# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
## B.Tech. in ELECTRONICS AND INSTRUMENTATION ENGINEERING
### COURSE STRUCTURE & SYLLABUS (R18)

**Applicable From 2018-19 Admitted Batch**

## I YEAR I SEMESTER

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**Induction Programme**

**Total Credits** | 13 | 3 | 10 | 18 |

## I YEAR II SEMESTER

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**Total Credits** | 12 | 2 | 10 | 19 |

## II YEAR I SEMESTER

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**Total Credits** | 18 | 3 | 6 | 21 |

## II YEAR II SEMESTER

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**III YEAR I SEMESTER**

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**III YEAR II SEMESTER**

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*MC609 - Environmental Science – Should be Registered by Lateral Entry Students Only.

**IV YEAR I SEMESTER**

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### IV YEAR II SEMESTER

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**Professional Elective – I**
- EI511PE Instrumentation Practices in Industries
- EI512PE Operating Systems
- EI513PE Robotics and Automation

**Professional Elective - II**
- EI611PE Optoelectronics and Laser Instrumentation
- EI612PE Industrial Data Communications
- EI613PE Embedded Systems

**Professional Elective – III**
- EI711PE Pharmaceutical Instrumentation
- EI712PE Virtual Instrumentation
- EI713PE MEMS and its applications

**Professional Elective – IV**
- EC721PE Biomedical Instrumentation
- EI722PE Computer Networks
- EI723PE Artificial Neural Networks

**Professional Elective – V**
- EI811PE Telemetry and Telecontrol
- EI812PE Digital Image Processing
- EI813PE VLSI Design

**Professional Elective – VI**
- EI821PE Power Plant Instrumentation
- EI822PE Machine Learning
- EI823PE Fundamentals of Internet of Things

*MC – Satisfactory/Unsatisfactory*

**Note:** Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.
MA101BS: MATHEMATICS - I

B.Tech. I Year I Sem.

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3 1 0 4

Course Objectives: To learn
- Types of matrices and their properties.
- 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.
- Concept of 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.
- Partial differentiation, concept of total derivative
- 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.

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:

REFERENCE BOOKS:
AP102BS/AP202BS: APPLIED PHYSICS

B.Tech. I Year I Sem.

Course Objectives:
- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: Upon graduation:
- The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
- The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
- Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics
Introduction to quantum physics, Black body radiation, Planck’s law, Photoelectric effect, Compton effect, de-Broglie’s hypothesis, Wave-particle duality, Davison and Germer experiment, Heisenberg’s Uncertainty principle, Born’s interpretation of the wave function, Schrodinger’s time independent wave equation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics
Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

UNIT-III: Optoelectronics

UNIT-IV: Lasers and Fibre Optics

UNIT-V: Electromagnetism and Magnetic Properties of Materials

TEXT BOOKS:
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
REFERENCE BOOKS:
1. Richard Robinett, Quantum Mechanics
3. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Guptha on NPTEL
CS103ES/CS203ES: PROGRAMMING FOR PROBLEM SOLVING

B.Tech. I Year I Sem.  

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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.

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, stdout and stderr. 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 (no implementation)
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 arrays of 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:
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd
   Edition)

REFERENCE BOOKS:
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
ME104ES/ME204ES: ENGINEERING GRAPHICS

B.Tech. I Year I Sem.

Pre-requisites: Nil

Course objectives:
- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course Outcomes: At the end of the course, the student will be able to:
- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT – I

UNIT- II

UNIT – III
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

UNIT – V

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 BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:
1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
AP105BS/AP205BS: APPLIED PHYSICS LAB

B.Tech. I Year I Sem. L T P C 0 0 3 1.5

List of Experiments:
1. Energy gap of P-N junction diode:
   To determine the energy gap of a semiconductor diode.

2. Solar Cell:
   To study the V-I Characteristics of solar cell.

3. Light emitting diode:
   Plot V-I and P-I characteristics of light emitting diode.

4. Stewart – Gee’s experiment:
   Determination of magnetic field along the axis of a current carrying coil.

5. Hall effect:
   To determine Hall co-efficient of a given semiconductor.

6. Photoelectric effect:
   To determine work function of a given material.

7. LASER:
   To study the characteristics of LASER sources.

8. Optical fibre:
   To determine the bending losses of Optical fibres.

9. LCR Circuit:
   To determine the Quality factor of LCR Circuit.

10. R-C Circuit:
    To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed
CS106ES/CS206ES: PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. I Year I Sem.  

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[Note: The programs may be executed using any available Open Source/ Freely available IDE  
Some of the Tools available are:  
CodeLite: https://codelite.org/  
Code::Blocks: http://www.codeblocks.org/  
DevC++ : http://www.bloodshed.net/devcpp.html  
Eclipse: http://www.eclipse.org  
This list is not exhaustive and is NOT in any order of preference]

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 from standard input.

Simple numeric problems:
- a. Write a program for finding 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
- h. 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.

i. \(1 - x/2 + x^2/4 - x^3/6\)

j. Write a C program to read in two numbers, \(x\) and \(n\), and then compute the sum of this geometric progression: \(1 + x + x^2 + x^3 + \ldots + x^n\). 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 function 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:

d. Addition of Two Matrices

e. ii. Multiplication of Two Matrices

f. iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

g. Write C programs that use both recursive and non-recursive functions

h. To find the factorial of a given integer.

i. ii. To find the GCD (greatest common divisor) of two given integers.

j. iii. To find \(x^n\)

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

l. Write a program for displaying values reverse order from array using pointer.

m. 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 first 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:

d. 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.

f. 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.)

g. Write a C program that displays the position of a character \(ch\) in the string \(S\) or – 1 if \(S\) doesn't contain \(ch\).

h. 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
  1 2 3 4 5
  1 2 3 4 5 6

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.
  c. 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.

Suggested Reference Books for solving the problems:
  i. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill
  iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
  iv. Hall of India
  v. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
*MC109ES: ENVIRONMENTAL SCIENCE

B.Tech. I Year I Sem.  

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Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations.

Course Outcomes:
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

UNIT-I
Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

UNIT-IV

UNIT-V

TEXT BOOKS:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.
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
- Identify whether the given differential equation of first order is exact or not
- 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

UNIT-I: First Order ODE
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 Higher Order
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type \(e^{ax}, \sin ax, \cos ax\), polynomials in \(x\), \(e^{ax}V(x)\) 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 parallelepiped).

UNIT-IV: Vector Differentiation

UNIT-V: Vector Integration
Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

REFERENCE BOOKS:
B.Tech. I Year II Sem.  

Course Objectives:  
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.  
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.  
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.  
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.  
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways.

Course Outcomes: The basic concepts included in this course will help the student to gain:  
- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.  
- The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.  
- The required skills to get clear concepts on basic spectroscopy and application to medical and other fields.  
- The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.


UNIT - V:
Spectroscopic techniques and applications: Principles of spectroscopy, selection rules and applications of electronic spectroscopy, vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

TEXT BOOKS:
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
B.Tech. I Year II Sem.

**Course Objectives:**
- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand 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 analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

**UNIT-I: D.C. Circuits**
Time-domain analysis of first-order RL and RC circuits.

**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.
Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: Transformers**
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**UNIT-IV: Electrical Machines**
Construction and working of synchronous generators.

**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 /REFERENCE BOOKS:**
ME105ES/ME205ES: ENGINEERING WORKSHOP

B.Tech. I Year II Sem.  

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Pre-requisites: Practical skill

Course Objectives:
- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes: At the end of the course, the student will be able to:
- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:
At least two exercises from each trade:
   I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
   II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
   III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
   IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
   V. Welding Practice – (Arc Welding & Gas Welding)
   VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
   VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:
Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:
1. Workshop Practice /B. L. Juneja / Cengage

REFERENCE BOOKS:
2. Workshop Manual / Venkat Reddy/ BSP
EN105HS/EN205HS: ENGLISH

B.Tech. I Year II Sem. 

**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 also 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, fostering ideas and practice of language skills in various contexts and cultures.*

**Learning Objectives:** The course will help to

a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.

b. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.

c. Develop study skills and communication skills in formal and informal situations.

**Course Outcomes:** Students should be able to

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

**SYLLABUS**

**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 in Writing 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-Précis 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
Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXT BOOK:

REFERENCE BOOKS:
CH106BS/CH206BS: ENGINEERING CHEMISTRY LAB

B.Tech. I Year II Sem.  

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as a function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity.
- Calculation of Rf values of some organic molecules by TLC technique.

List of Experiments:
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 catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of Rf 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.

REFERENCE BOOKS:
1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
EN107HS/EN207HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. I Year II Sem.  

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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

**Course 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:  
- Computer Assisted Language Learning (CALL) Lab  
- Interactive Communication Skills (ICS) 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 the 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.

**Exercise – II**
**CALL Lab:**
*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.

**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:**
*Understand:* Interview Skills.
*Practice:* Mock Interviews.

**************

**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 Communication Skills (ICS) Lab:
   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.
EE108ES/EE208ES: BASIC ELECTRICAL ENGINEERING LAB

B.Tech. I Year II Sem. 

