ACE EngineeringCollege

Ankushapur(V), Ghatkesar(M), Medchal.Dist - 501 301

(An Autonomous Institutions)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II B.TECH. COURSE STRUCTURE & SYLLABUS

II Year				I Semester				
S. No.	Course Type	Course Code	Course Title	% of Deviation	Periods Per Week			Credits
					L	T	P	
1	PCC	EC301PC	Electronic Devices and Circuits	0	3	1	0	4
2	PCC	EC302PC	Network Analysis and Transmission Lines	3	3	0	0	3
3	PCC	EC303PC	Switching Theory and Logic Design	5	3	1	0	4
4	PCC	EC304PC	Signals and Systems	0	3	1	0	4
5	ESC	EC305ES	Probability Theory and Stochastic Processes	0	3	0	0	3
6	PCC	EC306PC	Electronic Devices and Circuits Lab	0	0	0	2	1
7	PCC	EC307PC	Digital Logic Design Lab	10	0	0	2	1
8	PCC	EC308PC	Basic Simulation Lab	0	0	0	2	1
9	MC	MC309HS	Constitution of India	0	3	0	0	0
10	MC	MC310EC	Fundamentals of Data Structures	-	2	0	0	0
11	MC	MC311	Advanced Python Programming	-	0	0	2	0
Total					**20**	**3**	**8**	**21**

II Year				II Semester				
S. No.	Course Type	Course Code	Course Title	% of Deviation	Periods Per Week			Credits
					L	T	P	
1	BSC	MA402BS	Numerical Methods, Complex Variables & Statistical Inference	20	3	1	0	4
2	PCC	EC402PC	Electromagnetic Fields and Waves	0	3	0	0	3
3	PCC	EC403PC	Analog and Digital Communications	1	3	1	0	4
4	PCC	EC404PC	Analog and Pulse Circuits	0	3	0	0	3
5	PCC	EC405PC	Linear and Digital Integrated Circuits	10	3	0	0	3
6	PCC	EC406PC	Analog and Digital Communications Lab	0	0	0	3	1.5
7	PCC	EC407PC	Analog and Pulse Circuits Lab	20	0	0	3	1.5
8	PCC	EC408PC	Linear and Digital Integrated Circuits Lab	10	0	0	2	1
9	MC	MC409HS	Gender Sensitization Lab	0	0	0	2	0
10	MC	MC410EC	Electronic Circuit Design Lab	-	0	0	2	0
Total					**15**	**2**	**12**	**21**

EC301PC: ELECTRONIC DEVICES AND CIRCUITS

Existing JNTUH R18 Syllabus	Proposed ACE ECE R20 Autonomous Syllabus	Percentage (%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus	Reasons / Justification for Deviation
UNIT - I	**UNIT - I**		
Diode and Applications: Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.	**Diode and Applications:** Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem,Comparators.	0	.
UNIT - II	**UNIT - II**		
BJT: Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times. **BJT Biasing and Stabilization:** - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.	**polar Junction Transistor (BJT):** Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parametermodel,Determinationofh-parametersfromtransistorcharacteristics,Conversionofh-parameters.	0	**NIL**
UNIT - III	**UNIT - III**		
Unit 3: Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor. Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator. Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.	**Transistor Biasing and Stabilization** : Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias Compensation using Diodes and Transistors. **Analysis and Design of Small Signal Low Frequency BJT Amplifiers:** Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response	0	**2) In Unit -, 3,4 & 5 topics have been reshuffled to have a sequenced explanation.**

	of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.		
UNIT - IV	**UNIT - IV**		
Unit 4: Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance**, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.**	**Junction Field Effect Transistor:** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor, Analysis of CS, CD, CG JFET Configurations		
UNIT - V	**UNIT - V**		
Unit 5: FET Amplifiers: Small Signal Model, Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers. MOSFET Characteristics in Enhancement and Depletion mode, Basic Concepts of MOS Amplifiers.	**OSFET:** MOSFET Construction and its Characteristics in Enhancement and Depletion modes. Basic Concepts of MOSFET Amplifiers. **Special Purpose Devices:** Zener Diode - Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.		

EC301PC: ELECTRONIC DEVICES AND CIRCUITS

B.TECH II YEAR I SEMESTER								
COURSE CODE	CATEGORY	HOURS/WEEK			CREDITS	MAXIMUM MARKS		
EC301PC	CORE	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	4	30	70	100
CONTACT CLASSES:45	TUTORIAL CLASSES:15	PRACTICAL CLASSES:NIL				TOTAL CLASSES :60		

PREREQUISITES: APPLIED PHYSICS

COURSE OBJECTIVE:

1. To introduce components such as diodes, BJTs andFETs.
2. To know the applications ofcomponents.
3. To know the switching characteristics ofcomponents.
4. To give understanding of various types of amplifiercircuits.

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

1. Know the characteristics of various components.
2. Understand the utilization ofcomponents.
3. Understand the biasingtechniques.
4. Design and analyze small signal amplifiercircuits.

Unit-1 Diodes and Applications

Diode and Applications: Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times.

Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem,Comparators.

Unit-2 Bipolar Junction Transistor (BJT):

Bipolar Junction Transistor (BJT): Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parametermodel,Determinationofh-parametersfromtransistorcharacteristics,Conversionofh-parameters.

Unit-3 Analysis and Design of BJT Amplifiers

Transistor Biasing and Stabilization : Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias Compensation using Diodes and Transistors.

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

Unit-4 Junction Field Effect Transistor (JFET)

Junction Field Effect Transistor: Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor, Analysis of CS, CD, CG JFET Configurations

Unit-5 Metal Oxide Semiconductor Field Effect Transistor (MOSFET)&Special Purpose Devices

MOSFET: MOSFET Construction and its Characteristics in Enhancement and Depletion modes. Basic Concepts of MOSFET Amplifiers.

Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

TEXT BOOKS:

1. Integrated Electronic - Jacob Millman, Christos C. Halkias. McGraw HillEducation.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009,Pearson.

REFERENCE BOOKS:

1. The Art of Electronics, Horowitz, 3rd Edition Cambridge UniversityPress
2. Electronic Devices and Circuits, David A. Bell – 5th Edition,Oxford.
3. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2Ed., 2008, McGrawHill.
4. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education

WEB REFERENCES:

1. https://www.youtube.com/watch?v=S76CnEJMl5E
2. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits/rectifier/clampercircuits.html
3. https://www.youtube.com/watch?v=MZPeRlst8rQ
4. https://www.elprocus.com/bridge-rectifier-circuit-theory-with-working-operation/
5. https://www.youtube.com/watch?v=-VwPSDQmdjM
6. https://www.electronics-tutorials.ws/amplifier/transistor-biasing.html
7. https://www.youtube.com/watch?v=i2t9GTAd2I0
8. https://www.electronics-tutorials.ws/transistor/tran_5.html
9. https://www.youtube.com/watch?v=XqGBNyhImV4

E TEXT BOOKS:

1. https://www.e-booksdirectory.com/details.php?ebook=8466
2. https://www.e-booksdirectory.com/details.php?ebook=1109
3. https://www.e-booksdirectory.com/details.php?ebook=5302

NETWORK ANALYSIS AND TRANSMISSION LINES

Existing JNTUH R18 Syllabus	Proposed ACE ECE R20 Autonomous Syllabus	Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus	Reasons / Justification for Deviation
UNIT - II	**UNIT - II**		
Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.	Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves. **Maximum Power Transfer Theorem and Reciprocity Theorem**	3	**These Theorems are included in the syllabus as they are very useful for the analysis of all Communication systems. ex., Antennas Design**

EC302PC : NETWORK ANALYSIS AND TRANSMISSION LINES

B.Tech II year I semester

Course Code	Category	Hours/Week			Credits	Max Marks		
		L	T	P	C	CIA	SEE	Total
EC302PC	Core	3	0	0	3	30	70	100
Contact Classes : 45	Tutorial Classes : Nil	Practical Classes : Nil				Total Classes : 45		

Prerequisite : Basic Circuit elements & Basic Electrical Circuits

Course Objectives :

1. To understand the basic concepts on RLCcircuits.
2. To know the behavior of the steady states and transients states in RLCcircuits.
3. To understand the two port networkparameters.
4. To study the propagation, reflection and transmission of plane waves in boundedand unboundedmedia.

