



COURSE STRUCTURE (2026-27)
FIRST YEAR (FIRST SEMESTER)

Sl. No.	CATEGORY	COURSE CODE	SUBJECTS	Contact Hrs. L-T-P	Credit	ESE	CIE
Theory							
1	BS	26BS1001	Mathematics-I	3-0-0	3	60	40
2	BS	26BS1002 / 26BS1003	Physics / Chemistry	3-0-0	3	60	40
3	ES	26ES1001 / 26ES1002	Basic Electrical Engineering / Basic Electronics	2-0-0	2	60	40
4	ES	26ES1003 / 26ES1004	Programming in C and Data Structure / Engineering Mechanics	3-0-0	3	60	40
5	ES	26ES1005 / 26ES1006	Basic Civil Engineering / Basic Mechanical Engineering	2-0-0	2	60	40
6	HS	26HS1001 / 26HS1002	Universal Human Values / English for Technical Writing	2-0-0	2	60	40
Sessional / Practical							
7	BS	26BS1201 / 26BS1202	Physics Laboratory / Chemistry Laboratory	0-0-3	1.5	40	60
8	ES	26ES1201 / 26ES1202	Basic Electrical Engineering Lab. / Basic Electronics Lab.	0-0-3	1.5	40	60
9	ES / HS	26ES1203 / 26HS1201	Programming in C and Data Structure Lab./ Communicative English & Report Writing Lab.	0-0-3	1.5	40	60
10	ES	26ES1204 / 26ES1205	Engineering Graphics & Design Lab. / Workshop & Digital Manufacturing Lab.	0-0-3	1.5	40	60
11	MC	26MC1201 / 26MC1202	IKS / YOGA	0-0-2	1	40	60
Total				15-0-14	22	560	540

FIRST YEAR (SECOND SEMESTER)

Theory							
1	BS	26BS1004	Mathematics–II	3-0-0	3	60	40
2	BS	26BS1003 / 26BS1002	Chemistry / Physics	3-0-0	3	60	40
3	ES	26ES1002 / 26ES1001	Basic Electronics / Basic Electrical Engineering	2-0-0	2	60	40
4	ES	26ES1004 / 26ES1003	Engineering Mechanics / Programming in C and Data Structure	3-0-0	3	60	40
5	ES	26ES1006 / 26ES1005	Basic Mechanical Engineering / Basic Civil Engineering	2-0-0	2	60	40
6	HS	26HS1002 / 26HS1001	English for Technical Writing / Universal Human Values	2-0-0	2	60	40
Sessional / Practical							
7	BS	26BS1202 / 26BS1201	Chemistry Laboratory / Physics Laboratory	0-0-3	1.5	40	60
8	ES	26ES1202 / 26ES1201	Basic Electronics Lab. / Basic Electrical Engineering Lab.	0-0-3	1.5	40	60
9	HS / ES	26HS1201 / 26ES1203	Communicative English & Report Writing Lab./ Programming in C and Data Structure Lab.	0-0-3	1.5	40	60
10	ES	26ES1205 / 26ES1204	Workshop & Digital Manufacturing Lab. / Engineering Graphics & Design Lab.	0-0-3	1.5	40	60
11	MC	26MC1202 / 26MC1201	Yoga / IKS	0-0-2	1	40	60
Total				15-0-14	22	560	540



INFORMATIONS

A. ABBREVIATIONS USED:

CO – COURSE OUTCOME, **PO** – PROGRAMME OUTCOME,

PSO – PROGRAMME SPECIFIC OUTCOME, **PEO** – PROGRAMME EDUCATIONAL OBJECTIVE

BS – BASIC SCIENCES, **ES** – ENGINEERING SCIENCES, **HS** – HUMANITIES & SOCIAL SCIENCE

MC – MANDATORY COURSE, **L** – LECTURE, **T** – TUTORIAL, **P** – PRACTICAL, **ESE** – END SEMESTER EXAMINATION, **CIE** – CONTINUOUS INTERNAL EVALUATION

IN MAPPING: 3 – High Level Mapping, 2 – Moderate Level Mapping, 1 – Low Level Mapping

B. EVALUATION SCHEME:

THEORY:

Continuous Internal Evaluation (CIE)						External Assessment	Total	
Attendance	Quiz Test		Assignment		Class Test		End Semester Examination (ESE)	
	QT-1	QT-2	AS-1	AS-2	CT-1	CT-2		
	1.25	1.25	1.25	1.25	15	15		
5	2.5		2.5		30		60	100

SESSIONALS / PRACTICALS:

Continuous Sessional Evaluation		End Semester Sessional Examination		Total
Attendance, Performance, Viva-voce	Laboratory Record	Final Laboratory Experiment	Final Viva-voce	100
40	20	30	10	

C. TEACHING SCHEME:

THEORY:

Teaching Scheme	Regular class room lectures with use of ICT as and when required, sessions are planned to be interactive with focus on problem solving activities.
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SESSIONALS:

Teaching Scheme	Hands-on experimental learning to strengthen the practical understanding about the principle and operation of the instruments and the theory associated with it.
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**MATHEMATICS - I (FIRST SEMESTER)**

Subject Code	26BS1001	Total Contact Hours	40hrs
Semester	FIRST	Total Credit	3
Subject Name	MATHEMATICS-I		
Prerequisites	Knowledge of Integration, Differentiation, Trigonometry		
Course Objective	This course aims to develop a strong foundation in Linear Algebra, Basic Calculus, and Differential Calculus. Students will learn methods to solve systems of linear equations, understand matrix operations, eigenvalues, and diagonalization. The course introduces the application of definite integrals to geometry and the use of Beta and Gamma functions. It also covers key theorems in single-variable calculus and techniques for function approximation. In multivariable calculus, students will explore partial differentiation, Jacobians, Hessians, and optimization using Lagrange multipliers, Preparing them for advanced applications in engineering and technology.		

Syllabus		Contact Hours
Module-I	Linear Algebra: Elementary row operations, Solution of system of linear equations by using Gauss elimination, Gauss-Jordan elimination, Linear Dependence and Independence, Rank of a Matrix, Vector Space, Basis and dimension.	8hrs
Module-II	Linear Algebra: Symmetric, skew-symmetric and orthogonal matrices. Eigen values, Eigen vectors, Diagonalization, Caley-Hamilton theorem(statement only) with basic applications.	8hrs
Module-III	Basic Calculus: Applications of definite integrals to evaluate length of curves, Areas of surfaces and volumes of surfaces of revolution, Beta And Gamma functions and their properties.	8hrs
Module-IV	Single-variable Calculus(Differentiation): Rolle's Theorem, Mean value theorem (Statement and applications), First and second derivative test for local extreme values of functions. Taylor and Maclaurin series expansion of functions.	8hrs
Module-V	Multivariable Calculus (Differentiation): Elementary ideas about Partial differentiation, Homogeneous function and Euler's Theorem, Jacobians, Hessian Matrix, Maxima, Minima and Saddle points. Method of Lagrange multipliers.	8hrs



Essential Reading:

1. G. B. Thomas and R.L.Finney, Calculus and Analytic geometry, 9th Edition, Pearson, 2022.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, JohnWiley&Sons, 2023.
3. Santi Narayan and Mittal, Differential Calculus, S. Chand Publication, 15th Edition, 2007.

Supplementary Reading:

1. B.V. Ramana, Higher Engineering Mathematics, Tata Mc. Graw Hill, New Delhi, 11th Reprint, 2010.
2. H. K. Das, Advanced Engineering Mathematics, S. Chand and Company Limited, Twenty Second Revised Edition 2018.
3. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publication, 2023.
4. G. Samal, S.C.Jena, T.Biswal, D.K.Dalai, Advanced Higher Calculus, Vidyapuri, 2009.

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Apply elementary row operations to solve systems of linear equations using Gauss elimination and Gauss-Jordan methods.
CO2	Analyze the concepts of linear dependence and independence, rank, vector space, basis, and dimension of matrices.
CO3	Classify and work with different types of real and complex matrices and determine eigen values, eigen vectors and apply the Cayley-Hamilton Theorem for calculating inverse of a square matrix.
CO4	Evaluate definite integrals to calculate arc lengths, surface areas, and volumes of revolution, and apply Beta and Gamma function to solve integrals.
CO5	Examine and interpret the behavior of single-variable functions using Rolle's and Mean Value Theorems, perform local extremum tests, and expand functions using Taylor and Maclaurin series.
CO6	Apply partial differentiation techniques, use Jacobians and Hessian matrices, and determine local extrema of multi variable functions using Lagrange multipliers.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	0	1	1	0	0	0	0	0	0	1
CO2	3	3	0	2	1	0	0	0	0	0	0	1
CO3	3	3	1	2	1	0	0	0	0	0	0	1
CO4	3	2	1	2	1	0	0	0	0	0	0	1
CO5	3	3	1	2	1	0	0	0	0	0	0	1
CO6	3	3	2	2	1	0	0	0	0	0	0	1

1:Slight (Low), 2:Moderate (Medium), 3:Substantial (High), --:No Correlation

**MATHEMATICS – II (SECOND SEMESTER)**

Subject Code	26BS1004	Total Contact Hours	40hrs
Semester	SECOND	Total Credit	3
Subject Name	MATHEMATICS-II		
Prerequisite	Knowledge of calculus, vectors and complex numbers		
Course Objective	The objective of this course is to provide a strong foundation in solving first and second-order ordinary differential equations and applying them to real-world problems. It aims to develop analytical skills in vector calculus by exploring vector fields, line integrals, and Green's theorem. The course also introduces fundamental concepts of complex analysis, including analyticity, complex integration, and residue calculations.. By the end of the course, students will be equipped with essential mathematical tools and techniques required for modeling and solving engineering and physical science problems.		

