3rd SEMESTER

Sr. No.	Course Code	Course Title	L	T	P	Marks			Credits
						Int	Ext	Total	
1	BECES1-301	Electronic Devices & Circuits	3	1	0	40	60	100	4
2	BECES1-302	Digital Electronic Circuits& Design	3	1	0	40	60	100	4
3	BECES1-303	Signals and Systems	3	1	0	40	60	100	4
4	BECES1-304	Network Theory: Analysis & Synthesis	3	1	0	40	60	100	4
5	BECES1-305	Electronic Devices & Circuits Lab	0	0	2	60	40	100	1
6	BECES1-306	Digital Electronic Circuit & Design Lab	0	0	2	60	40	100	1
7	BMATH3-301	Mathematics-III	3	1	0	40	60	100	4
8	BECES1-307	Training-I	-	-	-	60	40	100	3
TOTAL			**15**	**5**	**4**	**380**	**420**	**800**	**25**

4th SEMESTER

Sr. No.	Course Code	Course Title	Contact Hours			Marks			Credits
			L	T	P	Int	Ext	Total	
1	BECES1-401	Analog and Digital Communication	3	1	0	40	60	100	4
2	BECES1-402	Analog Electronic Circuits	3	1	0	40	60	100	4
3	BECES1-403	Electromagnetic Theory & Applications	3	1	0	40	60	100	4
4	BECES1-404	Analog and Digital Communication Lab	0	0	2	60	40	100	1
5	BECES1-405	Analog Electronic Circuits Lab	0	0	2	60	40	100	1
6	BMECE0-001	Engineering Mechanics	3	1	0	40	60	100	4
7	BMNCC0-001	Constitution of India	2	0	0	-	-	-	--
TOTAL			**14**	**4**	**4**	**280**	**320**	**600**	**18**

There will be 4-weeks Internship as per AICTE Internship Policy after 4th semester.

ELECTRONIC DEVICES & CIRCUITS

Subject Code: BECES1-301 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

This course is meant to provide fundamental knowledge to students for understanding of the various electronic devices, their circuits & behavior under various conditions.

1. To make aware the students about the various electronic devices and their circuits.
2. To impart knowledge of BJTs and FETs.
3. To provide the students detailed concepts of MOSFETs and CMOSFETs.
4. To analyze low and high frequency transistor models.

Course Outcomes:

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

1. Understand the principles of semiconductor physics
2. Understand the concepts of junction diodes and their applications.
3. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems
4. Analyze BJT characteristics and determine their behavior under low and high frequencies.
5. Analyze various concepts of FETs and their characteristics.
6. Design low and high frequency models and observe and their various characteristics.

UNIT-I (15 Hrs)

Semiconductors: Introduction to Semiconductors and their classification, Energy bands in intrinsic and extrinsic semiconductors, Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, Generation and recombination of carriers.

Semiconductors Diodes: P-N junction diode, diode resistance and capacitance, I-V characteristics, small signal switching models, Avalanche/Zener breakdown, Applications of PN diode: rectifier, clipper and clamper, Zener diode, Schottky diode, LED, photodiode and solar cell

UNIT-II (15 Hrs)

Bipolar Junction Transistor: BJT and its operation, Ebers-Moll Model, Various BJT configurations and their I-V characteristics, Biasing techniques and bias stability, BJT as a switch and as an amplifier.

Field Effect Transistor: JFET and its operation, various configurations and I-V characteristics, Biasing techniques, FET as a switch and as an amplifier, MOS capacitor, C-V characteristics, MOSFETs; their operation and characteristics, biasing and small signal models of MOS transistor, CMOS devices and CMOS inverter.

UNIT-III (15 Hrs)

Low & High Frequency Transistor Models: Small signal low frequency BJT hybrid Model, Analysis of transistor amplifier in CB, CE and CC configuration using h-parameters, small signal low frequency analysis of FET/MOSFET, Need of high frequency BJT model, high frequency T model, hybrid-pi model, hybrid-pi conductances in terms of low frequency h parameters.

UNIT-IV (15 Hrs)

Integrated Circuit Fabrication Process: Fundamentals of IC fabrication, photolithography, etching, oxidation, diffusion, ion implantation, chemical vapor deposition, sputtering, twin-tub CMOS process. Monolithic IC-Fabrication: Resistor, PN junction Diode and BJTs.

Text/Reference Books:

1. G.Streetman,and S.K.Banerjee,"SolidStateElectronicDevices,"7thedition,Pearson,2014.
2. D.Neamen,D.Biswas"SemiconductorPhysicsandDevices,"McGraw-HillEducation
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
4. C.T.Sah,"Fundamentalsofsolidstateelectronics,"WorldScientificPublishingCo.Inc,1991.
5. Y.TsividisandM.Colin,"OperationandModelingoftheMOSTransistor,"Oxford Univ. Press, 2011.
6. J. Luo, "Integrated Modelling of Chemical Mechanical Planarization for sub-micron IC Fabrication", Springer.

DIGITAL ELECTRONIC CIRCUITS & DESIGN

Subject Code: BECES1-302 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

1. To provide knowledge about basics of digital electronics.
2. To impart knowledge about designing of digital circuits.
3. Students will use schematics and symbolic Algebra to represent digital gates in the creation of solutions to design problems

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
4. Design & analyze synchronous sequential logic circuits

UNIT-I (15 Hrs)

Fundamentals of Digital Electronics:- Digital/Analog signal, Concept of Number System, logic gates, Universal gates and their specifications**.**

Boolean Algebra: Boolean Algebra- De-Morgan's Theorem, Principle of Duality, Boolean expression Boolean function, Minimization of Boolean expressions– using Karnaugh map Sum of Products (SOP), Product of Sums (POS), QM method, Canonical terms, Minterm, Maxterm.

UNIT-II (15 Hrs)

Logic families: TTL, MOS, CMOS, ECL and their characteristics.

Combinational Circuits: Design procedure – Adders, Subtractors, Serial adder/ Subtractor, Parallel adder/ Subtractor Carry look ahead adder, BCD adder, Magnitude Comparator, Multiplexer/ Demultiplexer, encoder/decoder, parity checker, code converters. Implementation of combinational logic circuits using MUX.

UNIT-III (15 Hrs)

Sequential Circuits: Flip flops SR, JK, T, D and Master slave, Excitation table, Edge triggering, Level Triggering, Conversion of one Flip-Flop to another. Shift registers and their types, Design of universal Shift Register, Asynchronous/Ripple counters, Synchronous counters, Modulo-n counter, Ring Counters, Design of Synchronous counters.

Semiconductor Memories: Basic memory cell, RAM, ROM, PROM, EPROM, EEROM, PLD, PLA, FPGA, Logic implementation using Programmable Devices.

UNIT-IV (15 Hrs)

Finite State Machines: State diagram, state table, Excitation table, Transition and output table, state Reduction and Assignment. Design of sequential Circuits:- Finite State machine, Capabilities and limitations of FSM, Mathematical Representation of synchronous sequential machine, Mealy Model and Moore Model. Algorithmic State Machines:- Introduction, Components of ASM charts, salient features of ASM Charts, Introductory examples of ASM charts, ASM for Binary Multiplier, ASM for weighing Machine, Hazards in sequential circuits.

Text/Reference Books:

1. R.P. Jain, 'Modern Digital Electronics', Tata McGraw Hill.
2. Malvino & Leach, 'Digital Principles and Applications', McGraw Hill.
3. Taub & Schilling, 'Digital Integrated Electronics', Tata McGraw Hill.
4. DIGITAL DESIGN – Third Edition , M.Morris Mano, Pearson Education/PHI.
5. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
6. John F Wakerly, “Digital Design Principles and Practices 3/e”, Pearson Education.

SIGNALS AND SYSTEMS

Subject Code: BECES1-303 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

1. To introduce the students about the theoretical concepts associated with processing continuous & discrete time signals & systems.
2. To make the students aware about the signal transmission through linear networks.
3. To be able to think critically & to apply problem solving & reasoning strategies to the analysis of various types of signals & systems.
4. To impart them knowledge of various types of noises.

Course Outcomes:

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

1. Analyze the properties of signals & systems and representation in time and frequency domain.
2. Classify systems based on their properties and determine the response of LSI system.
3. Apply random signal theory and understand various types of noise.
4. Understand the process of sampling and reconstruction.

UNIT-I (15 Hrs)

Classification of Signals and Systems: Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals, System properties: linearity, additivity and homogeneity, shift-invariance, causality, stability, realizability.

Fourier Representation: The notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality, Convolution theorem and its graphical interpretation, Parseval's Theorem, idea of signal space and orthogonal bases.

UNIT-II (15 Hrs)

Linear Shift-invariant (LSI) Systems: Impulse response and step response, convolution, input-output behaviour with aperiodic convergent inputs. Characterization of causality and stability of linear shift invariant systems, System representation through differential equations and difference equations, Periodic and semi-periodic inputs to an LSI system,

Introduction to Noise: Thermal Noise, Shot noise, Partition noise, Flicker noise, Gaussian Noise. Equivalent input noise, Signal to Noise Ratio (SNR), Noise Temperature, Noise equivalent Bandwidth, Noise Figure.

UNIT-III (15 Hrs)

Random Signal Theory: Introduction to Probability Theory, Joint and Conditional Probability, Random Events, Probability Mass Function, Statistical Averages. Probability Density Functions (PDF) and Statistical Averages, mean, moments and expectations, standard deviation and variance, Probability

models: Uniform, Gaussian, Binomial, Examples of PDF, Transformation of Random Variables, Random Processes, Stationary and Ergodicity, Auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density.

UNIT-IV (15 Hrs)

Sampling and Reconstruction: Sampling Theorem and its implications- Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, Aliasing and its effects, Relation between continuous and discrete time systems.

Concept of State-space analysis: State-space analysis and multi-input, multi-output representation, the state-transition matrix and its role.

Text/Reference Books:

1. *A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.*
2. *R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.*
3. *A. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.*
4. *B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.*
5. *Douglas K. Lindner, "Introduction to Signals and Systems", Mc-Graw Hill International Edition: c1999.*
6. *Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, c1998.*
7. *Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons (SEA) Private Limited, c1995.*
8. *M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", Tata Mc Graw Hill Edition, 2003.*
9. *I. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2001.*
10. *Ashok Ambardar, "Analog and Digital Signal Processing", Second Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), c1999.*

NETWORK THEORY: ANALYSIS & SYNTHESIS

Subject Code: BECES1-304 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

1. To introduce nodal, mesh analysis and network theorems for network analysis.
2. To give knowledge of Trigonometric, exponential Fourier series and Laplace transforms along with its properties.
3. To provide overview of network functions and network synthesis techniques.
4. To familiarize with the classifications of filters and their design.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques.
6. Students will be able to design analog filters.

UNIT-I (15 Hrs)

Fundamentals of Network Analysis: Node and Mesh analysis, Matrix approach of network containing voltage and current sources and reactances, Source transformation and duality.

Network Theorems: Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Compensation and Tallegen's theorem as applied to A.C. circuits.

UNIT-II (15 Hrs)

Trigonometric and Exponential Fourier Series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra.

Laplace Transforms and Properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

UNIT-III (15 Hrs)

Network Functions: Transient behaviour, concept of complex frequency, Driving points and transfer functions, poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and Two port network and interconnections, Behaviour of series and parallel resonant circuits.

UNIT-IV (15 Hrs)

Network Synthesis: Fundamental concepts of network synthesis, Hurwitz Polynomials, Properties of RC, RL & LC networks, Foster and Cauer forms of realization.

Network Filters: Classification of filters, characteristics impedance and propagation constant of pure reactive network, Design of constant-K, m-derived and Composite filters.

Text/Reference Books:

1. Van, Valkenburg.; "Network analysis"; Prentice hall of India, 2000
2. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi,1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education
4. Chakrabarti A., "Network Analysis and Synthesis" DhanpatRai& Co.

ELECTRONIC DEVICES & CIRCUITS LAB

Subject Code: BECES1-305 **L T P C** **Duration: 30 Hrs**
0 0 2 1

Course Objectives:

1. Able to understand and identification of various electronic components.
2. To understand and plot characteristics of various semiconductor devices.
3. To understand the applications of Transistors as amplifier in various configurations.

Course Outcomes:

1. An ability to understand all types of electronics devices and circuits
2. An ability to conduct experiments, as well as to analyze and interpret various data sheets.

LIST OF EXPERIMENTS

1. To study I-V characteristics of PN junction diode and Zener diode.
2. To perform & analyze the use of PN junction diode as clipper and clamper.
3. To observe and calculate the characteristics/behavior of Half/Full wave rectifier.
4. To perform & analyze the use of Zener diode as voltage regulator.
5. Design of clipper circuit using diode and other components.
6. To plot the input and output characteristics of BJT in CE configuration.
7. To plot the input and output characteristics of BJT in CB/CC configuration.
8. To demonstrate use of BJT as amplifier in a CE configuration.
9. To demonstrate use of a BJT in a CC amplifier circuit configuration.
10. To plot the input and output characteristics of JFET in CG/CD/CS configurations.
11. To perform an experiment to observe the working of JFET as an amplifier.
12. Study and verification of the DC Superposition/Thevenin theorem
13. Study of simple capacitive filters (T & π).
14. Design of constant K filters.
15. Design of m- derived filters.

Note: At least 10 experiments are required to be performed.

DIGITAL ELECTRONIC CIRCUITS & DESIGN LAB

Subject Code: BECES1-306 **L T P C** **Duration: 30 Hrs**
0 0 2 1

Course Objectives:

1. To give students a practical knowledge about all types of digital circuits.
2. To give students a working knowledge to connect digital circuits and verify their truth tables.
3. To give students a knowledge about integrated circuits of different combinational and sequential circuits.

Course Outcomes:

1. An ability to test and verify working and truth tables of combinational and sequential circuits.
2. Working knowledge of different converters.
3. To perform multiplexer and demultiplexer.

LIST OF EXPERIMENTS

1. Verification of the truth tables of TTL gates, e.g., 7400, 7402, 7404, 7408, 7432 and 7486.
2. Realization of logic functions with the help of universal gates-NAND Gate
3. Realization of logic functions with the help of universal gates-NOR Gate
4. Design and verification of Half/Full Adder circuit(s) using Logic gates.
5. Design and verification of Half/Full Subtractor circuit(s) using Logic gates.
6. Design and implementation of parity generator/checker using basic gates and MSI devices.
7. Design and verification of 1-bit magnitude comparator using logic gates.
8. Verification of truth-table of multiplexer.
9. Verification of truth-table of demultiplexer.
10. Verification of truth-tables of RS and D flip flops.
11. Verification of truth-tables of JK and T flip flops.
12. To study and verify the Flip-flop conversion.
13. Design of 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter.
14. Design MOD-7 Synchronous up-counter using JK/RS/D Flip Flops.
15. Study of shift right, SIPO, SISO, PIPO, PISO and Shift left operations of shift registers using ICs.

Note: At least 10 experiments are required to be performed.

MATHEMATICS-III

Subject Code: BMATH3-301 **L T P C** **Duration: 60 Hrs**
3 1 0 4

UNIT-I (15 Hrs)

Fourier Series & Fourier Transform: Definition of Periodic functions, Euler's formula, Even and odd functions, half range expansions, Fourier series of different wave forms, Fourier transform, Dirichlet's conditions, Fourier integral formula (without proof), properties of Fourier transform, inversion formula, convolution, Parseval's equality; Fourier transform of generalized functions, application of transforms to heat wave and Laplace equation.

UNIT-II (15 Hrs)

Partial Differential Equations: Definition of PDE, origin of first-order PDE; determination of integral surfaces of linear first order partial differential equations passing through a given curve; surfaces orthogonal to given system of surfaces; non-linear PDE of first order, Cauchy's method of characteristic; compatible system of first order PDE; Charpit's method of solution.

UNIT-III (15 Hrs)

Solution to Linear Partial Differential Equations: Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method, Separation of variables in a PDE; wave and heat equations in one dimensional form, Elementary solutions of Laplace equations.

UNIT-IV (15 Hrs)

Propositional Logic: Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc., Decision problems of propositional logic, Introduction to first order logic and first order theory.

Partially Ordered Sets: Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices, Boolean and pseudo Boolean lattices.

References Books:

1. Kreyszing, E., Advanced Engineering Mathematics, 8th edition, John Wiley, New Delhi.
2. Grewal, B. S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3. Ian N. Sneedon, Elements of Partial Differential Equations, McGraw- Hill, Singapore, 1957.
4. Advanced Engineering Mathematics, O'Neil, Cengage Learning.
5. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.
8. C.L. Liu, Elements of Discrete Mathematics, 2nd Edition, Tata McGraw Hill, 2000.

ANALOG AND DIGITAL COMMUNICATION

Subject Code: BECES1-401 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

1. To provide students the understanding about the concept of analog and digital modulation techniques.
2. To provide the detailed knowledge about AM transmission and AM reception.
3. To impart the knowledge about FM transmission and FM reception.
4. To learn design of useful circuits required in communication system.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth.
2. Analyze the behavior of a communication system in presence of noise.
3. Investigate pulsed modulation system and analyze their system performance.

Analyze different digital modulation schemes and can compute the bit error performance

UNIT-I (15 Hrs)

Amplitude Modulation and Demodulation: DSB, SSB and VSB modulations, Basic Principles of AM Generation: Square law Diode Modulation, Suppressed Carrier AM Generation, Ring Modulator, Balanced Modulator, Tuned Radio Frequency (TRF) Receiver, Basic Elements of Super-heterodyne receiver, Envelope or Diode Detector, AGC, Applications, Noise in Amplitude modulation systems.

UNIT-II (15 Hrs)

Angle Modulation and Demodulation: Representation of FM and PM signals, Spectral characteristics of angle modulated signals, Generation of FM by Direct Methods, Indirect Generation of FM: The Armstrong Method, FM Stereo Transmission, Slope Detector, Foster Seeley or Phase Discriminator, Indirect methods of FM Demodulation: FM Detector using PLL and Stereo FM Multiplex Reception, Noise in Frequency modulation systems, Pre-emphasis and De-emphasis, Threshold effects in angle modulation.

UNIT-III (15 Hrs)

Pulse Modulation: Pulse Amplitude and Pulse code modulation (PCM), Noise considerations in PCM, Differential pulse code modulation, Delta modulation, Comparison of PCM and DM.

Baseband Transmission and Detection: Various line coding formats, Baseband Pulse Transmission-Inter symbol Interference and Nyquist criterion, Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations.

UNIT-IV (15 Hrs)

Digital Modulation Schemes: Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying. Synchronization and Carrier Recovery for Digital modulation, Digital Modulation tradeoffs

Passband Detection: Optimum demodulation of digital signals over band-limited channels-Maximum likelihood sequence detection (Viterbi receiver), Equalization Techniques.

Text/Reference Books:

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.
6. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.

ANALOG ELECTRONIC CIRCUITS

Subject Code: BECES1-402 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

1. To understand the characteristics of various power amplifiers.
2. To understand various sources of oscillations.
3. Able to understand, identification and selection of various amplifiers.
4. To make the students aware about the various multivibrator circuits.
5. To understand various Applications of Op amp.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators
4. Understand the functioning of OP-AMP and design OP-AMP based circuits
5. Design ADC and DAC

UNIT-I (15 Hrs)

Amplifiers: Review of small signal low frequency BJT models and their analysis, Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier.

Feedback Amplifiers: Concept of negative feedback, Feedback topologies, effect of feedback on gain, bandwidth, input/output impedances etc., practical circuits, concept of stability.

Oscillators: Concept of positive feedback, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.) their operation and conditions for sustained oscillations, crystal oscillator.

UNIT-II (15 Hrs)

Power Amplifiers: Frequency response of single stage amplifiers, Multistage amplifiers, cascade and cascade amplifiers, Different coupling schemes for multi stage amplifiers, different classes of operation(Class A, B,AB, C etc.),their power efficiency and linearity issues. Push-pull amplifier, cross over distortion, transistor phase inverter, complementary symmetry push-pull amplifier.

UNIT-III (15 Hrs)

Differential Amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR, OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation.

OP-AMP Applications: Review of inverting and non inverting amplifiers, integrator and

differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications, Active filters: Low pass, high pass, band pass and band stop, design guidelines.

UNIT-IV (15 Hrs)

Multivibrators: Collector/Emitter Coupled- Astable, Mono-stable multivibrators and Fixed/Self biased Bistable mutlivibrators, Triggering methods of Monostable and Bistable multivibrators.

Converter Circuits Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. Analog-to- digital converters (ADC): Single slope, dual slope, successive approximation, flash etc.

Text/Reference Books:

1. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
2. J. Millmanand A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
3. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder'sCollege11
5. Publishing,EditionIV
6. Paul R. Gray and Robert G. Meyer, Analysis and Design of Analog Integrated Circuits, JohnWiley, 3rdEdition

ELECTROMAGNETIC THEORY & APPLICATIONS

Subject Code: BECES1-403 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objective:

1. To introduce students with different coordinate systems.
2. To familiarize the students with the different concepts of electrostatic, magneto static and time varying electromagnetic systems.
3. To expose the students to the ideas of electromagnetic waves and structure of transmission lines.

