With effect from Academic Year 2014-15

Syllabus of B.E. II YEAR

OF

FOUR YEAR DEGREE COURSE

IN

ELECTRONICS & COMMUNICATON ENGINEERING

June 2014

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)

Hyderabad – 500 075

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
ELECTRONICS & COMMUNICATON ENGINEERING

SEMESTER – I

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	MT 211	Fourier Analysis and Partial Differential Equations	4	-	3	75	25	3
2	EC 211	Electronic Devices	4	1	3	75	25	3
3	EC 212	Electromagnetic Theory and Transmission Lines	4	1	3	75	25	3
4	EC 213	Signals and Systems	4	1	3	75	25	3
5	EE 215	Electrical Technology	4	-	3	75	25	3
6	ME 217	Elements of Mechanical Engineering	4	-	3	75	25	3
PRACTICALS								
7	EC 216	Electronic Devices Lab	-	3	3	50	25	2
8	EE 217	Electrical Technology Lab	-	3	3	50	25	2
		Total	**24**	**9**	**-**	**550**	**200**	**22**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

SEMESTER – I

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 214	Electronic Engineering –I (For EEE)	4	-	3	75	25	3
2	EC 215	Basic Electronics (Common to CSE and IT)	4	-	3	75	25	3
PRACTICALS								
1	EC 217	Electronic Engineering –I Lab (For EEE)	-	3	3	50	25	2
2	EC 218	Basic Electronics Lab (Common to CSE and IT)	-	3	3	50	25	2

L: Lecture, T: Tutorial, D: Drawing, P: Practical

MT 211

FOURIER ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all branches except Biotech)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Ojectives:

1. Introduce the concepts of Fourier analysis & z-transforms in engineering applications.
2. Introduction of boundary value problems and their applications in Heat Transfer and wave propagation.

Course Outcomes:

1. Students must be able to apply mathematical concepts of Fourier series, Fourier Transforms in solving one dimensional wave equation, Heat equation and the two dimensional Laplace equations.

UNIT– I

Fourier series: Dirichlet's conditions - expansion of a given function in Fourier series. Expansion of even and odd functions in Fourier series. Change of interval, half range sine and cosine series. Complex form of Fourier series.

UNIT– II

Fourier Transforms: Fourier integral (statement only)-Fourier transform, Inverse Fourier transform, Fourier sine and cosine transform, definitions and properties.

UNIT– III

Partial differential equations:

Formation of Partial differential equations by elimination of arbitrary constants and by elimination of arbitrary functions. Partial differential equations of First Order- Lagrange's Linear equation and its solution. Partial differential equations of First order but of any degree-Standard types: I- $f(p,q)=0$, $II-f(z,p,q)=0$, III- $f(x,p)=f(y,q)$ and IV- $z=px+qy+f(p,q)$ General Method of solution: Two independent variables-Charpit's Method-three or more independent variables Jacobi's method.

UNIT– IV

Applications of Partial differential equations:

Solutions of Partial differential equations by the method of separation of variables- boundary value problems. One dimensional Wave equation, one dimensional Heat equation- related problems. Laplace equation.

UNIT – V

Z- Transforms: Introduction, Basic theory of Z-transforms. Z-transforms of some standard sequences, Existence of z-transform. Properties of z-transforms: Linearity, Translation, scaling properties. Initial and final value theorems. Differentiation of
Z-transforms, convolution theorem, Solution of difference equations using Z-transforms.

Text Books:

1. Kanti B Datta "Mathematical Methods of Science and Engineering (Aided with MATLAB)" CENGAGE Learning.
2. B.S.Grewal "Higher Engineering Mathematics", Khanna Publishers 42nd Edition.2013
3. M.D.Raisinghania , Text Book of ODE and PDE , S.Chand publishers 4th -2012

EC 211

ELECTRONIC DEVICES

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

To provide knowledge about different types of diodes, transistors and their applications to analyze circuit characteristics. In particular:

1. To introduce the fundamental concepts of semiconductor devices like PN junction Diodes, Transistors and special Diodes.
2. To understand the applications of diodes and their operation.
3. To understand the characteristics of Transistors –BJT, FET, MOSFET and analyze their behavior in terms of h-parameters. This is a foundation course for "Electronic Circuits"

Course Outcomes:

The student will be able to:

1. Understand the basics of PN junction diodes, transistors and their applications.
2. Analyze the characteristic behavior of BJT , FET ,& MOSFET
3. Learn how to bias the transistors for their application as amplifiers

UNIT – I

SEMICONDUCTOR DIODE CHARACTERISTICS: Qualitative theory of p-n junction, The p-n junction as a Diode, Current components in p-n diode, Qualitative theory of the p-n Diode currents, The Volt-ampere characteristic temperature dependence of p-n diode characteristics, Diode Resistance, Transition Capacitance, Diffusion Capacitance, p-n diode switching times, breakdown Mechanisms , Diode as a circuit element, small signal diode models, Zener Diodes, Zener voltage regulator and its limitation.

UNIT – II

DIODE APPLICATIONS: Half wave, Full wave and Bridge Rectifiers - their operation, performance characteristics, and analysis; Filters (L, C, LC and CLC filters) used in power supplies and their ripple factor calculations, design of Rectifiers with and without Filters.

UNIT – III

BIPOLAR JUNCTION TRANSISTOR: Construction and Operation of NPN and PNP transistor, current components and current flow in BJT, Modes of transistor operation, Early effect, BJT input and output characteristics in CB, CE CC configuration obtaining h-parameters from BJT characteristics, BJT biasing techniques, stability factors, Bias compensation techniques, Thermal runway, Thermal stability, BJT as an amplifier and as a Switch

UNIT – IV

SPECIAL SEMICONDUCTOR DEVICES: Elementary Treatment of SCR- UJT- Diac- Triac - Varactor diode - PIN diode - Tunnel diode - Principle of photo electronic devices - Photo diode and Photo transistor - LED, LCD, LASER diode.

CRO: Elementary discussion on principles of CRT - Deflection and focusing of electron beam in CRT, CRO and its Applications.

UNIT – V

FIELD EFFECT TRANSISTORS: The Junction Field Effect Transistor, The Pinch-off Voltage V_P, V-I characteristics of JFET. JFET biasing-zero current drift biasing, biasing of FET, FET as an amplifier and as a switch. MOSFETs: Enhancement & Depletion mode MOSFETs, V-I characteristics, MOSFET as resistance, Biasing of MOSFETs, MOSFET as a switch.

