GURU NANAK INSTITUTIONS TECHNICAL CAMPUS (AUTONOMOUS)

Khanapur (V), Ibrahimpatnam, R.R.Dist.- 501506

COURSE STRUCTURE
1st B.Tech- Civil Engineering

I Year I SEMESTER (CE)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0PH01	Engineering Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH02	Engineering Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total periods	**27**			**18.5**

I Year II SEMESTER (CE)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1

7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total Periods	**24**			**19.5**

1st B.Tech- Electrical and Electronics Engineering

I Year I SEMESTER (EEE)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total periods	**27**			**18.5**

I Year II SEMESTER (EEE)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1

7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total Periods	**24**			**19.5**

1st B.Tech- Mechanical Engineering

I Year I SEMESTER (ME)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0PH01	Engineering Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH02	Engineering Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total periods	**27**			**18.5**

I Year II SEMESTER (ME)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total Periods	**24**			**19.5**

1st B.Tech- Electronics and communication Engineering

I Year I SEMESTER (ECE)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (ECE)

Sl.No	SubjectCode	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech – Computer Science and Engineering

I Year I SEMESTER (CSE)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (CSE)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech – Computer Science Cyber Security (CSC)

I Year I SEMESTER (CSC)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (CSC)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech – Computer Science Data Sciences (CSD)

I Year I SEMESTER (CSD)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (CSD)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech – Computer Science Artificial Intelligence and Machine Learning Security (CSM)

I Year I SEMESTER (CSM)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (CSM)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech – Computer Science Internet of Things Security (CSO)

I Year I SEMESTER (CSO)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (CSO)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech – Computer Science Artificial Intelligence and Data Sciences (AIDS)

I Year I SEMESTER (AIDS)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (AIDS)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

1st B.Tech- Information Technology

I Year I SEMESTER (IT)

Sl. No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA01	Mathematics–I	3	1	0	4
2	18BS0CH01	Chemistry	3	1	0	4
3	18ES0EE01	Basic Electrical Engineering	3	1	0	4
4	18ES0CS01	Programming for Problem Solving	3	0	0	3
5	18BS0CH02	Chemistry Lab	0	0	3	1.5
6	18ES0EE02	Basic Electrical Engineering Lab	0	0	2	1
7	18ES0CS02	Programming for Problem Solving Lab	0	0	4	2
		Total periods	**24**			**19.5**

I Year II SEMESTER (IT)

Sl.No	Subject Code	Subject	L	T	P	Credits
1	18BS0MA02	Mathematics – II	3	1	0	4
2	18BS0PH03	Applied Physics	3	1	0	4
3	18HS0EN01	English	3	1	0	2
4	18ES0ME01	Engineering Graphics	1	0	4	3
5	18BS0PH04	Applied Physics Lab	0	0	3	1.5
6	18HS0EN02	English Lab	0	0	2	1
7	18ES0ME03	Engineering Workshop	1	0	4	3
		Total Periods	**27**			**18.5**

I Year B. Tech.

L	T	P	C
3	1	0	4

(18BS0MA01) MATHEMATICS-I
(Common to all)

Course Objectives: To learn

- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence and nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigen values and Eigen vectors.
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions.
- Find the extreme values of functions of two variables with/ without constraints.

Syllabus

UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Sequences & Series Sequence:

Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus Mean value theorems:

Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. G. B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.

Reference Books:

1. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Ravish R Singh., Engineering Mathematics, Tata McGraw Hill New Delhi.
4. Dr.S.Sivaiah , Mathematical Methods , University Science Press, New Delhi.

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS
(AUTONOMOUS)

I Year B. Tech.

L	T	P	C
3	1	0	4

(18BS0MA02) MATHEMATICS-II
(Common to all)

Course Objectives: To learn
- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes:
After learning the contents of this paper the student must be able to
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped
- Evaluate the line, surface and volume integrals and converting them from one to another using Greens, Stokes and Gauss divergence theorems.

