrs)**	CO3
Introduction, Characteristics of Good Insulating Material, Classification, Solid Insulating Materials-Paper, Press Board, Fibrous Materials, Ceramics, Mica, Asbestos, Resins, Liquid Insulating Materials such as Transformer Oil, Varnish, Askarel. Insulating Gases like Air, SF6. Insulating Materials for Power and Distribution Transformers, Rotating Machines, Capacitors, Cables, Line Insulators and Switchgears.	
Unit 04: Dielectric Properties of Insulating Materials **(7 Hrs)**	CO4
Static Field, Parameters of Dielectric material [Dielectric constant, Dipole moment, Polarization, Polarizability], Introduction to Polar and Non- Polar dielectric materials. Mechanisms of Polarizations-Electronic, Ionic and Orientation Polarization (descriptive treatment only), Clausius Mossotti Equation, Piezo-Electric, Pyro-Electric & Ferro-Electric Materials, Dielectric loss and loss tangent, Concept of negative tan delta.	

Textbooks:

1. "A Course in Electrical Engineering Materials", by S.P. Seth, Dhanpat Rai and Sons publication.
2. A Textbook of "Electrical Engineering Materials" by R.K.Rajput, Laxmi Publications (P)Ltd.
3. "Electrical Engineering Materials", by T.T.T.I, Madras.
4. "Electrical Engineering Materials", by K. B. Raina and S. K. Bhattacharya, S. K. Kataria Sons.
5. "Material Science for Electrical Engineering", by P.K. Palanisamy, Scitech Pub. Pvt. Ltd., Chennai (India)

Reference books:

1. "Electrical Power Capacitors-Design & Manufacture", by D. M. Tagare, Tata McGraw Hill Publication.
2. "Electrical Engineering Materials", by S. P. Chalotra and B. K. Bhattacharya, Khanna Publishers, Nath Market.
3. "Electrical Engineering Materials", by C. S. Indulkar and S. Thiruvengadam, S. Chand and Company Ltd.
4. "High Voltage Engineering" by Kamraju and Naidu, Tata McGraw Hill Publication.
5. "Introduction to Material Science for Engineering", Sixth Edition by James F. Shackelford & M. K. Muralidhara, Pearson Education.
6. "Insulation Technology Course Material" of IEEMA Ratner, Pearson Education.
7. "Materials Science for Engineering Students", by Traugott Fischer, Elsevier Publications.
8. "Energy Conversion Systems", by Rakosh Das Begamudre, New Age International Publishers.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

(An Autonomous Institute Permanently Affiliated to SavitribaiPhule Pune University, Pune)

F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2400116: Indian Knowledge System

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory:	CIA:25
Practical: --hrs/week	Termwork: --		End-Sem:50
		Pract:	---
		Oral:	---
		Termwork	---

Course Objectives: The student is able to

1. Understand the nature of knowledge.
2. Understand the evolution of the scientific approach in the Indian subcontinent.
3. Study contributions made by different people to the various branches of knowledge before modernity evolved in India.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: The concept of the ancient intellectual knowledge tradition will be understood.

CO2: Information about human development will be understood.

CO3: Developments in science from ancient times will be introduced.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE, NASHIK

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F.Y. B. Tech(Common) *(2024 Pattern)*

Sem-I

2400116: Indian Knowledge System

Unit 1: Introduction to Indian Knowledge System **(6 Hrs.)**	**CO**
a. Definition, Scope and importance of knowledge b. Nature of Indian Knowledge System c. Evolution of scientific approach	CO1
Unit 2: Development of Humanities **(11 Hrs.)**	CO2
a. Language-Prakrit, Sanskrit, Farsee b. Philosophy-Vedic, Lokayat, Buddhist, Jaina c. EducationsysteminancientIndia–Takshashila,Nalanda,ValabhiUniversity d. Architecture Astronomy-	
Unit 3: Development of Sciences **(11 Hrs.)**	CO3
a. Aryabhatta,Varahamihira, Sawai Jai singh b. Medicine-Ayurveda and Yunani c. Metallurgy-Copper, Iron, Bronze & alloys.	

Reference books:

1. Abdur Rahman, Science and Technology in Medieval India: A Bibliography of Source Materials in Sanskrit, Arabic, and Persian, Indian National Science Academy, New Delhi, 1982.
2. Chattopadhyaya, Debiprasad, History of science and technology in ancient India: The beginnings, Firma KLM Pvt. Ltd. 1986.
3. Dasgupta Surendranath, A History of Indian Philosophy, Cambridge University press, 1922.
4. GopalL. and V. C. Shrivastava, History of Agriculture in India (Upto 1200A.D.), Concept Publishing, New Delhi, 2008.
5. IrfanHabib (ed.), People's History of India–Vol20: Technology in Medieval India, c. 650–1750, Aligarh Historians Society and Tulika Books, 2016.
6. JanGonda, A History of Indian Literature, Otto Harrassowitz, Wiesbaden, 1975.
7. Padmanabha Thanu (ed.), Astronomy in India: A Historical Perspective, Indian National Science Academy, Springer, New Delhi. 2014.
8. Sohoni Pushkar, Introduction to the History of Architecture in India, IISER, Pune, 2020.
9. Tripathi Radhavallabh, Vāda in theory and practice: studies in debates, dialogues and discussions in Indian intellectual discourses, IIAS, Shimla, 2016.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Automation & Robotics)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

AR171: Robot Maneuverability

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:--**	**Theory**	**CIA: --**
Practical: 06Hours/Day for 3 weeks	**Practical: 04**		**End-Sem:--**
Prerequisite : Nil		**Pract:**	**--**
		Oral:	**--**
		Termwork	**100**