Text Books:

1. Millman and Halkias," Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007
2. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009

Suggested Reading:

1. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.
2. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6thEdition, Pearson Education, 2005.
3. Jacob Millman, Christos C. Halkias, "Integrated electronics: analog and digital circuits and systems", 2nd Ed, Mc Graw-Hill, 2010

EC 212

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To explain the mathematical fundamentals necessary for understanding the electromagnetic theory
2. To teach the electrostatics and magnetic along with Maxwell's equations for EM Waves
3. To present the concepts of transmission lines, and this is a prerequisite course for "Antennas"

Course Outcomes: Students will be able to

1. Mathematically solve simple static Electromagnetic problems using various laws and theorems.
2. To understand the Electromagnetic wave properties with respect to different transmission mediums
3. To estimate the two wire transmission line properties

UNIT – I

Review of coordinate systems. Coulomb's Law, Electric field due to various Charge configurations and Electric flux density. Gauss's Law and its applications. Work, Potential and Energy, The dipole. Current and Current density, Laplace and Poisson's equations. Calculation of capacitance for simple configurations.

UNIT – II

Steady magnetic-Biot-Savart's law, Ampere's law. Stoke's theorem, Magnetic flux and magnetic flux density. Scalar and vector magnetic potentials.

Electric and Magnetic fields boundary conditions. Maxwell's equations for static and time varying fields.

UNIT – III

Uniform plane waves in free space and in conducting medium, Polarization. Instantaneous, average and complex Poynting thorem and its applications.

Reflection: Normal incidence on dielectrics and conducting medium.

Reflection: Oblique incidence on dielectrics and conducting medium,

UNIT – IV

Concept of symmetrical network-T and π networks. Types of Transmission Lines-Two wire lines. Primary and secondary constants. Transmission Line equations. Infinite line and characteristic impedance- Open and short circuit lines and their significance. Distortion less transmission line, Concept of loading of a transmission line, Campbell's formula.

UNIT – V

Impedance at any point on the transmission line- Input impedance. RF and UHF lines, transmission lines as circuit elements. Properties of λ/2, λ/4 and λ/8 Lines. Reflection and VSWR. Matching : Stub matching. Smith chart and its applications.

Text Books:

1. "Elements of Electromagnetics", Matthew N.O. Sadiku, 4th edition, 2008, Oxford University Press
2. "Engineering Electromagnetics", William H. Hayt Jr. and John A. Buck, 7th edition, 2006, TMH
3. "Networks Lines and Fields", John D. Ryder, 2nd edition, 1999, PHI

Suggested Reading:

1. "Electromagnetic Waves and Radiating Systems", E.C. Jordan and K.G. Balmain, 2nd edition.,2000, PHI
2. "Transmission Lines and Networks", Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi

EC 213

SIGNALS AND SYSTEMS

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. To teach Sampling theorem, describe the time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
3. To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems. This is a foundation course for "Communication Engineering".

Course Outcomes: Students will be able:

1. To mathematically represent and analyze the signals in time and frequency domains.
2. To understand the Sampling theorem and discrete time signal transformations techniques.
3. To evaluate convolution and correlation integrals and understand the signal comparison techniques and properties.

UNIT– I Continuous Time Signals (CTS): Introduction to signals, Elementary signals and other signals, their representations. Classifications of signals, introduction to systems and their classification. Orthogonality, approximation of a function by a set of mutually orthogonal functions, evaluation of mean square error.
Fourier series: Review of Fourier series, Exponential Fourier series. Existence and convergence. Relationship among various Fourier series representations. Symmetry conditions, amplitude and phase spectrums. Properties of Fourier series. Power Spectral Density (PSD).

UNIT – II Signal Representation By Continuous Exponentials: The direct and inverse Fourier transform. Existence and properties of Fourier Transform. Frequency spectrum. Fourier Transform of singularity functions and periodic signals. Energy Spectral Density (ESD). Filter characteristics of linear systems, distortion less system. Phase delay and group delay. Causality and physical realizability: The paley-weiner criterion.**UNIT – III Signal Representation By Generalized Exponentials:** The Bilateral and unilateral Laplace transforms. Region of convergence and it properties. Properties of Laplace transform. Inverse Laplace transform, Laplace transform of periodic signals. LTI system: Impulse response, System transfer function. Stability and Causality.

UNIT – IV Discrete Time Signals (DTS): Sampling of continuous time signals. DTS representation, Discrete Time Fourier Series (DTFS) and properties. Discrete Time Fourier Transform (DTFT) and properties.

Z–Transform: The Direct Z-Transform, Region of convergence and its properties. S–Plane and Z–Plane correspondence, Z–Transform properties. Inverse Z–Transform, Discrete LTI system: impulse response and system transfer function, Stability and Causality.

UNIT – V Convolution: Continuous convolution: Graphical interpretation and Convolution properties. Discrete convolution: Graphical interpretation and Convolution properties.

Correlation: Continuous correlation: Cross correlation and Auto correlation, their graphical interpretation and properties. Discrete correlation: Cross correlation and Auto correlation, their graphical interpretation and properties. Relation between convolution and correlation integrals.

Text Books:

1. B.P.Lathi, "Signals, Systems and Communications", BS Publications, 2008
2. A.V. Openheim, A.L.S. Willsky, I.T. Young, "Signals and Systems", Prentice Hall, India, 2nd edition, 2009
3. M.J. Robert " Fundamentals of signals and systems", McGraw Hill, 2008

Suggested Reading:

1. P. Rama Krishna Rao, "Signals and Systems", McGraw Hill, 2008
2. Simon Haykin, "Signals and Systems," Wiley India
3. Narayana Iyer, Cengage learning, "Signals and Systems", First Impression 2011

EE 215

ELECTRICAL TECHNOLOGY
(ECE)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To know the fundamentals of DC & AC machines.
2. To understand the concepts of power systems.

Course Outcomes:

The student will be able to:

1. Distinguish between DC machines & AC machines in respect of concepts, control and applications
2. Identify the various sources of generation of electricity and its transmission technologies.

UNIT – I

D.C. Generators: Constructional details, Simple lap & wave windings, Methods of excitation, Induced EMF, Basic ideas of armature reaction and commutation, Characteristics of shunt, series and compound generators and their applications.

DC Motors: Significance of back EMF, Torque developed in motors, three point starter, Characteristics of shunt, series and compound motors, Speed control of DC motors.

UNIT – II

Poly Phase System: Advantages of three phase system, Star and delta connections, Relationship between line and phase quantities, Measurement of power by Two Wattmeter method.

A.C. Generators: Construction, EMF equation, Armature reaction, Synchronous impedance, Regulation.

UNIT – III

Transformers: Single Phase transformer, Construction, Working principle, EMF equation, Ideal transformer, Phasor diagram under no load and loaded conditions, OC and SC tests on transformer, Efficiency and regulation, Working principle of auto transformer.

UNIT – IV

Induction Motors: Construction, Production of rotating magnetic field, Slip, Slip-torque characteristics, starting methods of Induction motors.

Single Phase Induction Motors: Construction, Theory of operation, Characteristics of shaded pole, Split phase and capacitor motors, Applications.

UNIT – V

Power Systems: Basic ideas of thermal, hydro, nuclear and non-conventional generating systems and layout, Block diagram of power systems, Transmission using high voltages, Advantages, Basic idea of line parameters of short lines.

Text Books:

1. H. Cotton, Electrical Technology, BI Publications
2. V.K.Mehta, Principles of Electrical Engineering, S.Chand & Co.
3. M.L. Soni, PV Gupta and VS Bhatnagar, A course in Electrical Power, Dhanpat Rai and Sons

Suggested Reading:

1. P.V. Prasad & S. Siva Nagaraju, Electrical Engineering: Concepts & Applications, Cengage Learning.
2. B.L.Theraja, Electrical Technology Vol.I & Vol.II, S.Chand & Co.
3. M.S.Naidu and Kamakshiah – Electrical Technology –TMH Publications.

ME 217

ELEMENTS OF MECHANICAL ENGINEERING
(ECE)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: Students will acquire basic knowledge in

1. Thermodynamics and its applications.
2. Basic manufacturing processes.
3. Mechanism of various power transmitting devices.

Course Outcomes: Students can

1. Understand the working principles of I.C. engines, refrigerators, reciprocating air compressors.
2. Estimate power transmitted by belts, gear trains and is exposed to various manufacturing processes.

UNIT – I Thermodynamics: Macroscopic & microscopic approaches, concepts of thermodynamic systems, processes, cycles and properties, quasi-static process, Zeroth law, first law of thermodynamics, application of first law to various thermodynamic processes & SFEE. Second law of thermodynamics - Kelvin–Planck & Clausius Statements. PMM1, PMM2.

I.C Engines: Working of four– stroke and two–stroke petrol and diesel engine with p–V diagrams, valve timing diagram, calculation of indicated power, brake power, specific fuel consumption, mechanical and thermal efficiencies.

Reciprocating Air Compressors: Uses of compressed air, principle of working and work done of single stage compressor–without & with clearance, multistage compressors, advantages, intercooler & aftercooler.

UNIT – II Heat Transfer: Basic modes of heat transfer, Fourier's law of conduction, Newton's law of cooling, Stefan–Boltzmann law of radiation, one–dimensional steady state conduction heat transfer through plane walls without heat generation and with constant thermal conductivity.

Heat Exchangers: Classification and application of heat exchangers in industry, derivation of LMTD in parallel and counter flow heat exchangers and problems on LMTD.

UNIT – III Refrigeration: Types of refrigeration systems–air refrigeration system using Bell–Coleman cycle. Simple vapor compression system, COP, T-s & p–h diagrams, types and properties of refrigerants, eco-friendly refrigerants., introduction to psychrometry, psychrometric processes, simple problems using psychrometric chart.

UNIT – IV Basic Manufacturing Processes: Welding, brazing and soldering, brief description of process and associated principles, arc welding & gas welding.
Casting: Sand casting, die casting and principles, application.
Forming: Description of forging, extrusion, drawing & rolling.
Principles and Applications of Basic Machining Process: Turning, milling, drilling and grinding.

UNIT – V Definition of kinematic link, pair, mechanism and machine.
Gears: Classifications of gears, nomenclature
Gear Trains: Simple, compound, inverted and epi–cyclic gear trains.
Belt Drives: Open and cross belt drives, length of belt, ratio of tensions for flat belt, condition for maximum power transmission for flat belt.

Text Books:

1. R.K.Rajput, Thermal Engineering, Laxmi Publications (P) Ltd, 8th edition, 201.
2. P.C.Sarma, A Text book of Production Technology, S. Chand & Company Ltd., 2008
3. Thomas Bevan, Theory of machines, CBS Publishers, 2010

Suggested Reading:

1. Mahesh M Rathor, Thermal Engineering, Tata McGraw Hill Publishers, 2013
2. R.K. Jain, Production Technology, Khanna Publishers, 2010
3. S.S.Ratan, Theory of machines, Tata McGraw Hill Publishers, 2008

EC 216

ELECTRONIC DEVICES LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

To develop an understanding of the underlying concepts of Electronic devices and circuits with special emphasis on the following concepts:

1. Fundamental concepts of semiconductor diodes and transistors.
2. Applications of various diodes.
3. V-I Characteristics of special devices.
4. Transistor circuit behavior and their characteristics.

Course Outcomes: The student will be able to:

1. Verify the working of PN Junction diodes, transistors and their characteristic behavior.
2. Learn design of different rectifiers with various filter combinations.
3. Set up bias point in a transistor.
4. Build an amplifier and find the frequency response of amplifier.

List of Experiments:

1. CRO Applications.
2. V-I Characteristics of Silicon and Germanium diodes and measurement of static and dynamic resistances.
3. Zener diode characteristics and its application as voltage regulator
4. Design, realization and performance evaluation of half wave rectifiers without filters and with C &π section filters
5. Design, realization and performance evaluation of full wave rectifiers without filters and with C &π section filters
6. Plotting the characteristics of BJT in Common Base configuration and measurement of h-parameters.
7. Plotting the characteristics of BJT in Common Emitter configuration and measurement of h-parameters.
8. Plotting the characteristics of JFET in CS configurations and measurement of Transconductance and Drain resistance.
9. BJT biasing circuits.
10. FET biasing circuits.
11. Common Emitter BJT Amplifier and measurement of Gain, bandwidth, input and output impedances.
12. Common Source FET Amplifier and measurement of Gain, bandwidth, input and output impedances.

13. Emitter Follower / Source Follower circuits and measurement of Gain, bandwidth, input and output impedance.
14. Characteristics of special semi-conductor devices-UJT and SCR.
15. Characteristics of Tunnel diode and photo diode.

Suggested Reading:

1. Robert Diffenderfer, "Electronic Devices Systems and Applications", Cengage Learning India Private Limited, 2010
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH 2001

Special Note:

1. Wherever possible, Analysis and design of circuits should be carried out using SPICE tools.
2. Five marks are allocated to SPICE design and analysis and the remaining 20 marks are for other internal lab assessments.

General Note:

1. The experiments should be performed on bread board using discrete components.
2. There should not be more than 2 students per batch while performing any of the lab experiment.
3. A minimum of 12 experiments should be performed.
4. Mini project of 10 marks.

EE 217

ELECTRICAL TECHNOLOGY LAB
(ECE)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To comprehend various characteristics of DC machines.
2. To understand the characteristics of different AC machines.
3. To become familiar with the operation of various electrical apparatus.

Course Outcomes: The student will be able to

1. Know the right instrument and its usage for the given circuit.
2. Identify the suitable machine for required application.

List of Experiments:

1. Magnetization curve of a separately excited DC generator
2. Load characteristics of a shunt generator
3. Load characteristics of a series generator
4. Performance characteristics of a DC shunt motor
5. Load characteristics of a DC series motor
6. Performance characteristics of a compound motor
7. Speed control of DC shunt motor
8. O.C. and S.C. tests on single phase transformer
9. Load test on single phase transformer
10. Performance characteristics of a three phase induction motor
11. Speed control methods of induction motor
12. Regulation of alternator by O.C. and S.C. tests
13. Measurement of three-phase power by two wattmeter method

Note: At least **10** Experiments should be conducted in the semester

EC 214

ELECTRONIC ENGINEERING-I
(For EEE)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

The aim of this course is to:

1. To introduce the fundamental concepts of semiconductor devices.
2. To understand the operation of different types of electronic devices and their corresponding applications.
3. To provide a conceptual foundation on amplifiers that can be used as a basis for further study.

Course Outcomes:

From this course student will be able to:

1. Demonstrate a systematic and critical understanding of the theories and principles of electronic devices.
2. Analyze the circuit behavior for various required characteristics.
3. Creatively apply the concepts behind various semi-conductor devices in their mini projects.

UNIT-I

Semiconductor diodes and Rectifiers: p-n junction diode: V-I characteristics, temperature dependence of V-I characteristics; Breakdown of junctions-Zener and Avalanche; Half wave, fullwave, bridge rectifiers, L, C, pi-section filters; Regulation and Ripple characteristics.

UNIT-II

Bipolar Junction Transistor: Current components; CE, CB, CC Configurations, characteristics; Transistor as an amplifier, operating point, bias stabilization circuits.

UNIT-III

Field Effect Transistors: V-I characteristics of JFET and MOSFET; Depletion and Enhancement modes, Biasing of JFET's and MOSFET's: Self-bias, biasing for zero current drift, biasing against device variations, biasing the enhancement MOSFET.

UNIT-IV

Low frequency amplifier Circuits: Small signal low frequency analysis of amplifier in 3 configurations using BJT and FET, Frequency response- effect of C_E/C_S and C_C on frequency response, Miller's theorem.

UNIT-V

CRO: Constructional details of CRO and its applications.

Special devices: Elementary treatment on the functioning of Tunnel/Backward diode, Varactor diode, Photo diode, Light Emitting diode. Liquid Crystal Display, Working of UJT, photo transistor.

Text Books:

1. Jacob Millman and Christos C. Halkias, Electronic Devices and Circuits, McGraw Hill, 3rd Edition, 2010.
2. Jacob Millman and Christos C. Halkias, Integrated Electronics, McGraw Hill, 1991.

Suggested Reading:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI, 10th edition, 2006.
2. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th edition, Oxford University press, 2008.
3. Beng Streetman and Sanjay Banerjee, "Solid state electronic devices" 6th edition, Pearson education, 2005.

EC 215

BASIC ELECTRONICS
(Common for CSE, IT, MECH, PROD)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the knowledge of basic semiconductor devices and create foundation for forthcoming circuit design courses
2. To understand various applications like amplifiers, oscillators and op-amps also motivate and train students in logic design.
3. To understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes:

1. Ability to understand the usefulness of semiconductor devices in circuit making like rectifiers, filters, regulators etc.
2. Ability to develop new directions in logic design to analyze, design and implement combinational circuits.
3. Ability to analyze the principles and practices for instrument design to development the real world Problems.

UNIT – I

Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.

Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT – II

Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).

Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator.

UNIT-III

Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance, Applications (Qualitative treatment only).

Oscillators: principle of oscillations, LC Type-Hartley, Colpitt and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT – IV

Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.
Digital System: Review of basic gates, Universal gates, Demorgan's theorem, minimization with Karnaugh Map up to three variables and realization of half, Full Adder and half, Full Sub tractors.

UNIT – V

Data Acquisition systems: Study of transducers-LVDT, Strain gauge.
Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.
Display Systems: Constructional details of C.R.O and Applications.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson Education, 9TH edition, LPE, Reprinted, 2006.
2. Morris Mano, "Digital Design", Pearson Education, Asia 2002.

Suggested Reading:

1. Jacob Millman and C., Halkias, "Electronic Devices", McGraw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall of India, 3rd edition,1985
3. W. D. Cooper, A. Helfric, "Electronic Instrumentation and Measurement Techniques", PHI, 4th edition.
4. S. Shalivahan, N. Suresh Kumar, A Vallavea Raj, "Electronic Devices and Circuits", Tata McGraw Hill, 2003

EC 217

ELECTRONIC ENGINEERING LAB - I

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. Fundamental concepts of semiconductor diodes and transistors.
2. Applications of various semi-conductor devices.
3. V-I Characteristics of special devices.
4. Transistor circuit behavior and their characteristics.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Learn the overview of principles and operation of various electronic components and equipment.
2. Verify the working of PN Junction diodes, transistors and their characteristic behavior.
3. Build an amplifier and find its voltage gain

List of Experiments:

1. Study of RLC components, Bread board, Regulated power supply, Function generator
2. Measurement of phase, frequency and sensitivity with CRO
3. V-I characteristics of semiconductor diodes (Germanium, Silicon and Zener)
4. Static Characteristics of BJT (CE)
5. Static Characteristics of BJT (CB)
6. Static Characteristics of FET (CS)
7. Design of Half wave and Full wave Rectifier with and without filters
8. Design of rectifiers with C, L, LC & Pi-filters
9. Static characteristics of SCR
10. Static characteristics of UJT
11. Biasing of BJT and FET
12. Emitter Follower
13. Source Follower
14. Frequency Response of CE amplifier
15. Frequency Response of CS amplifier

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text-Lab Manual", 7th Edition, TMH, 1994.
2. S. Poorna Chandra, B. Sasikala, "Electronics Laboratory Primer- A design approach", Wheeler Publishing, 1998.

General Note:

1. There should not be more than 2 students per batch while performing any of that lab experiment.
2. Mini project cum design exercise:
   a. The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.
   b. This exercise carries Sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercise.

C 218

BASIC ELECTRONICS LAB
(Common for CSE, IT, MECH, PROD)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices.
3. To study simple electronic circuits.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the knowledge regarding electronic components and equipment.
2. Design various rectifiers and filters .Analysis of characteristic behavior of BJT , FET
3. Design of an amplifier
4. Verify the operation of Op-amp for various applications.

List of Experiments:

1. Study of Electronic components.
2. Characteristics of Semiconductor diodes (Germanium, Silicon and Zener).
3. CRO and its Applications.
4. Half, Full wave rectifiers with and without filters.
5. Voltage Regulator using Zener diode.
6. Characteristics of BJT in CE Configuration.
7. Characteristics of FET in CS Configuration.
8. Amplifier with and without feedback.
9. RC Phase shift oscillator
10. Operational Amplifier and its applications.
11. Verification of Logic gates
12. Realization of Half and Full adder

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH, 1994.
2. Paul B. Zbar," Industrial Electronics, A Text - Lab Manual", 3rd Edition

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
ELECTRONICS & COMMUNICATON ENGINEERING

SEMESTER – II

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	MT 224	Complex Analysis and Random Processes	4	-	3	75	25	3
2	EC 221	Analog Electronic Circuits	4	1	3	75	25	3
3	EC 222	Analog Communication	4	1	3	75	25	3
4	EC 223	Pulse Digital and Switching Circuits	4	1	3	75	25	3
5	EC 224	Antennas and Wave Propagation	4	-	3	75	25	3
6	MB 214	Managerial Economics and Accountancy	4	-	3	75	25	3
PRACTICALS								
7	EC 226	Analog Electronic Circuits Lab	-	3	3	50	25	2
8	EC 227	Analog Communication Lab	-	3	3	50	25	2
9	EG 221	Soft Skills and Employability Enhancement	-	2	3	50	25	1
Total			**24**	**11**	**-**	**600**	**225**	**23**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

SEMESTER – II

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 225	Electronic Engineering –II (For EEE)	4	-	3	75	25	3
2	EC 215	Basic Electronics (Common to Mech. and Prod.)	4	-	3	75	25	3
PRACTICALS								
1	EC 228	Electronic Engineering –II Lab (For EEE)	-	3	3	50	25	2
2	EC 218	Basic Electronics Lab (Common to Mech. and Prod.)	-	3	3	50	25	2

L: Lecture, T: Tutorial, D: Drawing, P: Practical

MT 222

COMPLEX ANALYSIS AND RANDOM PROCESSES

Instruction:	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To develop the logical basis of probability theory
2. To develop skills necessary to solve practical problems in Complex Variables and its applications.
3. To develop the ability of analyzing the random signal

Course outcomes:

1. An ability to characterize probability models by employing counting methods and basic Probability mass function and probability density function canonical models for discrete and Continuous random variables.
2. An ability Characterize stochastic processes with an emphasis on stationary random processes.
3. An ability to characterize functions of random variables.

UNIT- I: Complex Variables:

Analytic function, Cauchy Riemann equations (Cartesian and polar forms) - construction of Analytic functions. Harmonic function, derivatives of Analytic functions.
Complex line integrals, Cauchy's Integral theorem, Cauchy's Integral formula and its derivatives and problems related to the above theorems.

UNIT-II: Taylor's and Laurent's Theorems (Only statement of the theorems)
Expansions-zeros, types of singularities and residues. Cauchy's Residue
theorem. Evaluation of real definite integrals by Cauchy's residue theorem.

UNIT-III: Probability & Random variables: Basic probability, addition and multiplication theorems. Conditional Probability and Bayes' Theorem. Discrete random variable and continuous random variable, probability mass function and probability density function, Mathematical expectation, properties of expatiations, variance, co-variance moments and moment generating function and characteristic function.

UNIT-IV: Probability distributions:

Discrete and continuous- probability distribution. Binomial distribution, Poisson distribution, Gaussian distribution, Rectangular/ uniform distribution, Normal distribution, Raylay distribution and erlong or negative exponential distribution.

UNIT-V: Random Process: Two Dimensional random variables, Joint probability density function, Cumulative Distribution function, Marginal probability distribution, conditional probability distribution, correlation.
Introduction to Random process, Classification of random processes, Average Values of Random processes, stationary, Analytical Representation of a Random Process ,Auto correlation function and its properties ,Cross Correlation Function and properties ,Ergodicity.

Text Books:

1. "Higher Engineering Mathematics", by Dr. B.S.Grewal, Khanna Publications, 43rd Edition-2014
2. "Functions of complex variables", by J N Sharma, Krishna Publications Ltd.50th Edition-2014.
3. "Probability, Statistics and Random Process" by T.Veerarajan
   (Tata Mc Graw Hill company Pvt. Ltd. Third Edition-2010)
4. "Probability Theory and Random Processes" by P.Ramesh Babu
   Tata McGraw Hill Education Private Limited First Edition-2014

EC 221

ANALOG ELECTRONIC CIRCUITS

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

To understand in detail about circuit analysis for various stages of transistor under amplification operations and stability considerations. In particular:

1. The concepts of high frequency equivalent transistor circuits like BJT, FET, and frequency response of single stage and multi stage amplifiers.
2. The fundamental concepts of positive and negative feedback and their applications.
3. The concepts of large signal amplifiers and radio frequency amplifiers.

Course Outcomes: The students will be able to:

1. Analyze and design various amplifier circuits.
2. Explain about feedback concepts and their importance in the amplifier circuits.
3. Design power amplifier and RF amplifiers and their stability considerations.

UNIT – I

Small Signal Single Stage Amplifiers: Low frequency and high frequency equivalent circuits – BJT & FET, Millers Theorem. Analysis of transistor amplifier circuit using h-parameters in various configurations - their comparison. Low frequency Common Source and Common Drain Amplifiers. High frequency Analysis of BJT and FET. Amplifier Frequency response, Multistage amplifiers: low frequency and High frequency Analysis of RC coupled , Transformer coupled and Direct coupled amplifiers with BJT and FET. Cascode amplifier, Darlington emitter follower – Bootstrap amplifier.

UNIT – II

Feed Back Amplifiers: The feedback concept, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, Voltage and current, series and shunt feedbacks. Stability considerations, Local versus global feedback.

UNIT – III

Oscillators: Positive feedback and conditions for sinusoidal oscillations, RC oscillator, LC oscillator, Crystal oscillator, Amplitude and frequency stability of oscillator.

Regulators: Transistorized series and shunt regulators.

UNIT – IV

Large Signal Amplifiers: BJT as large signal audio amplifiers, Classes of operation, Harmonic distortion, power dissipation, efficiency calculations. Design considerations of transformer coupled and transformer less push-pull audio power amplifiers under Class-A. Class-B, Class D and Class-AB operations, Heat Sinks

UNIT – V

Tuned Amplifiers: General consideration, Analysis and design of single tuned, inductively coupled and double tuned types with BIT, selectivity, gain & bandwidth comparison of multistage single tuned and double tuned amplifiers, the problem of stability in RF amplifiers, Neutralization & unilaterisation staggered tuned amplifiers. Class B and Class c tuned amplifiers.

Text Books:

1. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009
2. Donald Schilling, Charles Belove, TuviaApelewicz Raymond Saccardi, "Electronic Circuits: Discrete and Integrated", TMH, 3rd Edition

Suggested Reading:

1. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008
2. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 6th Edition, PHI, 1998
3. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6th Edition, Pearson Education, 2005
4. Roody and Coolen, "Electronic Communications", 4th Edition, Pearson Education, Reprint 2007

EC 222

ANALOG COMMUNICATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: To understand

1. The concept of modulation and also to analyze continuous / pulse modulation schemes.
2. The design procedure of AM and FM transmitters and receivers.
3. The concept of noise and its effect on modulation schemes and also to estimate the figure of merit.