Syllabus

UNIT-I: First Order Ordinary Differential Equations

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Second and Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax, \cos ax$ polynomials in $x, e^{x}V(x)$ and $xV(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

Reference Books:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
3. Ravish R Singh., Engineering Mathematics, Tata McGraw Hill New Delhi.
4. Dr.S.Sivaiah , Mathematical Methods , University Science Press, New Delhi.

I Year B. Tech.

L	T	P	C
3	1	0	4

(18BS0PH01) ENGINEERING PHYSICS
(Common to CE, ME)

Course Objectives:

- To make students understand the basic concepts & Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- To demonstrate competency and understanding of the concepts found in Mechanics, Harmonic Oscillations, Waves in one dimension, Acoustics, Lasers, Fiber Optics and a broad base of knowledge in physics.
- To equip engineering undergraduates with an understanding of the scientific method, so that they may use the training beneficially in their higher pursuits.

Course Outcomes:

At the end of the course the student will be able to:

- Verify laws of conservation of energy, linear momentum, angular momentum etc.
- Compute quality factor and power dissipated in damped harmonic oscillator.
- Identify the basic requirements of acoustically good buildings and compute reverberation time & absorption coefficient.
- Describe the properties of lasers, construction and working of laser, Classify different types of optical fibers and compute acceptance angle and numerical aperture of given optical fiber.
- Classify magnetic materials based on and magnetic moments and understand the significance of Faraday, Lenz's laws in Electromagnetism.

Syllabus

Module 1: Introduction to Mechanics

Introduction, Space and Time, Newton's laws of motion, Inertial frames, Mechanics of a particle: Conservation of linear momentum, Conservation of angular momentum, Conservation of energy; Forces in Nature, conservative and non-conservative forces, Central forces and examples, main features of central force , conservative force as a negative gradient of potential energy (F= -grad U), Curl of a conservative force.

Module 2: Harmonic Oscillations

Simple harmonic oscillators, Mechanical and Electrical oscillators, Damped harmonic oscillator: over, critical and under damping, energy and Power dissipation in Damped harmonic oscillator and Quality factor; Electrical analogy for a simple oscillator, mechanical and electrical impedance.

Module 3: Acoustics

Acoustics of buildings: Basic requirements of acoustically good hall, Reverberation, Reverberation time, the Factors effecting the Architectural Acoustics and their Remedies. Sabine's formula (Qualitative), Absorption coefficient and experiment to determine absorption coefficient by reverberation time method.

Module 4: Wave Optics

Huygens's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Newton's rings, and Michelson's interferometer, Diffraction, Fraunhofer diffraction from a single slit, Diffraction grating: Grating spectrum.

Module 5: Lasers and Fiber Optics:

Lasers: Interaction of radiation with matter: Absorption, Spontaneous and Stimulated emission, Characteristics of lasers: Resonating cavity, Active medium, pumping, population inversion, Construction and working of laser: Ruby laser, He-Ne laser, application of lasers.

Fiber Optics: Introduction, Principle and Construction of an optical fiber, Acceptance angle, Numerical aperture, Types of Fibers, Application of optical fibers.

Text Books:

1. Classical Mechanics-Goldstein- Norsa publications
2. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learing.
3. Engineering Mechanics, 2nd ed. — MK Harbola
4. Unified physics Vol-I S.L.Gupta and Sanjeev Gupta- JAICO
5. Engineering Physics, Shatendra Sharma & Jyotsna Sharma- Pearson Publishers

Reference books:

1. Introduction to Mechanics — MK Verma
2. Halliday and Resnick, Physics – Wiley. Introduction to Mechanics — D Kleppner& R Kolenkow
3. Principles of Mechanics — JL Synge & BA Griffiths
4. Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
5. Mechanical Vibrations — JP Den Hartog
6. Theory of Vibrations with Applications — WT Thomson
7. Unified Physics Volume 1- SL Gupta, Sanjeev Gupta

I Year B. Tech.

L	T	P	C
3	1	0	4

(18BS0PH03) APPLIED PHYSICS
(Common to CSE, ECE, EEE & IT)

Course Objective:

- To demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- To demonstrate competency and understanding of the concepts found in Quantum Mechanics, Semiconductor physics, Optoelectronics, Lasers and Faber optics.
- To inculcate problem solving skills that potentially draw knowledge in multiple areas of physics.