Course Objectives: The student should be able to

1: Impart basic knowledge of robot manipulator configurations.
2: Skilled in understanding robotics mobility
3: Train in handling robot manipulator mobility.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Describe robot manipulator anatomy and configuration of different types of robot manipulator.
CO2: Identify coordinate systems and position and orientation of base, joints, tool and job.
CO3: Apply basic concepts of mathematics to analyze the robot mobility.
CO4: Analyze robot maneuverability of various configurations.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Automation & Robotics)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

AR171: Robot Maneuverability

Module 1: Robot Manipulator Coordinate System	**Hrs**	**CO**
1. Study and analysis of Robot anatomy, Base coordinate system, joint coordinate system, tool coordinate system, and job coordinate system 2. Identification and defining of position and orientation of base, joint, tool and job in a given robotic cell.	30	CO1
Module 2 : Robot Maneuverability of Gantry & Cartesian Manipulator	20	CO1 - CO4
1. Study Gantry & Cartesian manipulator configuration 2. Analysis of no. of degree of freedom, types of drives, identification of base, joint, tool and job coordinate system 3. Analysis of mobility of gantry & Cartesian manipulator		
Module 3: Robot Maneuverability of 6 DOF Manipulator	20	CO1 - CO4
1. Study of 6 DOF manipulator configuration 2. Analysis of no. of degree of freedom, types of drives, identification of base, joint, tool and job coordinate system 3. Analysis of mobility of 6 DOF manipulator		
Module 4: Robot Maneuverability of SCARA Manipulator	20	CO1 - CO4
1. Study of SCARA manipulator configuration 2. Analysis of no. of degree of freedom, types of drives, identification of base, joint, tool and job coordinate system 3. Analysis of mobility of SCARA manipulator		

Text Books:

1. S. K. Saha, Introduction to Robotics, Second Edition, McGraw Hill Education (India) Pvt. Ltd.
2. Spong, Vydiasagar, Robot Dynamics and Control (Wiley)

References Books:

1. Robert J. Schilling, Fundamentals of Robotics Analysis and Control, PHI Learning, 2009.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Computer Engineering)*(2023 Pattern)*

UG Certificate Course Work (Exit Course)

EC101: JavaScript

Module 1 **6 hrs.**	**CO**
Write a HTML program for the demonstration of Lists. a. Unordered List b. Ordered List c. Definition List d. Nested List	CO1
Module 2 **6 hrs.**	CO1
Write a HTML program for demonstrating Hyperlinks. a. Navigation from one page to another. b. Navigation within the page	
Module 3 **6 hrs.**	CO1
Write a HTML program for time-table using tables.	
Module 4 **6 hrs.**	CO1
Write a HTML program to develop a static Home Page using frames.	
Module 5 **6 hrs.**	CO1
Write a HTML program to develop a static Registration Form.	
Module 6 **6 hrs.**	CO2
Write a HTML program to develop a static Login Page	
Module 7 **6 hrs.**	CO2
Write a HTML program to develop a static Web Page for Catalog.	
Module 8 **6 hrs.**	CO2
Write a HTML program to develop a static Web Page for Shopping Cart	
Module 9 **6 hrs.**	CO2
Write HTML for demonstration of cascading stylesheets. a. Embedded stylesheets. b. External stylesheets. c. Inline styles.	
Module 10 **6 hrs.**	CO2
Write a javascript program to validate USER LOGIN page	
Module 11 **3 hrs.**	CO3
Write a javascript program for validating REGISTRATION FORM	
Module 12 **3 hrs.**	CO3
Write a program for implementing XML document for CUSTOMER DETAILS.	
Module 13 **3 hrs.**	CO3
Write an internal Document Type Definition to validate XML for CUSTOMER DETAILS?	
Module 14 **3 hrs.**	CO3
Write an external Document Type Definition to validate XML for CUSTOMER DETAILS?	
Module 15 **3 hrs.**	CO3

Write an XML for person information and access the data using XSL.	
Module 16 **3 hrs.**	CO4
Write an XML for student information and access second students data using DOM	
Module 17 **3 hrs.**	CO4
Write a program to display contents of XML file in a table using Extensible Style Sheets.	
Module 18 **3 hrs.**	CO4
Write a simple servlet that displays a message.	
Module 19 **3 hrs.**	CO4
Write a servlet that reads parameters from employee login page.	
Module 20 **3 hrs.**	CO4
Write a servlet for creating a cookie and retrieving it.	

Text Books

1. JavaScript: The Good Parts: The Good Parts, Douglas Crockford, "O'Reilly Media, Inc
2. A Smarter Way to Learn JavaScript by Mark Myers,

Reference Books

1. Head First JavaScript Programming: A Brain-Friendly Guide, Elisabeth Robson.
2. JavaScript: The Definitive Guide, David Flanagan.
3. Secrets of the JavaScript Ninja, John Resig, Bear Bibeault, and Josip Maras.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B.Tech(Computer Engineering)*(2023 Pattern)*

UG Certificate Course Work(Exit Course)

EC101: JavaScript

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th:--**	**Theory**	**CIA: --**
Practical: 6 hours/day for 3 weeks	**Practical: 04**		**End-Sem:--**
Prerequisite: Nil		**Practical**	**--**
		Oral	**--**
		Termwork	**100**

Course Objectives: The student should be able to

1. Develop familiarity with the JavaScript language.
2. Learn to use best-practice idioms and patterns.
3. Understand concepts commonly used in dynamic language programming, such as introspection, higher-order functions, and closures.
4. Understand advanced language features such as prototypical interhitance.
5. Become familiar with common libraries and tools that are used in web application development.

