HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT						
B.TECH HR-22 COURSE STRUCTURE						
ELECTRONICS AND COMMUNICATION ENGINEERING						
(Applicable for the batch admitted from 2022-23 onwards)						
III Semester (2 year)						
S. No.	Course code	Semester-III	Hours Per Week			Credits
			L	T	P	
1	22PC3EC01	Analog Electronics*	3	0	2	4
2	22BS3MT05	Numerical Methods & Complex variables	3	1	0	4
3	22PC3CS16	Data Structures using C*	2	0	4	4
4	22PC3EC02	Probability Theory and Stochastic Processes	3	0	0	3
5	22PC3EC03	Signals and Systems	3	0	0	3
6	22PC3EC04	Modelling and Simulation Lab	0	0	2	1
7	22PR3EC01	Evaluation of Internship-I	0	1	0	1
TOTAL			**14**	**2**	**8**	**20**
8	22AC3HS01	Universal Human Values	0	2	0	0
IV Semester (2 year)						
S. No.	Course code	Semester-IV	Hours Per Week			Credits
			L	T	P	
1	22PC4EC05	Analog and Digital Communications*	3	0	2	4
2	22PC4EC06	Digital Logic Design*	3	0	2	4
3	22PC4EC07	Electromagnetic Fields and Transmission Lines	3	0	0	3
4	22PC4EC08	Control Systems	3	0	0	3
5	22BS4EG03	English for Employability*	1	0	2	2
6	22HS4HS01	Business Economics and Financial Analysis	2	0	0	2
7	22PR4EC02	Student Skill Development Course/Doing Engineering-1	0	1	2	2
TOTAL			**15**	**1**	**8**	**20**
8	22MC4HS06	Constitution of India	0	1	0	0

B.Tech II Year – I Sem	L	T	P	C
Subject Code: 22PC3EC01	3	0	2	4

ANALOG ELECTRONICS
(Integrated Course)

Course Objectives: This course will enable students to
1. To understand operation of semiconductor devices.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback and generate the oscillations for different frequencies.
4. To construct various Multivibrators using transistors and sweep circuits.

Course Outcomes:
Upon completion of the Course, the students will be able to:
1. Analyze the Diode applications, Bipolar Junction Transistor characteristics and the biasing techniques.
2. Design the multistage amplifiers using concepts of High Frequency Analysis ofTransistors.
3. Apply the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations
4. Design Multivibrators and sweep circuits for various applications.

Module 1
Special Semiconductor Devices
Operation and characteristics of Tunnel Diode, Energy band Diagram, Tunnel diode applications, Operation and characteristics of Photo diode, varactor diode, LASER and LED, Shockley Diode, Operation and characteristics of SCR, UJT, Photo transistor, Thermistor, LDR.

Week 1: Introduction to LT SPICE (or) TINA (or) Multisim software
Week 2: Analyze the Characteristics of UJT(*).
Week 3: Analyze the characteristics of LDR and Photo-diode

Module 2
Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing- fixed bias, collector to base bias, self bias, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability.
Small Signal Low Frequency Transistor Amplifier Models: BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized

analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

Week 4: Design a self-bias circuit of BJT.
Week 5: Determine the frequency response of Common Emitter Amplifier (*).
Week 6: Darlington pair circuit.

Module 3
Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair.
Transistor at High Frequency: Hybrid Π - model of Common Emitter transistor model, f_α, f_β and unity gain bandwidth, Gain-bandwidth product.

Week 7: Two Stage RC Coupled Amplifier(*).
Week 8: Cascode amplifier Circuit (*)

Module 4
Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.
Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

Week 9: Voltage Series Feedback amplifier Circuit.
Week 10: RC Phase shift Oscillator Circuit (*)
Week 11: Wien bridge Oscillator Circuit(*).
Week 12: Hartley and Colpitt's Oscillators Circuit(*).

Module 5
Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.
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.

Week 13: Design a Monostable Multivibrator(*).
Week 14: Design a Astable Multivibrator(*).

Week 15: The output voltage waveform of Miller Sweep Circuit.

Note:

- Experiments marked with (*) has to be designed, simulated and verified in hardware.
- Minimum of 8 experiments to be done in hardware.

Books:

1. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.
3. Microelectronic Circuits, Adel Sedra, C. Smith, 6th Edition, 2009, Oxford series

Reference Books

1. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S.
2. Electronic Devices and Circuits, Horowitz -, David A. Bell – 5thEdition, Oxford.
3. Basic Electronics-Principles and Applications, Chinmoy Saha, Arindam Halder, Debaati Ganguly - Cambridge, 2018.
4. Electronic Devices and Circuits: second edition. Author, S. Salivahanan. Publisher, Tata Mcgraw Hill, 2011.

CO-PO/PSO Mapping:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	1	-	-	-	-	-	3	-	-	-	2	-
CO2	2	3	-	-	3	-	-	-	3	-	-	-	2	-
CO3	2	2	2	-	-	-	-	-	3	-	-	-	2	-
CO4	2	1	-	-	3	-	-	-	3	-	-	-	2	-

B. Tech II Year–I Sem	L	T	P	C
Subject Code: 22BS3MT05	3	1	0	4

NUMERICAL METHODS AND COMPLEX VARIABLES
(Common to EEE/ECE)

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To provide the student with

1.Various methods to the find roots of an equation.
2.Concept of finite differences and to estimate the value for the given data using interpolation.
3.Evaluation of integrals using numerical techniques.
4.Solving ordinary differential equations using numerical techniques.
5.Differentiation and integration of complex valued functions.
6.Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
7.Expansion of complex functions using Taylor's and Laurent's series.
8.Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms.

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

CO1: Obtain the real roots of algebraic, transcendental equations also approximate solutions for evenly and unevenly spaced data.
CO2: Fit a given data to linear/non-linear curve and appreciate the concept of numerical differentiation and integration. Developthe skill of finding approximate solutions to problem arising in first order IVP in differential equations.
CO3: Analyse the complex function with reference to their analyticity, integration of complex functions by Cauchy's integral and residue theorems also Taylor's and Laurent's series expansions in complex function.
CO4: Express any periodic function in terms of sine and cosine.

MODULE I

Numerical Solutions of Algebraic Equations: Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Regula-Falsi method and Newton- Raphson method.
Interpolation: Newton's divided difference interpolation method. Finite differences-forward differences- backward differences-central differences-operational relations; Interpolation using Newton's forward and backward difference formulae. Gauss's forward and backward formulae; Sterling's formula, Lagrange's method of interpolation.

MODULE II

Numerical Differentiation and Integration: Forward, backward and central differences

for first and second order derivatives. General quadrature formula, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
Solutions Of Ordinary Differential Equations: Taylor's series; Picard's method, Euler's and modified Euler's methods; Runge-Kutta method of fourth order.

MODULE III
Complex Functions: Limit, Continuity and Differentiation of Complex functions.
Analytic Functions: Analyticity, Necessary and Sufficient condition for a function to be analytic (CR-Equations without proof), Harmonic function and finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties. Conformal mapping and Mobius transformation.

MODULE IV

Complex Integrals: Line integral, Cauchy's theorem (without proof), Cauchy's Integral formula (without proof), Zeros of analytic functions, Singularities.

Poles and Residues: Taylor's series, Laurent's series; Poles and Residues, Cauchy Residue theorem (without proof), Evaluation of Real definite integrals of the type $\int_0^{2\pi} f(sin\theta, cos\theta)d\theta$, $\int_{-\infty}^{\infty} f(x)dx$ (poles NOT on real axis).

MODULE V
Fourier Series: Introduction, Fourier series of periodic functions, Fourier series of even and odd functions, Change of interval, Half range sine and cosine series.
Fourier Transform: Fourier sine and cosine transforms - Inverse Fourier transforms.

Text Books:
1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Introductory methods of numerical analysis, S.S. Sastry, PHI, 4th Edition, 2005.
3. Complex Variables and Applications, J. W. Brown and R. V. Churchill, 7th Ed., Mc-Graw Hill, 2004

Reference Books:
1. Advanced Engineering Mathematics, Erwin kreyszig, 9th Edition, John Wiley & Sons, 2006
2. Advanced Modern Engineering Mathematics Glyn James, 5th edition, Prentice Hall, 2018.
3. Complex Analysis, Lars V Ahlfors, 3rd edition, McGraw-Hill International, 2017

MOOC Courses:

1. Complex variables: https://nptel.ac.in/courses/111/106/111106141/
2. Numerical Methods: https://nptel.ac.in/courses/127/106/127106019/

E- Books:

1.Higher Engineering Mathematics by B.S. Grewal lib.in/book/2352263/9368cb
2. Introductory methods of numerical analysis by S.S. Sastry
https://1lib.in/book/3380466/2e7cbd
3. Complex Variables and Applications by J. W. Brown and R. V. Churchill
https://1lib.in/book/2574161/794c8d
4. Advanced Engineering Mathematics by Erwin Kreyszig
https://1lib.in/book/1213502/92e465
5. Advanced Modern Engineering Mathematics by Glyn James
https://1lib.in/book/1204739/431eb2
6. Complex Analysis by Lars V Ahlfors
https://1lib.in/book/842200/9692f4

CO-PO MAPPING:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2										
CO2	3	2										
CO3	3	2										
CO4	3	2										

B.Tech I Year–II Sem	**L**	**T**	**P**	**C**
Subject Code: 22PC2CS16	**2**	**0**	**4**	**4**

DATA STRUCTURES USING C

(Common to CSE, AIML, EEE, ECE)

Prerequisite: Basic mathematical, analytical and logical capability, problem solving through C.

Course Objectives:

- Introduce Analysis of Algorithm in terms of space and time complexity.
- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms.

Course Outcomes:

- Understand concepts of ADT and to write an algorithm for a given problem statement, also calculate time and space complexity.
- Ability to develop C programs for computing real-life applications using data structures like linked lists, stacks,queues.
- Understand different types of trees like Red-Black, AVL, Splay trees.
- Ability to implement searching and sorting algorithms, and pattern matching algorithms.

Module I

Introduction: Basics of Data Structures, Abstract data types, Dynamic aspects of operations on data, Characteristics of data structures, Creation and manipulation of data structures, Operations on data structures.

Algorithms: Mathematical notations and functions, Asymptotic, Analysis of algorithms Time and Space complexity.

Programs:

1. Asymptotic notations to calculate the running time complexity of any algorithm. O Notation (Big-O Notation), Ω Notation (Big-Omega Notation), θ Notation (Theta Notation)
2. Calculate complexity analysis of control structures
3. Calculate complexity analysis of any recursive algorithm
4. Calculating Time complexity of Linear Search algorithm
5. Calculate Time Complexity of quick sort in all possible cases.

Module II

Linked lists: Types of linked lists – singly, doubly and circularly linked lists, operations on linked lists.

Stacks: Implementation of stacks– array and linked list, operations on stacks, Applications of Stacks, Notations – infix, prefix and postfix, Conversion and evaluation of arithmetic expressions using Stacks.

Queues: Implementation of queues– array and linked list, operations on queues, Types of queues – queue, double ended queue and priority queue.

Programs:

1. Write a Program to Implement Stack Operations using Dynamic Memory Allocation.
2. Write a program to convert expressions infix to postfix using stack.
3. Write a program to evaluate arithmetic expressions using stack
4. Write a program that uses functions to perform the following operations on Singly linkedlist.

   i) Creation ii) Insertion iii) Deletion iv) Traversal
5. Write a program that uses functions to perform the following operations on Circular linkedlist.

   i) Creation ii) Insertion iii) Deletion iv) Traversal
6. Write a program that implement Queue (its operations) using Arrays.
7. Write a program that implement stack (its operations) using Pointers

Module III

Dictionaries: Linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing- linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

Programs:

1. Write a program to implement dictionary linear list representation and its operations
2. Write a Program to Implement Hash Tables with Quadratic Probing
3. Write a Program to Implement Hash Tables with Linear Probing
4. Write a Program to Implement Hash Tables Chaining with Binary Trees
5. Write a Program to Implement Hash Tables Chaining with Doubly Linked Lists

Module- IV

Graph: Basic terminologies and Representation Traversal algorithms Breadth First Search, Depth First Search, Shortest path: Depth first search in directed and undirected graphs. Union-find data structure and applications. Directed acyclic graphs, topological sort.

Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching,Red –Black, Splay Trees.

Programs:

1. Write a program to implement the Binary Search tree.
   a) Insertion b) Deletion c) Traversal d) Searching element in tree.
2. Write a program to implement the AVL tree.
   a) Insertion b) Deletion c) Traversal d) Searching element in tree.
3. Write a program to implement the Red-Black tree.
   a) Insertion b) Deletion
4. Write a program to implement the Splay tree.
   a) Insertion b) Deletion
5. Write a program to implement graph traversal methods
   a) Breadth First Search, b) Depth First Search

Module V

Sorting: objective and Properties of different sorting Algorithms Insertion Sort, Bubble sort, Selection Sort, Merge sort, Quick Sort, Heap sort, Radix sort, Bucket sort. Performance and comparison among all the methods Algorithm design techniques: Divide and conquer, Greedy approach, dynamic programming.
Pattern Matching and Tries: Pattern matching algorithms-Brute force, The Boyer –Moore algorithm, Naive algorithm, The Knuth-Morris-Pratt algorithm; Tries- Standard Tries, Compressed Tries, Suffix tries.

Programs:

1. Write a program to implement merge sort using divide and conquer technique
2. Write a program to implement bubble sort using greedy approach.
3. Write a program to implement brute-force method of string matching.
4. Write a Program to perform string matching using Naive String Matching
5. Write a program to implement Standard Trie
6. Write a program to implement Compressed Trie

7. Write a program to implement Suffix Trie

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press.*
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/PearsonEducation.
3. AV Aho. J. Hopcroft, JD Ullman, Data Structures and Algorithms, Addison-Wesley,1983.

REFERENCE BOOKS:

1. Data Structures : A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.
2. Fundamentals of Computer Algorithms by Horwitz and Sahni,Galgotia.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011.
4. Reema Thareja,"Data Structures Using C", Oxford Higher Education, First Edition, 2011

WEB RESOURCES:

https://www.javatpoint.com /c-programming-language-tutorial

https://www.tutorialspoint.com/cprogramming/index.htm

Course Outcomes:

O-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2											2		
CO2	3	2	1										1		
CO3	3	2	1		2								1		
CO4	3	2	1		2								1		

B.Tech II Year–I Sem	**L**	**T**	**P**	**C**
SubjectCode: 22PC3EC02	**3**	**0**	**0**	**3**

Probability Theory and Stochastic Processes

Pr-requisite: Mathematics

Course Objectives: This course will enable students to

1. This gives basic understanding of random variables and operations that can be performed on them.
2. To known the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

Course Outcomes:

Upon completion of the Course, the students will be able to:

1. Perform operations on single and multiple Random variables.
2. Determine the Spectral and temporal characteristics of Random Signals.
3. Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
4. Describe the concepts of Noise and Information theory in Communication systems

Module I

Probability & Random Variable: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

Module II

Operations on Single & Multiple Random Variables – Expectations: Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable. Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables,

Module III

Random Processes – **Temporal Characteristics**: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, SecondOrder and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output. .

Module IV

Random Processes – **Spectral Characteristics**: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

Module V

Noise Sources & Information Theory: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

Text Books:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles -, 4 th Ed, TMH, 2001.
2. Principles of Communication systems, Taub and Schilling - TMH, 2008

Reference Books:

1. Random Processes for Engineers, Bruce Hajck - Cambridge unipress, 2015
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S. Unnikrishna Pillai -, 4th Ed., PHI, 2002.
3. Signals, Systems & Communications, B.P. Lathi - B.S. Publications, 2003.
4. Statistical Theory of Communication, S.P Eugene Xavier - New Age Publications, 2003

CO-PO MAPPING

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	**3**	**3**	**-**	**2**	-	-	-	-	-	-	-	-	-	-
CO2	**3**	**3**	**-**	**2**	-	-	-	-	-	-	-	-	-	-
CO3	**3**	**3**	**3**	**2**	-	-	-	-	-	-	-	-	-	-
CO4	**3**	**3**	**3**	**2**	-	-	-	-	-	-	-	-	-	-

B.Tech II Year–I Sem	**L**	**T**	**P**	**C**
Subject Code: 22PC3EC03	**3**	**0**	**0**	**3**

SIGNALS AND SYSTEMS

Pre-requisite: Nil

Course Objectives: This course will enable students to

1. To understand various fundamental characteristics of signals and systems.
2. To study the importance of transform domain.
3. To understand the characteristics of LTI systems.
4. To analyze and design various systems.
5. To study the effects of sampling.

Course Outcomes: Upon completion of the Course, the students will be able to

1. Analyze the various signals, systems and their operations.
2. Demonstrate arbitrary signals in time and frequency domain.
3. Analyze the characteristics of linear time invariant systems.
4. Apply the different transform techniques to the signals.

Module I

Representation of Signals: Introduction to signals, Elementary signals, basic operations on signals, classification of Signals, Operations on Signals. System and classification of systems.

Signal Analysis: Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Closed or complete set of orthogonal functions.

Module 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.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function.

Module III

Signal Transmission through Linear Systems: Linear System, Impulse response, Responseof a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Properties of LTI systems, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Filter characteristic of Linear System, Ideal LPF, HPF, and BPF characteristics, Causality and Paley Wiener criterion for physical realization, Relationship between Bandwidth and rise time.

Sampling Theorem: Graphical and analytical proof for Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing. Introduction to Band Pass Sampling.

Module IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, and Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal.

Z–Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

Module V

Convolution: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Properties of Convolution.

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parseval's Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power spectral density function.

Text Books:

1. Signals and Systems – Alan V.Oppenheim, Alan S.Willsky and S.Hamid Nawab, 2nd Edition, PHI, 1997.
2. Signals, Systems and Communications - B.P. Lathi, BS Publications, 2nd Edition, 2013.

Reference Books:

1. Signals and Systems – A. Rama Krishna Rao, 2nd Edition, 2008, TMH.
2. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3rdEdition.2004, PE.
3. Signals and Systems- A.Anand Kumar, 2ndEdition, PHI, 2012.

Web Resources:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/
2. https://www.classcentral.com/course/swayam-principles-of-signals-and-systems-9900

E Books:

1. https://www.pdfdrive.com/linear-systems-and-signals-2nd-edition-bp-lathi-e36667834.html
2. https://www.pdfdrive.com/signals-and-systems-2nd-ed-by-oppenheim-e163378398.html

Mooc Courses:

1. https://www.classcentral.com/course/edx-signals-and-systems-part-1-2679
2. https://www.engineeringonline.ncsu.edu/course/ece-200-introduction-to-signals-circuits-and-systems/

CO-PO/PSO Mapping

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	-	-	1	-	-	-	-	-	-	-	-	1
CO2	3	3	2	-	1	-	-	-	-	-	-	-	-	1
CO3	3	3	2	-	1	-	-	-	-	-	-	-	-	1
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	1

B.Tech II Year – I Sem	**L**	**T**	**P**	**C**
Course Code: 22PC3EC04	**0**	**0**	**2**	**1**

Modelling and Simulation Lab

Course Objectives: This course will enable students to

1. To develop ability to analyze linear systems and signals.
2. To develop critical understanding of mathematical methods to analyze linear systems and signals.
3. To know the various transform techniques
4. To analyze sampling principles

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

1. Generate, analyze and perform various operations on Signals/Sequences both in time and Frequency domain
2. Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling
3. Generate different Random Signals and capable to analyze their Characteristics
4. Apply the Concepts of Deterministic and Random Signals for Noise removal Applications andon other Real Time Signals

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.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system andverifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for thegiven transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value andits Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Removal of noise by Autocorrelation / Cross correlation.

16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.
19. Design An App

Text Books:

1. "Signals and systems", V. Oppenheim, A. S. Willsky and S. H. Nawab, Prentice Hall India, 1997.
2. "Digital Signal Processing: Principles, Algorithms, and Applications",J. G. Proakis and D. G. Manolakis, Pearson, 2006.

Reference Books:

1. "Signals and systems", H. P. HsuSchaum's series, McGraw Hill Education, 2010.
2. "Signals and Systems", S. Haykin and B. V. Veen, John Wiley and Sons, 2007.
3. "Discrete-Time Signal Processing", V. Oppenheim and R. W. Schafer, Prentice Hall, 2009
4. "Fundamentals of Signals and Systems", M. J. Robert McGraw Hill Education, 2007.
5. "Linear Systems and Signals", B. P. Lathi, Oxford University Press, 2009.

Web Resources:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/
2. https://www.classcentral.com/course/swayam-principles-of-signals-and-systems-9900

CO-PO mapping

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	3	3	3	2	-	-	3	1	-	1	-	1
CO2	3	2	3	3	3	2	-	-	3	1	-	1	-	1
CO3	3	2	3	3	3	2	-	-	3	1	-	1	-	1
CO4	3	2	3	3	3	2	-	-	3	1	-	1	-	1

B.Tech II Year–III Sem	**L**	**T**	**P**	**C**
Subject Code: 22AC3HS01	**0**	**2**	**0**	**0**

Universal Human Values (UHV)

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

Course Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a humanbeing.
4. To facilitate the students to understand harmony at all the levels of human living, andlive accordingly.
5. To facilitate the students in applying the understanding of harmony in existence intheir profession and lead an ethical life

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

CO1: Explore on the basic aspiration of Human being and its fulfilment

CO2: Distinguish the difference between the Self and the Body

CO3: Explore the value of harmony in family, society and nature

CO4: Understanding of gender related issues and gender relationship.

Module I

Self- Exploration on UHV Basic Guidelines: Content and Process for Value Education Understanding the need, basic guidelines, Self- Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration.

Continuous Happiness and Prosperity:A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being withtheir correct priority, Understanding Happiness and Prosperity.

Module II

Understanding Harmony in the Human Being: Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I'

Understanding Harmony in self: Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

Module III

Understanding Harmony in the Family: Harmony and Values in Relationships in the Family- the basic unit of human interaction, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas & Samman; Difference between intention and competence,

Understanding Harmony in the Society: Understanding the harmony in the society: Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha).

Module IV

Understanding Harmony in the Nature and Existence: Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

Understanding Harmony in the Existence: Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence.

Module V

Exploring Attitudes towards gender: Understanding gender and Basic Gender Concepts/terminology- exploring attitude towards gender-construction of gender-socialization: Making Women, making Men.

Gender relationship and Culture: Gender roles and relationship matrix, sex selection and consequences, declining sex ratio, Gender Issues- Gender sensitive language, Just Relationships: Being together as equals.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Towards a World of Equals: a bilingual Textbook on Gender. A Suneetha, andothers… Telugu Academy, Telangana Gov. 2015

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

MOOC Course: NPTEL -Exploring Human Values: Visions of Happiness and Perfect

Society - Web course

CO-PO MAPPING:

CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1								3				
CO2								3				
CO3								3				
CO4								3				

B. Tech II Year-II Sem	**L**	**T**	**P**	**C**
Subject Code: 22PC4EC05	**3**	**0**	**2**	**4**

ANALOG AND DIGITAL COMMUNICATIONS

(Integrate Course)

Prerequisite: Probability theory and Stochastic Processes, Signal and system

Course Objectives: This course will enable students to

1. To develop ability to analyze system requirements of Analog and digital communication systems.
2. To understand the generation, detection of various Analog and digital modulation techniques.
3. To acquire the vortical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

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

1. Analyze various Analog and Digital Modulation and Demodulation techniques.
2. Model the noise present in continuous wave Modulation techniques.
3. Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications
4. Design the base band Transmission

MODULE - I

Amplitude Modulation: Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.

Week 1: Amplitude Modulation and Demodulation using trainer kit

Week 2: DSB-SC, SSB-SC Modulator & Detector using trainer kit

Week 3: Generate modulated and demodulated signals of AM, DSB-SC, SSB- SC using OCTAVE or any equivalent software.

MODULE- II

Angle Modulation: Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave

Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

Week 4: Frequency Modulation and Demodulation using trainer kit

Week 5: Generate modulated and demodulated signals of FM and PM using OCTAVE or any equivalent software

MODULE - III

Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

Week 6: Course project/PBL

Week 7: Verification of Sampling Theorem using OCTAVE or any equivalent software.

MODULE - IV

Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

Week 8: Generation and detection of TDM and FDM signal using trainer kit.

Week 9: Generation and detection of PAM, PWM signal using trainer kit.

Week 10: Generation and detection of PPM and PCM signal using trainer kit .

Week 11: Generation and detection of PAM, PWM, PPM and PCM using OCTAVE or any equivalent software.

MODULE- V

Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.

Week 12: Generation and detection of PSK signal using trainer kit

Week 13: Generation and detection of BPSK signal using trainer kit

Week 14: Generation and detection of DPSK signal using trainer kit

Qualitative: Baseband Transmission and Optimal Reception of Digital Signal

TEXTBOOKS

1. Analog and Digital Communications, Simon Haykin -, John Wiley, 2005.
2. Electronics Communication Systems-Fundamentals through Advanced, Wayne Tomasi - 5thEd., PHI, 2009.

REFERENCE BOOKS

1. Principles of Communication Systems, Herbert Taub, Donald L Schilling, Goutam Saha, - 3rdEd., McGraw-Hill, 2008.
2. Electronic Communications, Dennis Roddy and John Coolean - 4th Ed., PEA, 2004
3. Electronics & Communication System, George Kennedy and Bernard Davis - TMH, 2004

4. Analog and Digital Communication, K. Sam Shanmugam - Willey, 2005

E- Books:

1. https://www.academia.edu/42933156/Basic_Electrical_Engineering_VK_Mehta
2. https://www.opentextbooks.org.hk/system/files/export/9/9648/pdf/Fundamentals_of_Electrical_Engineering_I_9648.pdf

CO-PO Mapping

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3	1	3	-	-	-	3	-	-	1	2	2
CO2	3	3	3	1	3	-	-	-	3	-	-	1	2	2
CO3	3	3	3	1	3	-	-	-	3	-	-	1	2	2
CO4	3	3	3	1	3	-	-	-	3	-	-	1	2	2

B.Tech II Year–II Sem	L	T	P	C
Subject Code: 22PC3EC06	3	0	2	4

DIGITAL LOGIC DESIGN

(Integrated Course)

Course Objectives: This course will enable students to

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used inthe design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

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

1. Describe the numerical information in different forms and Boolean Algebra theorems
2. Solve Boolean expressions using Boolean Theorems-maps
3. Design combinational and sequential circuits
4. Implement logic families and realization of logic gates

Module - I

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

Boolean algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

Week 1: Realization of Boolean Expressions using Gates

Week 2: Design and realization logic gates using universal gates

Week 3: Generation of clock using NAND / NOR gates

Module - II

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using RTL, DTL, TTL and CMOS Logic Families and its Comparison, NAND & NOR Gate using TTL & CMOS.

Week 4: Realization of logic gates using DTL, TTL, ECL, etc.,

Module – III

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers,Encoders, Decoders and Code converters, Parity-bit Generator.

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.

Week 5: Design a 4 – bit Adder /Subtractor
Week 6: Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter
Week 7: Design and realization of 8x1 MUX using 2x1MUX
Week 8: Design and realization of 4-bit comparator

Module - IV
Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.
Synchronous Sequential Logic: Analysis of Clocked Sequential Circuits- Serial Binary Adder, Sequence Detector, Design Synchronous & Asynchronous Modulo N –Counters.

Week 9: Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
Week 10: Design and realization of a Synchronous and Asynchronous counter using flip-flops
Week 11: Design and realization of Asynchronous counters using flip-flops

Module – V
Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs.

Week 12: Design and Realization of a sequence detector-a finite state machine
Week 13: PBL/ Course project

Text Books
1. Switching and Finite Automata Theory – ZviKohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010.
2. Modern Digital Electronics – R. P. Jain, 3rd Edition, 2007- Tata McGraw-Hill

Reference Books
1. Digital Design- Morris Mano, PHI, 4th Edition, 2006
2. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
3. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013

Web Resources
1. http://blog.digitalelectronics.co.in/
2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital
3. https://nptel.ac.in/courses/117105080/

E-Books
1. https://www.pdfdrive.com/digital-logic-and-computer-design-by-m-morris-mano-e34332016.html

2. https://www.pdfdrive.com/switching-and-finite-automata-theory-third-edition-e17569462.html

Mooc Courses

1. https://www.classcentral.com/course/swayam-digital-system-design-619
2. https://nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee75/

CO-PO mapping:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	-	-	-	-	-	-	-	3	-	-	-	2	-
CO2	3	-	3	-	-	-	-	-	3	-	-	-	2	-
CO3	3	2	3	-	-	-	-	-	3	-	-	-	2	-
CO4	3	-	3	-	-	-	-	-	3	-	-	-	2	-

B.Tech II Year – II Sem	L	T	P	C
Subject Code: 22PC4EC07	3	0	0	3

ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

Pre-requisite: Mathematics

Course Objectives: This course will enable students to

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To study the propagation, reflection and transmission of planewaves inbounded and unbounded media.

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

1. Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields and Magneto static Fields.
2. Characterize the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
3. Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPW Characteristics for several practical media of interest.
4. Analyze the Design aspect of transmission line parameters and configurations.

Module— I

Electrostatics: Coulomb's Law, Electric Field Intensity — Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Energy Density. Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance — Parallel Plate, Coaxial, Spherical Capacitors.

Module—II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

Module— III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Two Equations for Magnetostatic Fields, Maxwell's Two Equations for Electrostatic Fields Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Module — IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves — Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics — Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization.

Reflection and Refraction of Plane Waves — Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

Module — V

Transmission Lines: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.SC and OC Lines, λ/4, λ/2, λ/8 Lines, Reflection Coefficient, VSWR Smith Chart — Configuration and Applications, Single Stub Matching.

TEXT BOOKS:

1. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck- 8th Ed., McGraw Hill, 2014
2. - Principles of Electromagnetics, Matthew N.O. sadiku and S.V. Kulkarni 6' Ed., Oxford University Press, Aisan Edition, 2015.

REFERENCE BOOKS:

1. Electromagnetics with Applications, JD. Kraus -,5" Ed., TMH
2. Transmission Lines and Networks, Umesh Sinha, Satya Prakashan - (Tech. India Publications), New Delhi, 2001.

CO-PO/PSO Mapping:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	1	-	1	-	-	-	1	-	-	2	-
CO2	3	3	2	1	-	1	-	-	-	1	-	-	2	-
CO3	3	3	2	1	-	1	-	-	-	1	-	-	2	-
CO4	3	3	2	1	-	1	-	-	-	1	-	-	2	-

B.Tech II Year–II Sem	L	T	P	C
Subject Code: 22PC4EC08	3	0	0	3

Control Systems

Pre-requisite: Electrical circuit Analysis, M-II.

Course Objectives: This course will enable students to

1. To model the electrical & Mechanical LTI Systems
2. To obtain the transfer function model
3. To Study the time domain response of LTI system.
4. To study the frequency response of LTI System.
5. To model system using state space analysis

Course Outcomes: Upon completion of the Course, the students will be able to

1. Apply various control strategies to different applications (power systems, electrical drives, mechanical systems)
2. Apply various time domain and frequency domain techniques to assess the system performance.
3. Design a suitable controller and/or a compensator for the specific application to improve the system performance.
4. Perform controllability and observability using state space representation and applications of state space representation to various systems.

Module I

Mathematical modelling of systems: Introduction to Systems, Control systems, Open Loop and closed loop control systems and their differences- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and Transfer function – Translational and Rotational mechanical systems.

Block diagram algebra &Servo motors: Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula, Synchro's, AC & DC servo motor characteristics.

Module II

Time domain Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

Frequency domain Analysis: Advantages of frequency response, frequency response of LTI system, Frequency domain specifications, correlation between time domain and frequency domain specifications**.**

Module III

Stability analysis using Routh-Hurwitz & Root Locus The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability, Root-Locus technique. Construction of Root-loci

Frequency response plots: Polar Plots-Nyquist Plots, Relative stability using Nyquist criterion – gain and phase Margin. Closed-loop frequency response.-Bode plots.

Module IV

P, PI and PID controllers: Effect of addition of pole and zero to open loop transfer function, Design specifications– Effects of proportional derivative, proportional integral systems, and PID controllers.

Design of compensators: Practical constraints to implement PID controllers, Designing of Lag, Lead and Lead- Lag compensators, Design problems.

Module V

State Space Model: Concepts of state, state variables and state space model, derivation of state models from block diagrams, Solution of state equations. Eigen values and Stability Analysis. Diagonalization of State Matrix.

Solution of state equations of LTI systems: Solving the Time invariant state Equations- State Transition Matrix and its Properties. Controllability and Observability. Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

Text Books:

1. Automatic Control Systems 8th edition –B. C. Kuo 2003– John wiley and sons.
2. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

Reference Books:

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems – N.K. Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. – NISE 3rd Edition – John wiley, 2014.

MOOC Courses:

1. https://onlinecourses.nptel.ac.in/noc20_ee90

CO-PO/PSO Mapping

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	1
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-

B.Tech II Year II Sem	**L**	**T**	**P**	**C**
Subject Code: 22BS4EG03	**1**	**0**	**2**	**2**

English for Employability

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

Course Objectives:

1. To improve the communication skills, body language, facial expression and gesture.
2. To be able to understand the concept of employability skills (Quantum dexterity) and enhancing ones' behavior in the personal, professional and social forum.
3. To evaluate the LSRW (listening, speaking, reading and writing) through assessment.
4. To learn the basic grammar for improving spoken and written communication.
5. To become problem solver, analyze and apply critical and analytical skills.
6. To Identify the Employability skills, assigning tasks (Group Discussion, JAM, Role play etc.,) for day today evaluation.

Course Outcomes: After undergoing this course, the student will be able to;

1. **Understand** the explicit and implicit of importance of employability skills.
2. **Demonstrate** life skills like team work, learning skills, problem solving, attitude, adaptability and flexibility.
3. **Apply** critical and analytical skills to bring out the solution on problem/case study.
4. **Recognize** the need of appropriate words, Phrases & functional grammar and apply them in both spoken and written communication.

Module I: Wings of Fire

"Orientation" an extract from **Wings of fire-**An Autobiography of Abdul Kalam by Arun Tiwari.

Grammar

Vocabulary- Omission of Articles, Collective Nouns, Prepositions, Collocations.

Reading- Observation Passage, Survey Passage

Writing-Narrative & Descriptive writing.

Module II : **5 Points Someone**

The Gift an extract from **5 Points Someone** by Chetan Bhagat

Grammar -

Vocabulary- Advanced Collocations, Proverbs, Idioms, One word Substitute

Reading – Complex passage, Reading Comparison,

Writing- Usage of Idioms and Proverbs in Passage

Module III: Wise Leaders Wanted & Shift Your Perspective: Connect to Your Noble Purpose

"Wise Leaders Wanted & Shift Your Perspective: Connect to Your Noble Purpose" an extract from **From Smart to Wise: Acting and Leading with Wisdom** Kaipa, Prasad, and Navi Radjou.

Grammar
Vocabulary- Technical vocabulary, Auxiliaries and Modals,
Reading- Technical Comprehension,
Writing- Creative Resume.

Module IV: Variation Under Nature
"Variation Under Nature" an extract from **Origin of Species** by Charles Darwin
Grammar
Vocabulary- Coherence-Cohesive devices, Figures of speech
Writing- Story writing, Picture composition, Review of movie/match/book.
Reading- Inferring Reading, Reciting and Reviewing (SQ3R)

Module V: Let's Build a Company: A Start-up Story Minus the Bullshit
Let's Build a Company: A Start-up Story Minus the Bullshit by Harpreet Grover and Vibhore Goyal
Grammar
Vocabulary- Topic/Situation based Vocabulary, Tongue Twisters.
Reading- Critical Reading of known/unknown passages
Writing- Common Errors in Tenses, Description of hobbies, Future plans,
Reporting Speech: Direct & Indirect Speech, Email Writing, Formal letter writing (Enquiry, Apology, Leave, Request) Notice Writing, Information Transfer, Technical report writing

ACTIVITY IN LABS

Activity 1:
Narration (Historical places, events, Picture narration, Memorable incidents of life)
Self Intro, Daily Routine, Likes & Dislikes, Vocabulary, Triangular Activity (Person based- S-P), Imperatives & JAM
Targeted Skills- Listening- Speaking- Audio-Video clips

Activity 2: Quantum of Dexterity (QOD)
Ability (Personal, Behavioural & Professional) Request/Permission/Order, Survival kit, Career Objective Professional, Hidden Talents (Personal), Character Traits (Behavioural)
Targeted Skills- Reading-Writing – Concluding an open-ended Story, Creative Writing.

Activity 3: Critical & Analytical Skills
SWOC- (Social & Cultural, Political, Economic, Legal Impact, Technical, Nuances of Pronunciation, Voice Modulation, Neutralizing Mother Tongue Interference, Tongue Twisters for practice,
Targeted Skills- Writing SWOC, Self-Introduction, Exposure to a structured talk.

Activity 4: Flick Flow/Extempore
Mind Mapping, Wh- questions, Steps of Presentation, Use of Visual Aids, Individual/Group Presentation for practice.

Targeted Skills- Speaking Skills

Activity 5: On Job Training
Formal & Informal communication, Resume E-mail Etiquette, Telephonic & Interview Etiquette, Situation based- Santa's Bag, topic/case study-based Group Discussion, Kicks me! (Job Consultancy/Role Play)
Targeted Skills- Listening-Writing- Speaking

Text Books

1. Azad, Abdul Kalam, Wings of Fire. Generic pub. 2009.
2. Kaipa, Prasad, and Navi Radjou. *From Smart to Wise: Acting and Leading with Wisdom*. Jossey-Bass, 2013.
3. Grover, Harpreet S., and Vibhore Goyal. *Let's Build a Company: A Start-up Story Minus the Bullshit*. Penguin Books, 2020.
4. Wren & Martin High School English Grammar & Composition. New Delhi: S. Chand. 1999.

References

1. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.
2. Writing Skills Practice Book for EFL - English Teaching Forum Writing Skills Practice Book for EFL. Beginning/Intermediate Level.
3. Patricia Wilcox Peterson. Ajmani, J. C. Good English: Getting it Right. New Delhi: Rupa Publications, 2012.
4. Amos, Julie-Ann. Handling Tough Job Interviews. Mumbai: Jaico Publishing, 2004.
5. Murphy, R. *Intermediate English Grammar* English Grammar & Composition by S.C. Gupta. New Delhi: Cambridge, 2006

CO-PO MAPPING:

CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcome s (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1									**2**			
CO2									**2**	**2**		
CO3		**3**								**3**		
CO4										**3**		**3**

B.Tech II Year II Sem	L	T	P	C
Subject Code: 22HS4HS01	2	0	0	2

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

Pre-requisite: Nil

Course Objectives:

1. Describe concepts of business economics and demand analysis to help in optimal decision making in business environment
2. Differentiate the functional relationship between Production and factors of production and able to compute breakeven point to illustrate the various uses of breakeven analysis
3. Identify various market structures and discuss their implications for resource allocation
4. Explain various accounting concepts and different types of financial ratios for knowing financial positions of business concern.
5. Demonstrate an understanding of the concept of capital budgeting and allocations of the resources through capital budgeting methods and compute simple problems for project management.

Course Outcomes:

1. Understand economics and business economic concepts
2. Differentiate different business organisations and nurture the idea of start-ups
3. Analyze operations of markets under varying competitive conditions
4. Apply accounting concepts and methods to interpret financial statements for evaluating the financial position and performance of organizations

Module I INTRODUCTION TO BUSINESS AND ECONOMICS

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

Module II DEMAND AND SUPPLY ANALYSIS

Elasticity of Demand: Demand, Law of Demand, Elasticity, Types of Elasticity, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand,

Demand Forecasting: Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply

Module 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. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis.

Module IV INTRODUCTION TO FINANCIAL ACCOUNTING

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance

Final Accounts: Elements of Financial Statements, Preparation of Final Accounts: Trading account, Profit & Loss Account, Balance sheet

Module V CAPITAL BUDGETING

Capital and its Sources: Significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising capital

Capital budgeting: Features of capital budgeting proposals; Methods of capital budgeting: Payback period, accounting rate of return (ARR), net present value method and internal rate of return method (simple problems).

Text Books:

1. Aryasri, "Managerial Economics and Financial Analysis", TMH publications, 4th Edition, 2012.
2. M. Kasi Reddy, Saraswathi, "Managerial Economics and Financial Analysis", PHI Publications, New Delhi, 2nd Edition, 2012.
3. Varshney, Maheswari, "Managerial Economics", Sultan Chand Publications, 11th Edition, 2009.

Reference Books:

1. S. A. Siddiqual, A. S. Siddiqual, "Managerial Economics and Financial Analysis", New Age International Publishers, Hyderabad, Revised 1st Edition, 2013.
2. S. N. Maheswari, S. K. Maheswari, "Financial Accounting", Vikas publications, 3rd Edition, 2012.
3. J. V. Prabhakar Rao, P. V. Rao, "Managerial Economics and Financial Analysis", Maruthi Publishers, Reprinted Edition, 2011.
4. Vijay Kumar, Appa Rao, "Managerial Economics and Financial Analysis", Cengage Publications, 1st Edition, Paperback, 2011.

Web Resources:

1. https:// books.google.co.in/books/about/Managerial economics and financial analysis.
2. http://www. ebooktake. in /pdf/title/managerial-economics-and-financial analysis.
3. http://all4ryou.blogspot.in/2012/06/mefa-managerial-economics and financial analysis.
4. http://books.google.com/books/about/Managerial economics and financial analysis

CO-PO MAPPING:

CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1											2	
CO2											2	
CO3											2	
CO4											3	

B.Tech II Year–II Sem	L	T	P	C
Subject Code: 22PC3EC03	0	1	2	2

Student Skill Development Course/ Doing Engineering-I

Pre-requisite: Basic Knowledge on Computer and C language

Course Objectives: This course will enable students to

1. To Provide knowledge of different Smart System applications.
2. To provide knowledge of Arduino boards, Arduino as IDE, programming language, platform and basic components
3. Develop skills to design and implement various smart system application.
4. To know the basics of micro-controllers and sensors very quickly and can start building prototype.

Course Outcomes: Students are able to

1. Analyze Smart systems applications.
2. Explain new IDE, compiler, and MCU chip in Arduino compatible boards or similar types.
3. Explain Arduino programming with Python
4. Design prototype circuits with a breadboard

Module1: Microprocessor and Arduino

Introduction to Microprocessor, Micro controller, source mode and sink mode, Arduino pin diagram, Types of Arduino boards and its pin description.

Module 2: LED, LCD, Switch, Buzzer & Interfacing

Introduction to LED, Switch, Delay, 16X1 LCD display, 16X 2 LCD display, Buzzer and Interfacing

Module 3: Motor driver and Interfacing to arduino

L293D Pin diagram, Introduction to L293D Motor driver. Interfacing DC motors to arduino,

Module 4: Sensors and Programming

Introduction to soil moister sensor, gas sensor , Ultra Sonic sensor , Temperature sensor, LDR sensor, IR sensor and PIR sensor and its pin configurations.

Module 5: Bluetooth, RFID, GSM and GPS

Introduction Bluetooth, working principal, Modes, Introduction to RFID, working Principal, Introduction to GSM and GPS, Differences, Working Principal.

Practicing Models:

1. a) Blinking an LED with a delay of 2 seconds.
   b) Blinking two LED's alternatively with a delay of 1 second.
   c) Blinking two LED's together with a delay of 1 second.
   d) Traffic light program Turn ON Red LED for 4 seconds, Green LED for 5 seconds, Yellow for 2 seconds

2) a)Turn ON an LED when a button is pressed, OFF when button is released.
   b) Turn ON an LED for 1 second when a button is pressed.
   c)Turn ON an LED when button is pressed for odd number of times, OFF when button is pressed for even number of times.
   Final Task: Three floor elevator using Push button & LED.

3) a) Display Name on LCD
   b) Scrolling Display towards left and right on LCD
   c) Scrolling Display towards Right to Left on LCD
4) a) Read the analogue sensor (LDR Sensor) value and display it in serial monitor
   b) Turn on Buzzer if analogue sensor (LDR Sensor) value exceeds its threshold value.
   c) Read the digital sensor (IR sensor) value and display it in serial monitor.
   d) Turn on Buzzer if digital sensor (IR sensor) value is HIGH.
   Final Task: clap switch by using sound sensor
5) a) Interfacing Ultrasonic sensor to Arduino and displaying distance on screen
   b) Controlling LED using Temperature sensor with Arduino
   c) Interfacing Soil moister sensor and display the moister level on Screen
   d) Interfacing Gas sensor and display the gas level on Screen and Blink the LED
   Final Task: Design a smart Garden and Tank
   Final Task: Smart stick for blind person.
6) a) Interfacing DC motor.
   b) Interfacing Relay.
   c) Interfacing Stepper motor.
   Final Task: Automatic Tollgate system.
   Final Task: Automatic Street light control
7) a) LCD interfacing and displaying "Hello, Your Name".
   b) Interfacing Bluetooth
   c) Interfacing GPS
   d) Interfacing GSM
   Final Task: Sending GPS location to your mobile number through GSM

TEXTBOOKS:

1. Arduino – Principle and Programming, James arthur, ,2003.
2. Arduino programmimg, Blum Richard,– Sams Publishing; 1st edition (8 August 2014)

REFERENCE BOOKS:

1. Guide to learn Arduino projects, Rick abdous, , Kindle Edition
2. Arduino made simple ,Ashwin pajankar, BPB Publications; 1st edition (16 April 2019)

CO-PO MAPPING:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	**Program Outcomes (POs)**												**Program Specific Outcomes***	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	1	-
CO3	2	-	-	-	3	-	-	-	-	-	-	-	1	-
CO4	2	-	-	-	3	-	-	-	-	-	-	-	1	-

B.Tech II Year II Sem	L	T	P	C
Subject Code: 22MC4HS06	2	0	0	0

Constitution of India (CoI)

(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

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
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
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