Course Outcomes:

At the end of the course the student will be able to:

- Understand the wave nature associated with material particles under given conditions.
- Evaluate the carrier concentrations of intrinsic & extrinsic semiconductors and study the characteristics of semiconductor devices (P-N diode & Zener diode).
- Understand the construction and working principles of Optoelectronic devices (LED, Solar cell and PIN photo detector).
- Describe the properties of lasers, construction and working of laser.
- Classify different types of optical fibers and compute acceptance angle and numerical aperture of given optical fiber.

Syllabus

Module 1: Quantum Mechanics

Introduction to quantum mechanics, de-Broglie hypothesis, wave particle duality, properties of matter wave, Heisenberg's Uncertainty principle, Davisson and Germer's Experiment Physical significance of wave function, Schrodinger's time independent wave equation, particle in one dimensional potential well.

Module 2: Semiconductor Physics

Intrinsic and extrinsic semiconductors, Calculation of Carrier concentration in intrinsic semiconductors, Calculation of carrier concentration in n-type and p-type semiconductors. Carrier generation and recombination; drift current and diffusion current, Hall Effect (qualitative treatment), P-N junction diode: I-V Characteristics, Zener diode: I-V Characteristics

Module 3: Optoelectronics

Introduction to Optoelectronics, LED; Working Principle, materials, Construction, Characteristics, PIN photo-detectors: Construction, Materials, Working principle and Characteristics, Solar cell: Construction and Characteristics.

Module 4: Lasers

Introduction to interaction of radiation with matter, Absorption, Spontaneous and Stimulated emissions, differences between spontaneous and stimulated emissions,

characteristics of lasers, resonating cavity, Active medium, metastable state, pumping, population inversion, Construction and working of lasers: Ruby laser, semiconductor laser, applications of lasers.

Module 5: Fiber Optics

Introduction, Principle and Construction of an optical fiber, Acceptance angle, Numerical aperture, Types of Fibers: Step index and Graded index optical fibers, losses in optical fibers, Optical fiber in communication system, Application of optical fibers.

Text Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learning.
2. Engineering Physics, Shatendra Sharma, Jyotsna Sharma – Pearson Publications.
3. Optoelectronics: An introduction, J.Wilson & J.F.B.Hawkes by Printice Hall Inc.
4. Optoelectronics, Ghatak, Oxford University press.
5. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).

Reference Books:

1. Lasers & Non-linear Optics, B.B.Laud, New Age International publishers.
2. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
3. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
4. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.

I Year B. Tech.

L	T	P	C
3	1	0	4

(18BS0CH01) CHEMISTRY
(Common to all)

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Course Objectives

1. To bring compliancy to the concept of chemistry and to achieve the required skills to become an ideal engineer.
2. To recognize the basic knowledge of atomic and molecular structures with electronic modifications which makes the student to infer the technology based on them.
3. To attain the knowledge of synthesis of drugs, water treatment which are play a vital role in industry.
4. To secure the proficiency of spectroscopy in various fields.
5. To convey the concepts of organic reaction aspects and chemical equilibrium useful for reaction pathways.

Course Outcomes

The course will enable the student to:

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Elucidate the properties and processes using electrochemical considerations.
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
4. Deliberate Organic and drug properties such as Oxidation, Reduction properties.
5. Apply the chemical reactions that are used in the synthesis of molecules.

Syllabus:

UNIT-1: Periodic Properties and Theories of Bonding:

Periodic properties: Electronic configurations, Atomic and ionic sizes, ionization energies, electron-affinity, electro-negativity (Definition and factors), oxidation states and Penetration of s, p, d and f orbitals.

Crystal field theory (CFT): salient features of CFT- Crystal field splitting patterns of transition metal ion d-orbital in tetrahedral, octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

Molecular Orbital Theory: Linear combination of atomic orbitals (LCAO), Molecular orbital Energy level diagrams of diatomic (N_2, O_2 and F_2). Pi (Π) - molecular orbitals of Butadiene and Benzene.