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 basic electrical laws.
- 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 electrical machines.

List of experiments/demonstrations:
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator
EC301PC: ELECTRONIC DEVICES AND CIRCUITS

B.Tech. II Year I Sem.  

Course Objectives:
- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To know the switching characteristics of components
- To give understanding of various types of amplifier circuits

Course Outcomes: Upon completion of the Course, the students will be able to:
- Know the characteristics of various components.
- Understand the utilization of components.
- Understand the biasing techniques
- Design and analyze small signal amplifier circuits.

UNIT - I
Diode and Applications: Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clipper-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - II

UNIT - III

UNIT – IV

UNIT – V

TEXT BOOKS:
1. Electronic Devices and Circuits- Jacob Millman McGraw Hill Education

REFERENCE BOOKS:
EI302ES: NETWORK THEORY

B.Tech. II Year I Sem.  

Pre-Requisites: Basic Electrical and Electronics Engineering

Course Objectives:
- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To know the basic Laplace Transforms techniques in periodic waveforms.
- To understand the two port network parameters.
- To understand the properties of LC networks and filters.

Course Outcomes:
- Gains the knowledge on Basic network elements.
- Learns and analyzes the RLC circuits behavior in details.
- Analyze the performance of periodic waveforms.
- Learns and gains the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
- To analyze the filter design concepts in real world applications.

UNIT - I

UNIT - II
Steady state and transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves

UNIT - III
Network Topology- Definitions-Graphs-Tree, Basic Cutset and Basic Tieset Matrices for planet network-Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual Networks.
Network theorems (without Proof)- Tellegen’s, Superposition, Reciprocity, Thevenin’s, Norton’s Maximum Power Transfer, Millman’s and Compensation theorems for dc and ac excitations.

UNIT – IV
Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros.

UNIT – V
Standard T, π, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network, T and π Conversion, LC Networks and Filters; Properties of LC Networks, Foster’s Reactance theorem, design of constant K, LP, HP and BP Filters, Composite filter design.

TEXT BOOKS:

REFERENCE BOOKS:
4. Network Theory – Sudarshan and Shyam Mohan, TMH.
EI303PC: TRANSDUCERS ENGINEERING

B.Tech. II Year I Sem.  

L T P C  
3 1 0 4

Pre-requisites: Physics, Mathematics

Course Objectives

- To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
- To provide better familiarity with the Theoretical and Practical concepts of Transducers.
- To provide familiarity with different sensors and their application in real life.
- To provide the knowledge of various measurement methods of physical parameters like velocity, acceleration, torque, pressure, flow, temperature etc. and their relevance to Industry.

Course Outcomes: After completion of the course the student is able to:

- Identify suitable sensors and transducers for real time applications.
- Translate theoretical concepts into working models.
- Design the experimental applications to engineering modules and practices.
- Design engineering solution to the Industry/Society needs and develop products.

UNIT - I

Introduction to measurement systems: General concepts and terminology, measurement systems, sensor classifications: Analog Input and Output, Digital Input and Output, general input-output configuration, methods of correction.

Passive Sensors

Resistive Sensors: Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs), Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers.

Capacitive Sensors: Variable capacitor and Differential capacitor.


UNIT - II

Self-generating Sensors

Thermoelectric Sensors: Thermocouples, Thermo electric effects, Common thermocouples, Practical thermocouple laws, Cold junction compensation in thermocouples circuits.

Piezoelectric Sensors: Piezoelectric effect, piezoelectric materials, applications.


Photovoltaic Sensors: Photovoltaic effect, materials and applications.

Hall Effect Sensors

UNIT - III

Digital Sensors:


Smart Sensors: Definition of a Smart sensor, Smart sensor systems, Characteristics, Architectures, buses and interfaces, Smart sensors for electrical and non-electrical variables: Pressure and Temperature. Standards for Smart Sensors.

UNIT - IV

UNIT - V
Signal conditioning: Voltage dividers, Wheatstone Bridge, Instrumentation amplifier and linearization of resistive bridge sensor, Electrostatic shield, Noise elimination using filters.

TEXT BOOKS:

REFERENCE BOOKS:
3. Instrument Transducers – An Introduction to their Performance and design – by Herman K.P. Neubrat, Oxford University Press.
5. Electronic Instrumentation by H.S. Kalsi.
EI304PC: ELECTRONIC MEASUREMENTS

B.Tech. II Year I Sem. L T P C

3 0 0 3

Pre-requisites: Mathematics, Circuit Theory.

Course Objectives

- Understand different measurement methods and errors associated with them.
- Know the different standards and calibration methodologies adopted in the measurement systems.
- Know different AC and DC bridges for the measurement of R, L and C.
- Know different types of Oscilloscopes and Analyzers (Analog and Digital).
- Acquire clear concepts about the DC and AC voltage and current measurements

Course Outcomes After completion of the course the student is able to:

- Understand the different methods of measurement.
- Calibrate different instruments.
- Design bridges circuits for the measurement of unknown R, L and C
- Display and Analyze any complex waveforms through analog and digital techniques.

UNIT - I

UNIT - II

UNIT - III

UNIT - IV
Bridges: AC Bridges – measurement of inductance: - Maxwell's bridge, Anderson bridge, Hays Bridge measurement of capacitance:-Schering bridge, measurement of impedance: – Kelvin's bridge, Wheat Stone bridge, HF bridges, problems of shielding, and grounding, Q-meter.

UNIT - V
Oscilloscopes: CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits.

Analyzers

TEXT BOOKS

2. Electronic Instrumentation and measurements techniques by Helfrick and W.D. Cooper, PHI publications.
REFERENCE BOOKS

EC304PC: SIGNALS AND SYSTEMS

B.Tech. II Year I Sem.  \[ L \quad T \quad P \quad C \]
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Pre-requisite: Nil

Course Objectives:
- This gives the basics of Signals and Systems required for all Electrical Engineering related courses.
- To understand the behavior of signal in time and frequency domain
- To understand the characteristics of LTI systems
- This gives concepts of Signals and Systems and its analysis using different transform techniques.

Course Outcomes: Upon completing this course, the student will be able to
- Differentiate various signal functions.
- Represent any arbitrary signal in time and frequency domain.
- Understand the characteristics of linear time invariant systems.
- Analyze the signals with different transform technique

UNIT - I
Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT – II
Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet’s conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.


Unit - III
Signal Transmission through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT – IV


UNIT - V
Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.

and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

TEXT BOOKS:
1. Signals, Systems & Communications - B.P. Lathi , 2013, BSP.

REFERENCE BOOKS:
EC306PC: ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech. II Year I Sem.  

List of Experiments (Twelve experiments to be done):
Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Input and output characteristics of BJT in CE Configuration
5. Input and output characteristics of FE in CS Configuration
6. Common Emitter Amplifier Characteristics
7. Common Base Amplifier Characteristics
8. Common Source amplifier Characteristics
9. Measurement of h-parameters of transistor in CB, CE, CC configurations
10. Switching characteristics of a transistor
11. SCRs Characteristics.
12. Types of Clippers at different reference voltages
13. Types of Clampers at different reference voltages
14. The steady state output waveform of clampers for a square wave input

Major Equipments required for Laboratories:

1. Regulated Power Supplies, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic Components
EC308PC: BASIC SIMULATION LAB

B.Tech. II Year I Sem.

Note:
- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

List of Experiments:
1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
14. Verification of Sampling Theorem.
17. Verification of Weiner-Khinchine Relations.

Major Equipments required for Laboratories:
1. Computer System with latest specifications connected
2. Window Xp or equivalent
3. Simulation software-MAT Lab or any equivalent simulation software
EI307PC: TRANSDUCERS AND MEASUREMENTS LAB

B.Tech. II Year I Sem.  

Course Objectives:
- To acquire hands on experience in active and passive sensors/transducers.
- To understand different signal conditioners.
- To design basic measuring devices like bridges.

Course Outcomes: After completion of the course the student is able to:
- Appreciate the use of sensors.
- Identify the sensors required for any specific application.
- Design simple measuring devices.
- Develop simple measuring systems employing appropriate sensors.

List of Experiments: (Minimum 12 experiments to be conducted)
1. Measurement of Load using Strain Gauge bridge
2. Measurement of Temperature using Thermistor, RTD and Thermocouple
3. Measurement of Displacement using LVDT, use of LVDT for Capacitance measurement
4. Measurement of L, C and R using Bridges and comparing them with Q-Meter
5. Extension of range of DC Ammeter, converting it into Voltmeter
6. Extension of range of AC Voltmeter, converting it into Ammeter
7. Construction of Series and Shunt type Ohm meters using PMMC
8. Measurement of Resistance using Wheatstone Bridge / Kelvin Bridge
9. Measurement of Capacitance using Schering’s Bridge
10. Measurement of Inductance using Maxwell’s Bridge
11. Characteristics of Opto-Electric Transducers (Photo Transistor, Photo Diode and LDR)
12. Pressure measurement through Bourdon Tube
13. Radiation and optical Pyrometers
14. Characteristics of pH sensors
15. Characteristics of Conductivity sensors.
16. Characteristics of DO sensors
The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21
MA401BS: LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES

B.Tech. II Year II Sem.

