B. Tech 1st year Syllabus (2nd Semester)

2nd Semester:

Sl. No.	CourseCode	Course Name	Category	L-T-P	Credit
1	ECL 1201	Basic Electronics Engineering	DC	3-0-0	3
2	HUL 1202	Social Science	DC	2-0-0	2
3	MAL 1202	Engineering Mathematics II	DC	3-1-0	4
4	PHL 1201	Engineering Physics	DC	3-0-0	3
5	CSL 1201	Introduction to Computer Programming	DC	3-0-0	3
6	CHL 1201	Environmental Science	DC	2-0-0	2
Practical					
1	MEP 1201	Engineering Drawing	DC	0-0-4	2
2	CSP 1201	Introduction to Computer Programming Laboratory	DC	0-0-3	1.5
3	PHP 1201	Physics Laboratory	DC	0-0-3	1.5
4	MEP 1202	Mechanical Workshop	DC	0-0-3	1.5
5	ECA 1201	Extracurricular Activity	DC	0-0-0	AUDIT
TOTAL				16-1-13	**23.5**

ECL 1201 Basic Electronics Engineering

CO1 Identify semiconductors, and their properties
CO2 Understand essential operation of semiconductor diodes and transistors
CO3 Characterize and analyze various diodes and their applications
CO4 Design simple rectifier, oscillator and amplifier circuits and BJT characteristics
CO5 Understand the fundamentals of digital number system

Syllabus

Physics and Properties of Semiconductors: **Lectures: 08**

Semiconductor, Metals, Insulators, Energy bands, statistics, Fermi level, carrier concentration at thermal equilibrium, carrier transport phenomena, generation and recombination of carriers, basic properties for semiconductor operation.

PN Junction diode: **Lectures: 06**

Physical Description of p-n junction, Poisson's Equation, current flow at a junction, I–V characteristics, Quantitative analysis of p-n diode characteristics, Avalanche and Zener breakdown (zener diode).

Diode applications: **Lectures: 05**

Filter circuit: Passive filters (RC; low pass, high pass filter), Series and shunt diode clippers, clipping at two independent levels, clamping operation, clamping circuit, Basic regulator supply using Zener diode.

Other diodes: **Lectures: 02**

Photodiode, LED, Varactor and PV Cell.

Transistors: **Lectures: 09**

Construction and characteristics of BJT: CB, CE, CC configuration and their input output characteristics. Transistor action and dependence on device structure, Ebers- Moll Model, Coupled-Diode model current-voltage characteristics.

Field effect transistor: **Lectures: 06**

Construction of JFET, pinch-off voltage, volt-ampere characteristics, transfer characteristics, types of MOSFET (enhancement and depletion) construction and characteristics

Amplifiers and oscillators: **Lectures: 04**

Classification of amplifiers, concept of feedback, Characteristics of feedback amplifiers, basics of oscillator, barkhausen criterion, introduction to Op-Amp.

Basic Digital Logic: **Lectures: 02**

Boolean Algebra, Basic Logic Gates, Number System

Text Books:

1. Electronics: Fundamental and Applications, 15th eds by D. Chattopadhyay and P C Rakshit.
2. Electronics Devices and Circuit Theory by R. Boylestad.
3. Principles of Electronics, VK Mehta and Rohit Mehta, S. Chand Publishing, 2022
4. Digital Circuits Vol. I (Combinational Circuits) by Diptiman Ray Chauduri

Reference Books:

1. Electronics Devices and Circuits-II by A.P.Godre & U.A. Bakshi.
2. Electronics Devices and Circuit by G.K. Mithal.
3. Electronic Principles, A. P. Malvino and D. J. Bates, 7th Edn, McGraw-Hill Higher Education, 2007.
4. D.A. Neamen, Semiconductor Physics & Devices, TMH, 2003.

HUL1202 Social Sciences

Introduction: Meaning, Scope and general utility of Social Science to Engineers; Different Subjects in Social Sciences; Applied Humanities and Human Engineering. **Lectures: 04**

Fundamental Concepts in Social Sciences: Types, Characteristics and Problems; Social Structure and Social System; Social Stratification, Social Change and Social Control. Types, Characteristics, Difference between Culture and Civilization; Family and Marriage Institution in India. **Lectures: 06**

Industrialization & Society: Industrial Psychology and Industrial Democracy; Environment in Industry, Motivation, Selection and Training of Workers; Fatigue of Workers.