SYLLABUS		CONTACT HOURS
Module-I	First order ODE: Differential Equation: First order differential equations, Separable Equation, homogeneous differential equation, Exact and non-exact differential equation, integrating factor, linear differential equation, Bernoulli's equation. Applications to Population growth, Newton's law of cooling, electric circuits.	8hrs
Module-II	Second order ODE: Linear differential equation of second order, Homogeneous differential equation with constant coefficient, Euler-Cauchy equations, Solution of non-homogeneous differential equation by undetermined co-efficient. Solutions of differential equation by variation of parameters method. Series solution of differential equations, Solution of Legendre differential equation.	10hrs
Module-III	Vector Calculus: Vector and Scalar Functions and Fields, Derivatives, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field, Line Integrals, Path Independence of Line Integrals, Double Integrals, Green's Theorem in The Plane (Statement and applications).	8hrs
Module-IV	Complex Analysis: Limit, Continuity, Derivative, Analytic Function, Harmonic function, Cauchy-Riemann Equations, and Laplace's Equation, Exponential Function, Trigonometric and Logarithm functions.	6hrs
Module-V	Complex Integrations: Line Integral in the Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivatives of Analytic Functions, Laurent series, Residue theorem with Simple problems(Excluding real integral).	8hrs

**Essential Reading:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2023.
2. Higher Engineering Mathematics by B. S. Grewal, 44th Edition, Khanna Publication, 2023.

Supplementary Reading:

1. H. K. Das, Advanced Engineering Mathematics, S. Chand and Company Limited, Twenty Second Revised Edition 2018.
2. B. V. Ramana, Higher Engineering Mathematics, Tata Mc Graw Hill, New Delhi, 11th Reprint, 2010.

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO-1	Solve first-order ordinary differential equations using methods such as separation of variables, integrating factors, and exact equations, and apply them to real-world problems like Newton's law of cooling.
CO-2	Solve second-order linear differential equations with constant coefficients and Euler-Cauchy equations, both in homogeneous and non-homogeneous forms.
CO-3	Apply techniques such as variation of parameters and undetermined coefficients for Solving non-homogeneous second-order differential equations and find series solutions of Legendre differential equation.
CO-4	Compute gradient, divergence, and curl of scalar and vector fields and evaluate line Integrals and double integrals using Green's theorem.
CO-5	Analyze the properties of complex functions including limits, continuity, differentiability, and verify analyticity using Cauchy-Riemann equations.
CO-6	Evaluate complex line integrals and apply Cauchy's integral theorem, integral formula, Laurent series, and residue theorem to solve problems in complex analysis.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	0	0	0	0	0	0	3
CO2	3	3	2	2	1	0	0	0	0	0	0	3
CO3	3	3	3	2	1	0	0	0	0	0	0	3
CO4	3	3	2	3	1	0	0	0	0	0	0	3
CO5	3	3	2	2	1	0	0	0	0	0	0	3
CO6	3	3	2	3	1	0	0	0	0	0	0	3

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PHYSICS THEORY

Subject Code	26BS1002	Total Contact Hour	45HRS
Semester	FIRST/SECOND	Total Credit	03
Subject Name	PHYSICS		
Pre-requisites	Knowledge on Calculus, Trigonometry, Units and Dimensions.		
COURSE OBJECTIVE	To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology. To produce future-ready engineers with a strong foundation in science, to cater to the requirements of R & D. establishment focused on developing state-of-the-art and upcoming technologies.		

COURSE DETAILS	Contact Hour
Module I: OSCILLATIONS AND WAVES Simple mechanical oscillation: Definition, derivation of equation of motion, solution (no derivation). Parameters associated with simple mechanical oscillation: Displacement, velocity, acceleration, frequency, time period, phase and energy. Examples of simple oscillation. Damped mechanical oscillation: Definition, derivation of equation of motion, solution (no derivation). Types of damped oscillation (over damped, under damped and critically damped) with examples. Parameters associated with damped mechanical oscillation: Energy, modulus of decay, logarithmic decrement, Q-factor of the damped oscillation. Forced mechanical oscillation: Definition, derivation of equation of motion, solution (no derivation). Parameters associated with forced mechanical oscillation: Displacement, velocity, phase, Average energy, average power, Q-factor of the oscillation, Resonance: definition, derivation of condition for resonance, sharpness of resonance, resonant frequency, examples of resonance, advantages and disadvantages. Equation of motion for simple and forced electrical oscillation (no derivation) Concept of wave, properties of wave, wave function and its expression. Wave equation, Types of waves and their properties.	10hrs
Module II: OPTICS AND ACOUSTICS Concept of coherent sources. Practical realization of coherent sources. Principle of superposition. Two beam and multiple beam superposition. Condition for maximum and minimum in coherent superposition. Interference: Definition, Conditions for interference, types of interference (Division of wave front and	10hrs



division of amplitude), Theory of Newton's ring, Determination of Refractive index of liquid and wavelength of light by Newton's Rings method. Diffraction: Definition, types of diffraction and their properties. Differences between Fresnel and Fraunhofer diffraction, differences between diffraction and interference. Theory of Fraunhofer diffraction due to single slit. Plane diffraction grating & its characteristic properties. Ultrasonic: Definition, properties of ultrasonic, ultrasonic interferometer and its uses (qualitative idea only)	
Module III : ELECTROMAGNETISM Vector calculus: Gradient, Divergence, Curl & their physical interpretation, Gauss divergence theorem and Stoke's theorem (statement only), integrals in vector calculus, time derivative of vectors, vector calculus identities. Electromagnetism: Derivation of Maxwell's electromagnetic equation in differential form and integral form, Physical significance & properties of Maxwell's electromagnetic equation, Electromagnetic wave Equations for E and B in vacuum and conducting medium, transverse nature of EM waves, Poynting theorem and conservation of electromagnetic energy (No derivation).	07hrs
Module IV : QUANTUM PHYSICS Wave-particle duality of radiation, concept of phase velocity and group velocity, relation between them, Matter waves (de-Broglie hypothesis), de-Broglie wavelength for different types of particles, Wave function & its characteristic properties, Observables as operators, Eigen function and Eigen values, Normalization, Expectation values, derivation of Schrodinger equation (Time dependent and time independent), Qualitative idea about the use of Schrödinger's equation in Potential well, potential step and potential barrier (No derivation)	08hrs
Module V : LASERS & FIBER OPTICS AND NANO MATERIALS Laser Optics: Atomic transitions, definition of Laser, Characteristics of Lasers, Comparison with ordinary light, Einstein's coefficients and relation between them, Population inversion, Three and four level pumping schemes with examples, block diagram & Components for laser production, Types of lasers, Principle, Construction, working & applications of Ruby Laser. Fiber Optics: Principle & construction of Optical fiber, Numerical Aperture, Types of optical fibers (according to refractive index variation and modes of propagation), Block diagram of communication through optical fibers, Few Applications of Optical fibers. Nano Materials: Definition, properties and applications, Elementary ideas about the synthesis of nanomaterials.	10hrs



Essential / Supplementary Readings:

1. A. Ghatak, Optics, McGraw Hill Publisher
2. B. B. Swain & P. K. Jena, Physics I & II
3. Md. N. Khan, Physics I & II.
4. Optics by Dr. Mochiram Das, Krishna Publications.
5. Elements of Vector Calculus, N. Saran & R. Prasad, Pothisala Pvt. Limited.
6. Elements of Electromagnetic Fields by S. P. Seth, Dhanpat Rai & Co.
7. Quantum Physics by Dr. Mochiram Das & Dr. P. K. Jena, Krishna Publications.
8. Amretashis Sengupta and Chandan Kumar Sarkar, Introduction to Nano Basics to Nanoscience and Nanotechnology, Springer Berlin Heidelberg.
9. Dr. Anupam Vyas, Er. Anjali Srivastav, Dr. sanjeev Kumar Shrivastava, Dr. Nistha Vyas, Ultrasonics: Fundamentals & Technologies, AG Publishing House.

COURSE OUTCOME

COs	At the end of this course students will demonstrate the ability to
CO1	Demonstrate proficiency and perceptive of the basic concepts in physics.
CO2	Utilize the scientific and experimental methods to investigate and verify the concepts related to content knowledge.
CO3	Exploring the engineering applications and apply quantum mechanics to engineering Phenomena.
CO4	Identifying the relevant formulae and work out engineering problems.
CO5	Comprehend principle, concept, working and application of new technology and comparison of results with theoretical calculations.

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

1:Slight (Low), 2:Moderate (Medium), 3:Substantial (High), --:No Correlation



PHYSICS LABORATORY

Subject Code	26BS1201	Total Contact Hour	33HRS
Semester	FIRST/SECOND	Total Credit	1.5
Subject Name	PHYSICS LABORATORY		
Pre-requisites	Knowledge on Basic Measuring Instruments, Calculators, Units and Dimensions.		
COURSE OBJECTIVE	To enhance the fundamental knowledge in Practical Physics and its applications relevant to various streams of Engineering and Technology.		

LIST OF EXPERIMENTS (A Student has to Perform any Ten Experiments)

1. Determination of acceleration due to gravity by using Bar pendulum.
2. Determination of acceleration due to gravity by using Kater's pendulum.
3. Determination of wave length of monochromatic light with the help of Newton's ring apparatus.
4. Determination of grating element of a diffraction grating using spectrometer.
5. Determination of Wavelength of the given LASER source by Diffraction Grating Method.
6. Study of resonance using sonometer and to determine the frequency of the given tuning fork.
7. Study of resonance in series and parallel RLC Circuit.
8. Determination of surface tension of water by capillary rise method.
9. To draw the input and output characteristics curves of a bipolar junction transistor and hence to determine the input and output resistance of the configuration.
10. To determine the rigidity modulus of the material of a wire by using Barton's apparatus.
11. To determine e/m ratio by using Magnetron valve method.
12. Study of Magnetic field variation from Helmholtz coil.
13. Determination of Planck's constant by using Photoelectric Effect method.
14. To determine the Numerical Aperture and Bending losses in an optical fiber.
15. Study of acoustic properties of liquids by using Ultrasonic Interferometer.

Essential / Supplementary Readings:

1. A Text Book of Practical Physics by Dr. Samir Kumar Ghosh, New Central Book Agency
2. Advanced Physics Laboratory Manual, Dr. P. P. Mishra & Dr. J.C. Mohanty, South Asian Publishers Pvt. Ltd.
3. Engineering Practical Physics, S. Panigrahi & B. Mallick, S. Publishers.



COURSE OUTCOMES

COs	Upon completion of the subject the students will demonstrate the ability to:
CO1	Express the idea of calculation of acceleration due to gravity at any place using the concept of oscillatory system and simple harmonic motion.
CO2	Demonstrate the working and operational technique to calculate the mechanical properties of fluid and other materials.
CO3	Evaluate the voltage, current, power and characteristics behaviour of the electronic devices.
CO4	Understanding the rigidity and flexibility concept of solid materials.
CO5	Analyzing the Photoelectric effect, electrical and magnetic field measurements and their applications.
CO6	Understanding the new experimental developments in physics in the field of LASERs, Fibers.