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- Various methods to find roots of an equation.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy’s integral formula and Cauchy’s residue theorem.
- Expansion of complex functions using Taylor’s and Laurent’s series.

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

- Use the Laplace transforms techniques for solving ODE’s
- Find the root of a given equation.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given ODE’s
- Analyse the complex function with reference to their analyticity, integration using Cauchy’s integral and residue theorems.
- Taylor’s and Laurent’s series expansions of complex Function

UNIT - I

Laplace Transforms 10 L

Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by ‘t’. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.

Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT - II

Numerical Methods-I 10 L


Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton’s forward and backward difference formulae. Central difference interpolation: Gauss’s forward and backward formulae; Lagrange’s method of interpolation

UNIT - III

Numerical Methods-II 08 L


Ordinary differential equations: Taylor’s series; Picard’s method; Euler and modified Euler’s methods; Runge-Kutta method of fourth order.

UNIT - IV

Complex Variables (Differentiation) 10 L

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT - V

Complex Variables (Integration) 10 L

Line integrals, Cauchy’s theorem, Cauchy’s Integral formula, Liouville’s theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor’s series, Laurent’s series; Residues, Cauchy Residue theorem (without proof)
TEXT BOOKS:

REFERENCE BOOKS:
EI402PC: INDUSTRIAL INSTRUMENTATION

B.Tech. II Year II Sem.

Course Objectives:
- Understand the basic knowledge of the physical parameters like Pressure, Temperature, flow, level, density and viscosity employed in different Industries.
- Grasp sound knowledge about various techniques used for the measurement of industrial parameters.
- Understand the construction and working of measuring instruments.
- Analyze need and necessity of measuring instruments.

Course Outcomes: After completion of the course the student is able to:
- Acquire adequate knowledge about process transducers.
- Acquire adequate knowledge about the temperature standards, thermocouples and pyrometry techniques.
- Study area flow meters, mass flow meters and calibration.
- Understand various types of level measurements adopted in industry environment.

UNIT - I

Velocity and Acceleration Measurement

UNIT - II

UNIT - III
Flow Measurement and Level Measurement: Flow Meters- Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type, vertex shedding type, Hotwire anemometer type, Laser Doppler Velocity-meter.
Basic Level measurements – Direct, Indirect, Pressure, Buoyancy, Weight, Capacitive Probe methods

UNIT - IV
Density, Viscosity and other Measurements
Units of Viscosity, specific gravity scales used in Petroleum Industries, Different Methods of measuring consistency and Viscosity –Two float viscorator –Industrial consistency meter. Sound-Level Meters, Microphones, Humidity Measurement

UNIT - V
Calibration and Interfacing

TEXT BOOKS

REFERENCE BOOKS
EC404PC: LINEAR IC APPLICATIONS

B.Tech. II Year II Sem.  

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Pre-requisite: Electronic Devices & Circuits

Course Objectives: The main objectives of the course are:
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the theory and applications of analog multipliers and PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: Upon completing this course, the student will be able to
- A thorough understanding of operational amplifiers with linear integrated circuits.
- Attain the knowledge of functional diagrams and applications of IC 555 and IC 565
- Acquire the knowledge about the Data converters.

UNIT - I

UNIT - II
Op-amp and Applications: Basic information of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample & hold circuits, multipliers and dividers, differentiators and integrators, comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723

UNIT - III
Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

UNIT - IV
Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT - V

TEXT BOOKS:
1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International(p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:
1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Intergrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.
EC405PC: ELECTRONIC CIRCUIT ANALYSIS

B.Tech. II Year II Sem.  

Pre-requisite: Electronic Devices and Circuits

Course Objectives:
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
- To construct various multivibrators using transistors and sweep circuits.

Course Outcomes: Upon completing this course, the student will be able to
- Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.
- Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
- Design Multivibrators and sweep circuits for various applications.

UNIT – I
Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Casca RC Coupled amplifiers, Cascode amplifier, Darlington pair.

Transistor At High Frequency: Hybrid - model of Common Emitter transistor model, f, fβ and unity gain bandwidth, Gain-bandwidth product.

UNIT - II

UNIT - III

UNIT - IV
Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers.


UNIT - V

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

TEXT BOOKS:
1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education.
REFERENCE BOOKS:
EI403PC: DIGITAL SYSTEM DESIGN

B.Tech. II Year I Sem. 

Pre-Requisites: Nil

Course Objectives:
- To understand common forms of number representation in logic circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.
- To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes: Upon completing this course, the student will be able to
- Understand the numerical information in different forms and Boolean Algebra theorems
- Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Known about the logic families and realization of logic gates.

UNIT - I
Number Systems: Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.


UNIT - II:
Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don’t Care Map Entries, Tabular Method.

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

UNIT - III
Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

UNIT - IV
Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N –Counters. Finite state machine-capabilities and limitations, Mealy and Moore models

UNIT - V
Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL

TEXT BOOKS:

REFERENCE BOOKS:
4. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013
EC407PC: IC APPLICATIONS LAB

B.Tech. II Year II Sem.  
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Note: Verify the functionality of the IC in the given application

Design and Implementation of:
1. Inverting and Non-Inverting Amplifiers using Op Amps
4. Integrator Circuit using IC 741.
6. Active filter Applications-LPF, HPF (First Order)
7. IC 741 waveform Generators-Sine, Square wave and Triangular Waves.
8. Mono-Stable Multivibrator using IC 555.
10. Schmitt Trigger Circuits using IC 741.
11. IC 565-PLL Applications.
12. Voltage Regulator using IC 723
13. Three terminal voltage regulators-7805, 7809, 7912

Major Equipments required for Laboratories:
1. 5 V Fixed Regulated Power Supply/ 0-5 V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.
EI406PC: INDUSTRIAL INSTRUMENTATION LAB

B.Tech. II Year II Sem.  

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**Course Objectives:** Student will be able to
- Understand the basic knowledge of measurement of Velocity, Acceleration, Vibration, Humidity, Density, Viscosity, Sound Level and Intensity of Light.
- Understand the construction, working and calibration of measuring instruments
- Understand various Industrial Bus Protocols

**Course Outcomes:** After completion of the course the student is able to:
- Understand the knowledge of measurement of various parameters.
- Understand construction, working and calibration of measuring instruments and design.
- Analyze various Industrial Bus Protocols
- Design of signal conditioner for various sensors

**Industrial Instrumentation:**
1. Calibration of Pneumatic pressure to Current (P to I) and Current to Pneumatic Pressure (I to P) Converters
2. Measurement of RPM using opto-coupler and comparing it with stroboscope
3. Measurement of precision Angular Velocity and RPM of a rotating Disk
4. Measurement of Velocity, Acceleration and Vibration using Piezo-electric transducer
5. Measurement of Humidity
6. Measurement of intensity of Light
7. Measurement of Sound Level
8. Measurement of Viscosity of Edible Oil using Redwood Viscometer
9. Measurement of Viscosity of Crude Oil using Saybolt Viscometer
10. Measurement of Density
11. MEMS based Accelerometer
12. Design of signal conditioner for MEMS based Accelerometer
13. MEMS based Gyroscope
14. Design of signal conditioner for MEMS based Gyroscope
15. Experiments based on Industrial Bus Protocols
EC408PC: ELECTRONIC CIRCUIT ANALYSIS LAB

B.Tech. II Year II Sem.  

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Note:
- Experiments marked with * has to be designed, simulated and verified in hardware.
- Minimum of 9 experiments to be done in hardware.

Hardware Testing in Laboratory:
1. Common Emitter Amplifier (*)
2. Two Stage RC Coupled Amplifier
3. Cascode amplifier Circuit (*)
4. Darlington Pair Circuit
5. Current Shunt Feedback amplifier Circuit
6. Voltage Series Feedback amplifier Circuit (*)
7. RC Phase shift Oscillator Circuit (*)
8. Hartley and Colpitt’s Oscillators Circuit
9. Class A power amplifier
10. Class B Complementary symmetry amplifier (*)
11. Design a Monostable Multivibrator
12. The output voltage waveform of Miller Sweep Circuit

Major Equipments required for Laboratories:
1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-Multisim or any equivalent simulation software
4. Regulated Power Suppliers, 0-30V
5. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
6. Functions Generators-Sine and Square wave signals
7. Multimeters
8. Electronic Components
**MC409/**MC309: GENDER SENSITIZATION LAB
(An Activity-based Course)

B.Tech. II Year II Sem.  

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**COURSE DESCRIPTION**
This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

**Objectives of the Course:**
- To develop students’ sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

**Learning Outcomes:**
- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

**UNIT - I: UNDERSTANDING GENDER**

**UNIT – II: GENDER ROLES AND RELATIONS**
Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary
UNIT – III: GENDER AND LABOUR

UNIT – IV: GENDER - BASED VIOLENCE

UNIT – V: GENDER AND CULTURE

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

➢ Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.