Lectures: 06

Political Orientation: Indian Constitution; Federal System, Directive Principles, Legislative measures for Labour Welfare; Bureaucracy in India.

Lectures: 06

Major Social Problems in India:

1. Illiteracy **Lectures: 06**
2. Poverty
3. Population
4. Slums
5. Family Disorganisation
6. Corruption

Total Lectures: 28

Text Books:

1. Asudani. V.H. *An Easy Approach to Social Science*.
2. Shabbir. S. A.M. Sheikh and Jaya Dwadashiwar. *New Look Into Social Science.*

Reference Books:

1. Zoya, Hasan. And E. Sridharan (eds.). *India's Living Constitution: Ideas, Practices, Controversies* –Delhi: Permanent Black, 2002.
2. P.M Bakshi. *The Constitution of India* -Delhi: Universal Law Publishing, 2002.
3. Kozlowaski. Steve W. J. *The oxford handbook of organizational psychology*.
4. Ahuja. Ram. *Social Problems in India*.

MAL 1202 ENGINEERING MATHEMATICS--II

Function of Several variables: Limit, continuity, and differentiability of functions of several variables, partial derivatives and their geometrical interpretation, Tangent plane, and normal line. Euler's theorem on homogeneous functions, Total differentiation, chain rules, Jacobian, Inverse function theorem and implicit function theorem (statement only). Taylor's formula, maxima and minima, Lagrange's method of undetermined multipliers. (12Hrs)

Multiple Integrals: Double and triple integrals, change of order of integration, change of variables, application to area, volume, mass, centre of gravity and moment of inertia. (9Hrs)

Vector Calculus: Vector Differentiation: Scalar and vector fields, gradient of scalar point function, directional derivatives, divergence, and curl of vector point function, solenoidal and irrotational vectors. Vector Integration: line, surface and volume integral, theorem, Green's theorem, Stokes' theorem and Gauss divergence theorem (without proof). (10Hrs)

Ordinary Differential Equations: Formation of differential equations: its order and degree. First order differential equations: Exact equation, integrating factors, Reducible to exact differential equations, linear and Bernoulli's form. Solution of first order and higher degree differential equations. Second order differential equations: Solutions of second and higher order linear equation with constant coefficients, Linear independence, and dependence of solutions, Wronskian. Method of variation of parameters, solution of Cauchy's equation, simultaneous linear differential equations. (12Hrs)

Textbooks:

1. E. Kreyszig: Advanced Engineering Mathematics, 8th ed., John Wiley&Sons,2007.
2. G. B. Thomas and R. L. Finney: Calculus and Analytic Geometry 9th ed., Addison Wesley Longman, Inc; 1998.
3. W. E. Boyce and R. C. DiPrima: Elementary Differential Equations. 8th ed., John Wiley & Sons, Inc., New York,2005.

Reference Books:

1. Tom M. Apostol: Calculus, Volume 11,2nded., Wiley,2007.
2. R. K. Jain and S.R.K. Iyengar: Advanced Engineering Mathematics, Narosa Publishers, 2002.
3. S. L. Ross: Introduction to Ordinary Differential Equations, 4th ed.,Wiley,1989.

PHL 1201 Engineering Physics

Wave and Oscillations: Overview of vibrations with emphasis on damped and forced oscillations, Resonance, Coupled oscillations, Simple Harmonic Motion. **(05 hrs)**

Optics: Interference- Conditions for interference, types, Methods for producing Interference pattern of light, Fresnel's bi-prism, Newton's ring. Diffraction- Types of Diffraction, Diffraction by a single slit, double slit, diffraction by a N parallel slit: Diffraction grating. Polarization- Types of polarized light, Brewster's law, Nicol prism. **(10hrs)**

Wave Mechanics: Planck's theory of black body radiation, Photoelectric effect, Compton effect, Wave particle duality, de-Broglie matter waves, Davisson and Germer's experiment, Physical interpretation of wave function, Schrodinger's wave equation and its application particle in a box. **(10 hrs)**

Solid State Physics: Free electron theory, Band theory of solids- Classification of materials based on band theory of solid, Semiconductor, Fermi level in an intrinsic and extrinsic semiconductor, Hall effect. **(06 hrs)**

Lasers and Fibre optics: Lasers, Einstein's A and B coefficients, Population inversion, Optical pumping, Optical Resonators, Characteristics of lasers, Ruby laser, He-Ne laser, Semiconductor laser.