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

1. Gain the knowledge on basic RLC circuitsbehavior.
2. Analyze the Steady state and transient analysis of RLCCircuits.
3. Know the characteristics of two port network parameters.
4. Analyze the transmission line parameters andconfigurations.

Unit-1 Network Graphs & Magnetic Coupled Circuits

Network Topology, Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

Unit-2 RLC Analysis & Theorems

Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves. Maximum Power Transfer Theorem and Reciprocity Theorem

Unit-3 Two Port Networks

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T,π,L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

Unit-4 Transmission Lines - I

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, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

Unit-5 Transmission Lines - II

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. λ/4, λ/2, λ/8 Lines – Impedance Transformations, Smith Chart – Configuration and Applications, Single Stub Matching.

Text Books :

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 8th Edition,1993.
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition,1999.

Reference Books :

1. Network Analysis – Van Valkenburg, 3rd Ed., Pearson,2016.
2. Electric Circuits – J. Edminister and M. Nahvi – Schaum's Outlines, Mc Graw HillsEducation, 1999.
3. Fundamentals of Electric Circuits – Charles K. Alexander and Matthew N. O. Sadiku, 6thEd
4. Electromagnetics with Applications – JD. Kraus, 5th Ed., TMH
5. Network Analysis & Synthesis – S P Ghosh and A K Chakraborty, McGraw Hill,2009
6. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan, 2001, (Tech.India Publications), NewDelhi.

Web References :

1. https://www.electrical4u.com/transmission-line-in-power-system/
2. http://www.antenna-theory.com/tutorial/txline/
3. https://www.electrical4u.com/network-analysis/

E-text Books :

1. http://dl.konkur.in/post/Book/Bargh/Fundamentals-of-Electric-Circuits-6th-Edition-%5Bkonkur.in%5D.pdf
2. http://eng.harran.edu.tr/~msuzer/files/edt/edt.pdf
3. https://archive.org/details/Electromagnetics_559

EC303PC: Switching Theory and Logic Design			
Existing JNTUH R18 Syllabus	**Proposed ACE ECE R20 Autonomous Syllabus**	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
UNIT - V	**UNIT - V**		
Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, **DCTL, RTL, DTL**, TTL, CML and CMOS Logic Families and its Comparison, **Classification of Integrated circuits**, comparison of various logic families, standard TTL NAND Gate- Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.	Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, TTL-Open Collector, Totem pole and Tri-state, ECL and CMOS Logic Families and its Comparison. Standard TTL NAND Gate-Analysis & characteristics, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.	5	1.To emphasis more on CMOS &TTL ,and also the topics DCTL,RTL,DTL are obsulate were deleted. 2.The topic " classification of IC's" was included in the subject " Linear IC Application" in the next semester.Hence this topic is redudant and is deleted in this unit.

EC303PC: Switching Theory and Logic Design

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC303PC	**Core**	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

Prerequisite: Nil

Course Objectives:

- To understand common forms of number representation in logiccircuits
- To learn basic techniques for design of digital circuits and fundamental concepts used in the designof digitalsystems
- To understand the concepts of combinational logic circuits and sequentialcircuits.
- To understand the Realization of Logic Gates Using Diodes &Transistors.

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

- Understand the numerical information in different forms and Boolean Algebratheorems
- Postulates of Boolean algebra and to minimize combinationalfunctions
- Design and analyze combinational and sequentialcircuits
- Known about the logic families and realization of logicgates.

Unit-1 NUMBER SYSTEMS & BOOLEAN ALGEBRA

Number Systems: Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes 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.

Unit-2 MINIMIZATION OF BOOLEAN FUNCTIONS

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method
Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Realizations.

Unit-3 SEQUENTIAL CIRCUITS FUNDAMENTALS

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.
Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Unit-4 SEQUENTIAL MACHINES

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

Unit-5	REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, TTL, CML and CMOS Logic Families and its Comparison, Classification of Integrated circuits, standard TTL NAND Gate- Analysis & characteristics, TTL open collector Cofiguration, Tristate TTL, MOS & CMOS open drain and tri state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS &
CMOS driving TTL.

Text Books:

1. Digital Design- Morris Mano, PHI, 4th Edition,2006
2. Modern Digital Electronics – R. P. Jain, 3rd Edition, 2007- TataMcGraw-Hill

ReferenceBooks:

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rdEd, John Wiley & SonsInc.
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 References:

1. https://nptel.ac.in/courses/117/105/117105080/
2. https://nptel.ac.in/courses/106/105/106105185/
3. https://nptel.ac.in/courses/117/106/117106086/

E-Text Books:

1. https://www.pdfdrive.com/foundation-of-switching-theory-and-logic-design-as-per-jntu-syllabus-d159787713.html
2. https://neurophysics.ucsd.edu/courses/physics_120/Agarwal%20and%20Lang%20(2005)%20Foundations%20of%20Analog%20and%20Digital.pdf
3. http://dl.booktolearn.com/ebooks2/engineering/electrical/9789814364584_foundation_of_digital_electronics_and_logic_design_0516.pdf

EC304PC: SIGNALS AND SYSTEMS

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC304PC	**Core**	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

Prerequisite: Mathematics

Course Objectives:

- This gives the basics of Signals and Systems required for all Electrical Engineeringrelated courses.
- To understand the behavior of signal in time and frequencydomain
- To understand the characteristics of LTIsystems
- This gives concepts of Signals and Systems and its analysis using different transformtechniques.

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

- Differentiate various signalfunctions.
- Represent any arbitrary signal in time and frequencydomain.
- Understand the characteristics of linear time invariantsystems.
- Analyze the signals with different transformtechnique

Unit-1 Signal Analysis

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

Unit-2 Fourier series & Fourier Transforms

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, Introduction to Hilbert Transform.

Unit-3 Signal Transmission through Linear Systems

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

Unit-4 Laplace Transforms & Z–Transforms

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

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.

Unit-5	Sampling theorem& Correlation

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

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, 2013,BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willskyand S.H. Nawabi, 2Ed.
3. Signals and Systems – Simon Haykin and Van Veen, Wiley 2Ed.,

Reference Books:

1. Signals and Systems – A. Rama Krishna Rao, 2008,TMH
2. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH InternationalEdition.
3. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004,PE.
4. Signals and Systems – K. Deergha Rao, Birkhauser,2018.