CO – PO MAPPING

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	2	1	1	3	3	1	1
CO2	3	3	2	1	3	2	1	1	3	3	1	1
CO3	3	3	2	1	3	2	1	1	3	3	1	1
CO4	3	3	2	1	3	2	1	1	3	3	1	1
CO5	3	3	2	1	3	2	1	1	3	3	1	1
CO6	3	3	2	1	3	2	1	1	3	3	1	1

1:Slight (Low), 2:Moderate (Medium), 3:Substantial (High), --:No Correlation

CHEMISTRY (THEORY)

Subject Code	26BS1003	Total Contact Hour	40HRS
Semester	FIRST/SECOND	Total Credit	03
Subject Name	CHEMISTRY (THEORY)		
COURSE OBJECTIVE	COURSE OBJECTIVES • Understand basic periodic properties • Apply free energy concepts • Learn fundamentals of spectroscopy • Understand stereochemistry basics • Introduce nanomaterials and applications		

MODULE–I: PERIODIC PROPERTIES

(8 Hours)

Periodic properties; Effective nuclear charge; Shielding effect; Penetration of orbitals; Variation of s, p, d and f orbital energies; Electronic configuration of atoms and ions; Atomic and ionic



radii; Ionization energy; Electron affinity; Electronegativity; Oxidation states; Periodic trends and applications.

MODULE–II: FREE ENERGY AND CHEMICAL EQUILIBRIUM (8 Hours)

Concept of entropy; Entropy changes in physical and chemical processes; Gibbs free energy; Free energy change and spontaneity; Gibbs–Helmholtz equation; Free energy and Chemical Equilibrium;

Relation between ΔG and equilibrium constant; Van't Hoff equation.

MODULE–III: SPECTROSCOPIC TECHNIQUES (8 Hours)

Basic principle of spectroscopy; Electromagnetic radiation; Energy transitions. Molecular rotational (Microwave) spectroscopy: Principle; Rotational spectra of diatomic molecules; Selection rules; Applications.

Molecular vibrational (IR) spectroscopy: Principle; Types of vibrations; Selection rules; Applications.

Electronic (UV-Visible) spectroscopy: Beer-Lambert law; Electronic transitions; Chromophores; Auxochromes; Applications.

MODULE–IV: STEREOCHEMISTRY AND ORGANIC REACTIONS (8Hours)

Structural and stereoisomerism, Geometrical isomerism, Optical isomerism (basic idea), Chirality and optical activity, E-Z nomenclature (basic only), Reaction intermediates, Carbocation, Carbanion, free radicals

MODULE–V: NANOMATERIALS (8Hours)

Introduction to nanomaterials, Size dependent properties, Surface area to volume ratio. Types of nanomaterials: Nanoparticles, nanotubes, nanocomposites. Synthesis (basic idea): Top-down and bottom-up, Carbon nanotubes and graphene. Applications in engineering: energy storage, catalysis, sensors, coatings.

Textbooks

1. **Engineering Chemistry** by Shikha Agarwal, 2nd Edition, Cambridge University Press
2. **Engineering Chemistry** by B. Rama Devi, Ch. Venkata Ramana Reddy, Prasanta Rath, and Subhendu Chakraborty, 1st Edition (Indian Adaptation), Cengage Learning

Reference Books

3. **Atkins' Physical Chemistry:** Peter Atkins, Julio de Paula, and James Keeler: 11th Edition, Oxford University Press
4. **Concise Inorganic Chemistry** by J.D. Lee, 5th Edition, Wiley-Blackwell
5. **Fundamentals of Molecular Spectroscopy** by Colin N. Banwell and Elaine M. McCash, 4th Edition, McGraw-Hill Education
6. **Stereochemistry: Conformation and Mechanism** by P.S. Kalsi, 10th, Edition, New Age International Publishers
7. **Organic Chemistry** by Robert T. Morrison, Robert N. Boyd, and Saibal Kanti Bhattacharjee, 7th Edition, Pearson Education
8. **Textbook of Nanoscience and Nanotechnology** by B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, and James Murday, 1st Edition, Universities Press / Springer



9. **Principles of Physical Chemistry**, B.R. Puri, L.R. Sharma, and M.S. Pathania, 49th Edition, Vishal Publishing Co.

COURSE OUT COME

CO	Upon successful completion of this course, students will be able to:
CO-1	Apply concepts of effective nuclear charge, shielding, and orbital energies to predict atomic configurations, periodic trends, and oxidation states.
CO-2	Analyse entropy, Gibbs free energy and equilibrium constants to determine chemical reaction spontaneity and feasibility.
CO-3	Analyse molecular structure using rotational, vibrational (IR), and electronic (UV-Vis) spectroscopic data.
CO-4	Apply stereochemical rules and reaction intermediate stabilities to predict organic molecular geometries and reaction mechanisms
CO-5	Evaluate nanomaterial synthesis routes, size-dependent properties, and their performance in advanced engineering applications like energy storage and sensors.

CO – PO MAPPING

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2	0	0	0	0	0	0	0	0	0	1
CO-2	3	3	1	0	0	0	1	0	0	0	0	1
CO-3	3	3	0	2	2	0	0	0	0	0	0	1
CO-4	3	2	1	0	0	0	0	0	0	0	0	1
CO-5	3	2	2	0	0	1	2	0	0	0	0	2

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CHEMISTRY LABORATORY

Subject Code	26BS1202	Total Contact Hour	33HRS
Semester	FIRST/SECOND	Total Credit	1.5
Subject Name	CHEMISTRY LABORATORY		
Course Objective	- To develop basic skills in volumetric and instrumental analysis - To analyse water quality parameters - To understand reaction kinetics experimentally - To learn basic synthesis and physicochemical measurements		

LIST OF EXPERIMENTS (Any Ten)

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness of water using EDTA method.
3. Determination of available chlorine in bleaching powder.
4. Standardization of potassium permanganate using sodium oxalate.
5. Determination of ferrous iron present in Mohr's salt.
6. Estimation of calcium in limestone.
7. Determination of dissolved oxygen in water sample.



8. Determination of partition coefficient of a solute between two immiscible liquids.
9. Determination of strength of HCl using pH meter.
10. Determination of viscosity of lubricating oil using Redwood viscometer.
11. Determination of flash point of oil using Pensky–Marten’s apparatus.
12. Green Synthesis of Carbon Quantum Dot.

Reference Books

1. Bhasin, S.K. and Rani, S., Practical Engineering Chemistry, 3rd Edition, Dhanpat Rai Publications.
2. Mendham, J., Denney, R.C., Barnes, J.D. and Thomas, M., Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, Pearson Education.
3. Rattan, S., Laboratory Manual on Engineering Chemistry, 2nd Edition, S. K. Kataria & Sons.
4. Yadav, J.B., Advanced Practical Physical Chemistry, 16th Edition, Goel Publishing House.
5. Garland, C.W., Nibler, J.W. and Shoemaker, D.P., Experiments in Physical Chemistry, 8th Edition. McGraw-Hill,

COURSE OUTCOMES

CO	Upon successful completion of this course, students will be able to:
CO-1	Analyse water samples by measuring their hardness, alkalinity, and dissolved oxygen levels for industrial safety and domestic use
CO-2	Evaluate the composition of commercial chemicals (bleaching powder, limestone and Mohr's salt) using standard titrations.
CO-3	Apply instrumental methods (pH-metry) and distribution laws to determine chemical strengths and solute behaviours.
CO-4	Evaluate engineering properties of lubricants and fuels by measuring their viscosity and safe operating flash points.
CO-5	Apply green chemistry principles to synthesize advanced nanomaterials (Carbon Quantum Dots) using sustainable methods.

CO – PO MAPPING

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	-	2	-	2	2	-	2	1	-	2
CO 2	3	2	-	2	-	-	-	-	2	1	-	1
CO 3	3	2	-	2	3	-	-	-	2	1	-	1
CO 4	3	2	-	2	-	3	-	-	2	1	-	1
CO 5	3	1	2	2	-	-	3	-	2	1	-	2

1:Slight (Low), 2:Moderate (Medium), 3:Substantial (High), --:No Correlation



BASIC ELECTRICAL ENGINEERING (THEORY)

Subject Code	26ES1001	Total Contact Hour	40HRS
Semester	FIRST/SECOND	Total Credit	2
Subject Name	Basic Electrical Engineering (Theory)		
Pre-Requisites	Basic knowledge of intermediate physics and mathematics such as calculus, ordinary differential equations, matrices etc. is required.		
Objectives	This course aims to introduce the fundamental concepts of electrical engineering, including basic electrical quantities, circuit analysis of DC and AC networks, principles of electromagnetism, and the operation of transformers and electrical machines. It also provides an overview of the basic structure of electrical power systems including generation, transmission, and distribution of electrical energy.		

DETAILED SYLLABUS

Module-#	Topics	Hours
Module-1	Electric Circuits (DC Network): Charge & current, Ideal & practical sources, Source conversion, Characteristics of circuit elements, Kirchhoff's current and voltage laws, Current & voltage division rule; Resistive Network Analysis – Node voltage & Mesh current (controlled & uncontrolled sources), Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem.	12Hours
Module-2	Single-phase AC Circuit Analysis: Representation of sinusoidal waveforms, Peak and RMS values, Phasor representation, AC power analysis, Power factor, Improvement of power factor, Analysis of series & parallel AC circuits (R, L,C, R-L, R-C, R-L-C circuits), Resonance. Three-phase AC Circuit Analysis: Representation of 3-phase AC voltage, Phase sequence, Balanced load and source, Voltage and current relationship in star and delta connections, solution of the balanced three phase circuits, measurement of power in three phase circuits.	8Hours
Module-3	Electromagnetism: Magnetic flux, Reluctance, Series & parallel magnetic circuits, Magnetic materials, Hysteresis loop; Application of Electromagnetism in Transformer: Single-phase Transformer – Construction & working, Ideal and practical transformer, EMF equation, Equivalent circuit & phasor diagram of transformer on load and no-load, Losses in a transformer.	7Hours
Module-4	DC Machine: Construction, Working of generator and motor, EMF equation of generator, Torque equation of motor, Back EMF of Motor, Classification based on excitation system, Speed control of DC Motor. AC Machine: Construction and working of a 3-phase induction motor, Synchronous speed, Concept of slip.	8Hours
Module-5	Introduction to Power System: General structure of electrical power systems, Concepts of Generation, Transmission and Distribution, Sources of Electrical Power	5Hours



Text Books:

- T1.** G. Rizzoni, Principles and Applications of Electrical Engineering, TMH , 2017
T2. Nagrath I.J. and D. P. Kothari, Basic Electrical Engineering, Tata McGraw
T3. E. Hughes, Electrical & Electronic Technology, 9th Ed., Pearson, 2004.