Course Outcomes: On completion of the course, learner will be able to–

CO1: To gain knowledge on designing static and dynamic web pages.
CO2: Able to validate web pages at client-side.
CO3: Design and validate XML documents.
CO4: Gain knowledge on server side scripting.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-II:Data Analytics using MS-Excel, POWER BI & Tableau (EC151)

Certificate Course Work (Only for Exit Criteria)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Pr:4**	**Theory**	**CIA:**
Practical: 6 hrs/day for 3 weeks	**Exit Course**		**End-Sem:**
6 hrs/day for Skill based Course over three consecutive weeks		**Pract:**	**--**
		Oral:	**--**
		Termwork	**--100**

Course Objectives: The student should be able to

1. collect, classify, clean, and analyze the data using Excel, Power BI, and tableau
2. comprehend basic and advanced level skills for data anlytics using Excel, PowerBi, and Tableau
3. Use Excel, Tableau, PowerBI for data analysis proficiently

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and understand types of data, can collect, classify, clean, and analyze it for further processing

CO2: apply various data analytics techniques on various types of data as per industry demand

CO3: use Excel, PowerBI and Tableau at proficient level

CO4: implement interactive dashboards and applications for DataAnalytics in Excel, PowerBI, and Tableau

Module 1: MS Excel Introduction **15Hrs**	**CO**
What is a Spreadsheet? Excel Rows and Columns, Enter Text and numbers in a cell, How to edit text in a cell, How to centre text and numbers, Font Formatting excel, How to change the color of a cell, How to save your work in excel, Currency symbols in excel, How to Merge cells, How to use Auto fill in excel, Adding Simple Addition formula, The Sum Function in excel, Copy and Paste, How to use Paste Special, How to Multiply in excel, How to add a comment to a cell, How to Sort data in excel, Create an excel chart, Move and Resize your chart, Charts Styles and Layouts, Chart Titles and Series Titles, Chart Layout Panel in Excel, The Format chart Panel, Create Pie chart in Excel, Add Lables to a Pie Chart, Format Pie chart segments, Create a 2D line Chart in Excel, Format your Axis titles, Predict the future with a Trendline chart, Sparkline charts	CO3
Module 2 Excel Functions and Data Processing **15Hrs**	CO1 to CO4
The SUM Function, How to multiply in excel, Subtract and Divide, Combine the Arithmetic Operators, A Budget Spread Sheet, The Average Function, The Date Function, Time Functions in Excel, A Time table Project, Financial Projects, The Student Averages Project, The IF Function, Conditional Formatting in excel, CountIF, Count IFS, SUMIF, SUMIFS, Flash Fill, Data Tables in Excel, A Second Data Table, Excel Scenarios, Goal Seek, Absolute Cell References, Named Ranges in Excel, Create a Custom Name in Excel, More on Named Ranges, Excel Pivot Tables, Reference other Worksheets, The LOOKUP Function, The VLOOKUP Function in Excel, Searching with MATCH and INDEX, Create a Business Invoice,How to Create an Excel Template, Data Forms in Excel, Drop Down Lists in Excel, Add your own Error Messages, Array Formulas Intermediate Excel, Frequency Distribution Intermediate Excel, Hyperlinks in Excel, Object Linking and	

Embedding, Insert Drawing Objects	
Module 3 PowerBI Introduction 15Hrs	CO1 to CO4
SQL server Introduction: Data, Databases and RDBMS Software, Database Types: OLTP, DWH, OLAP, Microsoft SQL Server Advantages, Versions and Editions of SQL Server, SQL: Purpose, Real-time Usage Options, SQL versus Microsoft T-SQL [MSSQL], Microsoft SQL Server Components and Usage, Database Engine Component and OLTP, BI Components, Data Science Components, ETL, MSBI and Power BI Components, Power BI Job Roles in Real-time: Data Analyst , Business Analyst, Power BI Developer, Power BI for Data Scientists, Comparing MSBI and Power BI, Comparing Tableau and Power BI, MCSA 70-778, MCSA 70-779 Exam,Types of Reports in Real-World, Interactive & Paginated Reports, Analytical & Mobile Reports, Data Sources Types in Power BI, Power BI Licensing Plans – Types, Power BI Training : Lab Plan, Power BI Dev & Prod Environments, Understanding the Power BI Tools, Installing Power BI & Connecting to Data, Working with the query Editor, Working with the data model and creating a visualization	
Module 4 PowerBI Reports 15Hrs	CO1 to CO4
Power BI Desktop Installation, Data Sources & Visual Types, Canvas, Visualizations and Fields, Get Data and Memory Tables, In-Memory xvelocity Database, Table and Tree Map Visuals, Format Button and Data Labels, Legend, Category and Grid, PBIX and PBIT File Formats, Visual Interaction, Data Points, Disabling Visual Interactions, Edit Interactions - Format Options, SPOTLIGHT & FOCUSMODE, CSV and PDF Exports. Tooltips, Power BI EcoSystem, Architecture, Slicer Visual : Real-time Usage, Orientation, Selection Properties, Single & Multi Select, CTRL Options, Slicer : Number, Text and Date Data, Slicer List and Slicer Dropdowns, Visual Sync Limitations with Slicer, Disabling Slicers,Clear Selections, Grouping : Real-time Use, Examples	
Module 5 Tableau Introduction 15Hrs	CO1 to CO4
Tableau web, tableau desktop, tableau server, Connecting to Excel Files, Connecting to Text Files, Connect to Microsoft SQL Server, Connecting to Microsoft Analysis Services, Creating and Removing Hierarchies, Bins, Joining Tables, Data Blending. Reports: Parameters, Grouping Example 1, Grouping Example 2, Edit Groups, Set, Combined Sets, Creating a First Report, Data Labels, Create Folders, Sorting Data, Add Totals, Sub Totals and Grand Totals to Report	
Module 6 Tablaeu Charts 15Hrs	CO1 to CO4
Area Chart, Bar Chart, Box Plot, Bubble Chart, Bump Chart, Bullet Graph, Circle Views, Dual Combination Chart, Dual Lines Chart, Funnel Chart, Traditional Funnel Charts, Gantt Chart, Grouped Bar or Side by Side Bars Chart, Heatmap, Highlight Table, Histogram, Cumulative Histogram, Line Chart, Lollipop Chart, Pareto Chart, Pie Chart, Scatter Plot, Stacked Bar Chart, Text Label, Tree Map, Word Cloud, Waterfall Chart, Geographic map, Filled map, Crosstab, Combines axis, Motion chart, Reference lines	

