JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II Year-II Semester		L	T	P	C
		3	0	0	3

ELECTRONIC CIRCUIT ANALYSIS

Course Objectives:
The main objectives of this course are:

- To learn hybrid-pi parameters at high frequency and compare with low frequency parameters.
- Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltagegain.
- Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
- Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillatorcircuits.
- Compare and analyze different Power amplifiers like Class A, Class B, Class C, Class AB and other types ofamplifiers.
- Analyze different types of tuned amplifiercircuits.

UNIT-I Small Signal High Frequency Transistor Amplifier models:
BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, validity of hybrid π model, determination of high-frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.
FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II
Multistage Amplifiers: Classification of amplifiers, methods of coupling**, c**ascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Differential amplifier using BJT.

UNIT -III
Feedback Amplifiers : Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

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Unit-IV

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT, Frequency and amplitude stability of oscillators.

UNIT-V

Power Amplifiers: Classification of amplifiers(A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heatsinks.

Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, , staggered tunedamplifiers

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata McGraw-Hill,1972.
2. Electronic Devices and Circuits Theory – Robert L. Boylestad and LouisNashelsky, Pearson/Prentice Hall, Tenth Edition,2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh,Rekha , Pearson publications, 2006

References:

1. Electronic Circuit Analysis and Design – Donald A. Neaman, McGrawHill,2010.
2. Microelectronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press,Sixth Edition,2011.
3. Electronic Circuit Analysis-B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu,K.B.R.Murthy, PearsonPublications.

Course Outcomes:

At the end of this course the student can able to

- Design and analysis ofsmall signal high frequency transistor amplifier using BJT and FET.
- Designandanalysisofmultistageamplifiersusing BJTandFETandDifferential amplifier usingBJT.
- Derive the expressions for frequency ofoscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stabilityconcept.
- Know the classification of the power and tuned amplifiers and their analysiswith performance comparison.

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LINEAR CONTROL SYSTEMS

Course objectives:

- To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts offeedback
- To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system fornecessaryanalysis
- To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of variousperformanceindices
- To analyze the system in terms of absolute stability and relative stability by differentapproaches
- To design different control systems for different applications as pergivenspecifications
- To introduce the concepts of state variable analysis, design and also the concepts of controllability andobservability.

UNIT I
INTRODUCTION

Concepts of System,Control Systems: Open Loop and closed loop control systems and their differences. Different examples of control systems, Feed-Back Characteristics, Effects of feedback.Mathematical models, Differential equations, Impulse Response andtransfer functions.Translational and Rotational mechanicalsystems

UNIT II
TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram representation of systemsconsidering electrical systems as examples -Block diagram algebra– Representation by Signal flow graph - Reduction using mason'sgain formula.

TIME RESPONSEANALYSIS

Standard test signals - Time response of first order systems – CharacteristicEquation of Feedback control systems, Transient response of second ordersystems - Time domain specifications – Steady state response - Steady stateerrors and error constants.

UNIT III
STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stabilityand conditional stability – limitations of Routh's stability100

Root Locus Technique:

The root locus concept - construction of root loci-effects of adding polesand zeros to G(s)H(s) on the root loci.

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UNIT IV

Frequency response analysis: Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist StabilityCriterion

UNIT V

CLASSICAL CONTROL DESIGN TECHNIQUES

Compensation techniques – Lag, Lead, Lead-Lag Controllers design infrequency Domain, PID Controllers. State Space Analysis of ContinuousSystems Concepts of state, state variables and state model, derivation ofstate models from block diagrams, Diagonalization- Solving the Timeinvariant state Equations- State Transition Matrix and it's Properties –Concepts of Controllability and Observability.

TEXT BOOKS:

1. Automatic Control Systems 8th edition– by B. C. Kuo–John wiley andson's,2003.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal,New Age International(P) Limited, Publishers, 2nd edition,2007
3. Modern Control Engineering–by Katsuhiko Ogata – Pearson Publications, 5th edition,2015.