UNIT-2: Water and its Treatment:
Hardness of water – causes, types, units and numerical problems. Estimation of hardness of water by Complexo-metric method by using EDTA, Boiler troubles: Boiler corrosion, Caustic Embrittlement and scale-sludge formation. Internal Treatments – Calgon, Phosphate and Colloidal conditioning. External treatments - Ion-Exchange process. Desalination of water- - Reverse Osmosis. Potable water and its specifications, Step involved in treatment of potable water - Disinfection of water by Chlorination and Ozonization.

UNIT-3: Electrochemistry and Corrosion:
Electrochemistry: Cells - Electrochemical and Electrolytic cells. Standard Electrode potential, Nernst equation, Electro-chemical series and significance. Types of Electrodes: SCE and Glass Electrode, Batteries: Dry cell and Li-ion battery. Fuel cells- H_2-O_2 Fuel cell and its Applications.

Corrosion: Causes and effects. Mechanism of Chemical and Electrochemical corrosion, types of corrosion - Galvanic, waterline, pitting. Factors affecting corrosion- Nature of metal (Purity, position and nature of oxide film) and Nature of Environment (Temperature, pH, humidity). Corrosion control methods- Cathodic protection. Surface coatings- Metallic coating - Hot dipping-Galvanizing, Tinning, Electroplating and Electroless-plating of copper.

UNIT-4: Organic Reactions Mechanism and Synthesis of Drug Molecules:
Reaction Mechanism: Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN_1& SN_2 reactions. **Electrophilic and Nucleophilic addition reactions:** Addition of HBr to Propene. Markownikoff and anti-Markownikoff's additions. Grignard additions on carbonyl compounds. **Elimination reactions:** Dehydro-Halogenation of alkylhalides. Saytzeff rule. **Oxidation reactions:** Oxidation of alcohols using $KMnO_4$ and chromic acid. **Reduction reactions:** Reduction of carbonyl compounds using $LiAlH_4$&$NaBH_4$. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT-5: Spectroscopic Techniques and Applications:
Principles of electronic spectroscopy: Beer's Lamberts law, numerical problems. Types of electronic excitations. Applications of UV-Visible spectroscopy. **IR Spectroscopy:** Principle, modes of vibrations, selection rules, Force constant, some common organic Functional groups wave no. regions (C-H, N-H, O-H, -COOH, C=O, C≡N and C≡C) Applications of IR Spectroscopy, **H NMR (NMR Spectroscopy):** Principle of NMR spectroscopy Chemical shift, chemical shifts of some common organic protons. Introduction to MRI.

Text Books:

1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing company (P) Ltd., New Delhi.
2. Text Book of Engineering Chemistry Shashi Chawla, Dhanpat Rai Publishing company (P) Ltd., New Delhi.

Reference Books:

1. Physical Chemistry, by P.W. Atkins
2. University Chemistry, by B.H. Mahan
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt & N.E.Schore, 5th Edition.
5. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishna.

I Year B. Tech.

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(18HS0EN01) ENGLISH
(Common to all)

Introduction

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative, and critical thinking competencies of Engineering Students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development in the areas of vocabulary, Grammar, Reading and writing skills, fostering ideas and practice of language skills in various contexts.

Learning Objectives

The course will help the students to

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes:

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- The student will acquire basic proficiency in English including reading and listening comprehension, writing, and speaking skills.

SYLLABUS

(**Note:** As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is ***open-ended***, it is required to prepare teaching /learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the class.)

UNIT-I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The concept of Word Formation-The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance-Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures-Use of Phrases and Clauses in Sentences-Importance of Proper Punctuation-Techniques for Writing Precisely-**Paragraph Writing**-Types, structures and Features of a paragraph-Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT-II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms

Grammar: Identifying Common Errors with reference to Noun-Pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills-Techniques for Good Comprehension.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of complaint, Letter of Requisition, Job Application with Resume.

UNIT-III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading-Skimming and Scanning

Writing: Nature and Style of Sensible Writing-Defining-Describing Objects, Places and Events-**Classifying**-Providing Examples or Evidence

UNIT-IV

'What should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English.