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(AIDS) *(2023 Pattern)*

UG Certificate Course Work(Exit Course)

EC181:Elementary Data Analytics using MS-Excel

Teaching Scheme:	**Credits- 04**	**Examination Scheme**	
Theory:	**Th:--**	**Theory**	**CIA: --**
Practical: 06Hours/Day for 3 weeks	**Practical: 04**		**End-Sem:--**
Prerequisite :The readers of this tutorial are expected to have a good prior understanding of the basic features available in Microsoft Excel.		**Pract:**	**--**
		Oral:	**--**
		Termwork	**100**

Course Objectives: The student should be able to

This course will review and expand upon core topics in statistics and probability, particularly by initiating the beneficiaries of the course by using MS_EXCEL and use for Data Analytics.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Knowledge about MS Excel and its operations, representing data diagrammatically and graphically using MS-EXCEL.

CO2: Identify and Apply the Data Cleaning Operation on Large Data sets.

CO3: Evaluate and analyzeFormatting, Sorting and Filtering Operation on Data

CO4: Study and Create Pivot Table for smoother working with Large Data Sets

CO5: Apply Data Visualization and Data Validation Operation on Data.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(AIDS) *(2023 Pattern)*

UG Certificate Course Work(Exit Course)

EC181: Elementary Data Analytics using MS-Excel

Module 1: Data Analysis – Overview	**Hrs**	**CO**
Types of Data Analysis, Data Analysis with Excel, Data Analysis Process, **Data Analysis with Excel – Overview** Working with Range Names: Working with Range Names, Working with Range Names, Creating Range Names, Creating Names for Constants, Managing Names, Scope of a Name, Deleting Names with Error Values, Editing Names, Applying Names, Using Names in a Formula, Viewing Names in a Workbook, Using Names for Range Intersections, Copying Formulas with Names	10	CO1
Module 2 : Tables	15	CO2
Difference between Tables and Ranges, Create Table, Table Name, Managing Names in a Table, Table Headers replacing Column Letters, Propagation of a Formula in a Table, Resize Table, Remove Duplicates, Convert to Range, Table Style Options, Table Styles		
Module 3: Cleaning Data	15	CO3
Removing Unwanted Characters from Text, Extracting Data Values from Text. Formatting Data with Text Functions, Date Formats, Converting Dates in Serial Format to Month-Day-Year Format, Converting Dates in Month-Day-Year Format to Serial Format, Obtaining Today's Date, Finding a Workday after Specified Days, Customizing the Definition of a Weekend, Number of Workdays between two given Dates, Extracting Year, Month, Day from Date, Extracting Day of the Week from Date, Obtaining Date from Year, Month and Day, Calculating Years, Months and Days between two Dates, Time Formats, Converting Times in Serial Format to Hour-Minute-Second Format, Converting Times in Hour-Minute-Second Format to Serial Format, Obtaining the Current Time, Obtaining Time from Hour, Minute and Second, Extracting Hour, Minute and Second from Time, Number of hours between Start Time and End Time		
Module 4: Conditional Formatting, Sorting, Filtering	15	CO4
Highlight Cells Rules, Top / Bottom Rules, Data Bars, Color Scales, Icon Sets, New Rule, Clear Rules, Manage Rules, **Sorting:** Sort by Text, Sort by Numbers, Sort by Dates or Times, Sort by Cell Color, Sort by Font Color, Sort by Cell Icon, Sort by a Custom List, Sort by Rows, Sort by more than one Column or Row. **Filtering:** Filter by Selected Values, Filter by Text, Filter by Date, Filter by Numbers, Filter by Cell Color, Filter by Font Color, Filter by Cell Icon, Clear Filter, Advanced Filtering, Filter Using Slicers.		
Module 5: Subtotal, Analysis, Lookup Function		
Subtotals , Nested Subtotals, Quick Analysis with TOTALS, Sum, Average, %Total, Running Total, Sum of Columns, Using VLOOKUP Function, Using VLOOKUP Function with range_lookup TRUE, Using VLOOKUP Function with range_lookup FALSE, Using OOKUP Function, Using HLOOKUP Function with range_lookup FALSE, Using HLOOKUP Function with range_lookup TRUE, Using INDEX Function, Using MATCH Function.	12	CO3 ,CO 4
Module 6: PivotTables		
Creating PivotTable, Recommended PivotTables, PivotTable Fields, PivotTable Areas, Nesting in the PivotTable, Filters, Slicers, Summarizing Values by other Calculations, PivotTable Tools, ANALYZE, DESIGN, Expanding and Collapsing Field, Report Presentation Styles, Timeline in PivotTables,	15	

Module 7: Data Visualization, Data Validation.		
Creating Combination Charts , Creating a Combo Chart with Secondary Axis , Discriminating Series and Category Axis, Chart Elements and Chart Styles Data Labels , Quick Layout , Using Pictures in Column Charts , Band Chart , Thermometer Chart , Gantt Chart , Waterfall Chart , Sparklines , PivotCharts , PivotChart from PivotTable PivotChart without a PivotTable. Prepare the Structure for the Worksheet, Format Serial Number Values, Present Value of a series of Future Payments, What is EMI?, Monthly Payment of Principal and Interest on a Loan, Calculating Interest Rate, Calculating Term of Loan, Decisions on Investments, Cash Flows at the Beginning of the Year, Cash Flows in the Middle of the Year, Internal Rate of Return (IRR)	15	CO5
Module 8: Advance Data Analytics		
Importing Data into Excel, Data Consolidation, What-If Analysis, What-If Analysis with Data Tables, What-If Analysis with Scenario Manager, What-If Analysis with Goal Seek, Optimization with Excel Solver, Optimization with Excel Solver, Exploring Data with Power View Maps	8	CO4 ,CO 5