ASSESSMENT AND GRADING:
• Discussion & Classroom Participation: 20%
• Project/Assignment: 30%
• End Term Exam: 50%
EC501PC: MICROPROCESSORS AND MICROCONTROLLERS

B.Tech. III Year I Semester

Course Objectives:
- To familiarize the architecture of microprocessors and micro controllers
- To provide the knowledge about interfacing techniques of bus & memory
- To understand the concepts of ARM architecture
- To study the basic concepts of Advanced ARM processors

Course Outcomes: Upon completing this course, the student will be able to
- Understands the internal architecture, organization and assembly language programming of 8086 processors
- Understands the internal architecture, organization and assembly language programming of 8051/controllers
- Understands the interfacing techniques to 8086 and 8051 based systems
- Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors

UNIT - I:
Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT - II:
Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.
8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT – III:
I/O and Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.
Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT – IV:
ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT – V:

TEXT BOOKS:

REFERENCE BOOKS:
EI052PC: PROCESS DYNAMICS AND CONTROL

B.Tech. III Year I Semester

Course Objectives: Student will be able to
- Identify and monitor process parameters of various processes.
- Understand the principles of controllers, degrees of freedom, and control valves.
- Recognize these principles written in form of mathematical equations for various control applications.
- Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical process control problems.

Course Outcomes: After completion of the course the student is able to:
- Apply fundamental knowledge of mathematics to modeling and analysis of fluid flow, level, pressure, temperature problems.
- Conduct experiments in pipe flows and open-channel flows and interpreting data from model studies to prototype cases. Documenting them in engineering reports.
- Understand the possible disasters caused by an incorrect Design/Analysis in hydraulic, pneumatic engineering system.
- Apply multi loop control systems in various process industries.

UNIT - I
Process Dynamics

UNIT - II
Control Actions and Controllers and Types of Controllers
Basic control actions – characteristics of two position, three position, Proportional, Single speed floating, Integral and Derivative control modes – PI, PD, PID control modes – Problems -types of controllers -Pneumatic, Hydraulic and Electronic Controllers to realize various control actions.

UNIT - III
Controller Settings and Tuning of Controllers

UNIT - IV
Final Control Elements and Control Valves
I/P Converter, P/I converter - pneumatic, electric and hydraulic actuators – valve Positioned Control valves – characteristic of control valves – valve body – Globe, Butterfly, diaphragm, Ball valves – Control valve sizing – Cavitations, flashing - problems.

UNIT - V
Multiloop Control System
Feed forward control – Feed Forward Feedback Controller (FFBBC) – Ratio control – Cascade control – Split range – Multivariable control and examples from distillation column, Boiler system and heat exchanger.

TEXT BOOKS
REFERENCE BOOKS

EC503PC: CONTROL SYSTEMS

B.Tech. III Year I Semester

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**Prerequisite:** Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus, Laplace Transforms, Numerical Methods and Complex variables

**Course objectives:**
- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response.
- To assess the system performance using time domain analysis and methods for improving it.
- To assess the system performance using frequency domain analysis and techniques for improving the performance.
- To design various controllers and compensators to improve system performance.

**Course Outcomes:** At the end of this course, students will demonstrate the ability to:
- Understand the modeling of linear-time-invariant systems using transfer function and state-space representations.
- Understand the concept of stability and its assessment for linear-time invariant systems.
- Design simple feedback controllers.

**UNT - I**


**UNT - II**


**UNT - III**


**UNT - IV**


**UNT - V**


**TEXT BOOKS:**

**REFERENCE BOOKS:**
SM504MS: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year I Semester

Course Objective: To learn the basic business types, impact of the economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm’s financial position by analysing the Financial Statements of a Company.

UNIT – I: Introduction to Business and Economics

UNIT - II: Demand and Supply Analysis
Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

UNIT- III: Production, Cost, Market Structures & Pricing
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.
Cost analysis: Types of Costs, Short run and Long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.


TEXT BOOKS:

REFERENCE BOOKS:
EI511PE: INSTRUMENTATION PRACTICES IN INDUSTRIES (PE – I)

B.Tech. III Year I Semester

Course Objectives: Student will be able to
- Identify and quantitatively estimate different materials required for the manufacturing of Cement, Pulp, Paper, food, Power and pharmacy.
- Understand the principles of different manufacturing processes.
- Recognize these principles written in form of mathematical & chemical equations.
- Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical industrial problems.

Course Outcomes: After completion of the course the student is able to:
- Apply fundamental knowledge of chemistry & instrumentation to modeling and analysis of different Industrial engineering.
- Understand disasters caused by an incorrect analysis/design indifferent Industrial engineering system.
- Students will demonstrate a working knowledge of the basic principles of measuring techniques, and demonstrate technical knowledge and skills in the calibration and use of equipment used in different industrial process measurement and control.
- Students will demonstrate a working knowledge of safety practices and skills in troubleshooting problems used in the measurement and control in industrial processes.

UNIT - I
Cement Industries
Corrosion Analyzer Porosietester Compressive strength measurement, Blast Furnace Temperature Measurement using Radiation Pyrometers.

UNIT - II
Pulp and Paper Industries
Manufacture of pulp: Raw materials, Pulping processes, Craft pulping, Soda pulping, Sulfite pulping, Semi chemical pulping, Mechanical and Thermo mechanical Pulping.
Manufacture of paper: Wet Processing, Fourdrinier Machine, Coated Papers, Special Papers.
Wet-end Instrumentation:
Pressure: Force Balanced, Bell and Limp or Slack type systems
Temperature: Liquid in Glass, Thermal bulbs, Resistance Bulbs
Liquid Density and Specific Gravity: Fixed Volume, Differential Pressure, Nuclear Radiation Level:
Liquid Level- Continuous Purge Instrument, Diaphragm box, Float and Cable, Capacitive.
Solid Level- Diaphragm solids.
pH: pH Electrode system, types of electrodes.
Oxidation Reduction Potential (ORP): ORP Electrode system, electrode holders.
Freeness: Continuous Sample and Intermittent Sample Systems.
Dry-end Instrumentation:
Moisture: Conductivity, Resistance, Capacitance, Hygroscopic, Infrared Absorption type systems
Basis Weight: Transmission type, On-Machine type, Off-Machine type and Backscatter type systems
Caliper or Thickness: Contacting type- Electrical, Mechanical and Electro Mechanical, Non-Contacting type

UNIT - III
Petroleum Industries
UNIT - IV
Nuclear Power Plant
Introduction, The power plant scheme, Pressure, flow and level measurement, Vibration and expansion measurements, Analysis of impurities in cooling water, Flue Gas analysis, Ultrasonic Thermometry, Radiation Pyrometry, Emittance measurement.

UNIT - V
Food Processing and Allied Industries
Chromatography, Spectrometry – Mass Spectrometer, Toxicity meter.

TEXT BOOKS

REFERENCE BOOKS
EI512PE: OPERATING SYSTEMS (PE – I)

B.Tech. III Year I Semester

Course Objectives:
- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:
- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computer and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I

UNIT - II
System call interface for process management - fork, exit, wait, waitpid, exec

UNIT - III
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

UNIT - V

TEXT BOOKS:

REFERENCE BOOKS:
2. Operating System A Design Approach- Crowley, TMH.
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.
EI513PE: ROBOTICS AND AUTOMATION

B.Tech. III Year I Semester

Course Objectives: Student will be able to

- **Classification** by coordinate system and control system
- **Acquire Knowledge** on Different types Power Sources and Sensors
- **Classification** of Manipulators, Actuators and Grippers
- **Acquire Knowledge** on kinematics and Applications of different Robots

Course Outcomes: After completion of the course the student is able to:

- **Acquire knowledge** on different types of Power Sources (actuators) and Sensors, Classification Of Manipulators, Actuators and Grippers
- **Acquire knowledge** on different applications of various types of robots.
- **Analyze** the direct and the inverse kinematic problems and calculate the manipulator dynamics
- **Able to identify** the applications of robots in different process operations.

UNIT I: Basic Concepts & Power Sources
Fundamentals:

Actuators:
Characteristics of activating system, comparison of activating system Hydraulic devices, Pneumatic devices, electric motors, magnetostrictive actuators.

UNIT II: Sensors, Manipulators and Grippers
Sensors: Sensors characteristics, Position sensors, velocity sensors, acceleration sensors, torque sensors, micro switches, lighten infrared sensors, touch and tactile sensors, proximity sensors, range finders.


UNIT III: Kinematics

UNIT IV: Low level and high-level vision
Image acquisition, Illumination Techniques, Imaging Geometry, Some Basic Relationships between Pixels, Segmentation, Description, Segmentation and Description of 3-D Structures, Recognition, Interpretation.