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension-Intensive Reading and Extensive Reading.

Writing: **Writing Practices**—Writing Introduction and Conclusion- Essay Writing-Precis Writing.

UNIT-V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their Usage.

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice.

Writing: **Technical Reports**-Introduction-Characteristics of a Report-Categories of Reports-Formats-Structure of Reports (Manuscript Format)-Types of Reports-Writing a Report

Note: Listening and Speaking Skills which are given under Unit-6 are covered in the syllabus of ELCS Lab Course.

Text book:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

Reference Books:

1. Practical English Usage. Michael Swan. OUP. Fourth Edition 2016
2. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2018.
3. English: Context and Culture by Board of Editors published by Orient BlackSwanPvt. Ltd.
4. Remedial English Grammar. F.T. Wood. Macmillan.2007.
5. On Writing Well. William Zinsser. Harper Resource Book. 2001.
6. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
7. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

I Year B. Tech.

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(18ES0EE01) BASIC ELECTRICAL ENGINEERING
(Common to all)

Course Objectives:

- To introduce the concepts on electrical and magnetic circuit components and analyze the response for excitations.
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To understand and analyze basic Electric circuits and Magnetic circuits.
- To analyze and solve electrical circuits using network laws and theorems.
- To learn the working principles and characteristics of DC/AC Electrical Machines and applications.
- To introduce components of Low Voltage Electrical Installations and batteries

Syllabus

UNIT-I: D.C. Circuits

Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

Time-domain analysis of first-order RL and RC circuits (elementary treatment only).

UNIT-II: A.C. Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Introduction to three phase balanced AC circuits (elementary treatment only).

UNIT-III: Transformers

Magnetic materials, B-H characteristics. Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections (elementary treatment only).

UNIT-IV: Electrical Machines

DC Machines: - Construction, working, torque-speed characteristics and speed control of separately excited DC motor.
Three-Phase Induction Motor: - Generation of rotating magnetic fields, Construction and working, significance of torque-slip characteristic, loss components and efficiency, Starting and Speed Control methods (elementary treatment only). Single Phase Induction Motor: - Construction, working principle, types of 1-phase motors and speed torque characteristics (elementary treatment only).
Synchronous generators: - Construction and working principle.

UNIT-V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. M. Surya Kalavathi, Ramana Pilla “ Basic Electrical and Electronics Engineering”, S.Chand and Company Limited, 1st Edition, 2017

Reference Books:

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
3. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

I Year B. Tech.

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(18ES0CS01) PROGRAMMING FOR PROBLEM SOLVING
(Common to all)

Course Objectives:
To learn the fundamentals of computers.
To understand the various steps in program development.
To learn the syntax and semantics of C programming language.
To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn
To write algorithms and to draw flowcharts for solving problems.
To convert the algorithms/flowcharts to C programs.
To code and test a given logic in C programming language.
To decompose a problem into functions and to develop modular reusable code.
To use arrays, pointers, strings and structures to write C programs.
Searching and sorting problems.

Syllabus

Unit - I: Introduction to Programming

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments.

Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do
While loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, std out and std err. Command line arguments

Unit - II: Arrays, Strings, Structures and Pointers

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (noimplementation) Enumeration data type

Unit - III: Preprocessor and File handling in C

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Unit - IV: Function and Dynamic Memory Allocation

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arraysof different data types

Unit - V: Introduction to Algorithms

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms),

Basic concept of order of complexity through the example programs

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, and Pearson Education.
5. Herbert Schildt, C: The Complete Reference, McGraw-Hill

I Year B. Tech.

L	T	P	C
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(18ES0ME01) ENGINEERING GRAPHICS
(Common to all)

Course Objective:

To introduce the students to the "Universal Language of Engineers" for effective communication through drafting exercises of geometrical objects.

Course Outcomes:

- Construct and understand the importance of mathematical curves in Engineering application
- Analyze the basic concepts of Projection of points, lines and planes
- Visualize geometrical solids in 3D space through exercises in Orthographic projection
- Develop the surfaces and intersection of geometrical solids
- Interpret Orthographic and Isometric views of objects and Apply AutoCAD that uses solid modeling approach for 2D drawings.

Syllabus

UNIT – I

INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola - General method only, Cycloid, Epi-cycloid and Hypocycloid, Scales- Plain & Diagonal.

UNIT – II

ORTHOGRAPHIC PROJECTIONS

Principles of Orthographic Projections – Conventions - Projections of Points and lines, Projections of Plane regular geometric figures – Auxiliary planes

UNIT – III

Projections of Regular solids – Auxiliary views – Sections or Sectional views of Right Regular Solids - Prism, Cylinder, Pyramid, Cone – Auxiliary views – Section of Sphere.

UNIT – IV

Development of surfaces of right Regular Solids – Prisms, Cylinder, Pyramids and cone, intersection of solids: Intersection of – Prism vs. Prism - Cylinder vs. Cylinder

UNIT – V

ISOMETRIC PROJECTIONS

Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric views of lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines, Isometric Projection of Spherical parts, Conversion of Isometric Views to Orthographic Views and vice-versa- Conversions

INTRODUCTION TO CAD: (For internal evaluation Weightage only)
Introduction to CAD software Package Commands – Free Hand Sketches of 2D – Creation of 2D Sketches by CAD Package

Text/Reference Books:

1. Engineering Drawing, N.D. Bhatt & V.M.Panchal / Charotar (2014) Publishing House
2. Engineering Drawing, M.B.Shah & Rana B.C (2008) / Pearson
3. Engineering Drawing, Basant Agarwal and M.C.Agarwal (2012)/ Mc Graw Hill
4. Engineering Drawing, K.L.Narayana and P.Kannaiah (2008) / Scitech Publishers
5. Computer aided Engineering drawing, K.Balaveera Reddy / CBS Publisher

I Year B. Tech.

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(18BS0CH02) ENGINEERING PHYSICS LAB
(Common to CE & ME)

Course objective:

To stimulate scientific temper and analytical capabilities by providing logical thoughts of engineering problems that would come across due to rapidly developing new technologies.

Course Outcomes:

At the end of the course the student will be able to:

- Apply knowledge to determine very small dimensions of objects using Vernier calipers and screw gauge.
- Test optical components using principles of interference and diffraction of light.
- Demonstrate laws of resonance in stretched strings and LCR circuits.
- Identify the possible reasons for occurrence of errors in the experimental and theoretical values.

List of Experiments
(Any 8 experiments only)

1. Melde's experiment:
   To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.
2. Torsional pendulum:
   To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. Newton's rings:
   To determine the radius of curvature of the lens by forming Newton's rings.
4. Diffraction grating:
   To determine the wavelength of laser by using diffraction grating.
5. Damped Oscillator:
   To determine the coefficient of damped oscillator.
6. Optical fiber:
   To determine the bending losses of Optical fibers.
7. Optical fiber:
   To determine the Numerical aperture and Acceptance angel of a given fiber.
8. Plank's Constant:
   To determine the Planck`s constant using photocell or light emitting diodes.
9. LCR Circuit:
   To determine the resonance frequency and quality factor of LCR Circuit
10. LASER:
    To study the V-I characteristics of Laser diode.

I Year B. Tech.

L	T	P	C
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(18BS0CH02) APPLIED PHYSICS LAB
(Common to CSE, ECE, EEE & IT)

Course Objective:

To make students gain practical knowledge to co-relate with the theoretical studies, achieve perfectness in experimental skills and design circuits using new technologies and latest components.