Course Outcomes: The student will be able to

1. Analyze the performance of both analog and pulse analog modulation schemes.
2. Design various AM, FM transmitters and receivers and can study the characteristics of them.
3. Interpret the effect of various noise sources on the communication system and to analyze the SNR calculations.

UNIT – I

Linear Modulation schemes: Need for modulation, double side band suppressed carrier (DSB-SC) modulation, conventional Amplitude Modulation (AM). Hilbert transform, properties of Hilbert transform. Single side band (SSB) modulation and Vestigial-side band (VSB) modulation. Modulation and demodulation of modulation schemes: AM, DSB-SC, SSB and VSB.

UNIT – II

Angle modulation schemes: Frequency Modulation (FM) and Phase modulation (PM), Concept of instantaneous phase and frequency. Types of FM modulation: Narrow band FM and wide band FM. FM spectrum in terms of Bessel functions. Direct and indirect (Armstrong's) methods of FM generation. Foster–Seeley discriminator and Ratio detector for FM demodulation. Introduction to PLL.

UNIT – III

Transmitters and Receivers: Classification of transmitters. High level and low level AM transmitters.FM transmitters. Principle and operation of Tuned radio frequency (TRF) and Super Heterodyne receivers. Selection of RF amplifier. Choice of Intermediate frequency. Image frequency and its rejection ratio, Receiver characteristics: sensitivity, selectivity, fidelity, Double spotting, Tracking and alignment, Automatic Gain Control.

UNIT – IV

Noise Sources - External Noise: Atmospheric noise and Industrial noise, Internal Noise: Transit time noise, Flicker noise, Partition noise, Shot noise and Thermal noise. Noise temperature. Noise in two-port network: noise figure, equivalent noise temperature and noise bandwidth. Noise figure and equivalent noise temperature for cascaded stages. S/N ratio and Figure of merit calculations for AM, DSB-SC, SSB and FM systems. Pre-emphasis and De-emphasis.

UNIT – V

Pulse analog modulation schemes: Sampling of continuous time signals. Sampling of low pass and band pass signals. Types of sampling. Pulse Amplitude Modulation (PAM) generation and detection. Pulse time modulation schemes: PWM and PPM generation and detection.

Text Books:

1. Simon Haykin, "Communication Systems," 4th Edition, Wiley India, 2011
2. Herbert Taub, Donald L. Shilling & Goutam Saha, "Principles of Communication Systems," 3rd Edition, TMH, 2008
3. Singh, R.P. and Sapre, S.D., "Communication Systems," TMH, 2007

Suggested Reading:

1. P. Ramakrishna Rao, "Analog Communication", 1st Edition, TMH, 2011
2. F.E.Termann, "Radio Engineering", 3rd Edition, TMH, 1947

EC 223

PULSE DIGITAL AND SWITCHING CIRCUITS

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To Study the concepts of wave shaping using linear and non-linear circuits.
2. To study switching characteristics of Diode and design of Multivibrators
3. To learn various techniques for logic circuit reduction.
4. To understand the concepts of various combinational and sequential circuits.

Course Outcomes: The student will be able to

1. Construct different linear networks and find their response to different signals.
2. Understand switching characteristics of diodes.
3. Construct various multivibrators.
4. Design various combinational and sequential circuits

UNIT – I

Wave- Shaping: RC, RL and RLC circuits, response to Step, Pulse, Square wave inputs. Integrating and differentiating circuits, Compensated attenuators. Non-linear wave shaping using Diodes and Transistors. Clipping and Clamping circuits, Clamping circuit theorem.

UNIT – II

Multivibrators: Analysis and design of Transistor Multivibrators – Bistable, Monostable and Astable circuits. Operation of regenerative comparator (Schmitt Trigger). Bootstrap and Miller circuits, Time base generators, speed, transmission and displacement errors.

UNIT – III

Boolean – Algebra: Introduction to Boolean algebra, Demorgan's theorems, Canonical forms and Standard forms, Simplification of switching function using theorems, Introduction to Logic Gates, Ex-OR, Ex-NOR operations. Minimization of Switching Functions: Karnaugh map method, QuineMcCluskey tabular method. Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT – IV

Combinational Logic Design: Binary Adders, Subtractors, Code converters, Decoders and Encoders, Priority Encoder, Multiplexers and Demultiplexers. Static and hazard free design.

Introduction to Sequential Logic: Types of Flip-Flops, Excitation tables and Flip-Flop Conversions. Hold and setup times. Classification of sequential circuits.

UNIT – V

Sequential Logic Design: State diagram and State Table, Shift registers and counters, Design of synchronous and asynchronous counters. Introduction to ASM. Finite State Machines: Moore Type and Mealy Type FSM, Design of sequence Detector using Moore and Mealy FSM, One Hot Encoding.

Text Books:

1. Jacob Millman and HerbertTaub, "Pulse Digital and Switching Waveforms",TMH,3rd Edition 2011.
2. M. Morris Mano and Michael D. Ciletti, "Digital Design", 4th Edition., Prentice Hall, 2007
3. Zvi Kohavi, "Switching and Finite Automata Theory", TMH 2nd Edition, 2001.

Suggested Reading:

1. Ronald J. Tocci and Neal S. Widmer, "Digital systems principles and applications", 8th Edition, Pearson education, 2005
2. David A Bell, Solid state Pulse Circuits, 4th Edition, PHI 2009.
3. William I. Fletcher, "An engineering approach to digital design", Prentice Hall; 1st edition 1979.

EC 223

ANTENNAS AND WAVE PROPAGATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To explain the basic principles of antenna and its parameters for characterizing its performance.
2. To introduce concepts of various types of antennas, arrays for customizing the pattern parameters.
3. To present the propagation behavior of the radio wave in both troposphere and ionosphere.

Course Outcomes: Students will be capable of:

1. Estimating the basic antenna parameters using the antenna concepts.
2. Designing simple antenna with a specified radiation pattern characteristics.
3. Predicting the propagation behavior of radio wave in the atmosphere.

UNIT – I

Principles of radiation, retarded potential and isotropic radiator, Basic antenna parameters: Radiation patterns, radiation intensity, far field, near field, Gain and directivity, Antenna Polarization, effective aperture area and efficiency .Point sources, Current distribution, infinitesimal dipole.

UNIT – II

Half-wave dipole, quarter wave monopole, Effect of earth on vertical patterns, Loop antenna, Far field pattern of circular loop with uniform current.

Qualitative treatment of Helical Antennas: Axial mode pattern, wideband characteristics, radiation efficiency, Q, Bandwidth, S/N ratio.

UNIT – III

Arrays of point sources, two element array with equal and unequal amplitudes, different phases. Linear array with uniform distribution. Broadside and End fire arrays. Principle of pattern multiplication. Effect of inter element phase shift on beam scanning. Introduction to non-uniform linear arrays.