Course Outcome:

After the completion of this course the students shall be able to:

1. Examine the phenomena of wave propagation in different media and its interfaces and in applications of microwave engineering.
2. Understand the concepts of magnetic field and magnetic field intensity.
3. Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.
4. Understand transmission lines and use of smith chart in electromagnetic engineering problems.

UNIT-I (10 Hrs)

Introduction: The Electromagnetic model, vector algebra: vector addition, subtraction and product, orthogonal coordinate system and their transformations, vector calculus: del operator, gradient, divergence and curl operations and their physical significance, Divergence and Stokes's Theorem and their physical significance, Null Identities, Helmholtz's Equation

UNIT-II (20 Hrs)

Electrostatic Fields: Fundamental Postulates of Electrostatic in free space, Coloumb' s law, Gauss's law and its applications, Electric potential, Electric flux density and dielectric constant, Electrostatic fields in material space, polarization of dielectrics, Boundary conditions for electrostatic fields, Poisson's, Laplace's and Uniqueness Equation, Continuity equation & Relaxation time, Applications of electrostatic fields in Electrostatic discharge and multi-dielectric systems.

Magnetostatic Fields: Fundamental Postulates of Magnetostatics in free space, Ampere's circuit Law & its applications, Biot-Savart Law and applications, Magnetic dipole, Magnetic scalar and vector potentials, Behaviour of magnetic materials, Magnetization, magnetic field intensity and relative permeability, Boundary conditions for Magnetostatic fields, Applications of magneto static fields in lightning and magnetic levitation.

UNIT-III (15 Hrs)

Time Varying Electromagnetic Fields & Maxwell's Equations: Faraday's Law of Electromagnetic Induction and its applications, Maxwell's Equations in Integral form & their physical significance, Electromagnetic boundary conditions, Time Harmonic Fields, Wave Propagation and wave equations, Plane electromagnetic waves in Lossless and Lossy media, reflection and refraction of plane waves at boundaries for normal and oblique incidence, Group Velocity, Flow of Electromagnetic Power and Poynting Vector Theorem, Application of EM waves in telecommunications, radar systems and microwave heating.

UNIT-IV (15 Hrs)

Transmission Lines: Introduction, Transverse Electromagnetic wave along a parallel plate, General transmission line equations and transmission line parameters, Wave characteristics on Finite Transmission Lines, Transients on Transmission Lines, Transmission Line Impedance matching, Single stub matching, Double stub matching, Smith chart and its use in transmission lines**.**

RECOMMENDED BOOKS:

1. Sadiku, Elements of Electromagnetics, Oxford Press.
2. W. H. Hayt. Engineering Electromagnetics, McGraw Hill, New York
3. E.C. Jordan, Electromagnetic Waves and radiating systems, Prentice Hall of India, New Delhi.
4. T.A. John, Engg. Electromagnetics & Fields
5. D.K. Cheng, Fields and Wave Electromagnetics, Pearson education.
6. Kraus, Electromagnetics, McGraw Hill., New York

ENGINEERING MECHANICS

Subject Code: BMECE0-001 **L T P C** **Duration: 60 Hrs**
3 1 0 4

Course Objectives:

1. The concepts of friction in screw jack & inclined plane.
2. To draw shear force and bending moment diagrams by analytical method
3. To find forces in simple trusses by using joints and section methods
4. The concepts related to torsions and mechanics of fluids.

UNIT-I (14 Hrs)

Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT-II (13 Hrs)

Friction: Types of Friction, Limiting Friction, Angle of Repose, Coefficient of Friction, Laws of Friction, Static & dynamic Friction, Screw Jack, Minimum force required to drag a body on rough horizontal plane, body tending to move upwards on an inclined plane, body moving down the plane.

UNIT-III (21 Hrs)

Centroid and Centre of gravity: Centroid of composite sections, Parallel & perpendicular axes theorem, Moment of area, Moment of inertia of standard sections and composite sections, mass moment of inertia of cylinder cone sphere, and Polar moment of inertia.
Shear force and bending moment diagram, simple trusses, Method of joints, Method of section

UNIT-IV (12 Hrs)

Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component. Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

Expected Outcomes:

After going through these contents the student shall be able to solve the simple problems related to kinematics of particles, Co-planar and concurrent forces, solids mechanics, moment of inertia centre of gravity and role of friction in screw Jack and inclined planes.