Course Outcomes:

At the end of the course the student will be able to:

- Employ ammeter, signal generator for making measurements.
- Determine the selectivity parameters in electrical circuits.
- Compare voltage-current characteristics of Laser diodes, Light emitting diodes, PIN diode etc.
- Identify the possible reasons for occurrence of errors in the experimental and theoretical values.
- Construct solar panel circuits for different applications

List of experiments
(Any 8 experiments)

1. Energy gap of P-N junction diode:
   To determine the energy gap of a semiconductor diode.
2. Solar Cell:
   To determine the fill factor and efficiency of Solar cell.
3. Light emitting diode:
   To plot V-I characteristics of light emitting diode.
4. Zener Diode:
   To Study the V-I characteristics of Zener Diode.
5. Hall effect:
   To determine the electrical conductivity, mobility and concentration of carriers.
6. Four-Probemethod**:**
   To determine the resistivity and band gap using Four Probe method
7. LASER:
   To study the V-I characteristics of LASER sources.
8. Optical fiber:
   To determine the numerical aperture and bending losses of optical fibres.
9. Plank's Constant:
   To determine the Planck`s constant using photocell or light emitting diodes.
10. PIN diode:
    To study the V-I characteristics of PIN diode.

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L	T	P	C
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(18BS0CH02) CHEMISTRY LAB
(Common to all)

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

Course Objectives

1. To develop the scientific attitude by means of distinguishing, analyzing and solving various engineering problems.
2. To comprehend the concept of interaction between electrical energy and chemical energy.
3. To gain the knowledge about physical properties of liquids.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic technique.
5. To illustrate the rate of reactions and their functions.

Course Outcomes

The students will learn to:

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Choose the appropriate preparation methods of drugs.
4. Determine the parameters like hardness and chloride content in water.
5. Students can have practical observation of change in conductance and potential difference with neutralization using conductometer and potentiometer.

(Choice of 10-12 experiments from the following):

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. Eg: ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati & V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma & D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

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(18HS0EN02) ENGLISH LAB
(Common to all)

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in Spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews.

Learning Outcomes:

Students will be able to attain

- Better understanding of nuances of English Language through audio-visual experience and group activities.
- Neutralization of accent for intelligibility
- Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus:

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning Lab

b. Interactive Communication Skills Lab

Listening Skills

Objectives

1. To enable students, develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills
Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role Play-Individual/Group activities

The following course content is prescribed for English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab).

Exercise I
CALL LAB:
Understand: Listening Skill-Its importance-Purpose-Process-Types-Barriers of Listening.
Practice: Introduction to Phonetics-Speech Sounds-Vowels and Consonants.
ICS LAB:
Understand: Communication at Work Place-Spoken vs. Written language.
Practice: Ice-Breaking Activity and JAM session-Situational Dialogues-Greetings-Taking Leave-Introducing Oneself and Others.

Exercise II
CALL LAB:
Understand: Structure of Syllables-Word Stress and Rhythm-Weak Forms and Strong Forms in Context.
Practice: Basic Rules of Word Accent-Stress Shift-Weak Forms and Strong Forms in Context.
ICS LAB:
Understand: Features of Good Conversation-Non-Verbal Communication
Practice: Situational Dialogues-Role Play-Expressions in Various Situations-Making Requests and Seeking Permissions-Telephone Etiquette.

Exercise III
CALL LAB:
Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation-Differences in British and American Pronunciation.
ICS LAB:
Understand: How to make Formal Presentations.
Practice: Formal Presentations.

Exercise IV
CALL LAB:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests.

ICS LAB:
Understand: Public Speaking-Exposure to Structured Talks.
Practice: Making a Short Speech-Extempore.

Exercise V
CALL LAB:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS LAB:

1. Introduction to Interview Skills.
2. Common Errors in Speaking.

Minimum Requirement of Infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning(CALL) Lab:**

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English Language Learning Software for self-study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. **Interactive Communications Skills (ICS) Lab**:

The Interactive Communications Skills Lab: A spacious room with movable chairs and audio - visual aids with a Public-Address System, a LCD and a projector etc.

I Year B. Tech.

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(18ES0EE02) BASIC ELECTRICAL ENGINEERING LAB
(Common to all)

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Get an exposure to common electrical components and their ratings.
- Get an exposure to basic electrical laws and knowledge on usage of measuring instruments.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and DC&AC electrical machines.