UNIT– IV

VHF, UHF Rhombic Antenna, Yagi - Uda Array, Design of Horn antenna, Parabolic Reflector and Cassegrain feed, Lens antennas. Microstrip antennas: different types, advantages and disadvantages of Microstrip antennas, Design of rectangular Microstrip antennas.

Antenna Measurements: Antenna Test Site, impedance, radiation pattern and gain measurement techniques, Antenna temperature.

UNIT – V

Ground wave propagation, Space and Surface waves, Tropospheric refraction and reflection, Duct propagation, Sky wave propagation: Critical frequency, Maximum Usable Frequency (MUF) and Skip distance, Regular and irregular variations in ionosphere. Friis transmission formula, Line of sight propagation.

Text Books:

1. Constantine A. Balanis, "Antenna Theory: Analysis and Design," 3rd Edition, John Wiley, 2005
2. John D. Krauss, Ronald J. Marhefka & Ahmad S. Khan, "Antennas and Wave Propagation," 4th Edition, TMH, 2010
3. Edward C. Jordan and Kenneth G. Balmain, "Electromagnetic Waves and Radiating Systems," 2nd Edition, PHI, 2001

Suggested Readings:

1. Chatterjee, R., "Antenna Theory and Practice", New Age Publishers, 2008.

MB 214

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: The objective of the course is to provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

UNIT – I

Introduction to Managerial Economics: Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT – II

Demands Analysis: Demands Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT – III

Production and Cost Analysis: Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economies of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (Theory and problems)

UNIT– IV

Capital Management: Capital Management, its significance, determinants and estimation of fixed and working capital requirements, sources of capital - Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT – V

Accountancy: Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement).

Text Books:

1. Mehta P.L., Managerial Economics – Analysis, Problems and Cases, Sulthan Chand & Son's Educational Publishers, 2011
2. Maheswari S.N Introduction to Accountanc, Vikas Publishing House, 2005
3. Panday I.M. Financial Management, Vikas Publishing House, 2009

Suggested Reading:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2001
2. M Kasi Reddy and S Saraswathi, Managerial Economics and Financial Accounting, PHI, 2007
3. J C Pappas and EF Brigham, Managerial Economics

EC 226

ANALOG ELECTRONIC CIRCUITS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives: To develop an understanding of the underlying concepts of analog electronic circuits with special emphasis on the following concepts

1. Pulse and digital circuits and their applications
2. Frequency response of single stage and multistage amplifiers
3. Positive and negative feedback amplifiers and their applications
4. Symmetrical/Asymmetrical networks and low pass/high pass filters

Course Outcomes:

The students will be able to:

1. Design different types of clippers, clampers and multivibrators
2. Analyze the circuit behavior with and without feedback
3. Distinguish between symmetrical and asymmetrical networks and also between T and π section filters

List of Experiments:

1. Clipping and Clamping Circuits
2. Design and development of Astable multivibrator
3. Design and development of Monostable multivibrator
4. Design and development of Bistable multivibrator
5. Schmitt Trigger
6. Voltage to Frequency converter.
7. Design & frequency response of Single stage and Multistage RC - Coupled amplifier using BJT
8. Design & frequency response of Single stage and Multistage RC - Coupled amplifier using FET
9. Voltage series feedback amplifier
10. Current shunt feedback amplifier
11. RC phase shift oscillator, Hartley oscillator & Colpitts Oscillator
12. Design of Class-A power amplifier
13. Design of Class-B power amplifier
14. Tuned Amplifiers (Single and Double)
15. Design & verification of Constant-K low-pass & high-pass filter

Mini Project cum Design Exercise(s): Example: Design of

i. An audio power amplifier with specified power output and the associated power supply that can take audio input from microphone and deliver the output to a loudspeaker.
ii. Switch Mode Power Supply 'or Linear Power Supply using discrete components.

Suggested Reading:

1. Paul B. Zbar, Albert P, Malvino, Michael A. Miller, "Basic Electronics, A Text- Lab Manual", 7th Edition, TMH, 2001

Special Note: Sessional marks are to be awarded as per the following breakup.

1. 20 marks for the regular lab exercises
2. 5 marks for the Mini project-cum-design exercise(s).

General Note:

1. A total of not less than 14 experiments must be carried out during the Semester
   (Wherever possible, more than 1 lab experiment should be carried out in one lab session of 3 Periods per week).
2. The experiments should be performed on bread board using discrete components
3. There should not be more than 2 students per batch while performing any of the lab experiment
4. Wherever possible, Analysis and design of circuits should be carried out using SPICE tools

EC 227

ANALOG COMMUNICATION LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. Fundamental experimental design of generation and detection of various analog and pulse analog modulation systems.
2. Understand and analyze the radio receiver characteristics.
3. Understand the concept of multiplexing (TDM and FDM) and also to analyze them using spectrum analyzer.

Course Outcomes:

The student will be able to:

1. Design, develop and analyze various analog and pulse analog modulation / demodulation systems.
2. Analyze the basic receiver structure and understand its characteristics.
3. Understand the concept of multiplexing in both time domain and frequency domain.

List of Experiments:

1. AM generation and detection
2. Balanced Modulator
3. FM generation and detection
4. Pre emphasis and De-emphasis circuits
5. Radio Receiver Measurements: Sensitivity, Selectivity and Fidelity
6. Sampling and reconstruction
7. PAM generation and detection
8. PWM generation and detection
9. PPM generation and detection
10. Time Division Multiplexing and De-multiplexing
11. Frequency Division Multiplexing and De-multiplexing
12. PLL Characteristics
13. Spectral Analysis of Video signals generated by TV demonstrator Kit and Pattern Generator using Spectrum analyzer
14. Mixer Characteristics

General Note:

i. At least 10 experiments are to be conducted.
ii. There should not be more than 2 students per batch while performing any of the lab experiment.
iii. Mini Project cum design exercise:
    a. The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.
    b. This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercises.

EG 221

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations. Also to learn the art of communication.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to mange time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate. Also use media with etiquette and know what academic ethics are.

Exercise 1

Communicative Competence – The Art of Communication, basic grammar, Indianisms, Effective listening skills, using English in different situations

Exercise 2

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence

Elements of effective presentation – Structure of presentation – Presentation tools – Body language

Creating an effective PPT

Exercise 3

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets

Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews

Exercise 4

Personality Development – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 5
Corporate Culture – Grooming and etiquette, communication media etiquette
Academic ethics and integrity

Suggested Reading:

1. Madhavi Apte , "A Course in English communication", Prentice-Hall of India, 2007
2. Leena Sen , "Communication Skills", Prentice-Hall of India, 2005
3. Dr. Shalini Verma, "Body Language- Your Success Mantra", S Chand, 2006
4. Edgar Thorpe and Showick Thorpe , "Objective English", 2nd edition, Pearson Education, 2007
5. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010
6. Gulati and Sarvesh, " Corporate Soft Skills", New Delhi: Rupa and Co. , 2006
7. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004
8. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989

EC 225

ELECTRONIC ENGINEERING-II

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

The main objectives of this course are:

1. Learn working of feedback amplifiers, oscillators, multistage amplifiers, power amplifiers and linear and non-linear wave shaping circuits.
2. Have in depth knowledge of basic electronic devices and circuits
3. Pursue any advance level course in electronics.

Course Outcomes:

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

1. Design feedback amplifiers and various kinds of oscillators.
2. Analyze and Design various multistage amplifiers.
3. Design of power amplifiers, clipping, clamping and comparator circuits.

UNIT-I

Feedback amplifiers: Concept of Feedback, feedback amplifier configuration, circuits, advantages of negative feedback, analysis of simple feedback amplifiers using BJTs and FETs.

UNIT-II

Oscillators: Barkhausen criterion; RC oscillators; Weinbridge, phase shift, LC, Hartley and colpitts oscillators; Crystal controlled oscillators (Analysis of oscillators using BJTs only), stability of oscillators, Voltage regulators.

UNIT-III

Multistage amplifiers: Cascade and cascode configuration, High input impedance transistor circuits, frequency response of RC coupled amplifiers, Transformer coupled amplifiers, Step response, effect of cascading on bandwidth.

D.C. Amplifiers: Problems of dc amplifiers. Drift compensation techniques, differential amplifiers, importance of CMRR, high CMRR differential amplifier.

UNIT-IV

Power Amplifiers: Classification of power amplifiers, analysis of class A and B power amplifiers; Distortion in amplifiers, push pull amplifiers, complementary symmetry, Phase inverters

UNIT-V

Wave shaping circuits: RC low pass and high pass circuits; response to step, pulse, Ramp, Exponential and Square wave inputs; clipping circuits for single level and two levels; clamping circuits, Comparators

Text Books:

1. Jacob Millman and Christos C. Halkias, "Integrated Electronics", McGraw Hill, 1991.
2. Jacob Millman and Christos C. Halkias, "Electronics Devices and Circuits", McGraw Hill, 3rd Edition, 2010.
3. Jacob Millman and Taub: Pulse, "Digital and Switching wave forms", McGraw Hill, 2003.

Suggested Reading:

1. Sedra and Smith, "Microelectronic Circuits", Oxford University. Press, 5th Edition, 2009.
2. S. Salivahanan & N. Suresh Kumar, "Electronic Circuit Analysis", McGraw Hill, 2nd Edition, 2011.

EC 215

BASIC ELECTRONICS
(Common for CSE, IT, MECH, PROD)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the knowledge of basic semiconductor devices and create foundation for forthcoming circuit design courses.
2. To understand various applications like amplifiers, oscillators and op-amps also motivate and train students in logic design.
3. To understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes:

1. Ability to understand the usefulness of semiconductor devices in circuit making like rectifiers, filters, regulators etc.
2. Ability to develop new directions in logic design to analyze, design and implement combinational circuits.
3. Ability to analyze the principles and practices for instrument design to development the real world Problems.

UNIT - I

Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.

Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT - II

Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).

Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator.

UNIT-III

Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance, Applications (Qualitative treatment only).

Oscillators: principle of oscillations, LC Type-Hartley, Colpitt and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT - IV

Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.

Digital System: Review of basic gates, Universal gates, Demorgan's theorem, minimization with Karnaugh Map up to three variables and realization of half, Full Adder and half, Full Sub tractors.

UNIT - V

Data Acquisition systems: Study of transducers-LVDT, Strain gauge.

Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.

Display Systems: Constructional details of C.R.O and Applications.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, K. Lal Kishore, "Electronic Devices and Circuits Theory", Pearson Education, 9TH edition, LPE, Reprinted, 2006.
2. S. Shalivahan, N. Suresh Kumar, A Vallavea Raj, "Electronic Devices and Circuits", Tata McGraw
   Hill, 2003
3. Morris Mano, "Digital Design", Pearson Education, Asia 2002.

Suggested Reading:

1. Jacob Milman and C., Halkias, "Electronic Devices", McGraw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, "Op-AMPS and Linear Integrated Circuits", Prentice Hall of India, 3rd Edition,1985
3. W. D. Cooper, A. Helfric, "Electronic Instrumentation and Measurement Techniques", PHI, 4th Edition.

EC 228

ELECTRONIC ENGINEERING LAB -II
(For EEE)

Instruction	3 Periods per week
Duration of University Examination.	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. Hands on experience of working with different feedback amplifiers, oscillators, wave shaping circuits.
2. Learn applications of different transistor circuits.
3. Understand practical issues in Electronic Engineering lab

Course Outcomes:

Upon completion of this course, the student will be able to

1. Analyze the circuit behavior for various required characteristics.
2. Understand the basics of feedback amplifiers, oscillators, wave shaping circuits and their applications.

List of Experiments:

1. Voltage series feedback amplifier
2. Voltage shunt feedback amplifier
3. Current series feedback amplifier.
4. Current shunt feedback amplifier
5. Hartley Oscillator
6. Colpitt's oscillator
7. RC Phase shift oscillator
8. Wien Bridge Oscillator
9. Linear wave shaping -Integrator & Differentiator
10. Nonlinear wave shaping -Clipping
11. Class-B Power Amplifiers
12. Clamping Circuits(Diode)
13. Difference Amplifier (Op. Amp)
14. Voltage Comparators (Op. Amp)

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text -Lab Manual", 7th Edition, TMH, 1994.
2. Paul B. Zbar, "Industrial Electronics- A Text -Lab Manual", 3rd Edition, TMH,1983.

General Note:

i. There should not be more than 2 students per batch while performing any of the lab experiment.

ii. Mini project cum design exercise:
   a) The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.
   b) This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercise.

EC 218

BASIC ELECTRONICS LAB
(Common for CSE, IT, MECH, PROD)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices.
3. To study simple electronic circuits.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the knowledge regarding electronic components and equipment.
2. Design various rectifiers and filters .Analysis of characteristic behavior of BJT , FET
3. Design of an amplifier
4. Verify the operation of Op-amp for various applications.

List of Experiments:

1. Study of Electronic components.
2. Characteristics of Semiconductor diodes (Germanium, Silicon and Zener).
3. CRO and its Applications.
4. Half, Full wave rectifiers with and without filters.
5. Voltage Regulator using zener diode.
6. Characteristics of BJT in CE Configuration.
7. Characteristics of FET in CS Configuration.
8. Amplifier with and without feedback.
9. RC Phase shift oscillator
10. Operational Amplifier and its applications.
11. Verification of Logic gates
12. Realization of Half and Full adder

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH, 1994.
2. Paul B. Zbar," Industrial Electronics, A Text - Lab Manual", 3rd Edition.