Introduction to fibre optics, Construction, types, Principle of wave propagation, Numerical aperture, Fibre losses, Applications of optical fibre. **(10hrs)**

Text books:

1. Concept of Modern Physics; Arthur Beiser: Tata Mc Graw Hills, 6th edition, 2009.

2. Applied Physics for Engineers; Neeraj Mehta: PHI Publication, 1st edition, 2011.

3. Fundamental of Physics Extended Volume; Resnick Halliday and Walker: John Wiley & Sons , 8th Asian Edition, 2008.

Reference books:

1. Quantum Mechanics; L. I. Schiff: TataMc Graw Hills, 3rd edition, 2010.

2. Optics; Ajoy Ghatak: Tata McGraw Hills, 4th edition, 2009.

CSL1201 Introduction to Computer Programming

Computer Basics: Introduction, Characteristics of a Computer, Criteria for Using Computers, History of Computers, Generations of Computer, Classification of Computers, Applications of Computer, Basic Components of PC, Computer Architecture. Computer Hardware, Computer Software, Internet. **Lecture: 3**

Number System: Binary number, Octal number, Hexadecimal number system and their conversion among them. **Programming basics**: Assembly language, High level language, Compiler and assembler. **Lecture: 4**

Keyword & Identifiers: History & Importance of C, Basic structure of C programs, C fundamentals: The C character set identifier, Constants and keywords, Data types & size, Variable names declaration statement, C token, symbolic constant. **Lecture: 4**

Operators and Expression: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment & Decrement operators, Condition Operators, Bitwise Operators, Special operators, precedence of arithmetic operators. Managing Input & output operations: using of printf() & scanf( ). **Lecture: 4**

Decision making: Simple If statement, if-else statement, nested if else statement, Switch statement, nested switch, the ? operator, goto statement. **Lecture: 4**

Decision making & branching: while statement, do-while statement, for statement. **Lecture: 2**

Array, String & pointer: One-dimension array, Two-dimension array and multi dimension array. String: Operation on String without using library function and using library function. Pointer: Declaration of pointer variables, accessing the variable by using pointer, pointer increment and decrement operator, pointer and array.

Functions: Basic functions, function type, function with no argument & no return value, function with no argument but return value, function with argument & return value, Storage class identifier, Call by value and Call by reference, Recursive function. Pointer to function. **Lecture: 9**

Structure & Union: Defining a structure, accessing of structure variable, structure and array, array within structure. Nested structure, structure & functions, Pointer & structure, Unions. **Lecture: 4**

File management system: Advantage of using files, Open, close, read. Write in the files, Operation on files. **Lecture: 4**

Dynamic memory Allocation: use of Malloc, calloc, realloc, free library functions, linked list concept, the preprocessor: macro statements. **Lecture: 3**

Text Book:

1. Balaguruswamy," Programming with 'C'".
2. Kerninghan and Ritchie," The 'C' programming language".

Reference Book:

1. Govil, Agrawal, Mathur & Pathak, "Computer Fundamentals and Programming in C".
2. Sinha & Sinha," Foundations of Computing", BPB.

MEP 1101 Engineering Drawing

1. Course Description

Introduction: Importance of Engineering Drawing, General instruction, Lines, Lettering, Dimensioning, and freehand sketch. Geometrical construction and Scale: Bisecting a line, arc and angle, Dividing a straight line in to equal number of parts, Tangents to lines and arcs, Construction of pentagons and octagons, Inscribing circles inside regular polygons, Plane and Diagonal. Conic Sections: Type of conic surface, Method of construction of ellipse, Method of construction of parabola, Method of construction of hyperbola. Projection of point and straight line: Point Projection, Line parallel to both the reference planes, Line perpendicular to one reference plane and parallel to the other, Line inclined to one reference plane and parallel to the other, Line inclined to both the reference planes, True length and inclination, Traces of lines. Projection of plane: Plane perpendicular to both the reference planes, Plane perpendicular to one reference plane and parallel to the other. Plane inclined to one reference plane and perpendicular to the other, Plane inclined to both the reference plane. Projection of solids: Axis of solid parallel to both the reference planes, Axis of solid perpendicular to one reference plane and parallel to the other, Axis of solid inclined to both the reference planes. Sections of solids: Sectional view, section plane perpendicular to the HP & VP and other various positions, True shape of sections. Development of surface: The principle of development of surfaces, Methods for drawing the development of surfaces. Orthographic projection: Orthographic projection of different types of simple objects, Sectional view of different types of simple objects. Isometric projection: Principle of isometric projection, Isometric scale, Produced for drawing isometric projection, Isometric projection, and isometric view.

2. Prerequisite:

Engineering Mathematics- I (MAL 1101)

3. Broad Course Outlines

- Introduction
- Geometric construction and scale
- Conic Section
- Projection of points, lines, and planes
- Projection of solids
- Section of solids

4. Course Outcomes:

On completion of the course, the students will be able to:

- Draw the geometric construction and scale
- Draw the ellipse, circle, parabola, and hyperbola, etc.
- Understand different sections and views of points, lines, and planes
- Visualize the different projections and views of solids
- Perform and understand the sectioning of solid

5. Books:

Text Books

- N.D. Bhatt et.al., Engineering Drawing, Charotor Publishing House.

- B. Agrawal et.al, Engineering Drawing, Tata Mc Graw Hill.

Reference Books

- Dhananjay A. Jolie, Engineering Drawing, Tata Mc Graw Hill.

CHL 1201 Environmental Science

UNIT - I

Chemistry of the environment, systems and surroundings, environmental composition and segments, ecosystem and natural cycles of the environment, regions of atmosphere, composition of the atmosphere and the influence of solar radiations. Earth's radiation balance, Green House effect and global warming. **(Lecture: 06)**

UNIT - II

Atmospheric Chemistry: Stratospheric chemistry: Role of UV radiations in ozone balance with reference to oxygen-only chemistry; catalytic decomposition processes with special reference to the role of NO, OH and CIO radicals.

Tropospheric Chemistry: Chemistry of photochemical smog, VOCs and their oxidation, exhaust gases from the internal combustion engine.

Nitrogen and Sulphur Species: Sources, fate and role in the atmosphere, acidifying agents in rain, fog and snow, control of anthropogenic Nitrogen and Sulphur emissions

Aerosol Chemistry: Polyaromatic hydrocarbons (PAHs), heavy metals in aerosols, condensation aerosols, aerosol concentration and lifetime; air pollution control for particulate emissions, air quality standards, indoor air pollution **(Lecture: 10)**

UNIT - III

Hydrosphere: Distribution of water, physical and chemical properties of water; alkalinity and organic matters in water. Water Quality: Analytical techniques for water analysis and wastewater treatment. **(Lecture: 06)**

UNIT - IV

Soil Chemistry: Composition of soil and chemical weathering. Physical properties of soil: particle size, texture, bulk density, permeability. Chemical properties: cation exchange capacity, macro and micronutrients, leachate formation, nitrogen pathways and NPK in soil. Acid mine drainage, hazardous wastes and their disposal. **(Lecture: 06)**

Textbooks:

1. G.W. Vanloon and S.J. Duffer, Environmental Chemistry - A Global Perspective, Oxford University Press, 2008.
2. F.W. Fifield and W.P.J. Haines, Environmental Analytical Chemistry, 2nd Ed., Blackwell Science Ltd.
3. Colin Baird, Environmental Chemistry, W.H. Freeman and Company, New York.
4. A.K. De, Environmental Chemistry, 4th Ed., New Age International Private Ltd. New Delhi.
5. S.E. Manahan, Environmental Chemistry, 7th Ed., Lewis Publishers, Inc., Chelsea, Michigan, 1999.

Reference Books:

1. P.O. Warner, Analysis of Air Pollutants, 1st Ed., John Wiley, New York.
2. S.M. Khopkar, Environmental Pollution Analysis, 1st Ed., Wiley Eastern Ltd, New Delhi.
3. S. K. Banerji, Environmental Chemistry, 1st Ed., Prentice-Hall of India, New Delhi.
4. A. G. Howard, Aquatic Environmental Chemistry, Oxford Chemistry Primers, Oxford University Press.

CSP1201 Introduction to Computer Programming Laboratory

Programming Lab will be set in consonance with the material covered in CSL1201.

PHP 1201 Engineering Physics Laboratory

Minimum eight experiments are required to be performed in a semester:

List of the Experiments:

1. Hall Effect experiment.
2. CRO experiment.
3. Semiconductor diode characteristics.
4. Characteristics of a solar cell.
6. Series and Parallel resonant circuits experiment.
7. He-Ne Laser experiment.
8. Diffraction grating experiment by using semiconductor diode laser.
9. Newton's Ring experiment.
10. Dispersion of prism experiment by using spectrometer.
11. To determine the wavelength of sodium light by using plane transmission grating.
12. Fresnel's biprism experiment.