Reference Books:

- R1.** A. E. Fitzgerald, D. E. Higginbotham, and A. Gabel, Basic Electrical Engineering, 5th Ed., TataMcGraw Hill.
R2. B. L. Theraja and A. K. Theraja, Textbook of Electrical Technology (Vol-I), 23rd Ed., S. Chand &Co.Ltd., 2002.
R3. L. S. Bobrow, Foundations of Electrical Engineering, Asian Edition, Oxford Univ. Press, 2013.

Web Resources:

- W1.** <https://nptel.ac.in/courses/108105112>

COURSE OUTCOMES

CO	Upon completion of the course the students will demonstrate the ability to:
CO1	Analyze DC circuits by using network theorems and mesh current or nodal voltage methods.
CO2	Analyze the concept of single-phase and three-phase AC circuits.
CO3	Explain the behavior of magnetic circuits and the working of single-phase transformers.
CO4	Describe the construction and operation of DC machines and Induction motors.
CO5	Describe the structure of power systems and sources of electrical energy.

CO – PO - PSO MAPPING

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	2	1	–	–	–	–	1	3	2	1
CO2	3	3	2	1	1	2	1	–	–	–	–	1	3	3	1
CO3	3	3	2	1	1	2	1	–	–	–	–	1	2	2	2
CO4	3	3	2	1	1	2	1	–	–	–	–	1	3	2	2
CO5	3	3	2	1	1	2	1	–	–	–	–	1	3	2	2

1:Slight (Low), 2:Moderate (Medium), 3:Substantial (High), --:No Correlation

BASIC ELECTRICAL ENGINEERING (LABORATORY)

Subject Code	26ES1201	Total Contact Hour	30HRS
Semester	FIRST/SECOND	Total Credit	1.5
Subject Name	Basic Electrical Engineering (Laboratory)		
Pre-Requisites	Students should have basic knowledge of electrical quantities such as voltage, current, resistance, and power, along with fundamental concepts of electrical circuits and Ohm's law. Familiarity with basic electrical components, measuring instruments, and		

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	elementary mathematics used in engineering analysis is also desirable. Basic understanding of laboratory safety practices is recommended.
Objectives	The objective of the Basic Electrical Engineering Laboratory is to provide students with practical knowledge of fundamental electrical engineering concepts and instruments. The course enables students to understand the construction and operation of electrical machines and measuring instruments through hands-on experiments. It develops the ability to perform measurements of electrical parameters such as voltage, current, power, resistance, and power factor using standard methods. The laboratory also helps students verify basic electrical network theorems and study characteristics of electrical machines, while emphasizing safety practices in electrical laboratories.

DETAILED SYLLABUS

Experiment-#	EXPERIMENT	Hours
Experiment-1	Preliminary: Preparation of symbol chart for various systems & components as per ISS, to study the constructional & operational features for Voltmeter, Ammeter, Wattmeter, Frequency meter, multi-meter and Rheostat, Study of safety rules.	03Hours
Experiment-2	Study and verification of Thevenin's Theorem and Norton's Theorem.	03 Hours
Experiment-3	Measurement of the armature & field resistance of D.C. Machine by volt-amp method.	03 Hours
Experiment-4	Power & power factor measurement of three-phase load by two-wattmeter method.	03 Hours
Experiment-5	Connection and testing of a single-phase energy meter.	03 Hours
Experiment-6	Determination of efficiency of a single-phase transformer.	03 Hours
Experiment-7	Determination of open circuit characteristics (O.C.C) of D.C shunt generator.	03 Hours
Experiment-8	Study of B-H Curve of ferromagnetic core.	03 Hours
Experiment-9	Calculation of power & power factor in series R-L-C circuit excited by single-phase supply.	03 Hours
Experiment-10	Starting and speed control of a D.C. shunt motor	03 Hours

TEXT BOOKS:

T1. Basic Electrical Engineering Manual, Department of Electrical Engineering, ABIT (Autonomous)

T2. B. L. Thereja & A. K. Thereja, A Textbook of Electrical Technology, 23rd Ed., S. Chand & Co.

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Identify electrical instruments, their symbols and safety rules. (Exp-1)
CO2	Verify Thevenin's and Norton's theorems. (Exp-2)
CO3	Measure armature and field resistance of DC machine and study the V-I characteristics of OCC of DC shunt generator. (Exp-3, 7)
CO4	Determine efficiency of single-phase transformer and Analyze the B-H curve of ferromagnetic core. (Exp-6, 8)
CO5	Measure power, power factor in single-phase and three-phase circuits and test energy meter. (Exp-4,5,9,10)



CO – PO - PSO MAPPING															
COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	2	-	-	2	1	1	-	1	2	2	1
CO2	3	3	-	2	1	-	-	-	-	-	-	1	3	1	-
CO3	3	2	1	2	2	-	-	-	1	-	-	1	3	2	1
CO4	3	3	-	2	1	-	1	-	-	-	-	1	3	1	-
CO5	3	2	2	1	2	-	-	1	2	1	1	1	3	2	2

1:Slight (Low), 2:Moderate (Medium), 3:Substantial (High), --:No Correlation

BASIC ELECTRONICS (THEORY)

Subject Code	26ES1002	Total Contact Hour	30HRS
Semester	FIRST/SECOND	Total Credit	2
Subject Name	Basic Electronics (Theory)		
Pre-Requisites	An understanding of fundamental concepts of Physics relating to Electronics.		
Objectives	- To impart the fundamentals of semiconductor devices and their applications to various circuits. - To impart the knowledge of fundamentals of digital electronics and Boolean algebra. - To impart the knowledge of electronic measuring instruments and fundamentals of communication systems.		

DETAILED SYLLABUS

MODULE I

7 Hours

Semiconductor Physics: Properties of semiconductor, current flow in semiconductors, voltage-current characteristic of a P-N junction, Rectifiers.

Bipolar junction Transistor (BJT): Device structure, types and modes of operation, static characteristic, BJT as a switch, BJT as an amplifier.

MODULE II

7 Hours

JFET: Physical structure, operation and static characteristics.

MOSFET: Physical structure of JFET, operation and characteristics of D and E type MOSFET. **CMOS:** Physical structure of CMOS, operation and characteristics of CMOS Inverter.

MODULE III

6 Hours

Feedback Amplifiers: General feedback structure, properties of negative feedback, four basic types of feedback topologies (Block diagram only), **Operational Amplifier (OP-AMP):** Ideal OP-AMP, inverting configuration, non-inverting configuration, OP-AMP Applications (Adder, Subtractor only).

MODULE IV

5 Hours

Digital Electronics fundamentals: Number system (Decimal, Binary, Octal and Hexadecimal), conversion among number systems, Introduction to signed-binary numbers, binary addition, subtraction, multiplication and division, logic gates, laws of Boolean Algebra, simplification of expressions.

**MODULE V****5 Hours**

Electronic Instruments: Overview of CRO and DSO, Basic principles of operation of CRO, applications of CRO & DSO. **Principles of Communication Systems:** Introduction to communication systems, Fundamentals of AM & FM, (Waveforms and general expressions only).

Text Books

1. Electronic Devices & Circuit Theory, R.L. Boylestad and L. Nashelsky, Pearson Education.
2. Electronics Fundamentals and Applications, D. Chattopadhyay and P.C. Rakshit, New Age International Publications.(Selected portions from chapters).
3. Digital Fundamentals, Thomas L. Floyd and R.P. Jain, Pearson Education.

Reference Books

1. Integrated Electronics, Millman and Halkias, TMH Publications.
2. Microelectronics Circuits, A.S.Sedra, K.C.Smith, Oxford University Press.
3. Electrical & Electronics Measurement and Instrumentation ,A.K. Sawhney, Dhanpat Rai & Co(Pvt.) Ltd.

COURSE OUTCOMES

COs	At the end of this course students will demonstrate the ability to
CO1	Describe the operation and applications of PN junction diodes and bipolar junction transistors.
CO2	Explain the operation and characteristics of JFETs, MOSFETs, and CMOS devices.
CO3	Apply the concepts of feedback amplifiers and operational amplifiers to electronic circuits.
CO4	Perform number system conversions, binary arithmetic operations, and Boolean algebra simplifications.
CO5	Analyze the operating principles and applications of electronic instruments and communication systems.

CO-PO MAPPING

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

1:Slight(Low) 2:Moderate(Medium) 3:Substantial(High) --:No Correlation

BASIC ELECTRONICS LABORATORY

Subject Code	26ES1202	Total Contact Hours	30
Semester	First/Second	Total Credit	1.5
Subject Name	Basic Electronics Laboratory		
Prerequisites	Understanding Ohm's Law and the difference between AC and DC.		
Objectives	• To provide engineering skills for circuit design on breadboard with electronic components. • To impart the knowledge on digital fundamentals and digital circuit design. • To analyze various electronic devices & circuits such as BJT, FET, OP-AMPs etc.		



LIST OF EXPERIMENTS (ANY TEN)

1. Familiarity with electronic components and devices (Testing of semiconductor diode, Transistor, IC Pins connection) Digital Multimeter should be used.
2. Study and use of CRO to view wave forms and measure its Amplitude and Frequency.
3. V-I Characteristics of a Semiconductor Diode.
4. V-I (Output) Characteristics of N-P-N / P-N-P Transistor in CE Configuration.
5. Measurement of pinch off voltage and plot transfer characteristics and drain characteristics of JFET.
6. Transfer characteristics and drain characteristics of MOSFET.
7. OP-AMP: Inverting and Non-Inverting Configuration. Record of Waveforms.
8. Verification of Truth table of Logic gates (AND, OR, NOT, NAND, NOR, EX-OR).
9. Half Wave and Full Wave Rectifier without Capacitor filter. Record of Waveforms, Measurement of Average and RMS value.
10. Implementation of digital circuit using Universal gates.
11. Study of clipper & clamper circuit using diode. (Experiment beyond syllabus)

Reference Books

1. Integrated Electronics, Millman and Halkias, TMH Publications.
2. Electronic Devices & Circuit Theory, R.L Boylestad and L. Nashelsky, Pearson Education.

