DR B R AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY

JALANDHAR

SCHEME OF INSTRUCTION AND DETAILED SYLLABI

FOR B. TECH. FIRST YEAR

Effective from 2012

DR B R AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY

JALANDHAR

INSTITUTE VISION AND MISSION STATEMENTS

VISION

To build a rich intellectual potential embedded with interdisciplinary knowledge, human values and professional ethics among the youth, aspirant of becoming engineers and technologists, so that they contribute to society and create a niche for a successful career.

MISSION

To become a leading and unique institution of higher learning, offering state-of-the art education, research and training in engineering and technology to students who are able and eager to become change agents for the industrial and economic progress of the nation. To nurture and sustain an academic ambience conducive to the development and growth of committed professionals for sustained development of the nation and to accomplish its integration into the global economy.

SCHEME OF INSTRUCTION

Course Structure

B. Tech. 1st Year, Semester I, GROUP-A

S. No.	Course Code	Course Title	L	T	P	C
1	PHX-101	Physics	3	1	0	4
2	ICX-101	Electrical Sciences	2	0	0	2
3	CSX-101	Computer Programming	2	0	0	2
4	BTX-101	Introduction to Bio Sciences	3	0	0	3
5	HMX-101	Introduction to Management, Human Values and Behaviour	3	0	0	3
6	MEX-101	Engineering Graphics	1	0	4	3
7	PHX-102	Physics Lab	0	0	2	1
8	ICX-102	Electrical Science Lab	0	0	2	1
9	CSX-102	Computer Programming Lab	0	0	2	1
Total Credits			**14**	**1**	**10**	**20**

B. Tech. 1st Year Semester I, GROUP-B

S. No.	Course Code	Course Title	L	T	P	C
1	CHX-101	Chemistry	3	1	0	4
2	MEX-102	Elements of Mechanical Engineering	3	1	0	4
3	HMX-102	English Communication	3	0	0	3
4	IDX-101	Environmental Science and Technology	2	0	0	2
5	INX-101	Manufacturing Process	1	0	4	3
6	ECX-101	Basic Electronics	2	0	0	2
7	HMX-104	English Communication Lab	0	0	3	2
8	ECX-102	Basic Electronics Lab	0	0	2	1
9	CHX-102	Chemistry Lab	0	0	2	1
Total Credits			**14**	**2**	**11**	**22**

B. Tech. 1st Year, Semester II, GROUP-A

S. No.	Course Code	Course Title	L	T	P	C
1	MAX-101	Mathematics-I	3	1	0	4
2	CHX-101	Chemistry	3	1	0	4
3	MEX-102	Elements of Mechanical Engineering	3	1	0	4
4	HMX-102	English Communication	3	0	0	3
5	IDX-101	Environmental Science and Technology	2	0	0	2
6	INX-101	Manufacturing Process	1	0	4	3
7	ECX-101	Basic Electronics	2	0	0	2
8	HMX-104	English Communication Lab	0	0	3	2
9	ECX-102	Basic Electronics Lab	0	0	2	1
10	CHX-102	Chemistry Lab	0	0	2	1
Total Credits			**17**	**3**	**11**	**26**

B. Tech. 1st Year, Semester II, GROUP-B

S. No.	Course Code	Course Title	L	T	P	C
1	MAX-101	Mathematics-I	3	1	0	4
2	PHX-101	Physics	3	1	0	4
3	ICX-101	Electrical Sciences	2	0	0	2
4	CSX-101	Computer Programming	2	0	0	2
5	BTX-101	Introduction to Bio Sciences	3	0	0	3
6	HMX-101	Introduction to Management, Human Values and Behaviour	3	0	0	3
7	MEX-101	Engineering Graphics	1	0	4	3
8	PHX-102	Physics Lab	0	0	2	1
9	ICX-102	Electrical Science Lab	0	0	2	1
10	CSX-102	Computer Programming Lab	0	0	2	1
Total Credits			**17**	**2**	**10**	**24**

DETAILED SYLLABI OF ALL SUBJECTS

B.Tech. 1st Year **Semester I**

PHX-101	Physics	Core Course	L	T	P	Credit
			3	1	0	4

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	After completing the course PHX-101, students should be familiar with basics of electricity and magnetism. They should have knowledge of four Maxwell equations and their Physical significances.
CO 2	Students should have the knowledge about the basics phenomenon's related to physical optics i.e. interference, diffraction and polarisation. They should know about how interference patterns are formed in thin films and how the diffraction patterns are formed in diffraction grating.
CO 3	Students should know about the basic properties of Laser beams. They should know the basic physical principle behind the working of laser, different types of lasers and their applications.
CO 4	Students should know about the special theory of relativity and how it is different from Newtonian theory. They should have knowledge about various interesting consequences of special theory of relativity and about Einstein mass energy relationship.
CO 5	After completing the course students should know about the need of quantum mechanics. They should know about dual character of radiations as well as matter. They should know the Heisenberg uncertainty principle, the concept of wave function and about Schrodinger wave equations and their applications to simple one dimensional potential problem.

Detailed Syllabus

Electrostatics: Gradient of a scalar, divergence and curl of a vector, Gauss's law and its applications; electric potential and electric field (in vector form); potential due to a monopole, dipole and multipoles (multiple expansion); work and energy in electrostatics; dielectrics; polarization, electric displacement, susceptibility & permittivity, Clausius Mossotti equation.

Magneto statics and Electrodynamics: Lorentz Force Law; magnetic field of a steady current (Biot –Savart law); ampere's law and its applications; ampere's law in magnetized materials; electromotive force; Faraday's law; Maxwell's Equations, Wave Equation.

Optics: Interference: Conditions for Interference of light, Fresnel biprism experiment; displacement of fringes, Interference in thin films-wedge shaped film; Newton's rings; Diffraction: Single & N- Slit; Diffraction grating, Grating spectra; Rayleigh's criterion and resolving power of grating; Polarization: Phenomena of double refraction, Nicol prism; Production and analysis of plane; circular and elliptical polarized light; Fresnel's theory of optical activity, Polarimeters.

Lasers: Spontaneous and stimulated emission; Einstein's coefficients, population inversion and optical pumping; three and four-level lasers; Ruby, He-Ne, Nd: Yag, CO_2, semiconductor lasers. Industrial and medical applications of lasers.