List of experiments/demonstrations:

(Any 10 experiments are to be performed)

1. a) Basic electrical safety precautions. Identification, Specification of resistors, capacitors and inductors and measuring DC&AC voltage, current, power with voltmeter, ammeter, wattmeter and multimeter.
   b) Understanding the Low Voltage switchgear. (SFU, MCB)
2. Verification of Ohms Law
3. Verification of KVL and KCL
4. Resonance in series RLC circuit
5. Verification of Thevenin's Theorem and Norton's Theorem
6. Verification of Superposition Theorem
7. Transient Response of Series RL and RC circuits for DC excitation
8. Transient Response of RLC Series circuit for DC excitation
9. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
10. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
11. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
12. Demonstration of cut-out sections of machines
    a) DC Machine b) Three-phase induction machine c) Single phase induction machine
    d) Synchronous machine
13. Performance Characteristics of a DC Shunt Motor.
14. Performance Characteristics of a Three-phase Induction Moto
15. No load characteristics of three phase alternator.

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I Year B. Tech.

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(18ES0CS02) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to all)

Course Objectives: The students will learn the following:
- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:
- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.

b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

a. Write a program for find the max and min from the three numbers.

b. Write the program for the simple, compound interest.

c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

5 x 1 = 5
5 x 2 = 10
5 x 3 = 15

e. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user,
performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

c. Write a program that finds if a given number is a prime number

d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence
are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

g. Write a C program to find the roots of a Quadratic equation.

h. Write a C program to calculate the following, where x is a fractional value.
1-x/2 +x^2/4-x^3/6

j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+…….+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.

c. Write a C program that uses functions to perform the following:
i. Addition of Two Matrices
ii. Multiplication of Two Matrices
iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

d. Write C programs that use both recursive and non-recursive functions
i. To find the factorial of a given integer.
ii. To find the GCD (greatest common divisor) of two given integers.
iii. To find x^n

e. Write a program for reading elements using pointer into array and display the values using array.

f. Write a program for display values reverse order from array using pointer.

g. Write a program through pointer variable to sum of n elements from array.

Files:

a. Write a C program to display the contents of a file to standard output device.

b. Write a C program which copies one file to another, replacing all lowercase characters
with their uppercase equivalents.

c. Write a C program to count the number of times a character occurs in a text file. The

file name and the character are supplied as command line arguments.

d. Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back.

e. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

c. Write a C program that uses functions to perform the following operations:

i.To insert a sub-string in to a given main string from a given position.

ii. To delete n Characters from a given position in a given string.

d. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

e. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.

f. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose
between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

1 1 2 1 2 3	* * * * * *	1 2 3 4 5 6	1 2 2 3 3 3 4 4 4 4	* * * * * * * * *

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.

b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

e. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

d. Write a C program that sorts the given array of integers using selection sort in descending order

e. Write a C program that sorts the given array of integers using insertion sort in ascending order

f. Write a C program that sorts a given array of names

Reference Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

I Year B. Tech.

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(18ES0ME03) ENGINEERING WORKSHOP
(Common to all)

Course Objective:

1. Introduction to different manufacturing methods in different fields of engineering Practical exposure to different fabrication techniques
2. Creation of simple components using different materials
3. Exposure to some of the advanced and latest manufacturing techniques being employed in the industry

Course Outcomes: At the end of the course, the student will be able to

1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. By assembling different components, they will be able to produce small devices of their interest.
4. The students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Note: Workshop Manufacturing Practices [A total of 10 lecture hours & 60 hours of lab.]

Lectures & videos:

- ❖ Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
- ❖ CNC machining, Additive manufacturing
- ❖ Fitting operations & power tools
- ❖ Electrical & Electronics
- ❖ Carpentry
- ❖ Plastic moulding, glass cutting
- ❖ Metal casting
- ❖ Welding (arc welding & gas welding), brazing

Workshop Practice:

1.	Machine shop	-	10 hours
2.	Fitting shop	-	8 hours
3.	Carpentry	-	6 hours
4.	Electrical & Electronics	-	8 hours
5.	Welding shop	-	8 hours
6.	Casting	-	8 hours
7.	Smithy	-	6 hours
8.	Plastic moulding & Glass Cutting	-	6 hours

Note- Two exercise's in each Trade

Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.