Web References:

1. https://www.edx.org/course/discrete-time-signal-processing-mitx-6-341x-1
2. https://www.mooc-list.com/course/digital-signal-processing-coursera

E-Text Books:

1. http://onlinevideolecture.com/ebooks
2. http://www.freebookcentre.net/SpecialCat/Free-Signal-Processing-Boo

EC305PC: PROBABILITY THEORY AND STOCHASTIC PROCESSES			
Existing JNTUH R18 Syllabus	**Proposed ACE ECE R20 Autonomous Syllabus**	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
UNIT - I	**UNIT - 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.	**Probability :** 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, Baye'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. Operations On Single Random Variable: 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.	0	Operations on Single Random Variable is shifted from Unit 2 to Unit 1 for more clarity i.e. Unit 1 deals with Single Random Variable and Unit 2 deals with Multiple Random Variables.
UNIT - II	**UNIT - II**		
Operations On Single& Multiple Random Variables –Expectations: Expected Value of a Random Variable, Function of a Random Variable, Moments about	**Multiple Random Variables:** Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning,		

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, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.	Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. **Operations On Multiple Random Variables:** Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.		

EC305PC: PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC305ES	**ESC**	3	-	-	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Nil

Course Objectives:

1. This gives basic understanding of random signals and processessing
2. Utilization of Random signals and systems in Communications and Signal Processing areas.
3. To known the Spectral and temporal characteristics of RandomProcess.
4. To Learn the Basic concepts of Noisesources
5. To Learn the Basics of Information Theory and Source coding techniques of achannel.

Course Outcomes:

Upon completing this course, the student will be able to

1. Understand the concepts of Random Process and itsCharacteristics.
2. Understand the response of linear time Invariant system for a RandomProcesses.
3. Determine the Spectral and temporal characteristics of RandomSignals.
4. Understand the concepts of Noise in Communicationsystems.
5. Understand the concepts of Entropy, Channel capacity and different source coding techniques to evaluate coding efficiency of achannel.

Unit - 1 PROBABILITY & RANDOM VARIABLE

Probability :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, Baye's Theorem, IndependentEvents

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.

Operations On Single Random Variable: 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 TransformationsofContinuousRandomVariable,TransformationofaDiscreteRandom Variable.

Unit - 2 MULTIPLE RANDOM VARIABLES

Multiple Random Variables: 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, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

Operations On Multiple Random Variables: Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear
Transformations of Gaussian Random Variables.

Unit - 3	**RANDOM PROCESSES – TEMPORAL CHARACTERISTICS**

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, Second- Order 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.

Unit - 4	**RANDOM PROCESSES – SPECTRAL CHARACTERISTICS**

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.

Unit - 5	**NOISE SOURCES & INFORMATION THEORY**

Noise Sources: 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.

Information Theory: 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, TMH, 4th Edition, 2001.
2. Principles of Communication systems by Taub and Schilling,TMH

Reference Books:

1. Probability, Random Variables and Stochastic Processes – Athanasios Papoulisand
   S. Unnikrishna Pillai, PHI, 4th Edition
2. Communication Systems – Analog and Digital - R.P.Singh&S.D.Sapre,TMH
3. Probability, Statistics & Random Processes-K. Murugesan, P. Guruswamy, Anuradha Agencies, 3rdEdition
4. Probability Theory and Stochastic Processses - Y.Mallikarjun Reddy, University Press.
5. Statistical Theory of Communication – S.P Eugene Xavier, New AgePublications

Web References:

1. www.britannica.com/topic/probability-theory
2. www.math.uiuc.edu/~r-ash/BPT.html
3. www.nptel.ac.in/courses/111102014/
4. https://en.wikipedia.org/wiki/Information_theory#:~:text=It%20can%20be%20subdivided%20into,information%20entropy%20of%20the%20source.

E-Text Books:

1. http://freecomputerbooks.com/mathProbabilityBooks.html
2. http://www.springer.com/in/book/9780387878584
3. http://www.e-booksdirectory.com/listing.php?category=15

EC306PC: ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech. II Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EC306PC	Core	-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 30				Total Classes: 30		

Prerequisite: Semi-Conductor Physics

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

1. Understand the characteristics of PNDiode.
2. Understand the characteristics of ZenerDiode
3. Understand the operation of Rectifiers, Clippers &Clampers.
4. Understand the input & output characteristics of BJT &JFET
5. Understand the frequency response of BJT& JFETamplifiers.
6. Understand the characteristics ofSCR.

List of Experiments: Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reversebias.
2. Zener diode characteristics and Zener as voltageRegulator
3. Full Wave Rectifier with & withoutfilters
4. Input and output characteristics of BJT in CEConfiguration
5. Input and output characteristics of FET in CSConfiguration
6. Frequency response of Common Emitteramplifier.
7. Frequency response of Common Baseamplifier.
8. Frequency response of Common Sourceamplifier.
9. Measurement of h-parameters of transistor in CB, CE, CCconfigurations
10. Switching characteristics of atransistor
11. SCRCharacteristics.
12. Types of Clippers at different referencevoltages
13. Types of Clampers at different referencevoltages
14. The steady state output waveform of clampers for a square waveinput

List of Equipment/Software(with Specifications or Range) Required:

1. Regulated PowerSuppliers,0-30V
2. 20 MHz, Dual Channel Cathode RayOscilloscopes.
3. Functions Generators-Sine and Square wavesignals
4. Multimeters
5. ElectronicComponents

EC307PC: DIGITAL LOIC DESIGN LAB

Existing JNTUH R18 Syllabus	Proposed ACE ECE R20 Autonomous Syllabus	Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus	Reasons / Justification for Deviation
Experiments	**Experiments**		
1. Realization of Boolean Expressions using Gates 2. Design and realization logic gates using universal gates 3. Generation of clock using NAND / NOR gates 4. Design a 4 – bit Adder / Subtractor 5. Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter 6. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops. 7. Design and realization of a Synchronous and Asynchronous counter using flip-flops 8. Design and realization of Asynchronous counters using flip-flops 9. Design and realization of 8x1 MUX using 2x1 MUX 10. Design and realization of 4 bit comparator 11. Design and Realization of a sequence detector-a finite state machine	1. Realization of Boolean Expressions using Gates 2. Design and realization logic gates using universal gates 3. Generation of clock using NAND / NOR gates 4. Design a 4 – bit Adder / Subtractor **5.Design a 4- bit Adder using 3x8 decoder** 6. Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter 7. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops. 8. Design and realization of a Synchronous counter using flip-flops 9. Design and realization of Asynchronous counters using flip-flops **10.Design and realization of Ring and Twisted Ring counters** 11. Design and realization of 8x1 MUX using 2x1 MUX 12.Design and realization of 4 bit comparator 13. Design and realization of a sequence detector-a finite state machine **14. Realization of logic gates using DTL, ECL**	10%	Experiment No's 5,10,14 were newly included,because there is a related theory in the respective subject.

EC307PC: DIGITAL LOIC DESIGN LAB

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC307PC	**Core**	-	-	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes: 30**		

Prerequisite: Nil

Course Objectives:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand the concepts of combinational logic circuits and sequentialcircuits.
3. To Know about the logic families and realization of logicgates

List of Experiments:

1. Realization of Boolean Expressions usingGates
2. Design and realization logic gates using universalgates
3. Generation of clock using NAND / NORgates
4. Design a 4 – bit Adder /Subtractor
5. Design a Full Adder using 3x8decoder
6. Design and realization of a 4 – bit gray to Binary and Binary to GrayConverter
7. Design and realization of an 8 bit parallel load and serial out shift register usingflip-flops.
8. Design and realization of a Synchronous counter usingflip-flops
9. Design and realization of Asynchronous counters usingflip-flops
10. Design and realization of Ring and Twisted Ringcounters
11. Design and realization of 8x1 MUX using 2x1MUX
12. Design and realization of 4 bit comparator
13. Design and realization of a sequence detector-a finite statemachine
14. Realization of logic gates using DTL,ECL

List of Equipment/Software(with Specifications or Range) Required:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated PowerSupply.
2. 20 MHz Oscilloscope with DualChannel.
3. Bread board and components/ TrainerKit.
4. Multimeter.

EC308PC: BASIC SIMULATION LAB

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC308PC	**Core**	-	-	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes: 30**		

Prerequisite: Nil

Course Objectives: The course should enable the students to:

1. Understand the basics of MATLAB.
2. Simulate the generation of signals and operations on them.
3. Illustrate Gibbs phenomenon.
4. Analyze the signals using Fourier, Laplace and Ztransforms.

Note:

- All the experiments are to be simulated using MATLAB or equivalentsoftware
- Minimum of 15 experiment are to becompleted

List of Experiments:

1. Basic Operations onMatrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as UnitImpulse, 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 AveragePower.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts ofSignal.
5. Convolution for Signals andsequences.
6. Auto Correlation and Cross Correlation for Signals andSequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/DiscreteSystem.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI systemand verifying its physical realiazability and stabilityproperties.
9. Gibbs PhenomenonSimulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phasespectrum.
11. Waveform Synthesis using LaplaceTransform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane forthe given transferfunction.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value andits Skew, Kurtosis, and PSD, Probability DistributionFunction.
14. Verification of SamplingTheorem.
15. Removal of noise by Autocorrelation / Crosscorrelation.
16. Extraction of Periodic Signal masked by noise usingCorrelation.
17. Verification of Weiner-KhinchineRelations.
18. Checking a Random Process for Stationarity in Widesense.

List of Equipment/Software (with Specifications or Range) Required:

1. Computer System with latest specifications connected
2. Window Xp or equivalent
3. Simulation software-MAT Lab or any equivalent simulation software

MC309HS: CONSTITUTION OF INDIA

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
MC309HS	**MC**	3	-	-	0	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Nil								

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 andAmerica.

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 andconstitutionalism
2. Historical perspective of the Constitution ofIndia
3. Salient features and characteristics of the Constitution ofIndia
4. Scheme of the fundamentalrights
5. The scheme of the Fundamental Duties and its legalstatus
6. The Directive Principles of State Policy – Its importance andimplementation
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 ofIndia
9. Amendment of the Constitutional Powers andProcedure
10. The historical perspectives of the constitutional amendments inIndia
11. Emergency Provisions: National Emergency, President Rule, FinancialEmergency
12. Local Self Government – Constitutional Scheme inIndia
13. Scheme of the Fundamental Right toEquality
14. Scheme of the Fundamental Right to certain Freedom under Article19
15. Scope of the Right to Life and Personal Liberty under Article21

MC301EC: DATA STRUCTURES

B.Tech. II Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
MC301EC	**MC**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	-	-	0	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Mathematical Knowledge at pre-university level

Course Objectives: The course should enable the students to:

1. Learn the basic techniques of algorithm analysis.
2. Demonstrate searching and sorting algorithms and analyze their time complexities.
3. Implement linear data structures viz. stack, queue and linked list.
4. Demonstrate non-linear data structures viz. tree and graph traversal algorithms.
5. Study and choose appropriate data structure to solve problems in real world

Course Outcomes:

Unit - I: INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING

Basic concepts: Introduction to data structures, classification of data structures, operations on data structures; Searching techniques: Linear search and Binary search; Sorting techniques: Bubble sort, selection sort, insertion sort and comparison of sorting algorithms.

Unit - II: LINEAR DATA STRUCTURES

Stacks: Primitive operations, implementation of stacks using arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Arrays, applications of linear queue, circular queue and double ended queue (deque).

Unit - III: LINKED LISTS

Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation. Types of linked lists: Circular linked lists, doubly linked lists; Linked list representation and operations of Stack and Queue.

Unit - IV: NON LINEAR DATA STRUCTURES

Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs.

Unit - V: BINARY TREES AND HASHING

Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

Text Books:

1. Rance D. Necaise, “Data Structures and Algorithms using Python”, Wiley, John Wiley & Sons, INC.,

2011.
2. Benjamin Baka, David Julian, “Python Data Structures and Algorithms”, Packt Publishing Ltd., 2017.

Reference Books:

1.S. Lipschutz, “Data Structures”, Tata McGraw Hill Education, 1st Edition, 2008.
2. D. Samanta, “Classic Data Structures”, PHI Learning, 2nd Edition, 2004.

Web References:

1. https://www.tutorialspoint.com/data_structures_algorithms/algorithms_basics.htm
2. https://www.codechef.com/certification/data-structures-and-algorithms/prepare
3. https://www.cs.auckland.ac.nz/software/AlgAnim/dsToC.html
4. https://online-learning.harvard.edu/course/data-structures-and-algorithms

MC311: ADVANCED PYTHON PROGRAMMING LAB

B.Tech. II Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC311	MC	-	-	3	0	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite:

1. A course on "Data Science, GUI and Web Programming".
2. A course on "Python Programming".

Course Objectives: At the end of the course students should be able to:

1. Manipulate and Analyze dataset.
2. Perform statistical analysis.
3. Effectively visualizing result.
4. Develop the skill of designing Graphical user Interfaces.
5. Develop Database Application.

List of Experiments:

LIST OF PROGRAMS:

1. Create Regular Expressions that
   a) Recognize following strings bit, but, bat, hit, hat or hut
   b) Match any pair of words separated by a single space, that is, first and last names.
   c) Match any word and single letter separated by a comma and single space, as in last name, first initial.
   d) Match simple Web domain names that begin with www. and end with a ".com" suffix; for example, www.yahoo.com. Extra Credit: If your regex also supports other high-level domain names, such as .edu, .net, etc. (for example, www.foothill.edu).
   e) Match a street address according to your local format (keep your regex general enough to match any number of street words, including the type designation). For example, American street addresses use the format: 1180 Bordeaux Drive. Make your regex flexible enough to support multi-word street names such as: 3120 De la Cruz Boulevard.
2. Create Regular Expressions that:
   a) Extract the complete timestamps from each line.
   b) Extract the complete e-mail address from each line.
   c) Extract only the months from the timestamps.
   d) Extract only the years from the timestamps.
   e) Extract only the time (HH:MM:SS) from the timestamps.
3. Write a multithread program to create 3 threads where one thread calculates the factorial and second thread calculates square and third thread calculates the summation of a list of numbers.
4. Write a python program to create two threads to count how many lines in two text files (one thread will count lines from first file and other thread from second file).
5. Write a python script that performs basic operations using MySQL database and a corresponding Python database adapter.
6. Write a python script that performs basic operations using SQLite Database and a corresponding Python database adapter

7. Write a program to demonstrate operations in Numpy.
8. Write a python program to demonstrate data indexing, selection and filtering in Pandas.
9. Write a python program to create GUI application to illustrate slider tool that controls the size of the text font in the label widget.(Greater the slider position, larger the font and vice-versa)
10. Write a python program to create GUI application to implement road signs with the appropriate foreground and background colors based on sign type stop,wait and Go signal.
11. Write a python program to create a "Comments" or "Feedback" page for a Web site. Take user feedback via a form, process the data in your script, and return a "thank you" screen.
12. Create a CGI application that not only saves files to the server's disk, but also displays the content of file back to the client.

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Third Edition, Pearson.
2. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython by Wes McKinny, O'Reilly Media.
3. Elegant SciPy: The Art of Scientific Python By Nunez-Iglesias, Stefan van der Walt, Harriet Dashnow, O'Reilly Media.
4. A. Lukaszewski, MySQL for Python: Database Access Made Easy, Pact Publisher.

REFERENCE BOOKS:

1. Data Science from Scratch, 2nd Edition by Joel Grus, O'Reilly Media, Inc, May 2019.
2. Scipy and Numpy: An Overview for Developers by Eli Bressert, O'Reilly Media.

List of Equipment/Software (with Specifications or Range) Required:

1. **Python.org**

LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES	MA402BS:NUMERICAL METHODS, COMPLEX VARIABLES AND STATISTICAL INFERENCE		
Existing JNTUH R18 Syllabus	**Proposed ACE ECE R20 Autonomous Syllabus**	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
UNIT - I	**UNIT - I**		
Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by‘t’. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.	Solution of polynomial and transcendental equations – Bisection method, Iteration Method, NewtonRaphson method and Regula-Falsi method. Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton’s forward and backward difference formulae. Central difference interpolation: Gauss’s forward and backward formulae; Lagrange’s method of interpolation	20	Unit I : Laplace Transforms is replaced (**This topic we teach in signals and systems in the previous semester**) with Unit 5: **Inference Concerning Means& Test of hypothesis (This topic is important for Artificial Intelligence)**
UNIT - II	**UNIT - II**		
Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method. Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton’s forward and backward difference formulae. Central difference interpolation: Gauss’s forward and backward formulae; Lagrange’s method of interpolation	Numerical integration: Trapezoidal rule and Simpson’s 1/3rd and 3/8 rules. Ordinary differential equations: Taylor’s series; Picard’s method; Euler and modified Euler’s methods; Runge-Kutta method of fourth order.		

UNIT - III	**UNIT - III**		
Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.	Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.		
UNIT - IV	**UNIT - IV**		
Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.	Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof)		**The remaining units are shifted upwards** 1. **Unit 1 is replaced with unit 2** 2. **Unit 2 is replaced with unit 3** 3. **Unit 3 is replaced with unit 4** 4. **Unit 4 is replaced with unit 5**
UNIT - V	**UNIT - V**		
Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof)	**Inference Concerning Means**- Estimations- point estimation, interval estimation, Bayesian estimation, reliability, Confidence interval estimates of population parameters, Estimation confidence interval for means, Maximum Likelihood. **Test of hypothesis** – Null Hypothesis and Test of hypothesis- Type I and Type II errors -Test of hypothesis concerning single mean, two means, proportion- The relation between test and confidence intervals - Goodness of fit test.		

MA402BS: NUMERICAL METHODS, COMPLEX VARIABLES AND STATISTICAL INFERENCE

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MA402BS	BSC	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

Prerequisite: Mathematical Knowledge at pre-university level

Course Objectives: To learn

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. The sampling theory and testing of hypothesis and making inferences

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

1. Find the root of a given equation.
2. Estimate the value for the given data using interpolation
3. Find the numerical solutions for a given ODE's
4. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
5. Taylor's and Laurent's series expansions of complex Function
6. Apply statistical methods for analysing experimental data

Unit - 1 Numerical Methods – I

Solution of polynomial and transcendental equations – Bisection method, Iteration Method, NewtonRaphson method and Regula-Falsi method. Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae; Lagrange's method of interpolation

Unit - 2 Numerical Methods – II

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.

Unit - 3 Complex Variables (Differentiation)

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

Unit - 4 Complex Variables (Integration)

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

Unit - 5	Statistical Inference

Inference Concerning Means- Estimations- point estimation, interval estimation, Bayesian estimation, reliability, Confidence interval estimates of population parameters, Estimation confidence interval for means, Maximum Likelihood.

Test of hypothesis – Null Hypothesis and Test of hypothesis- Type I and Type II errors -Test of hypothesis concerning single mean, two means, proportion- The relation between test and confidence intervals - Goodness of fit test.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9th Edition, Pearson Publications.

Reference Books:

1. M. K. Jain, SRK Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. Complex Variables with Applications by PonnusamySaminathan, Birkhäuser Publisher.
4. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

Web References:

E-Text Books:

1. https://www.pdfdrive.com/higher-engineering-mathematics-d181992980.html
2. http://www.elcom-hu.com/Mshtrk/Statstics/9th%20txt%20book.pdf
3. https://soaneemrana.org/onewebmedia/ADVANCED%20ENGINEERING%20MATHEMATICS%20BY%20ERWIN%20ERESZIG1.pdf
4. https://namitatiwaridotorg.files.wordpress.com/2017/10/ponnusamy-s-silverman-h-1-complex-variables-with-applications.pdf

EC402PC: ELECTROMAGNETIC FIELDS AND WAVES

B.Tech. II Year II Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC402PC	**Core**	3	-	-	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Applied Physics

Course Objectives:

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineeringproblems.
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 engineeringproblems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine theirpropagation parameters and estimate the same for dielectric and dissipativemedia.
4. To conceptually understand the waveguides and to determine the characteristics ofrectangular waveguides, microstriplines.

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

1. Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields andMagneto staticFields.
2. Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and BoundaryConditions.
3. Analyze the Wave Equations for good conductors, good dielectrics and evaluate theUPW Characteristics for several practical media ofinterest.
4. To analyze completely the rectangular waveguides, their mode characteristics, and designwaveguides for solving practicalproblems.

Unit - 1 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, Maxwell's Two Equations for Electrostatic Fields, 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.

Unit - 2 Magnetostatics

Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

Unit - 3 Maxwell's Equations (Time Varying Fields)

Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Unit - 4	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.

Unit - 5	Waveguides

Electromagnetic Spectrum and Bands. Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Microstrip Lines – Zo Relations, Effective Dielectric Constant.

Text Books:

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

Reference Books:

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2ndEd.,2000,PHI.
2. Engineering Electromagnetics – Nathan Ida, 2nd Ed., 2005, Springer (India) Pvt. Ltd.,NewDelhi.

Web References:

1. http://nptel.ac.in/courses/108106073/ 1 to 108106073/42
2. http://emt-iiith.vlabs.ac.in/
3. http://emt-iiith.vlabs.ac.in/Experiment.php?code=C001toC010

E-Text Books:

1.http://qeee.in/coursepack/generate_books/generated_books/1975/
2. https://digital-library.theiet.org/content/subject/b5000
3. https://digital-library.theiet.org/content/books/ew/sbew037e

EC403PC: ANALOG AND DIGITAL COMMUNICATIONS			
Existing JNTUH R18 Syllabus	**Proposed ACE ECE R20 Autonomous Syllabus**	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
UNIT - I	**UNIT - I**		
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 - Time and Frequency domain description, Frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial sidebandmodulation.	**Introduction to Communication System**, 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 - Time and Frequency domain description, Frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial sidebandmodulation.	1	**Introduction to Communication System Added**
UNIT - II	**UNIT - II**		
Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop,	Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, 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 andde-	0	**NIL**

Comparison of FM and AM., Concept of Pre-emphasis andde-emphasis.	emphasis.		
UNIT - III	**UNIT - 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.	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.	0	**Unit 3 and Unit 5 are interchanged**
UNIT - IV	**UNIT - 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.	Digital Modulation Techniques: ASK- Modulator, Coherent and Non-coherent ASK Detector, FSK- Modulator, Coherent and Non-Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Differential PSK, Principles of QPSKandQAM. Baseband Data Transmission: Introduction, Baseband Binary PAM systems, ISI, Nyquist criterion for distortion less transmission ,Baseband Pulse Shaping, Introduction to Correlative coding, Optimum Transmitting and Receiving Filters, Eye Diagrams, Receiving Filters- Matched Filter, Correlation receiver, Adaptive Equalization	0	

UNIT - V	UNIT - V		
Digital Modulation Techniques: ASK- Modulator, Coherent and Non-coherent ASK Detector, FSK- Modulator, Coherent and Non-Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Differential PSK, Principles of QPSKandQAM. Baseband Data Transmission: Introduction, Baseband Binary PAM systems, ISI, Nyquist criterion for distortion less transmission ,Baseband Pulse Shaping, Introduction to Correlative coding, Optimum Transmitting and Receiving Filters, Eye Diagrams, Receiving Filters- Matched Filter, Correlation receiver, Adaptive Equalization	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.	0	

EC403PC: ANALOG AND DIGITAL COMMUNICATIONS

B.Tech. III Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC403PC	**Core**	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

Prerequisite: Signals & Systems, Probability theory and Stochastic Processes

Course Objectives:

1. To develop ability to analyze system requirements of analog and digitalcommunication systems.
2. To understand the generation, detection of various analog and digitalmodulationtechniques.
3. To acquire theoretical knowledge of each block in AM, FM transmittersandreceivers.
4. To understand the concepts of baseband transmissions.

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

1. Analyze and design of various continuous wave and angle modulation anddemodulation techniques
2. Understand the effect of noise present in continuous wave and angle modulationtechniques.
3. Attain the knowledge about AM , FM Transmitters andReceivers
4. Analyze and design the various Pulse ModulationTechniques.
5. Understand the concepts of Digital Modulation Techniques and Basebandtransmission**.**

Unit - 1 AMPLITUDE MODULATION

Introduction to Communication System, 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 - Time and Frequency domain description, Frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial sideband modulation.

Unit - 2 ANGLE MODULATION

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, 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.

Unit - 3 WAVEFORM CODING

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.

Unit - 4 DIGITAL MODULATION TECHNIQUES

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

Baseband Data Transmission: Introduction, Baseband Binary PAM systems, ISI, Nyquist criterion for distortion less transmission ,Baseband Pulse Shaping, Introduction to Correlative coding, Optimum Transmitting and Receiving Filters, Eye Diagrams, Receiving Filters- Matched Filter, Correlation receiver, Adaptive Equalization

Unit - 5 TRANSMITTER & RECEIVERS

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.

Text Books:

1. Analog and Digital Communications – Simon Haykin, JohnWiley,2005.
2. Analog and Digital Communication – K. Sam Shanmugam,Willey,2005

Reference Books:

1. Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha,3rd Edition,McGraw-Hill,2008.
2. Electronic Communications – Dennis Roddy and John Coolean , 4thEdition ,PEA,2004
3. Electronics & Communication System – George Kennedy and Bernard Davis,TMH2004
4. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5thEdition, 2009, PHI
5. Analog and Digital Communications By SanjaySharma

Web References:

E-Text Books:

1. https://gctjaipur.files.wordpress.com/2015/08/an-introduction-to-analog-and-digital-communications-2nd-edition.pdf
2. https://gradeup-question-images.grdp.co/liveData/f/2017/12/Advanced_Electronic_Communications_Systems_0130453501.pdf-86.pdf
3. https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM%20BY%20GEORGE%20KENNEDY.pdf

ELECTRONIC CIRCUIT ANALYSIS	EC404PC: ANALOG AND PULSE CIRCUITS		
Existing JNTUH R18 Syllabus ELECTRONIC CIRCUIT ANALYSIS	**Proposed ACE ECE R20 Autonomous Syllabus Analof and Pulse Circuits**	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
UNIT - I	**UNIT - I**		
Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Casca RC Coupled amplifiers, Cascode amplifier, Darlington pair. **Transistor at High Frequency:** Hybrid - model of Common Emitter transistor model, fα, fβ and unity gain bandwidth, Gain-bandwidth product.	**Multistage Amplifiers** lassification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair. **Transistor at High Frequency** ybrid - model of Common Emitter transistor model, $f_{\alpha, \beta}$ and unity gain bandwidth, Gain-bandwidth product.	0	
UNIT - II	**UNIT - II**		
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.	**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 Feedbackconfigurations		
UNIT - III	**UNIT - III**		

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.	**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		
UNIT - IV	**UNIT - IV**		
Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled , Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers. **Tuned Amplifiers:** Introduction, single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.	**Large Signal Amplifiers** lass A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers. **Tuned Amplifiers** ngle Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.		
UNIT - V	**UNIT - V**		
Multivibrators: Analysis and Design of Bistable, Monostable, AstableMultivibrators 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.	**Multivibrators** ypes of Triggering, Analysis and Design of Bistable, Monostable, AstableMultivibrators and Schmitt trigger using Transistors. **Time Base Generators** eneral 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.		

EC404PC: ANALOG AND PULSE CIRCUITS

B.TECH II YEAR II SEMESTER								
COURSE CODE	**CATEGORY**	**HOURS/WEEK**			**CREDITS**	**MAXIMUM MARKS**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
EC404PC	**CORE**	**3**	**0**	**0**	**3**	**30**	**70**	**100**
CONTACT CLASSES:45	**TUTORIAL CLASSES: Nil**	**PRCTICAL CLASSESS:NIL**				**TOTAL CLASSES :45**		

PREREQUISITES: ELECTRONIC DEVICES AND CIRCUITS

COURSE OBJECTIVE:

1. Learn the concepts of high frequency analysis oftransistors.
2. To give understanding of various types of amplifier circuits such as smallsignal, cascaded, large signal and tunedamplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiatebetween negative and positivefeedback.
4. To construct various multivibrators using transistors and sweepcircuits.

COURSE OUTCOME: Upon successful completion of this course, students should be able to:

1. Design the multistage amplifiers and understand the concepts of HighFrequency Analysis ofTransistors.
2. Utilize the Concepts of negative feedback to improve the stability of amplifiersand positive feedback to generate sustainedoscillations.
3. Design and realize different classes of Power Amplifiers and tuned amplifiersuseable for audio and Radioapplications.
4. Design multivibrators and sweep circuits for variousapplications.

Unit - 1 Multistage Amplifiers &Transistor at High Frequency

Multistage Amplifiers

Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency

Hybrid - model of Common Emitter transistor model, f_α, β and unity gain bandwidth, Gain-bandwidth product.

Unit - 2 Feedback Amplifiers

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.

Unit - 3 Oscillators

Oscillators

Conditionfor Oscillations,RCtypeOscillators-RCphaseshiftandWien-bridge Oscillators,LCtype Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

Unit - 4 Large Signal Amplifiers &Tuned Amplifiers

Large Signal Amplifiers

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

Tuned Amplifiers

Single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and
synchronous tuning.

Unit - 5	Multivibrators and Time Base Generators

Multivibrators

Types of Triggering, Analysis and Design of Bistable, Monostable, AstableMultivibrators 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.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw HillEducation.
2. Microelectronics by Sedra& Smith, 5th Edition,2009,Oxford

REFERENCE BOOKS:

1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015,Pearson.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11thEdition, 2009,Pearson
3. Electronic Devices and Circuits, David A. Bell – 5thEditions,Oxford.
4. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2ed., 2008, Mc GrawHill.

WEB REFERENCES:

1. https://www.youtube.com/watch?v=BAkaeYBZTZ4
2. https://www.youtube.com/watch?v=-bz6u7IF1gM
3. https://www.youtube.com/watch?v=m4sjTt7rhow
4. https://www.youtube.com/watch?v=M3yI0byaqKc
5. https://www.youtube.com/watch?v=huDZjQcEBMg
6. https://www.youtube.com/watch?v=XQ3TJsYdtTY
7. https://www.youtube.com/watch?v=M1ZY0LoIkBw

E TEXT BOOKS:

1. https://www.e-booksdirectory.com/details.php?ebook=8466
2. https://www.e-booksdirectory.com/details.php?ebook=1109

EC405PC: LINEAR AND DIGITAL INTEGRATED CIRCUITS			
Existing JNTUH R18 Syllabus	**Proposed ACE ECE R20 Autonomous Syllabus** Linear and Digital Integrated Circuits	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
UNIT - I	**UNIT - I**		
Integrated Circuits: Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC Characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.	eal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal VoltageRegulators.	10	
UNIT - II	**UNIT - II**		
Op-amp and Applications: Basic information of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample & hold circuits, multipliers and dividers, differentiators and integrators, comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723	troduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, principle andApplications.		
UNIT - III	**UNIT - III**		
Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.	Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADCSpecifications.		
UNIT - IV	**UNIT - IV**		

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.	pecifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.		
UNIT - V	**UNIT - V**		
D-A and A-D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC dual slope integration type ADC, DAC and ADC specifications.	miliarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. emories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.		

EC405PC: LINEAR AND DIGITAL INTEGRATED CIRCUITS

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EC405PC	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisite: Switching Theory and Logic Design

Course Objectives: The main objectives of the course are:

1. To introduce the basic building blocks of linear integratedcircuits.
2. To introduce the theory and applications of analog multipliers andPLL.
3. To introduce the concepts of waveform generation and introduce some special functionICs.
4. To understand and implement the working of basic digitalcircuits.

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

1. A thorough understanding of operational amplifiers with linear integratedcircuits.
2. Attain the knowledge of functional diagrams and applications of IC 555 and IC565.
3. Acquire the knowledge about the Dataconverters.
4. Understanding of the different families of digital integrated circuits and theircharacteristics.

Unit - 1 Operational Amplifier

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

Unit - 2 Op-Amp, IC-555 & IC 565 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565

PLL - Block Schematic, principle and Applications.

Unit - 3 Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type

ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

Unit - 4 Combinational Logic ICs

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor,Magnitude Comparators.

Unit - 5 Sequential Logic IC's and Memories

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Text Books:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI,2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8thEd., 2005.

Reference Books:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed.,2003.
2. Digital Design Principles and Practices – John. F. Wakerly, Pearson 3rd Ed.,2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH,2008.
4. Operational Amplifiers with Linear Integrated Circuits, 4th Ed., William D.Stanley, Pearson Education India,2009.

Web References:

1.https://nptel.ac.in/courses/108/108/108108111/

E-Text Books:

1. https://www2.mvcc.edu/users/faculty/jfiore/OpAmps/OperationalAmplifiersAndLinearICs_3E.pdf
2. http://kavediasir.yolasite.com/resources/Linear%20Integrated%20Circuit%202nd%20Edition%20-%20D.%20Roy%20Choudhary.pdf
3. https://www.ti.com/lit/an/sboa092b/sboa092b.pdf?ts=1593701507095&ref_url=https%253A%252F%252Fwww.google.com%252F
4. http://www.miedema.dyndns.org/co/2018/Op_Amp_Applications_Handbook-Walt-Jung_2005.pdf

EC406PC: ANALOG AND DIGITAL COMMUNICATIONS LAB

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EC406PC	Core	-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: Matlab

Course Objectives:

The course should enable the students to:

1. Study various modulation techniques incommunications.
2. Visualize various spectrums using spectrumanalyzer.
3. Observe receivercharacteristics.
4. Understand the importance of AGC andVCO

Note:

- Minimum 12 experiments should beconducted:
- All these experiments are to be simulated first either using MATLAB, COMSIM or anyother simulation package and then to be realized inhardware

List of Experiments:

1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis ofAM
2. (i) Frequency modulation and demodulation(ii) Spectrum analysis ofFM
3. DSB-SC Modulator &Detector
4. SSB-SC Modulator & Detector (Phase ShiftMethod)
5. Frequency Division Multiplexing & Demultiplexing
6. Pulse Amplitude Modulation &Demodulation
7. Pulse Width Modulation &Demodulation
8. Pulse Position Modulation &Demodulation
9. PCM Generation andDetection
10. DeltaModulation
11. Frequency Shift Keying: Generation andDetection
12. Binary Phase Shift Keying: Generation andDetection
13. Generation and Detection (i) DPSK (ii)QPSK

List of Equipment Required:

1. CROs:20MHz
2. Function Generators:2MHz
3. SpectrumAnalyzer
4. Regulated Power Supplies:0-30V
5. MAT Lab/Equivalent Simulation Package with Communication toolbox
6. Analog and Digital Modulation and Demodulation TrainerKits.

Electronic Circuit Analysis Lab	EC407PC: ANALOG AND PULSE CIRCUITS LAB		
Existing JNTUH R18 Syllabus	**Proposed ACE ECE R20 Autonomous Syllabus** Analog and Pulse Circuits Lab	**Percentage(%) of Deviation in ACE ECE R20 Autonomous Syllabus with reference to JNTUH R18 Syllabus**	**Reasons / Justification for Deviation**
Experiments	**Experiments**		
1. Common Emitter Amplifier**(*)** 2. Two Stage RC CoupledAmplifier **3.** Cascode amplifier Circuit**(*)** 4. Darlington PairCircuit 5. Current Shunt Feedback amplifierCircuit **6.** Voltage Series Feedback amplifier Circuit**(*)** **7.** RC Phase shift Oscillator Circuit**(*)** 8. Hartley and Colpitt's OscillatorsCircuit 9. Class A poweramplifier **10.** Class B Complementary symmetry amplifier**(*)** 11. Design of MonostableMultivibrator 12. The output voltage waveform of Miller SweepCircuit	1. Common Emitter Amplifier(*) 2. Two Stage RC CoupledAmplifier 3. Cascode amplifier Circuit(*) 4. Darlington PairCircuit 5. Current Shunt Feedback amplifierCircuit 6. Voltage Series Feedback amplifier Circuit(*) 7. RC Phase shift Oscillator Circuit(*) **8. Wien-Bridge Oscillator Circuit** 9. Hartley and Colpitt's Oscillator Circuits 10. Class A poweramplifier 11. Class B Complementary symmetry amplifier(*) **12. Design of AstableMultivibrator** 13. Design of Monostable Multivibrator 14. The output voltage waveform of Miller SweepCircuit **15. The output voltage waveform of bootstrap SweepCircuit** 16. Design a BistableMultivibrator and draw itswaveforms 17. Response of Schmitt Trigger circuit for loop gain less than and greater thanone 18. Response of a transistor Current sweepcircuit	20%	To have more flexibility in the laboratory , experiments are added

EC407PC: ANALOG AND PULSE CIRCUITS LAB

B.Tech. II Year II Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
EC407PC	**Core**	-	-	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes: 30**		

Prerequisite: Electronic Devices & Circuits

Course Objectives:

The course should enable the students to:

1. Simulate and analyze single stage and multistage amplifiers andoscillators.
2. Demonstrate the principles of feedback amplifiers and oscillators throughsimulation.
3. Analyze the characteristics of differentmultivibrators

Note:

- Experiments marked with ***** has to be designed, simulated and verified inhardware.
- Minimum of 9 experiments to be done inhardware.

Hardware Testing in Laboratory:

1. Common Emitter Amplifier(*)
2. Two Stage RC Coupled Amplifier
3. Cascode amplifier Circuit(*)
4. Darlington Pair Circuit
5. Current Shunt Feedback amplifier Circuit
6. Voltage Series Feedback amplifier Circuit(*)
7. RC Phase shift Oscillator Circuit(*)
8. Wien-Bridge Oscillator Circuit
9. Hartley and Colpitt's Oscillator Circuits
10. Class A power amplifier
11. Class B Complementary symmetry amplifier(*)
12. Design of Astable Multivibrator
13. Design of Monostable Multivibrator
14. The output voltage waveform of Miller Sweep Circuit
15. The output voltage waveform of bootstrap Sweep Circuit
16. Design a Bistable Multivibrator and draw itswaveforms
17. Response of Schmitt Trigger circuit for loop gain less than and greater than one
18. Response of a transistor Current sweep circuit

List of Equipment Required:

1. 1. Computer System with latest specificationsconnected
2. Window XP orequivalent
3. Simulation software-Multisim or any equivalent simulationsoftware
4. Regulated Power Suppliers,0-30V
5. 20 MHz, Dual Channel Cathode RayOscilloscopes.
6. Functions Generators-Sine and Square wavesignals
7. Multimeters
8. ElectronicComponents

EC408PC: LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EC408PC	Core	-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: Electronic Devices & Circuits

Course Objectives:

- To understand the basics of linear integrated circuits and availableICs.
- To apply operational amplifiers in linear and nonlinearapplications.

List of Experiments:

Note: 1. Verify the functionality of the IC in the given application.
2. Minimum 12 experiments are to be done.

Design and Implementation of:

1. Inverting and Non-Inverting Amplifiers using OpAmps
2. Adder and Subtractor using OpAmp.
3. Comparators using OpAmp.
4. Integrator Circuit using IC741.
5. Differentiator Circuit using OpAmp.
6. Active filter Applications-LPF, HPF (FirstOrder)
7. IC 741 waveform Generators-Sine, Square wave and TriangularWaves.
8. Mono-Stable Multivibrator using IC555.
9. Astablemultivibrator using IC555.
10. Schmitt Trigger Circuit using IC 741.
11. IC 565-PLLApplications.
12. Voltage Regulator using IC723
13. Three terminal voltage regulators-7805, 7809,7912

List of Equipment Required:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated PowerSupply.
2. 20 MHz Oscilloscope with DualChannel.
3. Bread board andcomponents/
4. Analog TrainerKit.
5. Multimeter

MC409HS: GENDER SENSITIZATION LAB

B.Tech. II Year II Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
MC409HS	**MC**	-	-	2	0	30	70	100
Contact Classes: 30	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 30**		

COURSE DESCRIPTION

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

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

Course Objectives:

1. To develop students' sensibility with regard to issues of gender in contemporaryIndia.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects ofgenders.
4. To expose the students to debates on the politics and economics ofwork.
5. To help students reflect critically on genderviolence.
6. To expose students to more egalitarian interactions between men andwomen.

Course Outcomes:

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

Unit - 1	UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men
- Preparing for Womanhood. Growing up Male. First lessons inCaste.

Unit - 2	GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit - 3	GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.
-Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit - 4	GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit - 5	GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

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

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

ESSENTIAL READING: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender" written* by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu**published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

1. Discussion & Classroom Participation:20%
2. Project/Assignment:30%
3. End Term Exam:50%

MC410EC: ELECTRONIC CIRCUIT DESIGN LAB

B.Tech. II Year II Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
MC410EC	**MC**	-	-	2	0	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes: 30**		

Prerequisite: Electronic Devices & Circuits

List of Minor Projects

1. Design of Crystal Testing circuit using diodes andresistances
2. Design of Fire alarm system using diode, resistances andrelay.
3. Design of Battery voltage monitor system using diode, resistances and operationalamplifiers.
4. Design of zener diode voltage regulator circuit for 5.1volts.
5. Design and verify voltage regulator circuit using LM317 voltageregulator.
6. Design of multi-purpose power supply circuit using different types of voltageregulators.
7. Design of mini amplifier circuit using transistorPNP8550.
8. Design of Half Watt Amplifier circuit using transistors 2N2222 and2N2907.
9. Design of one transistor Automatic BatteryCharger.
10. Design of Tiny amplifier for Hearing Aid using transistors 2N3904 andBD139.
11. Design of Mini Hi-Fi 2 watt amplifier circuit usingIC741.
12. Design of Buzzer with progressive Beep rate usingIC4060.
13. Design of MOSFET based DC motor speedcontroller.
14. Design of PWM DC Motor control circuit withIC555.
15. Design of Enhanced Speed control circuit usingIC556.
16. Design of ICE Warning circuit for automobiles usingIC741.
17. Design of PIR motion detector circuit using IC555 or IC8050 orBC547.
18. Design of wireless mobile charger circuit usingIC555.
19. Design of gas detection system circuit usingIC555.
20. Design of Automatic drip irrigation system using IC555 and soilsensor.
21. Design of Security alarm circuit using IC555 and PIRsensor.

TEXTBOOK: Microelectronics-circuit analysis and design, Donald A. Neamen, Fourth edition, McGraw-hill. REFERENCES: Microelectronic circuits, Sedra and Smith, Oxford University Press.

CATALOG DESCRIPTION: Diode circuits, transistor and biasing, Basic transistor amplifiers, Frequency response, Transistor current sources, Differential amplifiers, Multistage amplifiers, Digital circuits and logic gates.