Recommended Books:

1. Theory of machines by V.P Singh Dhanpat rai& Co
2. Jindal U.C Engineering Mechanics Part-I Galgotia Publications
3. Sadhu Singh, 'Strength of Materials', Khanna Publishers
4. Dr. Kirpal Singh, 'Mechanics of Materials', Standard Publishers
5. E.P.Popov, 'Mechanics of Materials', Pearson Education
6. K.L. Kumar, 'Engineering Fluid Mechanics', S. Chand
7. P.N. Chandramouli, 'Engineering Mechanics', PHI

ANALOG AND DIGITAL COMMUNICATION LAB

Subject Code: BECES1-404 **L T P C** **Duration: 30 Hrs**
0 0 2 1

Course Objectives:

1. To familiarize with modulation & demodulation techniques and study their waveforms on oscilloscope.
2. To learn design of useful circuits required in communication system.
3. To provide students with tools for communication signal analysis.

Course Outcomes:

Upon completion of the course, students will be able to

1. An ability to perform transmission of signals from transmitter to receiver using various modulation and demodulation techniques.
2. Design and implement base band transmission schemes.
3. Design and implement band pass signaling schemes.
4. Understand basic blocks of communication using MATLAB

LIST OF EXPERIMENTS

1. To study Amplitude Modulation using a transistor and determine depth of modulation.
2. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
3. Frequency Modulation using Voltage Controlled Oscillator
4. Generation of DSB-SC signal using Balanced Modulator.
5. Generation of Single Side Band (SSB) signal.
6. Study of Phase Lock Loop (PLL) and detection of FM Signal using PLL.
7. Measurement of Sensitivity, Selectivity and Fidelity of radio receivers.
8. Study of pulse code modulation and demodulation.
9. Study of delta modulation and demodulation and observe effect of slope overload.
10. Study pulse data coding techniques for various formats.
11. Data decoding techniques for various formats.
12. Study of amplitude shift keying modulator and demodulator.
13. Study of frequency shift keying modulator and demodulator.
14. Study of phase shift keying modulator and demodulator.
15. Digital link simulation: error introduction & error estimation in a digital link using MATLAB (SIMULINK)/ communication simulation packages.

Note: At least 10 experiments are required to be performed.

ANALOG ELECTRONIC CIRCUITS LAB

Subject Code: BECES1-405 **L T P C** **Duration: 30 Hrs**
0 0 2 1

Course Objectives:

1. To understand the characteristics of various power amplifiers.
2. To understand various sources of oscillations.
3. Able to understand, identification and selection of various amplifiers.
4. To make the students aware about the various multivibrator circuits.
5. To understand various Applications of Op amp.

Course Outcomes:

1. An ability to understand different types of electronics devices and circuits
2. An ability to design and conduct experiments, as well as to analyse and interpret output.

LIST OF EXPERIMENTS

1. To observe and analyze the frequency response of Class- A amplifier.
2. To observe and analyze the frequency response of Class- B amplifier.
3. To observe and analyze the frequency response of Class- B push-pull amplifier.
4. To observe and analyze the frequency response of complementary symmetry push-pull amplifier.
5. To study frequency response of a tuned amplifier.
6. To demonstrate and study a single stage RC coupled amplifier.
7. To demonstrate and study a two stage RC coupled amplifier.
8. To demonstrate and study a Transformer coupled amplifier.
9. To observe the response of RC phase shift oscillator/Wien Bridge oscillator and determine frequency of oscillation.
10. To observe the response of Hartley/Colpitts oscillator and determine frequency of oscillation.
11. To observe the response of Clapp's oscillator and determine frequency of oscillation
12. To understand and plot working of Monostable and Astable Multivibrators.
13. To demonstrate Application of Op amp as Inverting and Non Inverting amplifier.
14. To demonstrate the use of Op-Amp as summing, scaling & averaging amplifier.
15. Design of differentiator and Integrator using Op-Amp.

Note: At least 10 experiments are required to be performed.

CONSTITUTION OF INDIA

Subject Code: BMNCC0-001 **L T P C** **Duration: 30 Hrs**
2 0 0 0

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