Reference Book:

1. Richard Levin & David S.Rubin (2012): Statistics for Management,7th Edition,Pearson.
2. J K Shrma (2012) ; Business statistics , Second Edition- Pearson Education.
3. Andy field (2013) : Discovering statistics using IBM SPSS statistics ,4th Edition , SAGE Publications.
4. Cunningham,B.J (2012) :Using SPSS : An Interactive Hands-on Approach.
5. K.V.S. Sarma: Statistics made simple: do it yourself on PC. PHI

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Electronics & Telecommunication Engineering)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

EC171:IDENTIFICATION OF ACTIVE & PASSIVE COMPONENTS

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:--**	**Theory**	**CIA: --**
Practical: 06Hours/Day for 3 weeks	**Practical: 04**		**End-Sem:--**
Prerequisite : Nil		**Pract:**	**--**
		Oral:	**--**
		Termwork	**100**

Course Objectives: The student should be able to

- Understand the fundamental principles and characteristics of active and passive electronic components used in various circuits.
- Develop the skills to identify and analyze different types of resistors, capacitors, inductors, diodes, and transistors.
- Gain practical experience in measuring the values of resistors, capacitors, and inductors using appropriate tools.
- Learn the operation modes and applications of diodes and transistors in electronic circuits.
- Explore the applications of integrated circuits (ICs) such as operational amplifiers (Op-Amps) and timers.
- Design and construct basic electronic circuits using active and passive components for specific purposes.
- Analyze and troubleshoot electronic circuits to identify and rectify faults and malfunctions.
- Develop skills in circuit prototyping, testing, and optimizing circuit performance.
- Gain hands-on experience in using electronic test and measurement equipment for component characterization.
- Complete a comprehensive final project integrating knowledge and skills from the course.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify and distinguish between active and passive components based on their characteristics and applications.

CO2: Measure and calculate the values of resistors, capacitors, and inductors using appropriate measuring tools.

CO3: Analyze and explain the forward and reverse bias characteristics of diodes and their practical applications.

CO4: Design and construct transistor-based amplifiers with specified voltage gains and analyze their performance.

CO5: Utilize integrated circuits (ICs) for different applications, such as signal processing and timing functions.

CO6: Create and analyze basic electronic circuits, including voltage dividers, filters, and oscillators, using active and passive components.
CO7: Troubleshoot electronic circuits to identify and rectify faults related to active and passive components.
CO8: Apply knowledge of active and passive components to optimize the performance of electronic circuits.
CO9: Operate electronic test and measurement equipment proficiently to characterize electronic components.
CO10: Demonstrate a comprehensive understanding of active and passive components by successfully completing a final project, showcasing design, implementation, and analysis skills.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Electronics & Telecommunication Engineering)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

EC171:IDENTIFICATION OF ACTIVE & PASSIVE COMPONENTS

Module 1: Introduction to Basic Electronics Components	**Hrs**	**CO**
Identification of Resistors: • Use color codes to identify the resistance values of different resistors. • Measure resistors using a multimeter and verify their values. **Identification of Capacitors:** • Determine the capacitance values of capacitors using markings and codes. • Measure capacitors using a capacitance meter. **Identification of Inductors:** • Identify inductors based on markings and color bands. • Measure the inductance of inductors using an inductance meter. **Identification of Diodes:** • Identify different types of diodes (e.g., rectifier diodes, Zener diodes) by markings and physical characteristics. **Identification of Transistors:** • Identify NPN and PNP transistors using markings and pin configurations.	8	CO1
Module 2: Passive Components - Resistors	8	CO2
Resistor Color Code Practice: • Solve resistor color code problems to determine the resistance value. **Resistors in Series and Parallel:** • Assemble and measure resistors in series and parallel configurations. **Voltage Dividers:** • Create voltage divider circuits using resistors and verify the output voltages. **Resistor Temperature Coefficient:** • Measure the temperature coefficient of a resistor using temperature changes. **Light-Dependent Resistors (LDR):** • Observe the resistance change of an LDR under different light conditions.		
Module 3: Passive Components - Capacitors	8	CO3
Capacitor Charging and Discharging: • Construct an RC circuit and observe the charging and discharging of a capacitor. **Capacitor Frequency Response:** • Build a high-pass and low-pass filter using capacitors and measure their frequency responses. **Capacitor in Series and Parallel:** • Assemble capacitors in series and parallel configurations and analyze their total capacitance. **Capacitor Voltage Ratings:** • Demonstrate the importance of voltage ratings by applying excessive voltage to a capacitor.		
Module 4: Passive Components - Inductors		CO4

Inductor Saturation: • Apply high currents to an inductor and observe the saturation effect. **Inductor in Series and Parallel:** • Create inductors in series and parallel and measure their total inductance. **Inductor Frequency Response:** • Construct a simple band-pass filter using an inductor and measure its frequency response.	8	
Module 5: Diodes		
Diode Forward Voltage: • Measure the forward voltage drop of diodes using a multimeter. **Diode Reverse Recovery Time:** • Analyze the reverse recovery time of fast diodes using an oscilloscope. **Zener Diode Characteristics:** • Observe the voltage regulation behavior of a Zener diode. **Light Emitting Diodes (LEDs):** • Build simple LED circuits with current-limiting resistors and observe their illumination.	8	CO5
Module 6: Transistors		
Transistor Biasing: • Design and assemble biasing circuits for transistors. **Transistor as a Switch:** • Construct a transistor switch circuit and observe the on/off states. **Common Emitter Amplifier:** • Design and build a common emitter amplifier and measure its gain. **Transistor Oscillator:** • Construct a simple transistor-based oscillator and measure its frequency.	8	CO6
Module 7: Integrated Circuits (ICs)		
Op-Amp Basics: • Build inverting and non-inverting amplifier circuits using Op-Amps. **Op-Amp Comparator:** • Use an Op-Amp as a comparator to compare voltages. **555 Timer IC:** • Design and build timer circuits using the NE555 timer IC. **Voltage Regulator IC:** • Construct a voltage regulator circuit using a 3-terminal voltage regulator IC. **Digital Logic Gates:** • Build logic gate circuits using basic ICs (AND, OR, NOT).	8	CO7
Module 8: Basic Circuits		

RC Oscillator Circuit: • Construct an RC oscillator and measure its frequency. **Astable Multivibrator:** • Build an astable multivibrator circuit using transistors and analyze its output. **Monostable Multivibrator:** • Assemble a monostable multivibrator circuit and observe its behavior. **Audio Amplifier**: • Design and build a basic audio amplifier circuit using transistors or Op-Amps. **Power Supply Circuit:** • Construct a simple power supply circuit using a transformer, diodes, and capacitors.	8	CO8
Module 9: Troubleshooting and Analysis		
• Troubleshooting Faulty Circuits: • Given a malfunctioning circuit, identify the faulty component and repair it. • Frequency Response Analysis: • Analyze and compare the frequency response of different passive and active filter circuits. • AC and DC Load Line Analysis: • Analyze the AC and DC load lines of a transistor amplifier and understand its operating point.	8	CO9
Module 10: Final Project		
Final Project Kickoff: • Introduce the final project requirements and guidelines to the participants. **Project Proposal and Circuit Design**: • Participants submit their project proposals and design the circuit on paper or using simulation tools. **Component Selection and Circuit Assembly**: • Participants choose components and assemble the circuit on a breadboard or a PCB. **Circuit Testing and Troubleshooting:** • Participants test the project circuit, identify any issues, and troubleshoot them. **Project Improvement and Optimization:** • Participants improve the project circuit, if necessary, and optimize its performance. **Final Project Presentation Practice:** • Participants practice presenting their final projects to their peers or instructors. **Final Project Presentation and Evaluation:** • Participants present their completed projects, and evaluation is done based on the project's complexity, functionality, and implementation.	18	CO10

Reference Book:

1) "The Art of Electronics" by Paul Horowitz and Winfield Hill
2) "Electronic Devices and Circuit Theory" by Robert L. Boylestad and Louis Nashelsky

Textbook:

1) "Practical Electronics for Inventors" by Paul Scherz and Simon Monk
2) "Electronic Principles" by Albert Malvino and David J. Bates
3) "Introduction to Electric Circuits" by Richard C. Dorf and James A. Svoboda

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech (Electrical Engineering) *(2023 Pattern)*

Sem-II

UG Certificate Course Work

EC111: Introduction to Electrical Wiring System

Teaching Scheme:	**Credit**	**Examination Scheme**	
Theory: --	**Th:--**	**Theory**	**CIA:--**
Practical: 06hrs/Day for 3 weeks	**Practical:04**		**End-Sem:--**
Prerequisite : Nil		**Pract:**	**--**
		Oral:	**--**
		Termwork:	**100**

Course Objectives: The student should be able to

1)Explain detailed specification and numbers required of different materials

2) Illustrate the size and material of conductor and cable from electrical and mechanical consideration.

3)Provide students different concepts of diagram and develop wiring diagram for the same

Course Outcomes:

On completion of the course, learner will be able to

CO1: Write down detailed specification and numbers required of different materials

CO2: Determine the size and material of conductor and cable from electrical and mechanical consideration.

CO3: Explain different concepts of diagram and design wiring diagram.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Electrical Engineering) *(2023 Pattern)*

Sem-II

UG Certificate Course Work

EC111: Introduction to Electrical Wiring System

Module 1:	**Hrs**	**CO**
Basic Tools & Safety: Familiarization with Trade, Safety Precautions, Elementary First Aid , Identification of different hand tools with their specifications-Care and Maintenance of Hand Tools , Introduction to Electricity Ohms Law, Resistance Electric Sign & Symbols, Indian electricity rules- Definitions, Ampere, Apparatus, Accessible, Bare, cable, circuit, circuit breaker, conductor voltage (low, medium, high, EH), live, dead, cut-out, conduit, earthing system, switch gear, etc., General safety precautions, Practical: Demonstration of tools & Elementary First Aid -Artificial Respiration - Demonstration and use of different tools.	10	CO1
Module 2:	15	CO1 CO2
Identification of various types of wires used for house wiring, motor winding in electrical appliances, their uses and siges . Electric Accessories & Meters: Common Electric Accessories and Fixture with their specifications Installation of different types of electric meter and instruments Energy(Portable type Panel/Board Type) Function and uses of Ampere Meter, Voltmeter, Energy Meter, Wattmeter, Megger. Electrical Devices, Electrical Wire Joints, Electrical Surface Wiring, PVC Cable and Insulated tape, Devices of measuring of Electricity Practical: Identification of wires 1/27, 3/22, 3/22 Copper, 3/20 (copper) 1.3, 2.5 and 4 2 mm (Aluminum), V.I.R., P.V.C., C.T.S.,Lead covered, Enameled, Super Enameled Wire, Earthing Wire (G.I and uses and siges, (Copper), Guide Wire Use of Wire Gauge (SWG), Identification of Accessories and Fixtures, Using and Reading of various meters like Ammeter, Voltmeter, Multi-meter, Wattmeter, Energy meter , Megger. Care in Handling and Storage		
Module 3:	15	CO1 CO2
Protective Devices: Understanding of fuses and circuit breakers (Kit-Kat Type, H.R.C, Fuse, Cartridge Fuse, M.C.B., ELCB). Earthing Purpose of Earthing, Methods of Earthing (Plate & Pipe Earthing).Selection of right type of earth wire, Indian electricity rules for earthling. wire and cable, conductor materials used in cables,		

insulating materials mechanical protection. Types of cables used in internal wiring, multi-stranded cables, voltage grinding of cables, general specifications of cables Practical: Demonstration and familiarization of various types of fuses and circuit breakers (Kit-Kat Type, H.R.C. Fuse, Cartridge Fuse, M.C.B., ELCB). Earth Wires, Laying of earth wire for earthing in single and three phase connectior. Testing of earthing using Earth Tester.		
Module 4:	15	CO1 CO2
Common Electrical Accessories, their specifications in line with NEC, 201 1-Explanation of switches lamp holders, plugs and sockets. Accessories: Main switch and distribution boards, conduits, conduit accessories and fittings, lighting accessories and fittings, fuses, importantdefinitions, Developments of domestic circuits, Alarm & switches, with individual switches, Two way switch .Security surveillance, Fire alarm, MCB, ELCB, MCCB. Lighting Scheme: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits. Practical: Practice on installation and overhauling common electrical accessories as per simple Electrical circuit I Layout. Fixing of switches, holder plugs etc. in T.W. boards. Identification and use of wiring accessories concept of switching.		
Module 5:	15	CO1 CO2
Electric Switches & Energy Meters: Electric Meter and various types of Switches Methods of fixing various types of switches and meters Main switches -I.C.D.P., I.C.T.P. Distribution Box Methods of Fixing Single Phase and Three Phase Energy Meters. Determination of size of fuse – wire, fuse units. Earthing conductor, earthing Practical: Identification of various types of switches Preparation of switch board, mounting of various switches on sheet/wooden boards, fixing of switch boards on walls. Preparing Energy Meter Board with cutout and switches.		
Module 6:	10	CO1 CO2 CO3
Complete House-wiring layout. Splitting load wire in accordance with NEC I.E.E. Rules. Multi-storeyed system. Fault finding and trouble shooting. Methods of wiring, systems of wiring. Practice of Internal wiring: Type of internal wiring, cleat wiring, CTS wiring, wooden		

casing capping, metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications. Layout and repairing of workshop electrical installation. Fault finding practice		
Module 7:	10	CO1 CO2 CO3
Prepare one estimate of materials required for CTS wiring for small domestic installation of one room and one verandah within 25 m2 with given light, fan & plug points		

Text books

1. B.D. Arora-Electrical Wiring, Estimation and Costing, - New Heights, New Delhi.
2. S. L. Uppal, Electrical Wiring and Costing Estimation, Khanna Publishers, New Delhi.
3. Surjit Singh, Electrical wiring, Estimation and Costing, DhanpatRai and company, New Delhi.

Reference books

1. Electric Wiring Domestic Tenth Edition By A. J . Coker, W. Turner revised by B. Scaddan
2. Electric Wiring Domestic Thirteenth Edition by Brian Scaddan
3. Guide to the Wiring Regulations 17th Edition IEE Wiring Regulations by Darrell Locke
4. 16th Edition IEE Wiring Regulations Explained and Illustrated Seventh Edition By Brian Scaddan

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech (Civil Engineering) *(2023 Pattern)*

UG Certificate Course Work(Exit Course)

EC141: Basics of Civil Engineering for Construction

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th:--**	**Theory**	**CIA: --**
Practical: 06Hours/Day for 3 weeks	**Practical: 04**		**End-Sem:--**
Prerequisite : Nil		**Pract:**	--
		Oral:	--
		Termwork	**100**

Course Objectives: The student should be able to

1. Familiarize with different construction materials such as concrete, steel, bricks, and aggregates. Understand their properties, testing, and proper usage in construction.
2. Introduce various construction techniques used in civil engineering projects, such as masonry, formwork, concreting, and steel reinforcement.
3. Develop skills in measurement and surveying techniques used on construction sites, including distance measurement, leveling, and setting out.
4. Understand Construction tools and equipment used in the field, such as concrete mixers, scaffolding, and earthmoving machinery.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify various construction materials used in civil engineering projects, such as concrete, steel, and aggregates.

CO2: Explain the properties and applications of different construction materials in specific engineering tasks.

CO3: Apply knowledge of material properties to select appropriate materials for specific construction tasks.

CO4: Analyze construction site layouts and identify potential challenges or hazards.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech (Civil Engineering) ***(2023 Pattern)***

UG Certificate Course Work(Exit Course)

EC141: Basics of Civil Engineering for Construction

Module 1:Basic Terms and Facts13Hrs	**CO**
Development Length part, Lapping of Rebars, Lapping of Column Rebars, Lapping of Beam Rebars, Bent Up Bars, Characteristic Strength of Concrete, Plotting the Results for the Characteristic Strength, Grade of Concrete Introduction, Ratio for Grade of Concrete, Uses of different grades of concrete, Concrete Cover Introduction, Reasons for Providing Cover Blocks, How to provide concrete cover, Clear cover for different structural members, Weight of the Rebar Introduction, Formula for Rebar Weight Calculation	CO1 to CO4
Module 2:Measuring Area of Land 13Hrs	CO1 to CO4
Measuring Area of Irregular Land using Tape, Measuring Area of Land using AutoCAD, Measuring Area of Land using Google Earth	
Module 3:Building Foundation13Hrs	CO1 to CO4
Deep Foundation, Isolated Foundation, Combined and Mat Foundation, Strap Foundation	
Module 4:Structural Members13Hrs	CO1 to CO4
One Way Slab, Two Way Slab, Short Column, Beams	
Module 5Buildings13Hrs	CO1 to CO4
Torsion in Buildings, Plinth Level and Plinth Height, Tie Beam, Concrete Bands in Masonry Brick Walls	
Module 6:Concrete and Concrete Works13Hrs	CO1 to CO4
Nominal Mix v/s Design Mix of Concrete, How to Find Number of Bags of Cement for Concreting Works, Construction tools and equipments	
Module 7 Levelling 12Hrs	CO1 to CO4
Concept of Levelling, Datum and Mean Sea Level, Reduced Level, Sights in Levelling, Simple Levelling, Benchmarks, Differential Levelling	

Text Books:

1. Basic Civil Engineering by S.S. Bhavikatti
2. Basic Civil Engineering by SatheeshGopi
3. Basic Civil Engineering by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain
4. Basic Civil and Mechanical Engineering by S. Ramamrutham
5. Civil Engineering Materials and Construction Practices by N. Krishna Raju
6. Civil Engineering Materials, Tests & Practices by M.L. Gambhir

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Mechanical Engineering)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

EC121:Basic Machining operations using Lathe

Teaching Scheme:	**Credits- 04**	**Examination Scheme**	
Theory:	**Th:--**	**Theory**	**CIA: --**
Practical: 06Hours/Day for 3 weeks	**Practical: 04**		**End-Sem:--**
Prerequisite : Nil		**Pract:**	**--**
		Oral:	**--**
		Termwork	**100**

Course Objectives: The student should be able to:

1. Explain various machine tools and their principle functions.
2. Describe proper safety rules and environment regulation and housekeeping in machine shop.
3. Explain different cutting tools, accessories, instruments used.
4. Explain sequence of machining operations.
5. Develop their skill & knowledge on operating of conventional machines (Bench Work- filling, layout, sawing, punching, using of tools & instruments.
6. Set machining parameter with all relevant calculation.
7. Perform various machining operations on lathe machines for manufacturing job using suitable tools, accessories and measuring instruments.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Explain various machine tools and their principle functions.

CO2: Explain different types of lathe and its specifications.

CO3: Develop their skill & knowledge on operating of conventional lathes and Formulate machining parameter with all relevant calculation.

CO4: Perform various machining operations on lathe machines for manufacturing job using suitable tools, accessories and measuring instruments.

CO5: Understand the constructional details of semi-automatic lathe and their nomenclature

CO6: Understand the limitations of conventional lathe and need for automation

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Mechanical Engineering)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

EC121:Basic Machining operations using Lathe

Teaching Scheme:	**Credits- 04**	**Examination Scheme**	
Theory:	**Th:--**	**Theory**	**CIA: --**
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SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Mechanical Engineering)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

EC121:Basic Machining operations using Lathe

Modules

Module 1	**Lathe & its specifications** **(15 Hrs.)**	**CO**
Brief knowledge about the need of lathe and their historical development, The centre lathe and its principle of working, Types of lathes, Lathe specification and size, Features of lathe bed, Head stock and tail stock, Feed mechanism and change-gears. carriage saddle, Cross slide, Compound rest, Tool post, Apron mechanism, lathe accessories, Chucks, Face plate, Angle plate, Driving plate, Lathe doges, mandrils, Steady rest, Lathe attachments		**CO1, CO2**
Module 2	**Basic Lathe operations** **(20 Hrs.)**	**CO3**
Lathe operations-plane and step turning, Taper turning, Screw cutting, Drilling, Boring, reaming, Knurling, Parting off, Under cutting, Relieving, Types of lathe tools and their uses. Cooling process during machining, difference between coolantand cutting fluid, function and action of cutting fluids, Requirement of goodcutting fluids, their selection for different materials and operations. Difference between jigs and fixtures, Principle oflocation, Principle of clamping, Locating and clamping devices. Simple example of jigs and fixtures used in Lathe.		
Module 3	**Hands-on practice on Lathe** **(40 Hrs.)**	**CO4**
• Performing basic machiningpractices onLathe machines. • Performing of different operations on lathe machine for manufacturing a job using suitable tools, accessories, and measuring instruments. • Appropriate parameters settingof lathe operations • Operation sequence for the lathe operations • Industrial Safety &Practices		
Module 4	**Semi-automatic Lathes** **(15 Hrs.)**	**CO5, CO6**
Brief description of semi-automatic lathes such as capstan and turret lathes, their advantages and disadvantages over centre lathe, types of job done on them. General and periodic maintenance of a centre lathe.Introduction to CNC lathe (Computer Numerical Control Lathe) and FMS (Flexible Manufacturing System).		

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y.B. Tech(Mechanical Engineering)

(2023 Pattern)

UG Certificate Course Work(Exit Course)

EC121:Basic Machining operations using Lathe

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Text Books

1. Hazra&Choudhary Workshop Technology Vol. II Tata MCGraw Hill
2. Production Technology by P.C. Sharma S Chand & Co Ltd.
3. Manufacturing Technology Vol. I & II, By P.N. Rao, Tata McGraw Hill.
4. Manufacturing Engineering And Technology By S. Kalpakjian, Pearson.
5. Production technology, by R.K. Jain, Khanna publishers.

Reference Books

1. Degarmon’s Materials and Processes in Manufacturing, 11th Ed. Black, Ronald A Kohser, Wiley India.
2. Manufacturing Processes and Systems, 9th Ed. Phillip F., Ostwald, Jairo Munoz, Wiley India
3. Mc Geough, “Advanced Methods of Machining”, Chapman and Hall, London, 1998.
4. A. Ghosh and A. K. Mallik, Manufacturing Science, East-West Press, New Delhi, 2006

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