COURSE OUTCOMES

COs	At the end of this course students will demonstrate the ability to
CO1	Identify electronic components, devices, and measuring instruments.
CO2	Verify the characteristics of semiconductor diodes and rectifier circuits.
CO3	Analyse the characteristics of BJT, JFET, and MOSFET circuits.
CO4	Implement operational amplifier circuits in inverting and non-inverting configurations.
CO5	Demonstrate the truth table of digital logic circuits using logic gates and universal gates.

CO-PO MAPPING

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation



PROGRAMMING IN C & DATA STRUCTURE (THEORY)

Subject Code	26ES1003	Total Contact Hour	30HRS
Semester	FIRST/SECOND	Total Credit	3
Subject Name	Programming in C & Data Structure Theory		
Objectives	CLO1: Understand the fundamentals of C programming and problem-solving techniques. CLO2: Apply control structures, arrays, and strings to solve computational problems. CLO3: Develop modular programs using functions, recursion, and pointers. CLO4: Utilize structures, file handling, and dynamic memory allocation in real world applications. CLO5: Apply basic AI concepts using C programming for problem-solving.		

COURSE CONTENT

Module-I: (10 Hours)

Basics of C Programming:

Introduction to programming paradigms; Applications of C language; Structure of a C program; Data types; Constants and enumeration constants; Keywords; Operators (precedence and associativity); Expressions; Input/output statements; Assignment statements; Decision-making statements; Switch statement; Looping statements; Preprocessor directives; Compilation process.

Module-II: (8 Hours)

Arrays and Strings:

Introduction to arrays: declaration and initialization; One-dimensional and two-dimensional arrays; String operations: length, comparison, concatenation, copying; Searching techniques: linear and binary search; Sorting technique: selection sort.

Module-III: (8 Hours)

Functions and Pointers:

Modular programming; Function prototype, definition, and call; Built-in functions (string and mathematical functions); Recursion and binary search using recursion; Pointers and pointer operators; Pointer arithmetic; Arrays and pointers; Array of pointers; Parameter passing techniques: pass by value and pass by reference.

Module-IV: (8 Hours)

Structures, Union, and File Handling:

Structures and nested structures; Pointers and structures; Array of structures; Self-referential structures; Dynamic memory allocation; Singly linked list; typedef; Union; Storage classes and scope/visibility; File processing: sequential and random access; Command line arguments.

Module-V: (6 Hours)

AI Concepts using C:

Introduction to Artificial Intelligence; Role of C in AI development; Problem-solving using decision-making trees; Rule-based systems using logical constructs; Implementation of a simple AI chatbot using if-else and string matching.



Textbooks:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI.
2. E. Balagurusamy, Programming in ANSI C, McGraw Hill.

Reference Books:

1. Yasha Vant Kanetkar, Let Us C, BPB Publications.
2. Herbert Schildt, C: The Complete Reference, McGraw Hill.

Web Links / e-Resources:

1. <https://nptel.ac.in/courses/106/105/106105171/>
2. <https://www.tutorialspoint.com/cprogramming/>

COURSE OUTCOMES

COs	At the end of the course, the student will be able to:
CO1	Understand the fundamentals of C programming including program structure, data types, operators, and control statements.
CO2	Apply arrays, strings, and searching/sorting techniques to solve computational problems.
CO3	Develop modular programs using functions, recursion, and pointer concepts for efficient problem solving.
CO4	Analyze and implement complex data structures such as structures, unions, linked lists, and dynamic memory allocation.
CO5	Demonstrate file handling operations and utilize storage classes, command-line arguments, and scope rules in real-world applications.
CO6	Design simple AI-based solutions such as rule-based systems and chatbots using C programming constructs.

CO – PO – PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	–	2	–	–	–	–	1	–	1	1	–
CO2	3	3	2	1	2	–	–	–	–	1	–	1	1	1
CO3	3	3	2	2	2	–	–	–	–	1	–	1	2	1
CO4	3	3	3	2	2	–	–	–	–	1	–	1	2	2
CO5	3	3	2	3	2	–	–	–	–	1	–	1	2	2
CO6	3	3	3	2	2	–	–	–	1	2	–	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation



PROGRAMMING IN C & DATA STRUCTURE LABORATORY

Subject Code	26ES1203	Total Contact Hour	30HRS
Semester	FIRST/SECOND	Total Credit	1.5
Subject Name	Programming in C & Data Structure Laboratory		

LIST OF EXPERIMENTS

Experiment 1: Basics of C Programming

1. Write a C program to find the sum and average of three numbers entered by the user.
2. Write a C program to swap two numbers using a temporary variable.
3. Write a C program to evaluate a mathematical expression using different operators.
4. Write a C program to convert temperature from Celsius to Fahrenheit.
5. Write a C program to calculate simple interest given principal, rate, and time.

Experiment 2: Decision Making & Looping

1. Write a C program to check whether a given number is even or odd.
2. Write a C program to find the largest among three numbers using decision-making statements.
3. Write a C program to print the multiplication table of a given number using loops.
4. Write a C program to find the factorial of a number using looping constructs.
5. Write a C program to check whether a given number is prime or not.

Experiment 3: Arrays (1D & 2D)

1. Write a C program to find the sum of all elements in a one-dimensional array.
2. Write a C program to find the maximum and minimum elements in an array.
3. Write a C program to perform addition of two matrices.
4. Write a C program to perform multiplication of two matrices.
5. Write a C program to find the transpose of a matrix.

Experiment 4: Strings

1. Write a C program to find the length of a string using built-in and user-defined functions.
2. Write a C program to compare two strings.
3. Write a C program to concatenate two strings.
4. Write a C program to reverse a given string.
5. Write a C program to check whether a string is a palindrome or not.

Experiment 5: Searching Algorithms

1. Write a C program to implement linear search to find an element in an array.
2. Write a C program to implement binary search on a sorted array.
3. Write a C program to count the number of occurrences of an element in an array.
4. Write a C program to find the first and last occurrence of an element in an array.
5. Write a C program to search an element in a sorted array using recursion.

Experiment 6: Sorting Algorithms

1. Write a C program to implement the selection sort algorithm.
2. Write a C program to implement the bubble sort algorithm.

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3. Write a C program to implement the insertion sort algorithm.
4. Write a C program to sort an array in ascending and descending order.
5. Write a C program to count the number of swaps performed during sorting.

Experiment 7: Functions & Recursion

1. Write a C program to find the factorial of a number using recursion.
2. Write a C program to generate the Fibonacci series using recursion.
3. Write a C program to implement binary search using recursive functions.
4. Write a C program to check whether a number is an Armstrong number using functions.
5. Write a C program to demonstrate call by value and call by reference.

Experiment 8: Pointers

1. Write a C program to swap two numbers using pointers.
2. Write a C program to find the sum of elements of an array using pointers.
3. Write a C program to demonstrate pointer arithmetic operations.
4. Write a C program to access array elements using pointers.
5. Write a C program to create and use an array of pointers.

Experiment 9: Structures & File Handling

1. Write a C program to define a structure for student details and display the information.
2. Write a C program to store and display records using file handling.
3. Write a C program to append data to an existing file.
4. Write a C program to read data from a file and search for a specific record.
5. Write a C program to demonstrate the use of union and compare it with structures.

Experiment 10: AI Concepts using C

1. Write a C program to create a simple chatbot using if-else statements.
2. Write a C program to implement a rule-based system for decision making such as grading.
3. Write a C program to simulate decision tree logic using conditional statements.
4. Write a C program to perform basic pattern matching in strings.
5. Write a C program to develop a simple recommendation system using conditions.

COURSE OUTCOMES

CO'S	At the end of the laboratory course, the student will be able to:
CO1	Develop C programs using data types, operators, input/output statements, control structures, algorithms, and flowcharts to solve basic computational problems.
CO2	Implement modular programs using functions, recursion, arrays, strings, structures, and unions for solving engineering problems.
CO3	Analyze memory management concepts using pointers, dynamic memory allocation techniques, and file handling operations in C.
CO4	Construct and manipulate linear data structures such as linked lists, stacks, and queues for efficient data processing.
CO5	Implement searching, sorting, and tree-based data structures to organize and retrieve data efficiently.
CO6	Design and develop simple AI-based applications using decision-making logic, string matching, and rule-based programming techniques in C.

**CO-PO-PSO MAPPING**

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	–	2	–	–	–	–	–	–	1	–	2
CO2	3	2	2	–	2	–	–	–	–	–	–	1	–	2
CO3	2	3	1	1	2	–	–	–	–	–	–	1	–	2
CO4	2	3	2	1	2	–	–	–	–	–	–	1	–	3
CO5	2	3	2	2	3	–	–	–	–	–	–	1	1	3
CO6	2	2	3	2	3	–	–	–	1	1	–	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

ENGINEERING MECHANICS

Subject Code	26ES1004	Total Contact Hours	40
Semester	First/Second	Total Credit	3
Subject Name	Engineering Mechanics		
Prerequisites	Basic knowledge of Physics, vectors, trigonometry, and calculus.		
Objectives	The objective of this course is to provide students with a strong foundation in Engineering Mechanics by introducing the principles of statics and dynamics. The course aims to develop the ability to analyze force systems, friction, centroids, moments of inertia, work-energy relationships, impulse-momentum principles, and motion of particles and rigid bodies.		

MODULE-#	TOPICS	HOURS
Module-1	Concurrent and Coplanar Force Systems: Composition, resolution and equilibrium of concurrent coplanar forces, free body diagrams, method of moments, composition and equilibrium of general force systems in a plane. Plane Trusses: Method of joints and method of sections.	10Hours
Module-2	Friction: Laws of friction, angle of friction, angle of repose, applications involving wedges, ladders, and connected bodies. Principle of Virtual Work: Concept and applications to engineering systems.	06Hours
Module-3	Parallel forces on a plane: General case of parallel forces, center of parallel forces Centroid and Moment of Inertia: Center of gravity, centroid of plane and composite figures, Pappus-Guldinus theorems, area moment of inertia, polar moment of inertia, parallel axis theorem.	08Hours
Module-4	Rectilinear translation: Kinematics, Principle of dynamics, D'Alembert's Principle, Principle of work and energy for a particle and a rigid body, Conservation of energy, Principle of impulse and momentum for a particle and a rigid body, Conservation of momentum, System of rigid bodies, Impact, direct and central impact, coefficient of restitution.	08Hours



Module-5	Curvilinear translation: Kinematics, Equation of motion, Projectile, D'Alembert's principle of curvilinear motion. Kinematics of rotation of rigid body.	08Hours
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Text Books:

- T1.** Engineering Mechanics: S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati, 5th Edition, 2017 McGraw Hill..
- T2.** Engineering Mechanics, Static and Dynamics, J. L. Meriam and L.G. Kraige, 9th Edition, 2021, John Wiley & Sons, Inc.