UNIT V: Robot Applications
Material Transfer and Machine loading/unloading: General Considerations in Robot Material Handling, Material Transfer application, Machine loading and unloading, Liquid handling and pumping.
Processing operations: Spot welding, Continuous Arc Welding, Spray Coating, other processing operations using Robots.
Assembly and Inspection: Assembly and Robot Assembly automation, Parts Presentation methods, Assembly operations, compliance and the Remote Center Compliance (RCC) Device, Assembly system configuration, Adaptable-Programmable assembly system, Designing for Robotic Assembly, Inspection Automation.

TEXT BOOKS:
REFERENCE BOOKS:
EC505PC: MICROPROCESSORS AND MICROCONTROLLERS LAB

B.Tech. III Year I Semester

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**Cycle 1: Using 8086 Processor Kits and/or Assembler (5 Weeks)**
- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32 Bit Data.
  2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

**Cycle 2: Using 8051 Microcontroller Kit (6 weeks)**
- Introduction to IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
  2. Time delay Generation Using Timers of 8051.
  3. Serial Communication from / to 8051 to / from I/O devices.
  4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer0 8051 in 8bit Auto reload Mode and Connect a 1HZ Pulse to INT1 pin and Display on Port0. Assume Crystal Frequency as 11.0592 MHZ

**Cycle 3: Interfacing I/O Devices to 8051(5 Weeks)**
  1. 7 Segment Display to 8051.
  2. Matrix Keypad to 8051.
  3. Sequence Generator Using Serial Interface in 8051.
  4. 8bit ADC Interface to 8051.
  5. Triangular Wave Generator through DAC interfaces to 8051.

**TEXT BOOKS:**
EI506PC: PROCESS CONTROL LAB

B.Tech. III Year I Semester

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Course Objective: To provide better familiarity with the Theoretical concepts studied.

Course Outcomes: Upon completing these course students shall be able realize the process and different controls applied to each process.

Minimum Twelve experiments should be conducted.

1. Study of Electronic controllers.
2. Control valve characteristics (Different types).
3. Control of Flow process
4. Interacting and Non-interacting systems.
5. Control of Temperature process
7. Tuning of PID controller
8. Operation of flow loop in plant.
12. Multi loop control systems – Cascade Control.
13. Feed-forward control.
EN508HS: ADVANCED COMMUNICATION SKILLS LAB

B.Tech. III Year I Semester

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1. INTRODUCTION:
The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:
- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:
This Lab focuses on using multi-media instruction for language development to meet the following targets:
- To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:
The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. Activities on Reading Comprehension – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.


4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.

5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:
The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:
- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
5. SUGGESTED SOFTWARE:
The software consisting of the prescribed topics elaborated above should be procured and used.
- Oxford Advanced Learner’s Compass, 7th Edition
- DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

REFERENCE BOOKS:
MC510: INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Semester

UNIT – I
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
Course Objectives: Student will be able to
- It is to provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
- Learn the process of collecting information/data through PC from real world sources.
- Learn remote and networked data acquisition and operating system.
- Learn programmable logic controllers, and its application.

Course Outcomes: After completion of the course the student is able to:
- Understand the main functional units in a PC and be able to explain how they interact. They should know different bus types, and on this basis be able to distinguish account for different generations of PCs.
- Understand the basics of PLC and its programming.
- Apply different PLC functions to applications.
- Learn the basics of SCADA.

UNIT - I

UNIT - II
Programmable logic controller (PLC) basics: Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators.
Basic PLC programming: Programming On-Off inputs/outputs. Creating Ladder diagrams, Basic PLC functions, PLC Basic Functions, register basics, timer functions, counter functions.

UNIT - III
PLC intermediate and advanced functions: Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions.
PLC Advanced functions: Analog PLC operation, Networking of PLC.

UNIT - IV
Application of PLC: Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating

UNIT V

TEXT BOOKS:

REFERENCE BOOKS:
2. PC Based Instrumentation and Control Third Edition by Mike Tooley; Elsevier.
3. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control. By Kevin James; Elsevier.
4. Practical Data Acquisition for Instrumentation and Control Systems by John Park and Steve Mackay.
EC602PC: DIGITAL SIGNAL PROCESSING

B.Tech. III Year II Semester

Prerequisite: Signals and Systems

Course Objectives:
- To provide background and fundamental material for the analysis and processing of digital signals.
- To understand the fast computation of DFT and appreciate the FFT processing.
- To study the designs and structures of digital (IIR and FIR) filters and analyze and synthesize for a given specifications.
- To acquaint in Multi-rate signal processing techniques and finite word length effects.

Course Outcomes: Upon completing this course, the student will be able to
- Understand the LTI system characteristics and Multirate signal processing.
- Understand the inter-relationship between DFT and various transforms.
- Design a digital filter for a given specification.
- Understand the significance of various filter structures and effects of round off errors.

UNIT - I:

UNIT - II:

UNIT - III:

UNIT - IV:

UNIT - V:

TEXT BOOKS:

REFERENCE BOOKS:
EI603PC/EC611PE: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B.Tech. III Year II Semester

Course Objectives:
- Introduces Object Oriented Programming Concepts Using The Java Language
- Introduces The Principles Of Inheritance And Polymorphism; And Demonstrates How They Relate To The Design Of Abstract Classes.
- Introduces The Implementation Of Packages And Interfaces.
- Introduces Exception Handling, Event Handling and Multithreading.
- Introduces The Design Of Graphical User Interface Using Applets And Swings.

Course Outcomes:
- Develop Applications for Range of Problems Using Object-Oriented Programming Techniques
- Design Simple Graphical User Interface Applications.

UNIT - I:
Object Oriented Thinking and Java Basics: Need for OOP Paradigm, Summary of OOP Concepts, Coping with Complexity, Abstraction Mechanisms, A Way of Viewing World – Agents, Responsibility, Messages, Methods, History of Java, Java Buzzwords, Data Types, Variables, Scope and Life Time of Variables, Arrays, Operators, Expressions, Control Statements, Type Conversion and Casting, Simple Java Program, Concepts of Classes, Objects, Constructors, Methods, Access Control, This Keyword, Garbage Collection, Overloading Methods and Constructors, Method Binding, Inheritance, Overriding and Exceptions, Parameter Passing, Recursion, Nested and Inner Classes, Exploring String Class.

UNIT - II:

UNIT - III:

UNIT - IV:

UNIT - V:
TEXT BOOKS:
2. Understanding OOP with Java Updated Edition, T. Budd, Pearson Education.

REFERENCE BOOKS:
3. Introduction to Java Programming, Y. Daniel Liang, Pearson Education.
EI611PE: OPTOELECTRONICS AND LASER INSTRUMENTATION (PE – II)

B.Tech. III Year II Semester

Course Objectives: Student will be able to

- Understand the principles of optics and lasing action, Design of lasers.
- Apply the knowledge of Optics to fibers and understand the different industrial applications of Optical Fibers.
- Learn the various applications of Lasers in Instrumentation.
- Understand the Opto-Electronic devices and their principles of operation along with their applications.

Course Outcomes: After completion of the course the student is able to:

- Apply fundamental knowledge of Optics and lasers to design application specific optical fiber.
- Apply Lasers in Instrumentation for the measurement of Industrial parameters like Pressure, Temperature, and Level and find the solutions for the errors.
- Understand the advantages of using Lasers in the measurements.
- Understand the applications of Lasers in medicine.

UNIT - I
Optical Fibers and Their Properties
Introduction to optical fiber - fiber characteristics - principles of light propagation through a fiber - Different types of fibers and their properties - Losses in the optical fiber - Dispersion - advantages and disadvantages of optical fibers.

UNIT - II
Opto-Electronic Components

UNIT - III
Industrial Applications of Optical Fibers

UNIT - IV
Laser Fundamentals
Introduction to lasers - Laser characteristics – Laser configuration – Three level and four level lasers – Q-switching – Mode locking – Types of lasers: Solid lasers, Gas lasers, Liquid lasers and Semiconductor lasers

UNIT - V
Laser instrumentation
Industrial applications of lasers – Lasers for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect - Bio-medical applications, Holography: Principle, Methods, Holographic Interferometers and applications.

TEXT BOOKS:

REFERENCE BOOKS:
2. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers
EI612PE: INDUSTRIAL DATA COMMUNICATIONS

B.Tech. III Year II Semester

Course Objectives:

- To introduce the principals of analog and digital communication systems involving different modulation demodulation schemes.
- To provide insight about networks, topologies, and the key concepts used in instrumentation industries.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layer in ISO and TCP/IP.
- To know the basic concepts of network security and its various security issues related with each layer.

Course Outcomes: Upon completing this course, the student will be able to

- To remember and describe how the physical, data link, and network layers operate in a typical data communication system.
- To understand the setting of network environment with all the necessary data communication components, procedure, conflicting issues and resolution techniques that make it functional.
- To apply the operation and technique of various communication protocols such as multiple access protocols, TCP, UP, FTP, etc.
- To analyze the services and features of the various layers of data networks
- To evaluate communication protocols for route calculations and be able to perform such calculations of data transmission.
- To create suitable transmission route for different internetworking devices.