REFERENCE BOOKS:

1. Control Systems by A.Nagoorkani, RBA publications,3 edition,2017.
2. Control Systems by A.Anandkumar, PHI, 2 Edition,2014.

Course Outcomes:

- This course introduces the concepts of feedback and its advantages to various controlsystems
- The performance metrics to design the control system in time-domain and frequency domain areintroduced.
- Control systems for various applications can be designed using time-domain and frequency domainanalysis.
- In addition to the conventional approach, the state space approach for the analysis of control systems isalsointroduced.

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ELECTROMAGNETIC WAVES and TRANSMISSION LINES

Course objectives:
The main objectives of this course are to understand

- Fundamentals of steady electric and magnetic fields using variouslaws
- Apply the concept of static and time varying Maxwell equations and power flow using pointingtheorem
- Wave characteristics in different media for normal and obliqueincidence
- Implement various concepts of transmission lines and impedancemeasurements

SYLLABUS:
Prerequisites: Understanding of Cartesian co-ordinates, spherical & cylindrical systems

UNIT I:
Transmission Lines - I : Types, Parameters, T&π Equivalent Circuits, Transmission Line Equations,Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and GroupVelocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.

UNIT II:
Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Low loss radio frequency lines and UHF Transmission lines, UHF Lines as Circuit Elements; ImpedanceTransformations,λ/8,λ/4 andλ /2 Lines –. Smith Chart – Construction and Applications, Quarter wave transformer,Single Stub Matching, Illustrative Problems.

UNIT III:
Review of Co-ordinate Systems, **Electrostatics:**, Coulomb's Law, Electric Field Intensity, Electric Flux Density,Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density,Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

UNIT IV:
Magneto Statics : Biot-Savart 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 MagneticFields, Ampere's Force Law, Inductances and Magnetic Energy. IllustrativeProblems**.**
Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere'sLaw and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements.Conditions at a Boundary Surface.Illustrative Problems.

UNIT V:
EM Wave Characteristics : Wave Equations for Conducting and Perfect Dielectric Media,

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UniformPlane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossydielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types,Illustrative Problems.
Reflection and Refraction of Plane Waves – Normal and ObliqueIncidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total InternalReflection, Surface Impedance. Poynting Vector and Poynting Theorem.Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed.,2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI,2nd Edition,2000.

REFERENCE BOOKS:

1. Electromagnetic Field Theory and Transmission Lines –GSN Raju, Pearson Education2006
2. Engineering Electromagnetic – William H. Hayt Jr. and John A. Buck, TMH, 7th ed.,2006.
3. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao,WileyIndia 2013.
4. Networks,LinesandFieldsJohn D. Ryder,Second Edition, PearsonEducation,2015.

Course Outcomes:

At the end of this course the student can able to

- Determine E and H using various laws and applications of electric & magneticfields
- Apply the Maxwell equations to analyze the time varying behavior of EMwaves
- Gain the knowledge in uniform plane wave concept and characteristics of uniformplane wave invariousmedia
- Calculate Brewster angle, critical angle and total internalreflection
- Derive andCalculate the expressions for input impedance of transmission lines,reflection coefficient, VSWR etc. using smithchart

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ANALOG COMMUNICATIONS

Course Objectives:

Students undergoing this course are expected to

- Familiarize with the fundamentals of analog communicationsystems.
- Familiarize with various techniques for analog modulation and demodulation of signals.
- Distinguish the figure of merits of various analog modulationmethods.
- Develop the ability to classify and understand various functional blocks of radio transmitters andreceivers.
- Familiarize with basic techniques for generating and demodulating various pulse modulatedsignals.

UNIT I

AMPLITUDE MODULATION : Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT II

DSB & SSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems,FDM.

UNIT III

ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop. Comparison of FM & AM.

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UNIT IV

TRANSMITTERS & RECEIVERS: Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Super hetro dyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Communication Receivers, extensions of super heterodyne principle and additional circuits.