Reference Books:

- R1.** Engineering Mechanics by A.K. Tayal
- R2.** Fundamental of Engineering mechanics, S Rajasekharan & G Shankara Subramaniam, 3rd Edition, 2017, S. Chand .
- R3.** Engineering mechanics: K. L. Kumar and Veenu Kumar, 4th Edition, 2017, Tata MC Graw Hill..

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Analyze forces, moments, reactions and equilibrium conditions in engineering systems.
CO2	Apply principles of friction and virtual work to solve engineering mechanics problems.
CO3	Determine centroid and moment of inertia of plane sections for engineering applications.
CO4	Apply principles of work-energy, impulse-momentum and D'Alembert's principle to rectilinear motion problems.
CO5	Analyze projectile motion, curvilinear motion and rotational kinematics of rigid bodies.

CO-PO-PSO MATRIX														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO.1	3	3	2	1	-	-	-	-	-	-	-	2	3	1
CO.2	3	3	2	1	-	-	-	-	-	-	-	2	3	1
CO.3	3	3	2	1	-	-	-	-	-	-	-	2	3	1
CO.4	3	3	2	1	-	-	-	-	-	-	-	2	3	1
CO.5	3	3	2	1	-	-	-	-	-	-	-	2	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

BASIC CIVIL ENGINEERING (THEORY)

Subject Code	26ES1005	Total Contact Hours	36
Semester	First/Second	Total Credit	2
Subject Name	Basic Civil Engineering (Theory)		
Prerequisites	Students should have a basic understanding of Mathematics, Physics, measurements, and scientific principles, along with an interest in infrastructure and the built environment, to comprehend the fundamentals of civil engineering.		
Objectives	To provide students with a fundamental understanding of civil engineering disciplines, infrastructure systems, construction materials, transportation, water resources, and environmental engineering for addressing societal and developmental needs.		

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Module #	CONTENT	Contact Hours
Module 1	Introduction to Civil Engineering: Various disciplines of Civil engineering, Importance of Civil engineering in infrastructure development of the country, interdisciplinary nature of construction projects. Residential Buildings: NBC Classification, Basic Components of a building: Basic requirement. Planning and Design of buildings: fundamental requirements, selection of sites, Introduction to building design: functional and structural design. Foundations: Classification, Bearing Capacity of Soil and related terms (definition only)	8 hours
Module 2	Fundamental Properties of Construction Materials: Physical, mechanical and durability properties. Construction materials: stone, bricks, cement, aggregate, mortar, concrete, timber, steel, non-ferrous metals, paint, plastic, glass, adhesive, tiles, composites(Definition, classification and application),	7 hours
Module 3	Importance of Transportation, Transportation modes i.e. Highway, railway, airways, water, pipe and conveyor – Basic Characteristics, advantages and disadvantages. Indian road transport system: Types of roads, classification of highway, urban roads: basic requirements and classification. Basic Components of a Road, Rigid and Flexible pavement (comparison only)	8 hours
Module 4	Quantity of water: Sources of water, Per capita demand, drinking water standards, Public Water Supply System: Necessity and Basic lay out. Conventional water treatment process: Screening, Plain Sedimentation, Sedimentation aided with Coagulation, Filtration, and Disinfection (working principles only).	7 hours
Module 5	Irrigation: Importance of Irrigation, Classification of Irrigation projects, Irrigation system: Types, Field water distribution, Multipurpose river valley projects, Dams: Purpose, types. Layout of canal Irrigation system: components and definitions.	6 hours

TEXT BOOKS

1	Basic Civil engineering, Gopi, S., Pearson Publication
2	Basic Civil Engineering, Bhavikatti, S. S., New Age.
REFERENCE BOOKS	
1	Basic Civil Engineering – B.C. Punmia & Ashok Kumar Jain
2	Building Materials – S.K. Duggal
3	Water Supply Engineering and Irrigation Engineering – S.K. Garg



COURSE OUTCOMES	
COs	At the end of the course a student will be able to
CO1	Understand scope and importance of civil engineering and general aspects of building classifications.
CO2	Discuss various types of building materials and its function.
CO3	Explain about various transportation modes and their planning.
CO4	Describe the drinking water standards and various water treatment methods.
CO5	Understand various types of irrigation network system.

CO-PO MAPPING														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	2	1	-	-	1	-	2	2	3
CO2	3	2	1	-	-	1	2	-	-	1	-	2	2	1
CO3	3	2	2	1	1	2	2	-	-	1	1	2	3	1
CO4	3	2	2	1	1	2	3	-	-	1	-	2	3	1
CO5	3	2	2	1	1	2	3	-	-	1	1	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

BASIC MECHANICAL ENGINEERING (THEORY)

Subject Code	26ES1006	Total Contact Hours	30
Semester	First/Second	Total Credit	2
Subject Name	Basic Mechanical Engineering (Theory)		
Prerequisites	Basic knowledge of Physics, Chemistry and Mathematics.		
Objectives	The objective of this course is to provide students with a broad foundation in the fundamental principles of Mechanical Engineering, including thermodynamics, fluid mechanics, heat transfer, manufacturing processes, power transmission systems, and robotics. The course aims to develop an understanding of energy conversion systems, engineering materials, manufacturing methods, and mechanical components, enabling students to appreciate their applications in modern engineering practice and prepare for advanced studies in core mechanical engineering subjects.		

DETAILED SYLLABUS

Module-#	Topics	Hours
Module-1	Thermodynamics: Systems, Properties, Process, State, Cycle, Internal energy, Enthalpy, Zeroth Law, First law and Second Law of Thermodynamics, Basic Concept Entropy, Properties of ideal gas, Properties of pure substances, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables. Related numerical.	11

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Module-2	Application of Thermodynamics: Single stage air compressor, Steam Power Plant, I.C. Engines (Brief Description on working principles with Schematic diagrams only) Elements of Fluid Mechanics and Heat Transfer Properties used in Fluid Mechanics, Fluid Statics, Kinematics and Dynamics (Concepts only), Heat transfer and Classifications (Concepts only)	08
Module-3	Introduction to Manufacturing: Classification of engineering materials, Material Properties, Manufacturing processes: Welding, Casting, Forming (Basics only)	07
Module-4	Basic Power transmission devices: Belt, Gear drives, clutch, brakes. (Working principle only) Introduction to Robotics: Robot anatomy, Joints and links and common robot configurations.	04

Text Books:

T1. Basic Mechanical Engineering by Pravin Kumar, Pearson

T2. Basic Mechanical Engineering by D. Mishra, P. K. Parida, S.S.Sahoo, India Tech Publishing company

Reference Books

R4. Basic Mechanical Engineering by A R Israni, P K Shah, BS Publications

R5. Basic and applied Thermodynamics by P. K. Nag, Tata McGraw Hill

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Explain the laws of thermodynamics.
CO2	Describe energy interaction in Air Compressors, Steam Power Plant, and IC engines.
CO3	Explain the concepts of fluid mechanics and heat transfer.
CO4	Explain the properties of engineering materials and casting, welding and forming manufacturing processes.
CO5	Describe the working principle of power transmission devices.
CO6	Explain robot anatomy, joints and links and robot configurations.

CO – PO – PSO MAPPING

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	3	1
CO2	3	2	-	-	1	-	-	-	-	-	-	1	3	1
CO3	3	2	-	-	1	-	-	-	-	-	-	1	3	1
CO4	3	2	1	-	1	-	-	-	-	-	-	1	3	1
CO5	3	2	1	-	1	-	-	-	-	-	-	1	3	1
CO6	2	1	1	-	2	-	-	-	-	-	-	2	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation



UNIVERSAL HUMAN VALUES (THEORY)

Subject Code	26HS1001	Total Contact Hours	20
Semester	First/Second	Total Credit	2
Subject Name	Universal Human Values (Theory)		
Objectives	• Understand the fundamentals of value education and its role in achieving holistic human development through right understanding, healthy relationships, and proper use of physical facilities. • Develop self-exploration skills to identify and fulfill basic human aspirations of continuous happiness and prosperity through ethical and rational living. • Recognize harmony within the individual by understanding the relationship between the self and the body, and by balancing their respective needs. • Cultivate harmonious relationships based on universal human values such as trust, respect, justice, responsibility, and mutual fulfillment within the family and society. • Understand the interconnectedness of nature and existence, appreciating the principles of coexistence, self-regulation, and sustainability among the four orders of nature. • Apply human values and professional ethics in personal, social, and professional life to make ethical decisions and contribute toward a value-based, humane, and sustainable society.		

MODULE 1 - FOUNDATIONS OF VALUE EDUCATION

6 HOURS

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Lecture 3: Self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity - the Basic Human Aspirations

Lecture 5: Happiness and Prosperity-Current Scenario

Lecture 6: Method to Fulfil the Basic Human Aspirations

MODULE 2 - HARMONY IN THE HUMAN LIFE, RELATIONSHIPS AND SOCIETY

7 HOURS

Lecture 7: Understanding Human being as the Co-existence of the Self and the Body Lecture

Lecture 8: Distinguishing between the Needs of the Self and the Body

Lecture 9: Achieving Harmony: Integrating Self and the Body

Lecture 10: Harmony in the Family and Society

Lecture 11: 'Trust' & 'Respect'-as Foundational Values in Relationship

Lecture 12: Other Feelings, Justice in Human-to-Human Relationship

Lecture 13: Understanding Harmony in the Society & Universal Human Order.