UNIT - I
Amplitude Modulation: AM wave equation, spectrum, power relation, generation methods, high-level modulation, low level modulation, DSBSC and SSB Modulation, SSB generation methods, ISB, VSB.
Frequency Modulation: Mathematical Representation of FM, frequency spectrum of FM, generation methods of FM (Direct, Indirect Methods), effects of noise on FM, noise triangle, pre-emphasis and de-emphasis, phase modulation, compare AM, FM, PM, frequency division multiplexing.

UNIT - II
Serial Communication Standards: Basic concepts, TIA/EIA standards, interface signal functions, PC serial communications

UNIT - III
Local Area Networks: Layer 1 the physical layer, topologies, transmission media, 802 and industrial LANs, wireless LANs 802.11, Hub, bridge, Ethernet switch, router, IEEE 802.3/Ethernet: A layer 1 and layer 2 standard 10BASE5, 10BASE2, 10BASE-T, 10Gbe-10 gigabit Ethernet over fiber, 10 Gbe-10 gigabit Ethernet over copper
Internetworking: Layer 2 internetworking equipment, layer 3 devices, routing topologies, managed switches, gateways.
Wide Area Networks: wireless transmission, carrier concepts, wireless modems, modem types, WAN digital lines, cable modems, WANs for mobile and hinterlands.

UNIT - IV
UNIT - V

TEXT BOOK:

REFERENCE BOOKS:
EI613PE: EMBEDDED SYSTEMS

B.Tech. III Year II Semester

Prerequisite: Microprocessors and Microcontrollers; Computer Organization and Operating Systems

Course Objectives:
- To provide an overview of Design Principles of Embedded System.
- To provide clear understanding about the role of firmware.
- To understand the necessity of operating systems in correlation with hardware systems.
- To learn the methods of interfacing and synchronization for tasking.

Course Outcomes: Upon completing this course, the student will be able to
- To understand the selection procedure of Processors in the embedded domain.
- Design Procedure for Embedded Firmware.
- To visualize the role of Real time Operating Systems in Embedded Systems.
- To evaluate the Correlation between task synchronization and latency issues

UNIT -I:

UNIT -II:
Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT -III:
Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT -IV:

UNIT -V:
Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

TEXT BOOK:
1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:
1. Embedded Systems - Raj Kamal, TMH.
4. An Embedded Software Primer - David E. Simon, Pearson Education.
EC604PC: DIGITAL SIGNAL PROCESSING LAB

B.Tech. III Year II Semester

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The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

Note: - Minimum of 12 experiments has to be conducted.

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
3. To find DFT / IDFT of given DT Signal
4. To find Frequency Response of a given System given in Transfer Function/ Differential equation form.
5. Obtain Fourier series coefficients by formula and using FET and compare for half sine wave.
6. Implementation of FFT of given Sequence
7. Determination of Power Spectrum of a given Signal(s).
8. Implementation of LP FIR Filter for a given Sequence/Signal.
9. Implementation of HP IIR Filter for a given Sequence/Signal
10. Generation of Narrow Band Signal through Filtering
11. Generation of DTMF Signals
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D Sampling Rate Converters
15. Impulse Response of First order and Second Order Systems.
EI605PC: INDUSTRIAL AUTOMATION LAB

B.Tech. III Year II Semester

Course Objectives

- To make students proficient with PLC and SCADA programming
- To make students create interface between PLC and SCADA
- To make students implement PLC and SCADA for real time systems

Course Outcomes: After completion of the course the student is able to:

- Write PLC and SCADA programs for desired application.
- Implement PLC and SCADA control to real times systems.
- Design and create seamless interface between PLC and SCADA mincing the real industrial application.

PLC: Programming and applications

1. Overview of PLC systems, input/output modules, Power supplies and Isolators
2. Simulation: Creating Ladder diagrams for arbitrary applications
3. Basic Functions: register, timer, counter
4. Interfacing PLC with at least two real time process (Pressure Level)
5. Networking of PLC
6. Process Controllers and Loop Tuning using PLC

SCADA: Programming and Applications

1. Introduction to SCADA system, Industrial Application of SCADA
2. Remote Terminal Units programming
3. SCADA programming
4. Interfacing of SCADA and PLC
5. Remote Operation Monitoring using SCADA
6. Real time implementation of SCADA System to a process (DC Motor-RPM Control; Stepper Motor-Angular Displacement and Linear Displacement through Rack Pinion)
7. Implementation of SCADA interfaced PLCs to Flow Process Station
8. Implementation of SCADA interfaced PLCs to pH control system Process Station
9. Implementation of SCADA interfaced PLCs to split control system Process Station
10. Implementation of SCADA interfaced PLCs to Temperature Process Station
11. SCADA programming to simultaneously monitor and control the pH control system process Station, the split control system process Station and Temperature process station
12. Monitoring and evaluation of PLC network using SCADA.
EI606PC: OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

B.Tech. III Year II Semester

Course Objectives:
- To write programs using abstract classes.
- To write programs for solving real world problems using java collection framework.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:
- Able to write programs for solving real world problems using java collection framework.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

Note:
- Use Linux and MySQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.
- The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Programs:
1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. A) Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program for the following:
   i) Create a doubly linked list of elements.
   ii) Delete a given element from the above list.
   iii) Display the contents of the list after deletion.
7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.
8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).


*MC609: ENVIRONMENTAL SCIENCE*

B.Tech. III Year II Semester

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Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

Course Outcomes:
Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT - I
**Ecosystems:** Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II
**Natural Resources:** Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III
**Biodiversity And Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

UNIT - V
TEXT BOOKS:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:
EI701PC: ANALYTICAL INSTRUMENTATION

B.Tech. IV Year I Semester

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<th>Course Objectives: Student will be able to</th>
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<td>Students will be introduced to a whole array of modern analytical instrumentation with the goal of providing them with the tools with which they can further their applied research.</td>
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<td>The emphasis will be a “hands-on” approach with sample preparation, theory, application, method development, data analysis and interpretation being key elements.</td>
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<td>Interpret data derived from any of the above-mentioned spectroscopic instruments</td>
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<td>Appreciate the basic concept, principles and terms of chromatography</td>
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Course Outcomes: After completion of the course the student is able to:

- Understand the principles, procedures and applications of Analytical Instrument and analytical techniques
- Use statistical method for evaluating and interpreting data
- Appreciate the basic principles of spectroscopy and chromatography techniques.
- Integrate different analytical techniques to solve analytical and bio-analytical problems

UNIT - I
Electrochemical Instruments: Basic concepts of Analytical Instrumentation, Electro chemical instruments- pH meter, Conductivity meter, Dissolved oxygen analyzers, sodium analyzers, silica analyzers

UNIT - II
IR Spectrometers – sources and detector, Instrumentation associated with the above spectrophotometers, FTIR. Interpretation and Analysis.
Spectrophotometers-II (Emission): Flame emission and Atomic emission spectrophotometers – Sources for Flame Photometers, Online calorific value measurements.

UNIT - III
Gas and Liquid Chromatographs: Chromatography – types- Basic principles of gas chromatography, liquid chromatography (HPLC) ---- different types of columns, detectors, recorders and associated equipment for Gas and Liquid Chromatographs and their applications, Interpretation and Analysis.

UNIT - IV
Gas Analyzers- II: CO monitors, NOₓ analyzers, Industrial analyzer circuits, Pollution Monitoring systems

UNIT - V
Thermal Analyzers: Differential Scanning Calorimetry (DSC), Derivative Thermo Gravimetric Analyzers (DTGA).

TEXT BOOKS:
1. Handbook of Analytical Instrumentation, R.S. Khandpur, TMH.
REFERENCE BOOKS:
EI711PE: PHARMACEUTICAL INSTRUMENTATION (PE – III)

B.Tech. IV Year I Semester

Course Objectives: Student will be able to
- Understand the working pharmaceutical industry
- Understand the necessity of an instrumentation engineer pharmaceutical industry
- Understand different components and their control in pharmaceutical industry.

Course Outcomes: After completion of the course the student is able to:
- Appreciate the concept of analytical instrumentation learned during previous semester.
- Appreciate the necessity of homogenization of mixture and size reduction.
- Appreciate evaporation process involved in pharma industries.
- Appreciate distillation and filtration process involved in pharma industries.

UNIT - I
Introduction: Pharma Industries Basic Processors and Instrumentation Techniques, Process Analysis Technology (PAT).
Filtration: Classification of Filtration, Mechanism of Filtration, Filter media, Filter Aids, Pretreatment of materials, small scale filtration methods, filtration equipment, filter presses, Leaf filters, stacked disc filters, meta filters, Rotary continuous filters, other methods, ceramic filters, seitz filters, sintered (fritted) Glass filters, Membrane filters, factors affecting the rate of filtration, filter operation, theory of filtration, Limitations of filter theory.
Centrifugation: General principles, theoretical aspects, classification, Laboratory equipment, Large scale equipment, Semi continuous centrifuge, equipment with non-perforated basket, de laval clarifier, vertical solid bowl centrifuges, continuous centrifuges. Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary filter, edge filter, etc. Factors affecting filtration, mathematical problems on filtration, optimum cleaning cycle in batch filters. Principles of centrifugation, industrial centrifugal filters, centrifugal filters, and centrifugal sedimeters.