Theory of Relativity: Invariance of an equation and concept of ether; Michelson-Morley experiment; Einstein's postulates and Lorentz transformation equations, length, time and simultaneity in relativity; addition of velocity, variation of mass with velocity, mass- energy relation, energy-momentum relation.

Quantum Theory: The Compton effect; matter waves, group and phase velocities; Uncertainty principle and its application; time independent and time dependent Schrödinger wave equation; Eigen values and Eigen functions, Born's interpretation and normalization of wave function, orthogonal wave functions; applications of Schrödinger wave equation (particle in a box and harmonic oscillator).

Text Books:

1. D. J. Griffiths, "Introduction to Electrodynamics", Prentice Hall of India, New Delhi, 2nd Ed. (1998).
2. Ajoy Ghatak, "Optics" , McGraw Hill Companies, 3rd Ed.
3. K. Thyagarajan and A. K. Ghatak, "Lasers, - Theory and Applications", Macmilan India Ltd., New Delhi, (2000).
4. A. Beiser, "Concepts of Modem Physics", McGraw Hill, New Delhi, 6th Ed. (2002).

Reference Books:

1. Eugene Hecht, "Optics" , Addison Wesley (2002).
2. A. P. Arya, "Elementary Modern Physics" Addison –Wesley, Singapore, (1974).
3. H. S. Mani and G. K. Mehta, "Introduction to Modem Physics", Affiliated East West Press, New Delhi, (1991).
4. P. W. Milonni and J. H. Joseph Eberly, "Lasers" John Wiley and Sons, Singapore.

ICX-101	Electrical Science	Core Course	L	T	P	Credit
			2	0	0	2

Pre-requisites: None

Course Assessment Method: Both continuous and semester end examination.

Topics to be covered: All.

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

CO 1	After completing this course the student is expected to solve and analyze various simple electrical networks (both ac and dc) using network laws and theorems.
CO 2	The student will be learning basic concepts of ac circuits and is expected to solve simple single phase and three phase ac circuits.

CO 3	He will also learn the principle and working of basic electrical measuring instruments and devices so that he can understand the behavior and performance of them.

Detailed Syllabus

Network Laws and Theorems: Network Laws for D.C. networks, Node voltage and mesh current methods, Delta-star and star-delta conversion, Classification of network elements, Principle of superposition, Thevenin's and Norton's Theorems.

Single Phase A.C. Circuits: Single-phase EMF generation, Effective and Average values of sinusoids and determination of form factor, Analysis of simple RLC-series circuits, Solution of parallel circuits and resonance.

Three Phase A.C. Circuits: Three -phase EMF generation, Delta and star connection, Line and phase quantities and relations, Solution of 3-phase circuits – balanced voltage and balanced load, Phasor diagrams, Measurement of power in three-phase circuits; Concept and working of wattmeter and A.C. watt-hour meters.

Magnetic Circuits and Transformers: Analogy between electric and magnetic circuits,

Ampere's circuital law, Solutions of Magnetic Circuits, Hysteresis and Eddy current losses, constructional details, EMF equation, rating and phasor diagrams on no-load and full-load, Equivalent circuits, Regulation and efficiency, Open-circuit and short-circuit tests.

Recommended Books:

1. Hughes E, Smith IM, Hiley J and Brown K, "Hughes Electrical & Electronic Technology", 8/e, Pearson Education India
2. Del Torro, "Electrical Engineering Fundamentals", 2/e, Prentice Hall of India Pvt. Ltd.

Reference Books:

3. Kothari DP and Nagrath IJ, "Basic Electrical Engineering", Tata McGraw Hill
1. Nagsarkar TK and Suhija MS, "Basic Electrical Engineering", Oxford Univ. Press
2. Bell DA, "Electrical Circuit" 6th Edition, Prentice Hall of India Pvt. Ltd.

CSX-101	Computer Programming	Core Course	L	T	P	Credit
			2	0	0	2

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Identify and understand the working of key components of a computer system (hardware, software, firmware etc.).
CO 2	Understand, analyse and implement software development tools like algorithm, pseudo codes and flow charts.

CO 3	Analyse and understand logical structure of a computer program, and different construct to develop a program in 'C' language.
CO 4	Write, compile and debug programs in C language.
CO 5	Analyse and understand simple data structures, use of pointers, memory allocation and data handling through files in 'C'.

Detailed Syllabus

Introduction: Computer system, Software and hardware concepts. Memories, Booting of Computer system, Disk operating systems, Internal and external commands of DOS, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes, Flow charts.

Major elements of C program, Declarations of Variables, Body of Statements and functions, Identifiers, Keywords, Data types, Variables, Expressions, Statements, Type Conversions, Operators, Arithmetic operators, Unary operators, Binary operators, Char type, Cast operator, Precedence and Associatively of operations, Change of Precedence, Assignment operators, Bitwise operators, Shift operators, Relational operators, Ternary operators, Logical operators, Loops, if statement, if else statement, For loop and its variants, While loop, do-while loop, , Switch function, Break function, Continue function, Null statement, Goto Function, Escape Sequences.

Function and Macros, What is function, Passing arguments to function, passing arguments by value, returning value, passing arguments by reference, scope rule of function, recursion, storage classes and scope, library functions like math library, recursion, C preprocessor like macro expansion, macro with arguments, macro vs. functions, file inclusion, conditional compilation.

Array and Pointers: Array, array initialization: static and dynamic, bound checking, passing, array elements to functions, Pointers. Passing an entire array to functions, 2D array, initialization of 2D array, Array of pointers, Operations on pointers, Multi-dimensional array.

Strings: Why use strings, declaring strings, pointers and strings, string library functions, 2D array of characters, Array of pointers to strings.

Structures: Types of structure declarations, User defined data types, Nested structures declaration, Initialization of structure, processing structures with initialized values, using array as structures member, array of structure variable, Pointers to structures, Unions.

File Handling: Data organization. File operations, File opening modes, String I/O in file, Record I/O in files, Text files and Binary files.

Text/References:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 8/e, 2008.
2. Herbert Schildt, "C:The complete reference", Mcgraw Hill, 4/e, 2002.
3. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

4. Kernighan and Ritchie, "C Programming Language", PHI, 2/e, 1998.
5. Jeri R. Hanly and Elliot B. Koffman, "Problem Solving and Program Design in C", Pearson Addison-Wesley,
7/e, 2012.

BTX-101	Introduction to Bio Sciences	Core Course	L	T	P	Credit
			3	0	0	3

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Understand basic knowledge of biosciences, biological materials.
CO 2	Develop awareness about contemporary environmental problems.
CO 3	Develop skills they will need when collaborating with biological scientists.
CO 4	Understand human physiology and capable for applications in future in Medical Engg, biosensors, artificial organs, biomaterials etc.

Detailed Syllabus

Unit I:
Structure and function of Carbohydrates, Proteins, Amino Acids and Peptides, Nucleic Acids and Nucleotides, Lipids and Enzymes. Cell, Prokaryotic and Eukaryotic cell with short description of Bacterial cell, plant cell and animal cell. Microscopes, Cell count method: Membrane filter count method. Ecosystem: Biodiversity, Microorganisms, Biogeochemical Cycle.
Unit II:
Microbiology of Domestic water: Water Purification, Bacteriological evidence of pollution: Coliform and *E. coli*, Bacteriological Technique: Examination using standard plate count method along with membrane filter technique Microorganisms other that Coliform bacteria: Fecal Streptococci, Slime-Forming Bacteria, Iron bacteria, Sulfur bacteria, Algae, Viruses, Deterioration of water quality and its effect in Swimming pool. Eco-friendly Bio-products: Biofuels, Bio Hydrogen Generation, Bio pesticides, Bio fertilizers, Microbial Fuel Cell, Biodegradable Plastics. Microbiology of Foods: Microbial spoilage of food, Microbial Examination of foods, Preservation of foods and fermented foods. Industrial Microbiology: Lactic acid production, Vinegar production, Insulin, Alcohol fermentations, Penicillin Production, Enzyme production Deterioration of materials: paper, textiles, painted surface, Prevention of microbial deterioration.
Unit III:
Cardiovascular System, Respiratory System, Nervous System.
Recommended Books:

1. Pelczar M J, Chan E C S and Krieg N R "*Microbiology, 5th Edition*," Mc Graw Hill, New York (1995).
2. Stanley A S "*Cell Biology for Biotechnologists*" Narosa Book Distributors Pvt Ltd (2010).
3. Chatterji A K "*Introduction to Environmental Biotechnology*" Phi Learning Private Limited (2011).
4. Lehninger, A L "*Principles of Biochemistry*", 4th Edition Butterworth Publishers, New York (2003).

5. Marieb E N "*Essentials of Human Anatomy & Physiology, Eighth Edition*," Pearson Education Inc. USA (2007).

HMX-101	Introduction to Management and Human Values	Core Course	L	T	P	Credit
			3	0	0	3

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All
Course Outcomes: At the end of the course the student will be able to:

CO 1	Students will be able to understand the basic concept of the management, its nature and its relevance in the practical world.
CO 2	Students will also be able to understand the basic role of the management in the success of an organization. A student will also be able to understand the history of the evolution of the management which is nowadays established a so profession.
CO 3	Students will also be able to have a sense of the management process which starts with planning and ends with a success and strong control.
CO 4	Develop awareness about the social environment its impact on the common human beings and the psychological factors which influences a strong motivational in an individual.
CO 5	Develop a strategy for transition into a universal human order at the individual level as well as at the level of the responsible society.
CO 6	Develop group behaviour and team building skills, handle out stress and conflict resolution.
CO 7	Imbibe a positive learning attitude with cognition, emotional intelligence and a learned attitude.

Detailed Syllabus

Introduction to Management: Definition, function, process and significance, nature of management, management as a Profession. School of Management Thought: Contribution of Henry Fayol, F.W Taylor, Elton Mayo, Peter F. Drucker, McGregor. Functions of Management:

Planning: Planning process and types of plans. Organizing: Departmentation, span of control, authority, responsibility and accountability. Staffing: Manpower planning, Recruitment and selection .Directing: Leadership theories, styles, management grid. Motivation: Theories (Maslow and Herzberg). Coordination: Meaning, essence and techniques. Controlling: Controlling process, control areas, and essentials of effective control.

Introduction to Human Values: Understanding value education: Need, content and process.

Self exploration: Natural acceptance and experiential validation. Understanding the human being as a co-existence of self ('I') and material body. Harmony in family and society. Harmony in nature: Holistic perception of harmony at all levels of existence. Strategy for transition into

universal human order at the individual level (socially and ecologically responsible engineers) and at the level of the society (institutions and organizations).

Introduction to Human behaviour: Introduction to Psychology, Sociology, and Social Psychology. Personality Development, traits and types. Cognition: Intelligence, Emotional Intelligence. Perception, Learning and Attitude. Group Behaviour and Team Building. Stress and Conflict Management.

Books Recommended

1. Koontz. Hand Weihrich H, "Essentials of Management", 5th Ed., Tata McGraw-Hills, New Delhi (1998)
2. Prasad L M, "Principles and practices of Management", 5th Ed., Sultan Chand and Sons, New Delhi (1999)
3. Stoner J A F, Freeman R E and Gilbert D R, "Management", 6th Ed., Prentice Hall of India, New Delhi(2002)
4. Singh R N , "Management Thought and Thinkers", 2nd Ed., Sultan Chand and Sons, New Delhi (1999)
5. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.
6. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Publishers
7. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers
8. Morgan, C T, King, R A, Weisz, J R, and Schopler J "Introduction to Psychology", Singapur: McGraw-Hill.
9. Atkinson, R L, Atkinson,R C, and Hilgard, E R "Introduction to psychology", Harcourt Brace Jovanovich. Inc.
10. Baron, R A "Psychology", New Delhi, Prentice Hall of India

MEX-101	Engineering Graphics	Core Course	L	T	P	Credit
			1	0	4	3

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Students will be able to acquire knowledge of different conventions and methods of engineering drawing.
CO 2	Student's capability to generate and draw various geometric constructions & engineering objects (2D & 3D) with different drawing tools will upgrade.
CO 3	Students will enhance their imagination and conceptualization skills so as to impart this knowledge in designing and development of various objects.
CO 4	Knowledge gained will further help students for future project works.

Detailed Syllabus

Introduction: Engineering Graphics/Technical Drawing– a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments, Application of Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to dimensioning, Concepts of scale drawing, Types of scales.

Theory of Projections: Relevance of projection, Theory of projections, Perspective, Orthographic, Axonometric and their basic principles, system of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

Projection of Points: Projection in quadrants and octants, Projection of point on auxiliary planes.

Projection of Lines: Parallel to both H P and V P, Parallel to one and inclined to other, Contained in profile plane, Other typical cases: three view projection of straight lines, true length and angle orientation of straight line: rotation method and auxiliary plane method, Distance between two non-intersecting lines, trace of line.

Projection of Planes: Difference between plane and lamina, Projection of lamina, Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, Plane oblique to three reference planes, application of auxiliary planes, trace of planes.

Projection of Solids: Definition of solids, types of solids, and elements of solids, Projection of solids in first or third quadrant, Axis parallel to one and perpendicular to other, Axis parallel to one inclined to other, Axis inclined to both the principle plane, Axis perpendicular to profile plane and parallel to both H P and V P, visible and invisible details in the projection, Use of rotation and auxiliary plane method.

Section of Solids: Definition of Sectioning and its purpose, Procedure of Sectioning, Illustration through examples, Types of sectional planes-application to few examples.

Intersection of Surfaces/Solids: Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

Development of Surface: Purpose of development, Parallel line, radial line and triangulation method, Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, Development of surface.

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and drawing, Isometric projection of solids such as cube, prism, pyramid and cylinder, Discussion on isometric projection of simple machine parts.

Orthographic Projection: Review of principle of Orthographic Projection, Examples of simple machine parts, Drawing of Block and machine parts.

PHX-102	Physics Lab	Core Course	L	T	P	Credit
			0	0	2	1

Pre-requisites: None

Course Assessment Method: Both continuous and semester end examination.

Topics to be covered: All.

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

CO 1	After completing the course PHX-102, students should be familiar with practical training of basic electrical circuits.
CO 2	Students would have the practical knowledge about the basics phenomenon's related to physical optics i.e. interference, diffraction and polarisation. They should know about how interference patterns are formed in thin films and how the diffraction patterns are formed in diffraction grating.
CO 3	Students would know about the basic properties of Laser beams. They would know the basic physical principle behind the working of laser, different types of lasers and their applications.
CO 4	After completing the course students would know about the application and working of basic semiconductor devices.

List of Experiments

1. To verify the laws of vibrating strings by Melde's experiments.
2. To determine the frequency of AC Mains by using a sonometer and an electromagnet.
3. To determine the impedance of A.C. Circuits.
4. To study the characteristic of PN diode and Zener diode.
5. To find out the intensity response of a solar cell/Photo diode.
6. To analyze the suitability of a given Zener diode as a power regulator.
7. To determine the band gap of a semiconductor.
8. To determine the Refractive index of the Prism material using spectrometer.
9. To determine the wavelength using Fresnel's Biprism /Diffraction grating.
10. To determine the wavelength of sodium light using Newton's ring method.
11. To determine the specific rotation of sugar using Laurent's half-shade polari meter.
12. To determine the velocity of ultrasonic waves in liquids.
13. To study the effect of voltmeter resistance on voltage measurement.
14. To study the variation of magnetic field with distance along the axis of a circular coil carrying current and its estimate the radius of the coil.
15. To determine the Laser Parameters like divergence, Wavelength etc. for a given laser source.

Recommended Books:

1. Dr. R.S. Sirohi, Practical Physics, Wiley Eastern, New Delhi.

ICX-102	Electrical Science Lab	Core Course	L	T	P	Credit
			0	0	2	1

Pre-requisites: None

Course Assessment Method: Both continuous and semester end examination.

Topics to be covered: All.

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

CO 1	After completing this course the student is expected to solve and analyze experimentally various simple electrical networks (both ac and dc) using network laws and theorems.
CO 2	The student is expected to solve and analyze experimentally the behavior of simple single phase and three phase ac circuits and analyze them.
CO 3	He is expected to verify the behavior and performance characteristics of basic electrical measuring instruments and devices experimentally.

List of Experiments

At least 8 experiments are to be performed out of the following list:

1. To verify Kirchoff's voltage and current laws.
2. To verify Thevenin, Norton and Superposition theorems with DC input. Compare the results with theoretical value.
3. To use CRO for:
   (a) Component testing
   (b) Voltage and frequency measurement of different wave shapes
   ©Frequency measurement using Lissajous pattern
4. To study the use of the following:
   (a)Multimeter (Analog and Digital)
   (b) Function generator
   © Power supply
5. To calibrate moving iron ammeter and voltmeter with respect to standard (DC PMMC) ammeter, voltmeters and draw the calibration curves.
6. To plot and study the voltage-current characteristics and power consumption of the following:
   (i) Incandescent lamp
   (ii) Mercury vapour lamp
   (iii) Fluorescent lamp
7. To study (a) RL Series Circuit and (b) RLC Series Circuit excited by single phase AC supply and to draw phasor diagram.
8. To perform open and short circuit tests on a single-phase transformer and to obtain Iron-losses, Copper-losses, efficiency & regulation and draw the equivalent circuit.
9. To measure energy consumption using single-phase energy meter (unit power factor load only) & compare the results with wattmeter method.
10. To measure power in three-phase circuit (star / delta) using two wattmeter method.

The list of experiments given above is only suggestive. The Instructor may add new experiments as per the requirement of the course.

CSX-102	Computer Programming Lab	Core Course	L	T	P	Credit
			0	0	2	1

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Understand key components of computer and work with internal and external DOS commands.
CO 2	Understand C programming development environment, compiling, debugging, linking and executing a program using the development environment.
CO 3	Analysing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
CO 4	Understand and apply the in-built functions and user defined functions for solving the problems.
CO 5	Understand and apply various data structures such as arrays, structures, union, enum etc.
CO 6	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

List of Experiments

1. To work at command prompt and running internal and external commands on it.
2. Installation and Introduction of C Compiler.
3. Program to demonstrate the use of various operators.
4. Programs to demonstrate the use of conditional statements and loop statements: if, if-else, nested-if else, for, while and do-while.
5. Program to print various patterns using nested for loops.
6. Program to make use of jump statements in loop: break, continue and goto.
7. Program to demonstrate the concept of call by value and call by reference methods of parameter passing to function.
8. Program to find prime factor of number using function.
9. Program to generate Fibonacci series using recursive function.
10. Program to find root of quadratic equation. Use sqrt( ) function in math.h header file to find the square root of number.
11. Write macro definitions with arguments for calculation of area and parameter of a triangle, a square and a circle. Store these macro definitions in a file called areaperei.h. Include this file in your program and call the macro definitions for calculating area and perimeter for different squares, triangles and circles.
12. Write down macro definitions for the following:
a. To find arithmetic mean of two numbers
b. To convert uppercase alphabet to lowercase.

c. To obtain bigger of two numbers.
13. Program to find largest and smallest number in 1D array.
14. Program to find the sum of even and odd numbers in 1D and 2D array.
15. Program to Program to multiply two matrices.
16. Program to demonstrate the concept of passing array to function.
17. Program to compare, concatenate two strings without using inbuilt functions.
18. Program to check whether a string is palindrome or not.
19. Program to swap to numbers using pointers.
20. Program to reverse the strings stored in the array of pointers to strings.
21. Program to demonstrate the operations on pointers.
22. Program to multiply two arrays using pointers to the functions.
23. Program to display the details of an employee record using nested structure.
24. Program to read a file and display its contents.
25. Suppose a file contains student's records with each record containing name and age of a student. Write a program to read these records and display them in sorted order by name.

This is only the suggested list of practicals. Instructor may frame additional practicals relevant to the course contents

B.Tech. 1st Year **Semester II**

MAX-101	Mathematics-I	Core Course	L	T	P	Credit
			3	1	0	4

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	To develop skill of higher derivative, expansion of functions in ascending power of variable & value of the function in neighboured of some points.
CO 2	To determine limits of indeterminate function applicable to already word problems & engineering problems.
CO 3	To gain the knowledge to solve differential equation arising in different Engineering branch and able to form mathematical & physical interpretation of its solution which place important role in all branches of engineering.
CO 4	To demonstrate the basic concepts in Fourier series, properties, parseval's identity.
CO 5	To apply the concepts of Fourier and integral transform.
CO 6	To develop the concepts of Laplace transformation & inverse Laplace transform with its property to solve partial differential equation and ordinary differential equation with given boundary conditions which is helpful in all engineering & research work.
CO 7	To develop the concepts of Z-Transform and its application.

Detailed Syllabus

Formation of ordinary differential equations, solution of first order differential equations by separate of variables, homogeneous equations, exact differential equations, equations reducible to exact form integrating factors, equations of the first order and higher degree. Clairaut's equation.

Linear differential equations with constant coefficients, Cauchy's homogeneous linear equation Legendre's linear equation, simultaneous linear equations with constant coefficients.

Fourier series of periodic functions, even and odd functions, half range expansions and Fourier set of different wave forms, complex form of Fourier series and practical harmonic analysis.

Laplace transforms of various standard functions, properties of Laplace transforms and inverse Laplace transforms, Convolution theorem, Laplace transforms of unit step function, impulse function in periodic functions, application to solution of ordinary differential equations with constant coefficient and simultaneous differential equations.

Z-transform and difference equations. Elementary properties of z-transform. Convolution theorem formation of difference equations using z-transform.

Fourier transforms, Fourier integral theorem. Fourier sine. Cosine integrals and transforms. Fourier transforms of derivatives of a function, convolution theorem. Parseval's indentity.

Books Recommended:

1. E Kreyszig, "*Advanced Engineering Mathematics*", 8th Ed., John Wiley, Singapore (2011).
2. R.K.Jain and S R K Iyengar, "*Advanced Engineering Mathematics*", 2nd Ed., Narosa Publishing House, New Delhi (2003).
3. B.S. Grewal, "*Higher Engineering Mathematics*", 35th Ed.. Khanna Publishers, Delhi.

CHX-101	Chemistry	Core Course	L	T	P	Credit
			3	1	0	4

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	To understand the solid state chemistry of the materials along with the distribution of solvents and their application in solvent extraction.
CO 2	To understand the phase transitions of different compositions of the elements, alloys and interpret the phase diagram of phases present.
CO 3	To study the spectra of compounds and propose the structures of the compounds along with applications of the spectroscopy in various fields.
CO 4	To study the reaction mechanisms of the various reactions and use of various reagents. To understand the shape and structure, stability, magnetic properties, and applications of coordination complexes.
CO 5	To examine the role of metals in biology, the study biological processes such as respiration, oxygen transport, role of Myoglobin and Hemoglobin and metal properties in biological chemistry.
CO 6	To understand the basic concept of Nanochemistry along with fabrication, characterization and application of nanomaterials.
CO 7	To identify and formulate the conducting polymers and their applications in different fields.

Detailed Syllabus

Solid State and Distribution Law: Introduction to Solid State Chemistry, Law of rational indices, Miller indices, Interplaner spacing, X-ray diffraction, Nernst distribution law, Applications of distribution law: solvent extraction.
Chemical and Phase Equlibria: Phase diagram for single component system, carbon

dioxide system, sulphur system, carbon system, helium system, Two component systems: Pb-Ag system, Bi-Cd system, Kl-H_2O system, Freezing mixtures, Azeotropic mixtures, solubility of partially miscible liquids.

Spectroscopic Studies of Materials: Lambert-Beer's Law**,** Principles and applications of U. V. Visible, Molecular Absorption Spectroscopy, Chromophores, Effect of conjugation on chromophores, Absorption by aromatic systems, Rotational and Vibrational spectroscopy: Principles and application to simple molecules, Magnetic Resonance Spectroscopy: Principles and application to simple molecules and Introduction to Photoelectron Spectroscopy.

Organic Reactions and Reagents: Oxidation of hydrocarbons, Oxidation of alcohols (chromic acid), oxidation of carbon-carbon double bonds (sharpless epoxidation) including Palladium-catalyzed oxidation, oxidation of ketones (Baeyer-Villiger oxidation). Catalytic hydrogenation, homogeneous hydrogenation (Wilkinson's catalyst), Reduction by dissolving metals (Birch reduction), Reduction by hydride-transfer reagents (NaBH4), Reduction with boranes (BF3).

Coordination Complexes: Crystal field theory of octahedral and tetrahedral complexes, Spectrochemical series, High spin and low spin complexes. Charge transfer spectra, John- Teller effect, colour & magnetic properties.

Biological Inorganic Chemistry: Oxygen transport and storage-Myoglobin, Haemoglobin, The chemistry of elements in medicine – chelation therapy, Cancer treatment, Anti-arthritis drugs, contributions of individual elements to biological systems.

Nano-science and Technology: Introduction to Nano-science and technology, Self Assembly, Lithography, Soft Lithography, Dip pen nanolithography, CNTs, bio-nanoinformation, Applications in microelectronics.

Conducting Polymers: Introduction, types, n-doping, p-doping, some specific examples of conducting polymers, conducting polymers – a comparison between metals and CPs, applications in diversified fields.

REFERENCES:

1. *Advanced Inorganic Chemistry* (6^{th} edition), F. A. Cotton and G. Wilkinson, John Wiley and Sons, 2003.
2. *Inorganic Chemistry* (4^{th} edition), D. F. Shrives and P. W. Atkins, Oxford University, Oxford, 2006.
3. *Modern methods of organic synthesis* (3^{rd} edition), W. Carruthers, Cambridge University Press (Cambridge Low Price editions) 1986, Reprinted 2004.
4. *Reactions, Rearrangements and Reagents* (4^{th} edition), S. N. Sanyal, Bharti Bhawan (P & D), 2003.
5. *Polymer Science and technology* (2^{nd} Edition), P. Ghosh, Tata McGRAW Hill, 2008.
6. *Applications of Absorption Spectroscopy of Organic Compounds* (4^{th} edition), John R. Dyer, Prentice Hall of India Pvt. Ltd., 1978.
7. *Introduction to Nanotechnology* , C. P. Poole Jr. , F. J. Owens, Wiley Interscience, 2003**.**
8. *Nanotechnology Science, Innovation and Opportunity*, L. E. Foster, Pearson Education, 2007.
9. *Spectroscopic methods in organic chemistry* (4^{th} Edition), Williams & Fleming, Tata Mcgraw Hill, 2003.

MEX-102	Elements of Mechanical Engineering	Core Course	L	T	P	Credit
			3	1	0	4

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Emphasis laid upon the principles and fundamentals involved in the inter-conversion of thermal energy into mechanical energy and vice versa.
CO 2	The subject also offers a birds eye-view to all students about the common engineering materials finding vide application in Mech. Engg. Industry and about their strength and other related vital aspects.
CO 3	Understand the basic concepts of fundamental of fluid mechanics and thermodynamics.
CO 4	To understand basic principle of engineering mechanics to design and analyze various types of structural elements.

Detailed Syllabus

Part-I: Solid Mechanics

Introduction: System of forces, coplanar concurrent force system, composition and resolution of force, equilibrium of rigid bodies, free body diagram, Lami's theorem.

Analysis of framed structure: Reaction in beam with different end conditions, determination of reactions in members of trusses: a) Analytical methods b) Graphical method

Centre of gravity and moment of inertia: Concept of C.G and centroid, position of centroid, theorem of parallel and perpendicular axes, moment of inertia of simple geometrical figures.

Stress and strain: Concept of stress and strain, simple stresses, tensile, compressive, shear, bending and torsion, stress- strain curves, elongation of bars, composite bars, thermal stresses, elastic constants.

Part- II Basis of Thermal and Fluid Science

Thermal Science: Introduction and scope of thermodynamics, thermodynamics properties, forms of energy, thermodynamic systems and control volume, steady flow systems, types of work, thermodynamic processes, laws of thermodynamics, Carnot theorem, concept of entropy.

Fluid and their properties: Ideal and real fluids, capillarity, Vapour pressure, compressibility and bulk modulus, Newtonian and non Newtonian fluids.

Fluid Statics: Concept of pressure, Pascal's law and its engineering applications, action of fluid pressure on a plane (horizontal, vertical and inclined) submerged surface, resultant force and centre of pressure, Buoyancy and flotation, stability of floating and submerged bodies, Metacentric height.

Fluid Kinematics: Classification of fluid flows, velocity and acceleration of fluid particle, normal and tangential acceleration, streamline, path line and streak line, flow rate and discharge mean velocity, continuity equation, Euler's equation, Bernoulli's equation and its applications and steady flow energy equation.

Books Recommended

1. Engg. Thermodynamics by P.K Nag, Tata McGraw- Hill education, 01- April- 2005.
2. Thermodynamics: An Engg. Approach by Yunus A. Cengel, Michael Boles, Tata McGraw- Hill Education, 2006.
3. Fluid Mechanics: Fundamentals and Applications- by Yunus A. Cengel, John M Cimbala, Tata McGraw- Hill Series in Mechanical Engg.

HMX-102	English Communication	Core Course	L	T	P	Credit
			3	0	0	3

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Students are equipped with effective speaking and listening skills.
CO 2	Helps to develop their soft skills, which will make the transition from college, to workplace smoother and help them to excel in their jobs.
CO 3	Enhances students' performance at Placement interviews, Group Discussions and other recruitment exercises.

Detailed Syllabus

1. **Communication:** Meaning, types, significance, process, verbal, non-verbal, formal, informal channels, functions, barriers to communication, miscommunication, effective communication strategies, ethical & legal communication, role in society.

2. **Business Correspondence:** Elements of business writing, business letters, components and kinds, memorandum, reports writing, purchase order, quotation and tenders, job application letters, resume writing, etc.
3. **Discussion Meeting and Telephonic Skills:** Group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids.

4. **Writing Skills:** Elements of effective writing, writing style, scientific & technical writing, and clarity in writing.
5. **Basic Applied Grammar and Usage**: Transformation of sentences, words used as different parts of speech, one word substitution, abbreviations, technical terms etc.
   Sentences: Kinds of sentences, simple & complex sentences, interrogative, assertive, affirmative & negative, phrases.Parts of Speech: Nouns, pronouns, adjectives, determiners, articles, adverbs, prepositions, verbs, auxiliaries, conjunctions, interjections, active & passive voice, gender, tenses.Synonyms & antonyms, spotting errors in sentences, passages, homophones, homonyms.

6. **Reading Skills:** Process of reading, reading purposes, characteristic of efficient reading, models, strategies, methodologies, reading comprehension, improving comprehension skills, reading activities.

7. **Listening Skills:** Meaning, types, process of listening, active & passive listening, barriers to listening, effective listening skills, feedback skills, roles of listening in an organization.

8. **Speaking Skills:** Speech mechanism, organs of speech, production and classification of speech sound, phonetic transcription, the skills of effective speaking, the components of effective talk.

Books Recommended

1. Rodriques M V, "*Effective Business Communication*", Concept Publishing Company New Delhi, 1992 reprint (2000)
2. Bhattacharya Indrajit, "*An Approach to Communication Skills*", Dhanpat rai Co., (Pvt.) Ltd. New Delhi.
3. Wright, Chrissie, "*Handbook of Practical Communication Skills*", Jaico Publishing House. Mumbai.
4. Gartside L, "*Modern Business Correspondence*", Pitman Publishing London.
5. Day, Robert A., "*How to Write and Publish a Scientific Paper*" Cambridge University Press Cambridge.
6. Gimson A C, "*An Introduction to the Pronunciation of English*", ELBS. (YP)
7. Bansal, R K and Harrison J B, "*Spoken English*", Orient Longman Hyderabad.
8. Eckersley C E, " *A Comprehensive English Grammar*" Orient Longman, Hyderabad.
9. Ronald Carter and Michael McCarthy, "*Cambridge Grammar of English*", Cambridge University Press, Cambridge.
10. P D Chaturvedi & Mukesh Chaturvedi, "*Business Communication – Concepts, Cases & applications*, Pearson Publications.
11. Swan, Michael. *Practical English Usage*. Oxford University Press.

IDX-101	Environmental Science and Technology	Core Course	L	T	P	Credit
			2	0	0	2

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Students could understand the mechanism of various environmental issues and due to this a new idea for remedy of environmental problems may be solved. The students could also understand responsibility towards environmental and spread this to others for perform our duties to environment.
CO 2	Students ethical values could be enhance.
CO 3	Students are updated about various energy resources (renewable and non-renewable) from this they could understand the importance of energy conservation and consumption.

Detailed Syllabus

Section – A

Ecology and Ecosystem

Ecology and environment, functions of an ecosystem, habitats of biological species, ecological succession, food-chains and food-webs, the bio-geo-chemical cycles of elements and minerals.

Biodiversity and its Conservation

Introduction, components, importance and threats to biodiversity, factors causing loss of biodiversity, in situ and ex situ techniques for conservation of biodiversity.

Environment and Human Population

Population growth, population explosion, human health, human rights, value based environmental education, environmental ethics, environmental movements.

Sustainable Development and Utilization of Resources

Introduction types of natural resources, present status, utilization of renewable and non-renewable resources, role of individual in conservation of resources.

Global environment issues

Global warming, ozone depletion, green house effect, acid rain, carbon trading, remote sensing, natural disaster, environmental toxicology and degradation environmental biotechnology.

Section – B

Environment Pollution

Introduction, definition, sources, characteristics and perspective of air pollution, water pollution, soil pollution, noise pollution, marine pollution and thermal pollution.

Legislation for Biodiversity Protection

Environmental Laws, Acts, Rules and Regulations, National Conservation Strategy and policy statement on environment and development, Policy statement for abatement of pollution.

Environmental Management Systems

International Standards Organization (ISO), Introduction, Terminology and Certification, ISO 14000 family of standards, guides and technical reports.

Environmental Impact Assessment

Concept, Origin, Procedure and Evaluation methodology for environmental impact assessment, scope studies, preparation and review of environmental impact statement.

International Efforts for Environmental Protection

United Nation's conference on human environment, Earth Summits, Basel Convention, Kyoto Protocol, Montreal Protocol.

Recommended Books:

1. S. C. Santra, *Environmental Science*, New Central Book Agency (P) Ltd., Kolkatta, Second Edition, 2011.
2. N. K. Uberoi, *Environmental Management*, Excel Books, New Delhi, Second Edition, 2006.

INX-101	Manufacturing Process	Core Course	L	T	P	Credit
			1	0	4	3

Pre-requisites: None

Course Assessment Method: Both continuous and semester end examination.

Topics to be covered: All.

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

CO 1	Ability to clear basic fundamental concepts of machining, welding, casting, forming and list of major metal, non metal, alloy and their physical characteristics.
CO 2	Selecting or suggesting suitable manufacturing processes to achieve the required products with the aim of avoiding material and time wastage.
CO 3	Recommend appropriate part manufacturing processes when provided a set of functional requirements and product development constraints.
CO 4	Developing manufacturing processes and tools for typical applications in the industries.

Detailed Syllabus

Manufacturing: Introduction to manufacturing processes, Basic terminology used Economical and technological considerations.

Materials properties and their application: Different engineering materials, Properties, Nomenclature, Basics of heat treatment.

Carpentry: Introduction, Classification of wood, Seasoning of wood, Classification of carpentry tools, Joints and joining processes, Wood working machines and processes, safety precaution.

Fitting: Introduction, Tools used in fitting, measuring and marking tools, the process of making sawing, Filling, Tapping and die, Introduction to drills.

Welding: Introduction, Various welding processes with brief introduction, Electric Arc welding, Arc welding procedure, List of equipment for electric arc welding, Gas welding process and equipment, Soldering and Brazing process.

Smithy: Introduction, Types of forging, Equipment used in the smithy shop, Smithy tools, Black smith's hearth, Hand forging operations.

Foundry: Introduction, Basic terminology, Pattern, Types of patterns, Patterns allowances, Tools for hand Moulding, Moulding sand and Moulding process, Crucible furnace, Operation of cupola, Foundry containers, Casting defects, Safety precautions.

Sheet metal working: Introduction, Types of sheets (ferrous/non-ferrous), Standard sheet sizes and their measurement, Tools used in sheet metal.

Metal cutting: Introduction, Classification of machine tools and cutting tolls, Basic operations on lathe, Drilling, Shaper, Milling, Cutting tool material, Work-holding devices, Cutting parameters i.e. speed, feed and depth of cut.

ECX-101	Basic Electronics	Core Course	L	T	P	Credit
			2	0	0	2

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Students will be able to acquire knowledge of different measuring instruments for study of various electrical parameters.
CO 2	Students could understand basic fundamental concepts of basic semiconductor diodes, its application.
CO 3	Gain knowledge of transistors and its applications for amplifiers and oscillators.
CO 4	Gain knowledge about digital logic families and basic circuits design.

Detailed Syllabus

Electronics Instruments: Role and importance of general-purpose test instruments viz Multimeter, Cathode Ray Oscilloscope (CRO), Function/Signal Generator, Block diagram and working of CRO, Amplitude, frequency and phase measurements using CRO. (3)
Regulated Power Supply : Review of PN Junction Diode, Block diagram of power supply, Halfwave, Fullwave and Bridge rectifiers, Passive filters, Regulators, Line regulator and load regulators, Zener Diode as voltage regulators, concept of switched mode power supply (SMPS). (3)
Bipolar junction transistor-: Physical structure and modes of operation and its configurations Load line analysis, Transistor as a switch and as an amplifier, frequency response and bandwidth. (7)
Feedback and Oscillators: Concept of feedback, positive and negative feedback, advantages of negative feedback, Basic principles of sinusoidal oscillators, Oscillation criteria, LC and RC oscillators. (5)
Operational Amplifiers: Ideal Op-amp, Equivalent model, Open and close Inverting and non-inverting and differential configurations, Applications of op-amp as summing amplifier, differentiator and integrator. (4)
Digital Electronics: Review of number system and logic gates, NAND and NOR as universal gates, combinational Circuit: Half adder, Full adder, MUX, DEMUX, Encoder, Decoder, Sequential circuit: SR and JK flip-flops, idea about ROM, RAM, and EPROM, Introduction of Microprocessor and Microcontroller and their Evolution. (8)
Books Recommended

1. Mottershed A, "Electronic devices and circuits: An introduction," Goodyear Publisher Co.
2. Stanley D William, Hackworth R John and Jones L Richard, "*Fundamentals of Electrical Engineering and Technology,*" Cengage Learning, (2007).
3. Mano M Morris, "*Digital Design*", 3rd Ed., Pearson Education.
4. Ramesh S Gaonkar, "*Microprocessor Architecture- Programming & Applications with 8085/8080A*", 5th Ed., Penram International Publishing (India) Pvt. Ltd.
5. Boylestad and Nashelsky, "*Electronic Devices and Circuit Theory"*, 8th Ed., Pearson Education India, New Delhi.
6. Sedra A S and Smith K C, "*Microelectronic Circuits"* 4th Ed., New York, Oxford University Press, New York.

HMX-104	English Communication Lab	Core Course	L	T	P	Credit
			0	0	3	2

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	Students are equipped with effective speaking and listening skills.
CO 2	Helps to develop their soft skills, which will make the transition from college, to workplace smoother and help them to excel in their jobs.
CO 3	Enhances students' performance at Placement interviews, Group Discussions and other recruitment exercises.

Detailed Syllabus

1. **Business Letters:** Structure of business letters, language in business letters.

- Letters of inquiry & their places.
- Sales letters
- Memorandum, quotations/tenders
- Bank correspondence
- Letters of application and appointments
- Resume, bio data, curriculum vitae writing

2. **Comprehension & Précis Writing:** Role of listening, ear training, reading, comprehension: reasons for poor comprehension, improving comprehension skills, developing skills of comprehension exercises. Précis writing: difference from comprehension, techniques of précis writing, topic sentences and its arrangement.

3. **Essay Writing:** Definition of essay, types of essay, relevant essay writing for engineers/professionals, use of essay writing. Dimensions of essay writing: literary, scientific, sociological: contemporary problem solving essays. Horizons of essay writing: narrative essays, descriptive essays, reflective essays, expository essays, argumentative and imaginative essays.

4. **Report Writing**

5**. Conducting a Meeting, Minutes of Meeting**

6**. Oral Presentation**

7**. Group Discussion**

ECX-102	Basic Electronics Lab	Core Course	L	T	P	Credit
			0	0	2	1

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	To understand measuring process of different measuring instruments for study of various electrical parameters.

CO 2	To study practical behaviour of semiconductor diodes and its applications for rectifiers deign.
CO 3	To study transistor and its applications for amplifiers.
CO 4	Able to deign digital circuits and analyse it behaviour.

List of Experiments

1. To get familiar with the working knowledge of the following instruments:
   a) Cathode ray oscilloscope (CRO)
   b) Multimeter (Analog and Digital)
   c) Function generator
   d) Power supply

2. a) To measure phase difference between two waveforms using CRO
   b) To measure an unknown frequency from Lissajous figures using CRO

3. a) Plot the forward and reverse V-I characteristics of P-N junction diode
   b) Calculation of cut-in-voltage
   c) Study of Zener diode in breakdown region

4. To assemble and test 5V/9 V DC regulated power supply and find its line-regulation and load regulation

5. To plot and study the input and output characteristics of BJT in common-emitter configuration.
6. To find frequency response of a given amplifier and calculate its bandwidth

7. To assemble RC Phase shift oscillator circuit and calculation of oscillation-frequency and its verification from the observed output

8. To get familiar with pin-configuration of typical op-amp (741) and its use as:
   a) Inverting amplifier
   b) Non-inverting amplifier
   c) Summing amplifier
   d) Difference amplifier

9. Use of op-amp as
   a) Integrator
   b) Differentiator

10. Verification of truth tables of logic gates -OR, AND, NOT, NAND, NOR and Ex-OR

11. Verification of NAND and NOR as universal gates.

12. Verification of truth tables of flip-flops (S-R, J-K)

CHX-102	Chemistry Lab	Core Course	L	T	P	Credit
			0	0	2	1

Pre-requisites: None
Course Assessment Method: Both continuous and semester end examination.
Topics to be covered: All.
Course Outcomes: At the end of the course the student will be able to:

CO 1	To understand the mechanism of synthesis of polymers and their applications.
CO 2	To understand the concept of water purification through ion exchange, COD etc techniques.
CO 3	To study the partition coefficient and distribution of solute in different solvents.
CO 4	To study the synthesis of drugs like aspirin.
CO 5	To understand the concept of acid-base titrations using pH and conductance measurements.
CO 6	To analyze the solutions and extraction of metals using spectrophotometric techniques.
CO 7	To learn other techniques like thin layer chromatography, determination of molecular weight, and adsorption phenomenon.
CO 8	To find viscosity of different solvents and their applications.

List of Experiments

1. To draw the phase diagram of lead-in binary system.
2. To study the adsorption of acetic acid on activated charcoal.
3. To verify Bear's law for a coloured solution and to determine the concentration of a given unknown solution.
4. Determine the partition coefficient of iodine between carbon tetrachloride and water.
5. Determine the viscosity of a given liquid by Oswald's viscometer.
6. To determine the molecular weight of a given compound by cryoscopy.
7. Isolation of caffeine from tea leaves.
8. To synthesize paracetamol and determine percentage yield of the product.
9. To synthesize Phenol and Urea formaldehyde resin.
10. Thin layer-chromatographic separations of amino acids / organic molecules.
11. Determination of ion-exchange capacity of a given ion-exchange (cationic / Anionic).
12. Determination of COD of water sample.
13. To draw the pH-titration curve of strong acid vs strong base.
14. To determine concentration of trace metals by atomic absorption spectrophotometer.
15. An investigatory project (compulsory for all students).