MODULE 3 - HARMONY IN THE NATURE/EXISTENCE & PROFESSIONAL ETHICS

7 HOURS

B. TECH. FIRST YEAR SYLLABUS (2026-27), ABIT (AUTONOMOUS)**Lecture 14:** Understanding Harmony in the Nature**Lecture 15:** Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature**Lecture 16:** Realizing Existence as Co-existence at All Levels**Lecture 17:** The Holistic Perception of Harmony in Existence**Lecture 18:** Natural Acceptance of Human Values**Lecture 19:** Humanistic Education, Humanistic Constitution and Universal Human Order**Lecture 20:** Competence in Professional Ethics - Ethical Decision Making & Transition towards Value-based Life and Profession.**SUGGESTED BOOKS**

SL. NO.	NAME OF THE BOOK	AUTHOR	PUBLIUSHER
1.	Universal Human Values and Professional Ethics	Dr. Ritu Soryan	S.K. Kataria & Sons
2.	Universal Human Values: An Activity-Based Course	R. R. Gaur, R. Sangal, G. P. Bagaria	AICTE/Excel Books
3.	Human Values and Professional Ethics	A. Nagarajan	New Age International
4.	Professional Ethics and Human Values	M. Govindarajan, S. Natarajan, V. S. Senthil Kumar	PHI Learning
5.	Human Values and Ethics	B. S. Raghavan	
6.	A Foundation Course in Human Values and Professional Ethics		Excel Books

COURSE OUTCOME

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Understand and analyse the essentials of human values and skills, self-exploration, happiness and prosperity.
CO2	Evaluate coexistence of the "I" with the body.
CO3	Identify and evaluate the role of harmony in family, society and universal order.
CO4	Understand and associate the holistic perception of harmony at all levels of existence.
CO5	Develop appropriate technologies and management patterns to create harmony in professional and personal lives.

CO – PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	0	0	0	0	0	0	3	0	0	0	1
CO2	0	0	0	0	0	0	1	0	0	0	0	0
CO3	0	0	0	0	0	2	1	0	0	0	0	0
CO4	0	0	0	0	0	2	2	0	0	0	0	1
CO5	0	0	0	0	0	2	2	3	0	0	0	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation



ENGLISH FOR TECHNICAL WRITING (THEORY)

Subject Code	26HS1002	Total Contact Hours	30
Semester	First/Second	Total Credit	2
Subject Name	English for Technical Writing (Theory)		
Objectives	- To develop awareness about the complexity of the communication process. - To provide a learning environment to practice listening, speaking, reading and writing skills. - To assist the students in carrying on the tasks and activities through guided instructions and materials. - To develop effective writing skills to enable students to write in a clear, concise, and persuasive manner - To acquaint students with a variety of forms of writing in the professional world. - To effectively integrate English language learning with employability skills and training.		

Content	Hours
Module I - Fundamentals of Technical Communication - Process of communication, types of communication (Verbal & Non-Verbal) - Channels of business communication - Communication barriers. - Bias-free language	6
Module II- Communicative Grammar - Time and Tense - Passive and active voice - Subject- Verb Agreement (Concord)	6
Module III- Sounds of English Hours - Basic vowel and consonant sounds (Surface level only) - Stress, syllable, and intonation (functional use) - Surface-level phonetic transcription (basic symbols and simple word transcription) - Listening skills: types of listening	6
Module IV - Professional Communication for the Workplace - E-Mail Writing - Formal Letter Writing (Application, Cover Letter). - Memo, Notice writing - Agenda and Minutes writing - Report Writing - Reading skills: skimming, scanning, reading technical texts	6



Content	Hours
Module V - Professional Communication for Employment - CV writing - Interview skills - Group Discussion (concept, strategies, practice)	6

Essential Reading:

1. Effective Technical Communication by M Ashraf Rizvi (Tata McGraw-Hill)
2. Better English Pronunciations by J. D.O Conner (Cambridge University Press)
3. A Communicative Grammar of English by G.N. Leech and Jan Svartik (OUP)

Supplementary Reading:

1. Business Communication Today by Bovee, Thill and Chatterjee, Pearson.
2. Technical Communication: Principles and Practice by Meenakshi Raman and, Oxford University Press.

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Understand the concept and nature of communication and the objectives of technical communication relevant for the workplace as Engineers.
CO2	Apply and use suitable vocabulary and grammar with confidence and express their ideas both in speech and writing.
CO3	Evaluate the efficacy of students as fluent and efficient communicators by learning the voice dynamics
CO4	Create and develop effective writing skills to write in a clear, concise, and persuasive manner at the workplace and in the professional world
CO5	Understand and acquire strategic competence to use both spoken and written language in a wide range of communication strategies

CO – PO MAPPING												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	0	0	0	0	2	2	2	3	3	3	2
CO2	0	0	0	0	0	1	1	1	2	3	2	2
CO3	0	0	0	0	0	2	2	2	3	3	3	1
CO4	0	0	0	0	0	2	2	2	3	3	3	2
CO5	0	0	0	0	0	2	2	2	3	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation



COMMUNICATIVE ENGLISH & REPORT WRITING LABORATORY

Subject Code	26HS1201	Total Contact Hours	30
Semester	First/Second	Total Credit	1.5
Subject Name	Communicative English & Report Writing Laboratory		
Objectives	The purpose of the English lab is to involve students in actively participating in language learning exercises and to get more practice than in the traditional classroom environment. The primary role of the lab is to create an environment where students feel comfortable speaking the language they are learning and where they can get the help they need in their journey to learn English as a second language. The lab further focuses • To provide a platform for the students to develop their language skills. • To strengthen their professional skills and to improve fluency in spoken English, to practice correct pronunciation and neutralise their mother tongue influence. • To provide hands-on training in speaking, listening, reading and writing skills. • To improve the fluency of students in spoken English and neutralise their mother tongue influence		

SYLLABUS

Assignment I	Self- introduction	Assignment VI	Cover letter and CV writing
Assignment II	Professional presentation	Assignment VII	Listening Practice
Assignment III	PowerPoint presentation	Assignment VIII	Group Discussion
Assignment IV	Situational conversational practice/ Role play	Assignment IX	Mock Interview
Assignment V	Review of a book/newspaper editorial/ movie	Assignment X	Reading Practice

COURSE OUTCOME

COs	
CO.1	Understand and apply a wide range of communication strategies in both spoken and written communication.
CO.2	Understand and apply good linguistic competence - through accuracy in grammar, pronunciation and articulation.
CO.3	Understand and speak English with proper pronunciation, articulation, and voice modulation and neutralize their mother tongue influence.
CO.4	Create and make effective oral presentation by interpreting and analysing data, pictures and video and participate in group discussion on general topics.
CO.5	Apply and effectively integrate English language learning with employability skills and training.



CO – PO MAPPING												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	0	1	0	1	0	2	2	2	3	3	3	1
CO.2	0	0	0	0	0	1	1	2	3	3	3	0
CO.3	0	0	0	0	0	1	1	2	3	3	3	0
CO.4	0	0	0	1	0	1	2	0	3	3	3	1
CO.5	0	0	0	0	0	0	2	1	3	3	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

ENGINEERING GRAPHICS AND DESIGN LABORATORY

Subject Code	26ES1204	Total Contact Hours	30
Semester	First/Second	Total Credit	1.5
Subject Name	Engineering Graphics and Design Laboratory		
Pre-Requisites	Students should have a basic understanding of geometry, measurements, and elementary mathematics, along with an interest in technical drawing and visualization.		
Objectives	To provide students with the knowledge and skills required to prepare engineering drawings, visualize and represent engineering objects, and apply projection techniques for effective graphical communication.		

CONTENT (Any Ten)	
Exp.1	Introduction to drawing, different accessories details used in drawing
Exp.2	Lettering of single stroke letter
Exp.3	Lettering of double stroke letter
Exp.4	Lettering of gothic letter
Exp.5	Drawing of scales: plane scales
Exp.6	Drawing of diagonal scales :diagonal scales
Exp.7	Projection of a point situated in various quadrant
Exp.8	Projection of straight line.
Exp.9	Projection of plane figure
Exp.10	Projection of simple solids
Exp.11	Projection of solid and development surfaces

REFERENCES	
1	N.D Bhatt, Engineering Drawing ,Charotar Book Stall
2	K. L. Narayana and P. Kannaiah, Engineering Graphics, Tata McGraw Hill Publishing Co. Ltd.



COURSE OUTCOMES

COs	At the end of the course a student will be able to
CO1	Prepare and understand drawings.
CO2	Draw the projections of points, straight lines and plane surfaces in given quadrant.
CO3	Understand the projection of solids in various positions, dimensional objects and that will enable them to design new products.
CO4	Draw projections and solids and development of surfaces
CO5	Prepare isometric and perspective sections of solids and Represent the object in three dimensional appearances.

CO-PO-PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	2	-	-	-	-	2	-	-	2	1
CO2	3	2	1	-	2	-	-	-	-	1	-	-	3	-
CO3	3	3	3	1	2	-	-	-	-	1	-	1	3	1
CO4	3	2	3	1	2	-	-	-	-	1	-	-	3	-
CO5	3	2	3	-	3	-	-	-	-	2	-	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

WORKSHOP AND DIGITAL MANUFACTURING LABORATORY

Subject Code	26ES1205	Total Contact Hours	36
Semester	First/Second	Total Credit	1.5
Subject Name	Workshop and Digital Manufacturing Laboratory		
Pre-Requisites	Basic knowledge of mathematics, physics, measurement and safety practices.		
Objectives	This course aims to develop practical skills in the use of hand tools, fitting operations, and basic machining processes for fabrication of simple engineering components. It also introduces students to CNC machining, CNC programming fundamentals, additive manufacturing, and 3D printing technologies used in modern manufacturing and product development.		

DETAILED SYLLABUS

Experiment-#	Experiment	Hours
Experiment-1	Sensitization on different hand tools, instruments, machine tools and equipment used in workshop practices.	03
Experiment-2	Making of simple products using hand tools like hacksaw, files, etc.	12
Experiment-3	Machining of cylindrical products of given shape and dimensions.	09
Experiment-4	Study of CNC programming and machining.	06
Experiment-5	Study of 3D printing process	06

**Text Book:**

Workshop Manual, Department of Mechanical Engineering, ABIT (Autonomous)

COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Select suitable hand tools for fabrication works with proper safety measures.
CO2	Fabricate simple components through fitting operations by interpreting dimensions and specifications.
CO3	Perform basic turning operations on a lathe machine to produce jobs of given dimensions
CO4	Demonstrate understanding of CNC machining concepts, machine elements, and programming fundamentals
CO5	Demonstrate understanding of additive manufacturing and 3D printing technologies for rapid prototyping and production applications

CO-PO MAPPING

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

INDIAN KNOWLEDGE SYSTEM (IKS)

Subject Code	26MC1201	Total Contact Hours	15
Semester	First/Second	Total Credit	01
Subject Name	Indian Knowledge System (IKS)		
Objectives	- Understand the basics of IKS, Vedas, Indian philosophy, and the Guru-Shishya tradition. - Learn about India's contributions to Mathematics, Astronomy, Medicine, Architecture, and Metallurgy. - Understand Indian education, arts, epics, and ethical values. - Understand traditional environmental practices, yoga, and sustainability. - Connect Indian knowledge with modern technology, innovation, AI, and NEP 2020.		

MODULE I: Introduction to Indian Knowledge System**Individual Activities**

1. Prepare a simple chart on the six Indian philosophies (Shad Darshanas).
2. Write a short note (300 words): "What can we learn from the Guru-Shishya tradition?"
3. Attend a quiz on Vedas and Indian knowledge.



4. Create a timeline showing important events in Indian knowledge history.

Group Activities

1. Group discussion on the relevance of Indian philosophy today.
2. Poster making: *"Indian Knowledge Tree"*.
3. Storytelling based on an Upanishad or Indian philosophical story.

Community Activity

- Interview a teacher, scholar, or elder person about traditional learning methods.

Reflection

- Write one page on: *"What new thing did I learn about India's knowledge tradition?"*

MODULE II: Indian Knowledge in Science and Technology

Individual Activities

1. Short report on the Iron Pillar of Delhi.
2. Solve a few Vedic Mathematics problems.
3. Prepare a summary of Aryabhata's contributions.
4. Draw a simple Vastu-based house plan.

Group Activities

1. Build a model of a traditional water harvesting system.
2. Watch a documentary on Indian science and discuss.
3. Prepare a poster on famous Indian scientists.
4. Role-play as Aryabhata, Charaka, Sushruta, etc.

Community Activity

- Visit a local craftsman or artisan and observe traditional techniques.

Reflection

- Write about one Indian scientific achievement that impressed you.

MODULE III: Indian Knowledge in Society and Culture

Individual Activities

1. Compare Nalanda University with a modern university.
2. Write your personal code of ethics inspired by Indian values.
3. Watch a classical dance or music performance and write your observations.

Group Activities

1. Role play a scene from the Ramayana or Mahabharata.
2. Conduct a heritage visit and prepare a report.
3. Present on an Indian art form such as Odissi, Bharatanatyam, or Classical Music.

Community Activity

- Interview a local artist, weaver, or craftsperson.

Reflection

- Write about one value from Indian epics that can help in professional life.

MODULE IV: Indian Knowledge for Sustainable Development

Individual Activities

1. Connect three Indian traditional practices with UN Sustainable Development Goals (SDGs).



2. Maintain a 10-day Yoga practice diary.
3. Prepare a report on a traditional water management system.

Group Activities

1. Visit a local pond, canal, or water body and prepare a report.
2. Conduct a survey on eco-friendly traditional practices.
3. Design a Smart Village using traditional and modern technologies.

Community Activity

- Organize a Yoga awareness or wellness session.

Reflection

- Write about one sustainable habit you can adopt from Indian traditions.

MODULE V: IKS and Modern Technology

Individual Activities

1. Use AI tools to research an IKS topic and prepare a report.
2. Develop a startup idea based on traditional Indian knowledge.
3. Prepare a list of 5–10 research articles on IKS.

Group Activities

1. Mini Hackathon: Solve a problem using IKS concepts and modern technology.
2. Panel discussion on the importance of IKS in higher education.
3. Create a short video on any IKS topic.

Community Activity

- Present your project findings to school students or the local community.

Final Reflection

- Write: *"How has this course changed my understanding of Indian Knowledge and my future career?"*

SAMPLE IKS MINI PROJECTS

ACTIVITIES	OBJECTIVE	DELIVERABLES	OUTCOMES
1. Traditional Water Harvesting Systems of India	Study ancient water conservation techniques and compare them with modern methods.	• Model or poster • Report (5-10 pages) • Presentation	Examples: Stepwells, Johads, Tank Irrigation, Katas.
2. Vedic Mathematics for Faster Calculations	Learn and demonstrate Vedic Maths techniques.	• Solve 20 problems using Vedic methods. • Compare time with conventional methods.	Demonstration and report.
3. Medicinal Plants and Ayurveda	Document medicinal plants available in the local area.	• Identify 15–20 plants. • Mention scientific name, uses, and Ayurvedic significance.	Herbal garden catalogue or digital booklet.

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4. Smart Village Based on Traditional Indian Practices	Design a sustainable village using traditional knowledge and modern technology.	• Rainwater harvesting • Solar energy • Organic farming • Waste management	Layout plan and presentation.
5. Engineering Lessons from Ancient Indian Monuments	Study the engineering behind historical structures.	• Konark Sun Temple • Puri Jagannath Temple • Bhubaneswar Lingaraj Temple	Case study report
6. Indian Knowledge in Daily Life	Document traditional practices followed in households.	• Tulsi plantation • Traditional food preservation • Festival-based sustainability practices	Survey report and infographic.
7. Digital Documentation of Local Heritage	Create a digital archive of local heritage sites.	• Photography • Historical information collection • QR-code based information system	Website, brochure, or video.
8. Startup Idea from Traditional Knowledge	Develop a business idea inspired by Indian traditions.	• Herbal products • Eco-friendly packaging • Millet-based food products • Natural dyes	Lean Canvas and business pitch.

COURSE OUTCOME

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Explain the fundamental concepts of the Indian Knowledge System (IKS), including Vedas, Indian philosophies, Guru-Shishya tradition, and knowledge heritage of India.
CO2	Describe the contributions of ancient India in science, technology, mathematics, medicine, architecture, and metallurgy, and relate them to contemporary developments.
CO3	Analyze the role of Indian knowledge, ethical values, arts, culture, and educational traditions in shaping society and professional life.
CO4	Apply traditional Indian practices related to sustainability, environmental conservation, yoga, and wellness to address present-day societal and environmental challenges.
CO5	Discuss the relevance of Indian Knowledge Systems in modern technology, innovation, education, and sustainable development.

**CO – PO MAPPING**

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

YOGA

A B.Tech 1st-year Yoga sessional (often paired with Sports) focuses on holistic development. It is **heavily practical**, **emphasizing foundational yoga principles, postures (asanas), breathing techniques (pranayama), and meditation** to help engineering students manage academic stress and improve their physical well-being.

Subject Code	26MC1202	Total Contact Hours	15
Semester	First/Second	Total Credit	01
Subject Name	YOGA		
Objectives	- Understanding the mind-body connection and developing awareness through basic yogic practices. - Counteracting sedentary lifestyle effects and improving spinal health. - Regulating the nervous system and improving emotional resilience. - Achieving cognitive recovery and improving concentration.		

Teaching Methodology

- Demonstration and guided practice
- Interactive discussions
- Guided meditation sessions
- Reflective learning journal
- Continuous performance feedback

UNIT-I: Introduction and Foundation**(3 Hours)****Theoretical Concepts**

- Concept of Yoga: Myths and realities
- Relevance of Yoga in technical and professional education
- Science of breathing and diaphragmatic breathing
- Importance of posture and body awareness

Practical Applications

- Sukshma Vyayama (Joint Loosening Exercises)
- Neck movements
- Shoulder rotations
- Wrist exercises
- Ankle exercises
- Breathing awareness practices
- Corrective postural alignment techniques



UNIT-II: Posture Correction and Physical Strength

(4 Hours)

Theoretical Concepts

- Ergonomics for engineering students
- Anatomy of the spine and posture-related disorders
- Benefits and principles of Surya Namaskar

Practical Applications (Asanas)

- Tadasana • TiriyakTadasana • Bhujangasana • Marjariasana • Vrikshasana
- Surya Namaskar (12-step sequence)

Expected Benefits

- Improved spinal flexibility • Better posture and balance
- Enhanced muscular endurance • Reduction in neck and lower back discomfort

UNIT-III: Stress Management and Neurological Balance

(4 Hours)

Theoretical Concepts

- Autonomic Nervous System • Sympathetic Nervous System
- Parasympathetic Nervous System • Impact of stress on learning, creativity, and problem-solving
- Scientific basis of pranayama

Practical Applications (Pranayama)

- Anulom Vilom • Bhramari • Sheetali • Sheetkari • Kapalbhati

Expected Benefits

- Improved mental calmness • Reduced anxiety and stress
- Better emotional regulation • Enhanced alertness and concentration

UNIT-IV: Deep Relaxation and Focus Enhancement

(4 Hours)

Theoretical Concepts

- Sleep science and recovery • Concept of Non-Sleep Deep Rest (NSDR)
- Neuroplasticity and attention training

Practical Applications

- Yoga Nidra • Trataka (Candle/Point Gazing) • Guided Mindfulness Meditation

Expected Benefits

- Improved concentration • Better memory retention • Enhanced mental clarity
- Increased academic productivity

Reference Books :

1. Iyengar, B.K.S., Light on Yoga, HarperCollins.
2. Satyananda Saraswati, Asana Pranayama Mudra Bandha, Yoga Publications Trust.
3. Swami Vivekananda, Raja Yoga.
4. Ministry of AYUSH, Common Yoga Protocol.
5. Hatha Yoga Pradipika.



COURSE OUTCOMES

COs	Upon completion of the course the students will demonstrate the ability to:
CO1	Explain the fundamental concepts and scientific basis of yoga and its relevance to engineering education.
CO2	Demonstrate yogic postures and exercises for posture correction, flexibility, and musculoskeletal health.
CO3	Apply pranayama techniques for stress management, emotional regulation, and mental balance.
CO4	Practice meditation and relaxation techniques to enhance focus, productivity, and overall well-being.

CO – PO MAPPING

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) --: No Correlation

EVALUATION AND ASSESSMENT SCHEME

Assessment Component	Weightage	Evaluation Criteria
Practical Demonstration	50%	Performance of Surya Namaskar, Asanas, Pranayama, posture alignment and technique
Attendance & Participation	30%	Regular attendance, discipline, active participation and engagement
Viva Voce & Reflective Journal	20%	Understanding of concepts and reflection on impact of yoga on physical and mental well-being