UNIT V

NOISE: Review of noise and noise sources, noise figure**,** Noise in Analog communication Systems, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis
PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing, TDM Vs FDM

TEXT BOOKS:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe,TMH, 3rd Edition,2007.
2. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Edition,2007.
3. Modern Digital and Analog Communication Systems –B.P.Lathi,Zhi Ding,Hari Mohan Gupta,Oxford University Press,4th Edition,2017

REFERENCES:

1. Electronics & Communication System – George Kennedy and Bernard Davis,TMH 2004.
2. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH,2007.
3. Electronic Communication systems – Tomasi, Pearson, fourth Edition,2007.

Course Outcomes:

After undergoing the course, students will be able to

- Differentiate various Analog modulation and demodulationschemes and their spectralcharacteristics
- Analyze noise characteristics of various analog modulationmethods
- Analyze various functional blocks of radio transmitters andreceivers
- Design simple analog systems for various modulationtechniques.

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II Year-II Semester		L	T	P	C
		3	0	0	3

COMPUTER ARCHITECTURE and ORGANIZATION

Course objectives:

- To understand the architecture of amodern computer with its variousprocessingunits. Also the Performance measurement of thecomputersystem.
- To understand the memory management systemofcomputer.
- To Understand the various instructions, addressingmodes
- To Understand the concept of I/Oorganization

UNIT -I:

Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

Machine Instruction and Programs:

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,

UNIT -II:

Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT -III:

INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access,

Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT -IV:

The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory,

Cache Memories: Mapping Functions, INTERLEAVING

Secondary Storage: Magnetic Hard Disks, Optical Disks,

UNIT -V:

Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic Or

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Logic Operation, Fetching A Word From Memory,Execution of Complete Instruction, Hardwired Control,

Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

TEXTBOOKS:

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5thEdition, McGrawHill,2011.
2. Computer Architecture and Organization, John P. Hayes ,3rdEdition, McGrawHill,2002.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings SixthEdition,Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th EditionPHI/Pearson, 2012.
3. Fundamentals or Computer Organization and Design, - SivaraamaDandamudiSpringer Int.Edition,2003.
4. “Computer Organization and Design: The Hardware/Software Interface” by DavidA. Patterson and John L.Hennessy, 1998.
5. J .P. Hayes, "Computer Architecture and Organization",McGraw-Hill,1998.

Course Outcomes:

- Students can understand the architecture ofmoderncomputer.
- They can analyze the Performance of a computer usingperformanceequation
- Understanding of differentinstructiontypes.
- Students can calculate the effective address of an operand byaddressingmodes
- They can understand how computer stores positive andnegativenumbers.
- Understand the concepts of I/O Organization and Memorysystems.

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		3	0	0	3

MANAGEMENT and ORGANISATIONAL BEHAVIOUR

Course Objectives:

- To familiarize with the process of management, principles, leadership styles andbasic concepts onOrganization.
- To provide conceptual knowledge on functional management that is on Human resource management and Marketingmanagement.
- To provide basic insight into select contemporary management practices and Strategic Management.
- To learn theories of motivationand also deals with individual behavior, their personality and perception ofindividuals.
- To understand about organizations groups that affect the climate of anentire organizations which helps employees in stressmanagement.

Unit I

Introduction: Management and organizational concepts of management and organization- Nature and Importance of Management, Functions of Management, System approach to Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Leadership Styles, Social responsibilities of Management. Designing Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, MBO, Process and concepts.

Unit II

Functional Management: Human Resource Management (HRM) Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Wage and Salary Administration Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating. - Marketing Management: Concepts of Marketing, Marketing mixelements and marketingstrategies.

Unit III

Strategic Management: Strategic Management and Contemporary Strategic Issues: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

Unit IV

Individual Behavior: Perception-Perceptual process- Impression management- Personality development – Socialization – Attitude- Process- Formation- Positive attitude- Change – Learning – Learning organizations- Reinforcement Motivation – Process- Motives – Theories of

Motivation: Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation,

Unit V

Group Dynamics: Types of Groups, Stages of Group Development, Group Behaviour and Group Performance Factors, Organizational conflicts: Reasons for Conflicts, Consequences of Conflictsin
Organization, Types of Conflicts, Strategies for Managing Conflicts, Organizational Climate and Culture, Stress, Causes and effects, coping strategies of stress.

Reference Books:

1. Subba Rao P., *Organizational Behaviour,* Himalaya Publishing House.Mumbai.
2. Fred Luthans *Organizational Behaviour*, TMH, NewDelhi.
3. Robins, Stephen P., *Fundamentals of Management,* Pearson,India.
4. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI,2007
5. Koontz & Weihrich: *Essentials of Management*, 6/e, TMH,2007
6. Kanishka Bedi, *Production and Operations Management*, Oxford University Press,2007.

Course Outcomes:

- After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizationalstructure.
- Will familiarize with the concepts of functional management that is HRM and Marketing of new productdevelopments.
- The learner is able to think in strategically through contemporary managementpractices.
- The learner can develop positive attitude through personality development and can equip with motivationaltheories.
- The student can attain the group performance and grievance handling in managing the organizationalculture.

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ELECTRONIC CIRCUIT ANALYSIS LAB

Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool**.** Further they are required to verify the result using necessary hardware equipment.

List of Experiments :(Minimum of Ten Experiments has to be performed)

1. Determination of f_T of a giventransistor.
2. Voltage-Series FeedbackAmplifier
3. Current-Shunt FeedbackAmplifier
4. RC Phase Shift/Wien BridgeOscillator
5. Hartley/ Colpitt'sOscillator
6. Two Stage RC CoupledAmplifier
7. Darlington PairAmplifier
8. Bootstrapped EmitterFollower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A PowerAmplifier
11. Class B Push-Pull PowerAmplifier
12. Complementary Symmetry Class B Push-Pull PowerAmplifier
13. Single Tuned VoltageAmplifier
14. Double Tuned VoltageAmplifier

Equipment required:

Software:

i. Multisim/ Equivalent Industrial Standard Licensed simulation softwaretool.
ii. Computer Systems with requiredspecifications

Hardware Required:

1. Regulated Powersupplies
2. Analog/Digital StorageOscilloscopes
3. Analog/Digital FunctionGenerators
4. DigitalMultimeters
5. Decade RésistanceBoxes/Rheostats
6. Decade CapacitanceBoxes
7. Ammeters (Analog orDigital)
8. Voltmeters (Analog orDigital)
9. Active & Passive ElectronicComponents

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ANALOG COMMUNICATIONS LAB

List of Experiments:

(Twelve experiments to be done- **The students have to calculate the relevant parameters**)–
(a. Hardware, b.MATLABSimulink,c. MATLAB Communication toolbox)

A. Amplitude Modulation - Modulation &Demodulation
B. AM - DSB SC - Modulation &Demodulation
C. Spectrum Analysis of Modulated signal usingSpectrumAnalyzer
D. DiodeDetector
E. Pre-emphasis&De-emphasis
F. Frequency Modulation - Modulation&Demodulation
G. AGCCircuits
H. Verification ofSamplingTheorem
I. Pulse Amplitude Modulation&Demodulation
J. PWM, PPM –Modulation&Demodulation
K. PLL IC-565 as FM demodulator
L. Radioreceivercharacteristics
M. Radio Receiver/TV Receiver Demo kits orTrainees.

Note: All the above experiments are to be executed/completed using hardware boards and also to be simulated on Mat lab.

Equipment& Softwarerequired:

Software :

i) Computer Systems withlatestspecifications
ii) Connected inLAN(Optional)
iii) Operating system(Windows/Linuxsoftware)
iv) Simulations software (Simulink&MATLAB)

Equipment:

1. RPS - 0 – 30V
2. CRO - 0 – 20 M Hz.
3. FunctionGenerators - 0 – 1 MHz
4. Components andBreadboards
5. Multimeters and othermeters
6. SpectrumAnalyzer