UNIT - II

UNIT - III
Humidity control and Refrigeration: Basic concepts and definition, wet bulb temperature, adiabatic cooling lines, use of Humidity chart, determination of humidity, air conditioning, humidification and humidifying equipment, dehumidifiers. Introduction, refrigeration equipment, coefficient of performance and refrigerants, Brine systems, refrigeration load, absorption systems.

UNIT - IV
Size Reduction and Separation: Introduction, mechanism and principles of size reduction, classification of size reduction equipment, law of size reduction, large equipment, mills using impact force for size reduction, cage mills, pin mills, fluid energy or jet mills, attrition and grinding mills tumbling mills. Ball mills and tube mills, practical size classifiers used with grinding mills, wet classifiers, nonrotary
ball and bead mills, dry vs wet grinding, end runner mill, edge runner mills, disc attrition mills, dispersion and colloid mills, roller mills, size reduction combined with other operations, factors influencing choice of size reduction machinery, changes resulting in the material due to size reduction.

size separation sieving, Screening equipment, sedimentation, screen analysis Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill, fluid energy mill etc. Various methods and equipments employed for size separation, centrifugal elutriation, microscopic methods.

UNIT - V
Mixing and Homogenization: Introduction, equipment for mixing of miscible liquids, mixing of a soluble solid with a low viscon liquid etc., mixing solids with solids, equipment, consideration while choosing solids mixing equipment, theory of mixing, mixing solids with liquids, mixing miscible liquids, mixing viscous masses, mixing of immiscible liquids, equipment for emulsification.
Theory of mixing, solid solid, solid liquid and liquid liquid mixing equipment, double cone, twin-shell, silverson mixer, colloid mill, sigma blade mixer, planetary mixer, propeller mixer and turbine mixer. Semi solid mixing, Triple roller mill.

TEXT BOOKS:
1. Pharmaceutical Engineering. K. Samba Murthy
2. Pharmaceutical Engineering CVS Subhramanyam.

REFERENCE BOOKS:
2. Unit Operations by Mc Cabe & Smith.
EI712PE: VIRTUAL INSTRUMENTATION (PE – III)

B.Tech. IV Year I Semester

Course Objectives: Student will be able to
- Develop virtual instruments for specific application using Lab VIEW software.
- Ease the programming required to make computer interact with real world.
- To acquire, analyze and display the throughput of any compatible system.
- Knowledge to connect with third party software and hardware

Course Outcomes: After completion of the course the student is able to:
- Create Virtual Instrument using Lab VIEW software for Control system, Signal Processing and Image processing applications.
- Create effective Virtual Instrument that shall use minimum memory space and work effectively with any processor.
- Interface the computer with DAQ to monitor, process and control real world applications
- Analyze the throughput using the tools in Lab VIEW software

UNIT - I
Virtual Instrumentation: An Introduction, Historical perspective, advantages, blocks diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming.

UNIT - II
VI Programming Techniques: VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, mathscript.

UNIT - III
VI Interface Requirements: Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI, VISA and IVI, Data Acquisition Hardware

UNIT - IV

UNIT - V
VI toolsets: Distributed I/O modules, Control Design and Simulation, Digital Signal processing tool kit, Image acquisition and processing, Motion control

TEXT BOOKS:

REFERENCE BOOKS:
EI713PE: MEMS AND ITS APPLICATIONS (PE – III)

B.Tech. IV Year I Semester

Course Objectives: The course is intended for students to:
- Acquire knowledge about MEMS devices and their applications in various domains.
- Understand the techniques to fabricate MEMS devices.
- Learn the design considerations for MEMS devices and Microsystems.
- Learning to characterize Microsystems using optical and electron microscopy and other techniques.

Course Outcomes: After completion of the course the student is able to:
- Apply fundamental knowledge of physics and chemistry to design microsystems for various applications.
- Select appropriate tools and techniques considering particular practical need for a microsystem application.
- Realize the need for advancement of technology towards microsystems for better living in the society.
- Understand the need to keep oneself updated constantly to understand the ease of use of emerging technologies.

UNIT - I
Fundamentals of MEMS: Overview of MEMS and Microsystems; Evolution of microfabrication; Applications of MEMS in optical devices (Micro-Opto-Electro-Mechanical Systems or MOEMS), healthcare and biomedicine (including Bio-MEMS and Bio-MOEMS), aerospace, telecommunications, consumer products, automotive, and industrial products; Working principles of microsystems: Microsensors – acoustic wave, bio-, chemical, optical, pressure, thermal; Microactuation – thermal, shape-memory alloys, piezoelectric, electrostatic; MEMS devices – Microgrippers; Micromotors; Microfluidics – Micropumps, Microvalves; Micro accelerometers

UNIT - II
Materials for MEMS and Microsystems: Substrates and Wafers; Silicon as a Substrate, Silicon Compounds, Silicon piezoresistors, Non-silicon-based materials: Gallium Arsenide, Gallium Nitride, Quartz, Piezoelectric Crystals, Polymers.

UNIT - III
Basics of Micromanufacturing: Photolithography; Cleanroom Environment; Deposition techniques: Ion implantation, Diffusion, Vapour Deposition (PVD, CVD, PECVD), Oxidation, Epitaxial growth; Etching techniques: Chemical (Wet) Etching, Plasma (Dry) Etching Design considerations; Process Design; Photomask layout using CAD; Mechanical design overview

UNIT - IV
Fabrication of MEMS: Bulk micromachining, Surface micromachining, LIGA Process, Deep X-Ray Lithography (DXRL)

UNIT - V

TEXT BOOKS:

REFERENCE BOOKS:
EC721PE: BIOMEDICAL INSTRUMENTATION (PE – IV)

B.Tech. IV Year I Semester

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Course Objectives:
- Identify significant biological variables at cellular level and ways to acquire different bio-signals.
- Elucidate the methods to monitor the activity of the heart, brain, eyes and muscles.
- Introduce therapeutic equipment for intensive and critical care.
- Outline medical imaging techniques and equipment for certain diagnosis and therapies.

Course Outcomes: After completion of the course the student is able to:
- Understand bio systems and medical systems from an engineering perspective.
- Identify the techniques to acquire record and primarily understand physiological activity of the human body through cell potential, ECG, EEG, BP and blood flow measurement and EMG.
- Understand the working of various medical instruments and critical care equipment.
- Know the imaging techniques including CT, PET, SPECT and MRI used in diagnosis of various medical conditions.

UNIT - I:
Bio-Potential Signals and Electrodes
Bio-signals and their characteristics, Organization of cell, Nernst equation of membrane, Resting and Action potentials.
Bio-amplifiers, characteristics of medical instruments, problems encountered with measurements from living systems.
Bio-potential electrodes – Body surface recording electrodes, Internal electrodes, micro electrodes.
Bio-chemical transducers – reference electrode, the pH electrodes, Blood gas electrodes.

UNIT - II:

UNIT - III:
Neurological Instrumentation: Neuronal communication, electro encephalogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, preamplifiers and amplifiers. EMG block diagram and Stimulators

UNIT - IV:

UNIT - V:
Principles of Medical Imaging: Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography, Introduction to Telemedicine.

TEXT BOOKS

REFERENCE BOOKS
1. Biomedical Instrumentation and Measurements – by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.
3. Introduction to Biomedical equipment technology-by Joseph Carr and Brown.
EI722PE: COMPUTER NETWORKS (PE – IV)

B.Tech. IV Year I Semester

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Prerequisites:
1. A course on “Programming for problem solving”
2. A course on “Data Structures”

Course Objectives:
- The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes:
- Gain the knowledge of the basic computer network technology.
- Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Obtain the skills of subnetting and routing mechanisms.
- Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

UNIT - I
Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

UNIT - II
Data link layer: Design issues, framing, Error detection and correction.
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

UNIT - IV
Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V
Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

REFERENCE BOOKS:
EC711PE/EI723PE: ARTIFICIAL NEURAL NETWORKS (PE – IV)

B.Tech. IV Year I Semester

Prerequisite: Nil

Course Objectives:
- To understand the biological neural network and to model equivalent neuron models.
- To understand the architecture, learning algorithms
- To know the issues of various feed forward and feedback neural networks.
- To explore the Neuro dynamic models for various problems.

Course Outcomes: Upon completing this course, the student will be able to
- Understand the similarity of Biological networks and Neural networks
- Perform the training of neural networks using various learning rules.
- Understanding the concepts of forward and backward propagations.
- Understand and Construct the Hopfield models.

UNIT-I:
Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaptation, Statistical Nature of the Learning Process

UNIT-II:
Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment
Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT-III:
Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT-IV:
Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT-V:
Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm
Hopfield Models – Hopfield Models, restricted boltzmen machine.

TEXT BOOKS:
1. Neural Networks a Comprehensive Foundations, Simon S. Haykin, PHI Ed.,

REFERENCE BOOKS:
1. Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
3. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005
SM702MS: PROFESSIONAL PRACTICE, LAW AND ETHICS

B.Tech. IV Year I Semester

Course Objective:
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop some ideas of the legal and practical aspects of their profession.

Course Outcome: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT - I
Professional Practice and Ethics: Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures. Introduction to GST - Various Roles of Various Stake holders

UNIT - II

UNIT - III
Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT - IV
Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen’s Compensation Act, 1923; Building & Other - Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

UNIT - V
Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970

TEXT BOOKS:

REFERENCE BOOKS:
EI703PC: ANALYTICAL INSTRUMENTATION LAB

B.Tech. IV Year I Semester

Course Objectives
- To introduce the student to principles and theory of instrument analysis.
- To introduce the student to a whole array of modern analytical instruments.
- To emphasize a hands-on approach with sample preparation, application, method development, data analysis and interpretation being key elements.
- They can understand the applications and usage of Water quality, Air Quality, Spectrometry, chromatography in real time industrial environments.

Course Outcomes: After completion of the course the student is able to:
- Develop an understanding of the range and theories of instrumental methods available in analytical instrumentation
- Apply knowledge pertaining to the appropriate selection of instruments for the successful analysis of complex mixtures
- Develop an understanding of the role of the Instrumentation Engineer in measurement and problem solving in chemical analysis
- Expand skills in the scientific method of planning, developing, conducting, reviewing and reporting experiments

List of Experiments:
1. Ambient and emission air monitoring using gas analyzer.
2. Separation of different constituents in a mixture of chemical using chromatography
3. Identification of atoms and its concentration through absorption spectra with UV-VIS spectrophotometer.
4. Identification of chemical compound and its concentration using FTIR spectrometer.
5. Identification of atoms and its concentration through emission spectra using flame photometer.
6. Measurement of calorific value using digital bomb calorimeter
11. Radiation intensity measurement with varying distance and measurement of absorber thickness using nuclear radiation detector-G.M. counter.
12. Analysis of water quality using water purity meter
13. Measurement of TDS and conductivity of water using digital conductivity meter
EI811PE: TELEMETRY AND TELECONTROL (PE – V)

B.Tech. IV Year II Semester

Course Objectives:
- To study the concepts of classical telemetry systems
- To get an exposure to radio and satellite telemetry systems
- To learn the fundamentals of optical telemetering systems
- To understand the essential principles of telecontrol systems and installation.

Course Outcomes: After completion of the course the student is able to:
- Students will be able to apply techniques of telemetry and telecontrol.
- Applications of Telemetry and Telecontrol from a remote location.
- Use different communication technique to assist telemetry and telecontrol
- Able to design projects using Telecontrol and Telemetry concepts

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
Optical Telemetry Optical Fibers Cable – Sources and detectors – Transmitter and Receiving Circuits, Coherent Optical Fiber Communication System.

UNIT – V

TEXT BOOKS:
1. Telemetry Principles – D. Patranabis, TMH

REFERENCE BOOKS:
EC713PE/EI812PE: DIGITAL IMAGE PROCESSING (PE – V)

B.Tech. IV Year II Semester

Prerequisite: Digital Signal Processing

Course Objectives:
- To provide a approach towards image processing and introduction about 2D transforms
- To expertise about enhancement methods in time and frequency domain
- To expertise about segmentation and compression techniques
- To understand the Morphological operations on an image

Course Outcomes: Upon completing this course, the student will be able to
- Explore the fundamental relations between pixels and utility of 2-D transforms in image processor.
- Understand the enhancement, segmentation and restoration processes on an image.
- Implement the various Morphological operations on an image
- Understand the need of compression and evaluation of basic compression algorithms.

UNIT - I:


UNIT - II:

UNIT - III:
Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT - IV:

TEXT BOOKS:

REFERENCE BOOKS:
EI813PE: VLSI DESIGN (PE – V)

B.Tech. IV Year II Semester

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Prerequisite: Electronic Circuit Analysis; Switching Theory and Logic Design

Course Objectives: The objectives of the course are to:
- Give exposure to different steps involved in the fabrication of ICs.
- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
- Give exposure to the design rules to be followed to draw the layout of any logic circuit.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

Course Outcomes: Upon completing this course, the student will be able to
- Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors.
- Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit
- Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system

UNIT - I:
Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_d–V_d relationships, MOS transistor threshold Voltage, g_m, g_d, Figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT - II:

UNIT - III:
Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out.

UNIT - IV:
Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.
Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT - V:
Programmable Logic Devices: Design Approach – PLA, PAL, Standard Cells FPGAs, CPLDs.

TEXT BOOKS:

REFERENCE BOOKS:
EI821PE: POWER PLANT INSTRUMENTATION (PE – VI)

B.Tech. IV Year II Semester

Course Objective: Student will be able to

- Understand the working model of power plant
- Understand the necessity of a instrumentation engineer in a power plant
- Understand different components and their control in power plants.
- Understand various analyzers used in power plant

Course Outcome: After completion of the course the student is able to:

- Appreciate the power generation technique used in different types of power plants
- Appreciate different parameters and their control in the power plant
- Understand and standby the saying — one watt saved = two watts generated.
- Understand the concepts of Nuclear power plants.

UNIT - I
An Overview of Power Generation
Introduction- various sources of Electrical Energy - Non-conventional Energy sources - Wind power, solar power, tidal power, geothermal power, magnetohydrodynamic (MHD) Power, Fuel Cells, Biomass Power, Conventional energy sources - hydropower, nuclear power, gas power, steam power (Thermal Power), comparison of various conventional power plants, Importance of instrumentation and control in power Generation – Classification of Instruments in a power plant, objectives of Instrumentation and control.

Piping and Instrumentation diagram (P and I Diagram) – Examples of ISA Instrumentation diagram symbols, examples of SAMA instrumentation diagram symbols, examples of ISA and SAMA diagram, piping and instrumentation diagramming, Cogeneration of Power-back pressure turbine, pass-out turbine process heat unit, control rooms, thermal or boiler control room, electrical control room, plan of control rooms.

UNIT - II
Instrumentation and Control in Water Circuit
Water circuit, boiler feed water circulation - natural circulation, forced circulation, combined circulation, Measurements in Water Circuit - Water Flow Measurement, Differential Pressure transmitter (DPT), steam flow measurement, water and steam pressure measurements, water and steam temperature measurements, drum water level measurement.

Controls in water circuit - boiler drum level control, superheated steam temperature control, steam pressure control, impurities in water and steam - impurities in Raw Water, Effects of Impurities, Measurement of Impurities, feed water treatment.

UNIT - III
Instrumentation and Control in Air-Fuel Circuit


UNIT - IV
Turbine Monitoring and Control
Introduction – Classification, instrumentation control points of View, Principal parts of steam turbines, Turbine Steam Inlet System – Inlet valve arrangements, inlet measurements, Governors, Turbine Measurements – Process Parameters, mechanical parameters, electrical parameters, Turbine control system – safety control systems, process control systems, Lubrication for turbo-alternator – Lubrication system, Controls in Lubrication system, Turbo-Alternator Cooling System – Lube Oil cooling system, Alternator/Generator cooling system.
UNIT - V

Nuclear Power Plant Instrumentation

Digital Architectures in Nuclear Power Plants- System-level Instrumentation and control architecture, safety related systems, non-safety-related systems, man machine interface system (MMIS), Instrumentation and controls architecture platform.

Radiation protection and monitoring – accident at three-mile Island, USA, disaster at Chernobyl nuclear power plant, Ukraine, calamity at Fukushima, Daiichi nuclear power plant, Japan, Radiation Units, Biological Effects of Radiation, Radiation Monitoring, Nuclear Reactor Safety - Reactor protection system, Reactor Tripping, Engineered Safety Features, Surveillance, Diagnostics and Prognostics – Surveillance, Diagnosis, Prognosis.

TEXT BOOKS:

REFERENCE BOOKS:
2. Power Plant Instrumentation by Prof. K. Krishna Swamy, New Age International Publisher.
EI822PE: MACHINE LEARNING (PE – VI)

B.Tech. IV Year II Semester

Course Objectives:
- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

Course Outcomes:
- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT - I

UNIT - II

UNIT - III
Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV
Regularization for Deep Learning
Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V
Optimization for Train Deep Models

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:
1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
EI823PE: FUNDAMENTALS OF INTERNET OF THINGS (PE – VI)

B.Tech. IV Year II Semester

Course Objectives: The objectives of the course are to:
- understand the concepts of Internet of Things and able to build IoT applications
- Learn the programming and use of Arduino and Raspberry Pi boards.
- Known about data handling and analytics in SDN

Course Outcomes: Upon completing this course, the student will be able to
- Known basic protocols in sensor networks
- Program and configure Arduino boards for various designs
- Python programming and interfacing for Raspberry Pi
- Design IoT applications in different domains

UNIT - I:

UNIT - II:

UNIT - III:
Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi

UNIT - IV:
Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics.

UNIT - V:
Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.
Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:
   "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti

REFERENCE BOOKS: