DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

Scheme of Instruction
and
Syllabi of

B.E. (ECE)

II/IV - I Semester

(With effect from 2015-2016)

VASAVI COLLEGE OF ENGINEERING
(Autonomous Institution Under UGC)
Ibrahimbagh, Hyderabad - 500 031.
Telangana.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II/IV – I SEMESTER

S. No	Code	Subject	Scheme of Instruction				Scheme of Examination			
			Periods per Week				Duration in Hrs	Maximum Marks		Credits
			L	T	D	P		Ext. Exam	Sessionals	
THEORY										
1	MA 2010	Mathematics-III	4	-	-	-	3	70	30	3
2	EC 2010	Basic Circuit Analysis	4	1	-	-	3	70	30	3
3	EC 2020	Electronic Materials & Devices	4	1	-	-	3	70	30	3
4	ME 2061	Elements of Mechanical Engineering	4	1	-	-	3	70	30	3
5	CE 2090	Environmental Studies	4	-	-	-	3	70	30	3
6	HS 2010	Finishing School - I	2	1	-	-	3	70	30	2
PRACTICAL										
7	EC 2311	Electronic Devices Lab	-	-	-	3	3	50	25	2
8	EC 2321	Basic Circuits and Simulation Lab	-	-	-	3	3	50	25	2
9	EE 2031	Basic Electrical Engineering Lab	-	-	-	3	3	50	25	2
		TOTAL	**22**	**4**	**-**	**9**	**-**	**570**	**255**	**23**
		GRAND TOTAL	**35**					**825**		

Service Courses (CSE & EEE)

S. No	Code	Subject	Scheme of Instruction				Scheme of Examination			
			Periods per Week				Duration in Hrs	Maximum Marks		Credits
			L	T	D	P		Ext. Exam	Sessionals	
THEORY										
1	EC 2130	Basic Electronics	4	1	-	-	3	70	30	3
2	EC 2140	Electronics Engineering - I	4	1	-	-	3	70	30	3
PRACTICAL										
1	EC 2391	Basic Electronics Lab	-	-	-	3	3	50	25	2
2	EC 2401	Electronics Engineering - I Lab	-	-	-	3	3	50	25	2

MA 2010

MATHEMATICS – III

(Common to all Branches except IT)

Instruction	4 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
• To understand the basics of Fourier series, partial differential equations. Applications of partial differential equations in one dimensional wave, heat and Laplace equations • To study the basic numerical methods to find the solution of algebraic, transcendental equations and also the numerical techniques for finding derivatives, solutions of ordinary differential equations and their applications. • To study the fundamentals of probability, statistics, distributions, testing of hypothesis, curve fitting, correlation, regression, lines of regression and their applications	• The student is able to understand the basics of Fourier series, partial differential equations. Applications of partial differential equations in one dimensional wave, heat and Laplace equations. • The student is able to understand study the basic numerical methods to find the solution of algebraic, transcendental equations and also the numerical techniques for finding derivatives, solutions of ordinary differential equations and their applications • The student is able to understand the fundamentals of probability, statistics, distributions, testing of hypothesis, curve fitting, correlation, regression, lines of regression and their applications.

UNIT –I (8 classes)

Fourier Series : Introduction to Fourier series – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half- range Sine and Cosine series.

UNIT –II (15 classes)

Partial Differential Equations and its Applications: Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange's Equation, Non-linear first order equations - Charpit's method

Applications of Partial Differential Equations: Method of Separation of Variables - Solution of One **D**imensional Heat Equation - One Dimensional Wave Equation - Laplace's Equation.

UNIT-III (12 classes)

Numerical Methods: Solution of Algebraic and Transcendental equations-Bisection method - Regula Falsi method- Newton-Raphson Method - Solution of Linear System of Equations - Gauss- Seidel Iteration Method – Interpolation- Newton's Forward and Backward Interpolation Formulae - Lagrange's Interpolation Formula - Newton's Divided Difference Formula - Numerical Differentiation -Interpolation approach- Numerical Solutions of Ordinary Differential Equations - Taylor's Series Method - Euler's Method - Runge-Kutta Method of 4^{th} order(without proofs).

UNIT-IV (12 classes)

Probability and Statistics: Random variables – Discrete Probability Distribution – Continuous Probability Distribution - Expectation – Variance – Moments -Moment Generating Function- Poisson and Normal Distributions – Testing of Hypothesis - Tests of Significance - t-test - F- test - χ^2 - test for small samples.

UNIT-V (8 classes)

Curve Fitting: Curve Fitting by the Method of Least Squares**,** Fitting of Straight line – Parabola - Exponential Curves- Correlation – Karl Pearson's Co-efficient of Correlation - Spearman's Rank Correlation, Regression - Lines of Regression.

Suggested Readings:

1. R.K. Jain & S.R.K. lyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2. Higher Engineering Mathematics, Dr.B.S Grewal 40^{th} Edition, Khanna Publishers.
3. Numerical Methods, Dr.B.S Grewal Khanna Publishers.
4. Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand & sons, New Delhi.
5. Advanced Engineering Mathematics, Kreyszig E, 8 th Edition, John Wiley & Sons Ltd, 2006.
6. A text book of Engineering Mathematics by N.P.Bali & Manish Goyal, Laxmi Publication.
7. Numerical Analysis by S.S.Sastry –PHI Learning Ltd.,

EC 2010

BASIC CIRCUIT ANALYSIS

Instruction	4 + 1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
Course Objective: Students will be able to analyze the response of the circuit and using various concepts such as network theorems, mesh & nodal analysis and topology and the frequency response of the circuit.	At the end of the course students should be able to: • Solve circuits using various theorems and network topology. • Analyze the circuits for dc, sinusoidal and exponential inputs and also magnetically coupled circuits. • Find the frequency response and phasor analysis of ac circuits. • Able to apply cutset and tieset topology concepts and test the principle of duality for a circuit.

UNIT-I

Basic concepts of Electric Circuits: Lumped circuit elements, Dependent and independent voltage and current sources, Energy and power, Ohm's law, Kirchhoff's laws, network reduction techniques, nodal and super nodal analysis, mesh and super mesh analysis.

Network Theorems to DC circuits: Source transformation, Star and Delta transformations, Superposition theorem, The venin's and Norton's Theorem, Maximum power transfer theorem, Reciprocity theorem, Tellegen's theorem

UNIT-II

Response of circuits for Unit step input: Linear time invariant first order and second order circuits, Formulation of Integro differential equations. Transient and steady state analysis for series and parallel RL, RC and RLC circuits, Zero Input Response (ZIR), Zero State Response (ZSR) and complete response.

UNIT-III

Response of circuits for sinusoidal and exponential inputs: Transient and steady state response of RC, RL and RLC networks for Sinusoidal and exponential signals. Network theorems to a.c circuits.

Calculation of power in a.c circuits: phasor and vector representations average power, apparent power, complex power, power triangle.

UNIT-IV

Magnetic Coupled Circuits: Concept of Self, Mutual inductance, co-efficient of coupling, dot convention rules and analysis of simple circuits.

Resonance: Analysis of Series and Parallel resonance, Q-factor, Selectivity and bandwidth.

UNIT-V

Frequency Domain Analysis: Concept of complex frequency, Impedance and Admittance functions, Pole-Zero cancellation, Calculation of natural response from pole zero plots.

Network Topology: Topological description of Network: graph, tree, co-tree, link, chord, incidence matrix, tieset, tieset matrix, cutset, cutset matrix. Formation of node and loop equations. Principle of duality and dual networks.

Suggested Reading:

1. William H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin, *Engineering Circuit Analysis*, 5th edition, McGraw Hill, 2010.
2. Van.valkenberg M.E Network analysis, PHI, New Delhi, 3rd edition 2002.
3. Chakrabarti, *Ciruit Theory* Dhanapati Rai & Co(Pvt.)Ltd., Educational & Technical Publishers,
4. Charles A. Desoer and Ernest S Kuh, *Basic Circuit Theory*, McGraw Hill, 2009.
5. Raymond A. DeCarlo and Penmin Lin, Linear Circuit Analysis, 2nd edition, Oxford Univ. Press, 2003.
6. Lawrence P. Huelsman, *Basic Circuit Theory*, 3rd edition,2009.

EC 2020

ELECTRONIC MATERIALS & DEVICES

Instruction	4 + 1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
To familiarize the students with various two terminal and three terminal electronic devices working and implementation and use in the design of real time electronic products.	• Analyze the operation and design aspects of diode under various conditions. • Illustrate the use of diode in practical applications and gain knowledge on special diodes. • Design aspects and functionality of Bipolar junction Transistor and analyzing its operation as an amplifier • Design aspects and functionality of Field effect transistors.

UNIT – I

Materials: Types of materials – gasses, Liquids & solids, Different types of solids – conductors, insulators & semiconductors (intrinsic, N-type & P-type), Interface between metal-metal, metal-semiconductor and semiconductor-semiconductor (PN & shotkey contact).

Junction Diode : Different types of PN Junction formation techniques, PN Junction Characteristics, biasing-band diagrams and current flow, Diode current equations under forward bias and reverse bias conditions, Junction breakdown in diodes and breakdown voltages, effect of temperature on diode characteristics, Diode as a circuit element, small signal diode models, Junction capacitance under forward bias and reverse bias, Diode switching characteristics, Zener Diodes, Zener voltage regulator and its limitation.

UNIT – II

PN 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.**Specials Diodes**: Elementary treatment on the functioning of Tunnel, Varactor, Photo, Light Emitting diodes. **Display devices**: Study of block diagram of typical display device.

UNIT – III

Bipolar Junction Transistor : Transistor Junction formation (collector-base, base-emitter Junctions) Transistor biasing-band diagram for NPN and PNP transistors, current components and current flow in BJT, Early effect, BJT input and output characteristics in CB, CE CC configuration, BJT as an amplifier, BJT biasing techniques, Thermal runway, heat sinks and thermal stabilization, operating point stabilization against temperature and device variations, stability factors, Bias stabilization .

UNIT – IV

Small Signal Transistors equivalent circuits : Small signal low frequency h-parameter model of BJT, Determination of h parameters, analysis of BJT amplifiers using h-parameter, comparison of CB, CE and CC amplifier configurations, Analysis of BJT amplifier with approximate model. **Special Devices:** working of UJT, SCR, DIAC, TRIAC

UNIT – V

Junction Field Effect Transistors (JFET): JFET formation, operation & current flow, pinch-off voltage, V-I characteristics of JFET. JFET biasing-zero drift biasing. Low frequency small signal model of FETs. Analysis of CS, CD and CG amplifiers and their comparison. FET as an amplifier and as a switch. MOSFETs: MOSFETs, Enhancement & Depletion mode MOSFETs, V-I characteristics. MOSFET as resistor, MOSFET as a switch. Introduction to CMOS.

Suggested Reading:

1. Millman and Halkias," Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007
2. Adel S.Sedra and Kenneth C.Smith “Micro Electronic Circuits theory and applications” sixth edition Oxford publications.
3. M Satyam, K Ramkumar, “ Foundations of Electronic Devices”, Wiley Eastern Limited, 1990.
4. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009
5. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.
6. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6thEdition, Pearson Education, 2005.
7. Jacob Millman, Christos C. Halkias, "Integrated electronics: analog and digital circuits and systems", 2nd Ed, Mc Graw-Hill, 2010

ME 2061

ELEMENTS OF MECHANICAL ENGINEERING

Instruction	4 + 1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
The course will enable the students to: • Learn the basic principles of Mechanical Engineering in the areas of Thermodynamics, Heat transfer, Refrigeration, IC Engines, Compressors, Manufacturing and Kinematics of Machines	At the end of the course students should be able to: • Understand the Thermodynamic laws and their applications. • Understand the modes of heat transfer and different types heat exchangers. • Understand the principles of refrigeration. • Understand the basic manufacturing processes. • understand the principles of kinematic links

UNIT– I

Thermodynamics: Concept of system, process and properties, laws of thermodynamics, concept of entropy and Clausius inequality, steady flow energy equation for an open system.
IC 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: Work done, efficiency of multistage compressors, Effect of clearance volume.

UNIT– II

Heat Transfer: Basic modes of heat transfer, Fourier's law of conduction, Newton's Law of cooling, Stefan–Boltzman Law of radiation and one dimensional steady state conduction heat transfer through plane walls without heat generation.
Heat Exchangers: classification and applications of heat exchangers in industry, derivation of LMTD in parallel and counter– flow heat exchangers and problems.

UNIT– III

Refrigeration: Types of Refrigeration systems–Air Refrigeration system, vapor compression system, ammonia– water absorption refrigeration system, thermoelectric refrigeration system, COP and representation of cycle on T-S and H-S diagrams, Types and properties of refrigerants, eco– friendly refrigerants, Introduction to Psychometry and Psychometry processes.

UNIT– IV

Basic Manufacturing Processes: Welding, Brazing, Soldering, brief description of process and parameters, associated principles of gas welding, arc welding.
Casting: Sand casting, Die casting and principles and applications.
Forming: Basic concepts of forming processes: Extrusion, rod/wire drawing, Forging and Rolling.
Principles and Applications of basic Machine Processes: Turning, Drilling and Shaping.

UNIT– V

Definition of kinematic link and pair, mechanism and machine. **Gears:** Classification of gears, nomenclature, **Gear Trains:** Simple, compound, inverted and epi– cycle gear trains.
Belt and Rope drives: Open and crossed belt drives, Length of belt, Ratio of tensions of flat belt, condition for maximum power transmission for flat belt.

Suggested Reading:

1. RK Rajput, Thermal Engineering, Laxmi Publications, 2005
2. C. Sachdeva, Fundamentals of Engineering heat and mass transfer, Wiley Eastern Ltd., 2004.
3. PN Rao, Manufacturing Technology, Vol. 1 & 2, Tata McGraw hill Publishing Co., 2010.
4. Thomas Bevan, Theory of Machines, CBS Publishers, 1995.

CE 2090

ENVIRONMENTAL STUDIES
(Common to all branches)

Instruction	4 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
In this subject the students will 1. Describe various types of natural resources available on the earth surface. 2. Explain the concepts, energy flow in ecosystem along with the biotic and abiotic components of various aquatic ecosystems. 3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity. 4. Explain the causes, effects and control measures of various types of pollutions and environmental protection acts. 5. Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, various types of disasters and their mitigation measures.	*Upon the completion of this course students will be able to* 1. Describe the various types of natural resources. 2. Differentiate between various biotic and abiotic components of ecosystem. 3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India. 4. Illustrate causes, effects, control measures of various types of environmental pollutions and environmental protection acts. 5. Explain the causes, effects of climate change, global warming, acid rain and ozone layer depletion, various types of disasters and their mitigation measures and list the methods of water conservation and watershed management.

UNIT – I

Environmental Studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources, growing energy needs, renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT – II

Ecosystems: Concepts of an ecosystem, structure and functions of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, oceans, estuaries).

UNIT – III

Biodiversity: Genetic species and ecosystem diversity. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT – IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollutions, noise pollution, thermal pollution and solid waste & e-waste management.

Environment Protection Act: Air, water, forest and wild life acts.

UNIT – V

Social Aspects and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid, rain, ozone layer depletion. EIA, population explosion.

Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology, disaster management cycle, and disaster management in India.

Learning Resources :

Text books:

1. Deswal S. and Deswal A., *A Basic Course on Environmental studies*, Dhanpat Rai & Co Pvt. Ltd. 2004.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2005.

Suggested Reading:

1. Suresh K. Dhameja, *Environmental Studies*, S.K. Kataria & Sons, 2010.
2. De A.K., *Environmental Chemistry*, New Age International, 2003.
3. Odum E.P., *Fundamentals of Ecology*, W.B. Sunders Co., USA, 2004.
4. Sharma V.K., *Disaster Management*, National Centre for Disaster Management, IIPE, Delhi, 1999.
5. Rajagopalan R., *Environmental Studies*, Second Edition, Oxford University Press, 2013.

HS 2010

FINISHING SCHOOL

Instruction	2 + 1 Periods per week	External Examination - Duration	03
Sessionals	30 Marks	External Examination - Marks	70
Credits	02		

Course Objective:	Course Outcomes
Identify the various features and functions of human language and communication. Develop the habit of listening effectively so as to analyze the speaker's tone and tenor. Choose the appropriate words so as to speak and write accurately. Read various types of texts and sift information correctly. Write notes and letters for personal and official purposes.	**At the end of the course students should be able to:** Listen and analyze context, tone and tenor before responding to others. Begin, sustain and end conversation. Respond to people in different situations. Read with adequate speed and comprehend various texts. Use words appropriately in different contexts for speaking and writing. Use markers in written discourse. Construct grammatically correct sentences to write effectively.

UNIT –I

ORAL COMMUNICATION: LANGUAGE FUNCTIONS IN CONTEXT

- Greeting People and responding to greetings
- Making and responding to introductions
- Making and responding to requests
- Making, accepting and refusing invitations
- Taking permissions
- Thanking people and responding to thanks

UNIT-II

AURAL COMMUNICATION: LISTENING TO VARIOUS SPEAKERS AND TEXTS

- Listening for meaningful chunks of information
- Listening for gist and specific information

UNIT-III

READING : COMMUNICATING WITH A GIVEN TEXT

- For gist
- For details
- For main idea
- For supporting details
- To target questions

UNIT-IV

WRITING: PERSONAL AND OFFICIAL COMMUNICATION

- Basic structures of various texts
- Punctuation
- Types of sentences
- Letter writing

UNIT-V

GRAMMAR

- Relative clauses
- Subject -verb Agreement
- Prepositions
- Common errors

VOCABULARY

- Collocations
- Phrasal verbs
- Idioms
- Adjectives for descriptions

EC 2311

ELECTRONIC DEVICES LAB

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To develop an understanding of the underlying concepts of Electronic devices and circuits with Qualitative approach	At the end of the course students should be able to: • Verify the working of PN Junction diodes, transistors and their characteristic behavior. • Learn design of different rectifiers with various filter combinations. • Set up bias point in a transistor. • Build an amplifier and find the frequency response of amplifier.

List of Experiments Proposed:

CYCLE - I

1. Zener Diode Characteristics and Zener as Voltage Regulator
2. Design of Half wave and Full wave Rectifiers with and without Filters
3. Characteristics of PHOTO DIODE
4. Common Base characteristics of BJT and measurement of h – parameters
5. Common Emitter characteristics of BJT and measurement of h- parameters,
6. JFET Characteristics and measurement of its small signal parameters.
7. Characteristics of UJT and Seven Segment LED Display

CYCLE - II

8. BJT Biasing
9. FET Biasing
10. Analysis and bandwidth calculation of Single stage RC coupled CE Amplifier.
11. Analysis and bandwidth calculation of Single stage RC coupled CC Amplifier.
12. Single stage FET Common Source RC coupled Amplifier
13. Characteristics of SCR and study of TRIAC characteristics
14. Analysis & Design of circuits using PSPICE(Minimum of five experiments).

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", 7thEdition, TMH 2001

EC 2321

BASIC CIRCUITS AND SIMULATION LAB

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To apply the concepts of circuit theory for a given complex circuit and verify its response using discrete components and CAD tools.	At the end of the course students should be able to: • Identify the appropriate network theorem to analyze for a given network. • To determine different two port network parameters for a given network and also characterize the network from the two port parameters. • To simulate and find the response of a given circuit using CAD tools.

List of Experiments:

Part -A

1. Verification of superposition theorem and Thevenin's theorems
2. Verification of maximum power transfer theorem
3. Verification of Tellegan's theorem
4. Measurement of two-port network parameters
5. Design & verification of Series Resonance
6. Design & verification of Parallel Resonance

Part –B (using SPICE)

1. Determination of two port network parameters in the presence of at least one dependent source.
2. Transient response of RL and RC circuits.
3. Verification of network theorems in the presence of dependent source.
4. Transient response of RLC series and parallel circuits.
5. Measurement of power factor and power relationships.

Suggested Reading :

1. Muhammad H. Rashid, "Spice for Circuits and Electronics Using PSPICE" 2/e, 2001, PHI.
2. John O. Attia, "PSPICE and MATLAB for Electronics: An Integrated Approach" 2/e, CRC Press, 2002.

EE 2031 BASIC ELECTRICAL ENGINEERING LAB

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To impart the practical knowledge on measuring of 3-phase power, performance and speed control of DC machines and AC machines.	• Identify suitable instruments in the application of DC and AC machines. • Analyze the performance and speed control of DC Machines. • Analyze the performance and speed control of Induction motor. • Analyze the performance of an alternator. • Analyze the performance of single phase transformer. • Compute a 3-phase power by using 2-Watt meters.

List of Experiments:

1. Magnetization curve of a separately excited D.C. generator.
2. The load characteristics of a shunt generator.
3. The load characteristics of a series generator.
4. Performance characteristics of a D.C. shunt motor
5. The load characteristics of a D.C. series motor
6. The performance characteristic of DC compound motor.
7. Speed control of D.C. 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.

EC 2130

BASIC ELECTRONICS

(For CSE)

Instruction	4 +1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
• The course enables the students to acquire the knowledge of various electronic devices and their applications.	After the completion of course, students will be able to: • Employ different electronic devices to build electronic circuits such as rectifiers, amplifiers, voltage regulators and oscillators. • Implement digital circuits such as adders and subtractors using logic gates. • Convert real time signals into corresponding electrical signals using different types of transducers.

UNIT - I

Semiconductor Theory: Classification of semiconductors, Energy Levels, Conductivity, Mobility, Diffusion and Drift currents, Hall Effect, Characteristics of P-N Junction diode, Parameters and Applications. **Rectifiers:** Half wave and Full wave Rectifiers (Bridge, center tapped), ripple factor and efficiency, comparison of rectifiers, Filters, types of filters, Rectifiers with and without filters

UNIT - II

Transistors: Bipolar Junction Transistor, Construction, Types, Working principle, Configurations, Transistor parameters, Transistor as an amplifier, Problems, h-parameter equivalent circuits. Field effect transistor, Construction and working of JFET, Parameters and applications of JFET, Types of MOSFET (depletion and enhancement), Comparison of BJTs with JFETs; **Regulators:** Characteristics of Zener Diode, Voltage Regulation, Zener diode as voltage regulator, IC voltage regulators.

UNIT - III

Feedback Concepts – Basic concept of feedback, Types of feedback, Feedback topologies, General characteristics of Negative feedback amplifiers; **Oscillators** – Classification of Oscillators, Types, LC Type and RC Type Oscillators and Crystal Oscillators (Qualitative treatment only)

UNIT - IV

Operational Amplifiers – Introduction, Characteristics of ideal Operational amplifier, Operational amplifier stages, Parameters, Open loop and closed loop configurations, Applications (Adder, Subtractor, Voltage follower, Integrator, Differentiator, Instrumentation Amplifier); **Digital circuits:** Boolean Algebra, Logic Gates, Combinational circuits such as half and full adders, half and full subtractors.

UNIT - V

Data Acquisition systems: Introduction, Classification of transducers, Capacitive transducer, Inductive transducer, LVDT, Electrical strain gauges, Temperature transducers (Thermocouple), Piezoelectric transducer, Photoelectric transducer; **Photo Electric Devices:** Photo diode, Photo Transistor, LED, LCD; **Industrial Devices:** SCR, TRIAC, DIAC, UJT - Construction, Working principle and Characteristics only; **Display Systems:** Constructional details of C.R.O and Applications.

Suggested Reading :

1. S.Shalivahan, N. Suresh Kumar, A Vallavea Raj Electronic Devices and Circuits Tata McGraw Hill, 2003.
2. Jacob Milman & C., Halkias, Electronic devices Eighth Edition, Reprinted, Mc Graw Hill,1985.
3. Ramakanth A. Gayakwad, Op-AMPS and Linear Integrated Circuits, 3rd edition, Prentice Hall of India,1985.
4. Mooris Mano, Digital design, 3rd edition, Prentice Hall of India,2002.
5. Cooper, Electronic Measurement and Instrumentations.

EC 2140

ELECTRONICS ENGINEERING – I

(For EEE)

Instruction	4+1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
To familiarize the students with various electronic devices working and analyzation and design of simple real time electronic products.	**At the end of the course students should be able to:** • Define and describe the principle of operation of electronic devices like PN junction diode, Zener diode, BJT and FET etc. • Analyze and design various rectifier circuits with and without filters for a regulated DC power supply. • Illustrate the use of diode in practical applications and gain knowledge on special diodes. • Analyze and compare the small signal low frequency Bipolar junction Transistor and Field effect transistor amplifiers in different configurations with the help of their equivalent circuits.

UNIT – I

Semiconductor diodes and Rectifiers : Review of semiconductor physics, p-n junction as a rectifier, V-I characteristics, temperature dependence of V-I characteristics; Breakdown of junctions-Zener and Avalanche. Half wave, full wave, bridge rectifiers, L, C, π-section filters; Regulation and Ripple characteristics

UNIT – II

Transistors and their biasing : BJT, current components; CE, CB, CC configurations; characteristics. Transistor as an amplifiers; h-parameters; Analysis of CE, CB, CC amplifiers. Operating point,, bias stability,stabilization circuits, fixed bias, collector to base bias and Emitter bias.

UNIT – III

Field Effect Transistors and their biasing : Principles of V-I characteristics of JFET and MOSFETs; Depletion and Enhancement modes, small signal equivalent circuit, FET as a CS amplifier. Biasing of JFET's and MOSFET's source self bias, biasing for zero current drift, biasing against device variations, Characteristics of UJT, SCR, DIAC & TRIAC.

UNIT – IV

Low frequency BJT amplifier Circuits : Cascading amplifier stages, simplified analysis for three amplifier configurations, Miller's theorem-High input impedance transistor circuits, cascode configuration, Difference amplifier.

UNIT – V

Multistage amplifiers : Classification of amplifiers, Distortion in amplifiers, Frequency response of RC coupled amplifiers, effect of emitter (source) by pass capacitor on LF response,Transformer coupled amplifiers, step response, Bandwidth of cascaded stages.

Suggested Reading:

1. Jacob Millman and Halkias," Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 3/e,2010.
2. Jacob Millman, Christos C. Halkias, "Integrated electronics: analog and digital circuits and systems", 2nd Ed, Mc Graw-Hill, 2010.
3. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.
4. Donald L schilling & Charles Belove,Electronic circuits:Discrete & Integrated, McGraw Hill International Edition, 3rd Edition,1989.
5. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009

EC 2391

BASIC ELECTRONICS LAB

(For CSE)

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
• Lab course enables the students to verify the characteristics of various electronic devices and circuits.	**After the completion of course, students will be able to:** • Verify input/output characteristics of active devices and to compute their parameters. • Perform operations such as addition, subtraction, comparison of voltage levels using operational amplifier. • Implement digital adders and subtractors using logic gates.

1. Characteristics of Semiconductor (Si and Ge) and Zener diodes
2. CRO Applications
3. Full wave rectifier with and without filter
4. Zener Voltage Regulator
5. Characteristics of BJT (CB and CE)
6. Characteristics of FET
7. Amplifier with and without feedback
8. RC Phase shift oscillator
9. Hartley oscillator and Calpitt's Oscillator
10. Applications of Operational Amplifier: Adder, Subtractor, Comparator.
11. Verifications 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, TMH, 1983.

General Note :

1. There should not be more than 2 students per batch while performing any of the 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 exercises.

EC 2401

ELECTRONICS ENGINEERING – I LAB

(For EEE)

Instruction	4 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To develop an understanding of the characteristics of Electronic devices and circuits with Qualitative approach	**At the end of the course students should be able to:** • Estimate the parameters from V-I characteristics of different diodes and evaluate the performance of rectifiers. • Estimate the parameters from BJT and FET characteristics. • Compute the bandwidth of RC coupled BJT and FET amplifiers from the frequency response.

List of Experiments Proposed:

CYCLE—I

1. V-I Characteristics of Si, Ge and Zener diode
2. Zener as Voltage Regulator
3. Design of Half wave and Full wave Rectifiers with and without Filters
4. Common Base characteristics of BJT and measurement of h – parameters
5. Common Emitter characteristics of BJT and measurement of h- parameters,
6. JFET Characteristics and measurement of its small signal parameters.
7. Applications of Cathode ray oscilloscope.

CYCLE—II

8. BJT biasing.
9. Analysis and bandwidth calculation of Single stage RC coupled CE Amplifier.
10. Analysis and bandwidth calculation of Emitter follower.
11. Single stage FET Common Source RC coupled Amplifier
12. Analysis and bandwidth calculation of Source follower.
13. Analysis and bandwidth calculation of Multi stage RC coupled CE Amplifier.
14. Characteristics of UJT.

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001
2. S.Poorna Chandra,B. Sasikala, Electronics Laboratory Primer,A design approach, Wheeler publishing,1998.

DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

Scheme of Instruction
and
Syllabi of

B.E. (ECE)

II/IV - II Semester

(With effect from 2015-2016)

VASAVI COLLEGE OF ENGINEERING
(Autonomous Institution Under UGC)
Ibrahimbagh, Hyderabad - 500 031.
Telangana.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II/IV – II SEMESTER

S. No.	Code	Subject	Scheme of Instruction				Scheme of Examination			
			Period per week				Duration in Hrs	Max. marks		Credits
			L	T	D	P		Ext. Exam	Sessionals	
THEORY										
1	MA 2020	Mathematics – IV	4	-	-	-	3	70	30	3
2	EC 2150	Analog Electronic Circuits	4	1	-	-	3	70	30	3
3	EC 2160	Electromagnetic Theory	4	1	-	-	3	70	30	3
4	EC 2170	Networks and Transmission Lines	4	1	-	-	3	70	30	3
5	EC 2180	Signal Analysis and Transform Techniques	4	1	-	-	3	70	30	3
6	EC 2190	Pulse, Digital and Switching Circuits	4	1	-	-	3	70	30	3
7	HS 2020	Finishing School - II	2	1	-	-	3	70	30	2
8	HS 2150	Human Values and Professional Ethics	2	-	-	-	3	70	30	1
PRACTICALS										
9	EC 2411	Electronics Circuits Lab	-	-	-	3	3	50	25	2
10	EC 2421	Simulation Lab for Signals and Systems	-	-	-	3	3	50	25	2
		TOTAL	**28**	**6**	**-**	**6**	**-**	**660**	**290**	**25**
		GRAND TOTAL	**40**					**950**		

Service Courses (ME & EEE)

S. No.	Code	Subject	Scheme of Instruction				Scheme of Examination			
			Period per week				Duration in Hrs	Max. marks		Credits
			L	T	D	P		Ext. Exam	Sessionals	
THEORY										
1	EC 2280	Applied Electronics	4	1	-	-	3	70	30	3
2	EC 2290	Electronics Engineering - II	4	1	-	-	3	70	30	3
PRACTICALS										
1	EC 2491	Applied Electronics Lab	-	-	-	3	3	50	25	2
2	EC 2501	Electronics Engineering - II Lab	-	-	-	3	3	50	25	2

MA 2020

MATHEMATICS – IV

(CSE, ECE, ME)

Instruction	4 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
• To study the Laplace transforms and Z-transforms to solve differential and difference equations. • To understand the concepts of fourier transforms and its applications • To understand the basics of differentiation and integration of complex functions using Cauchy-Riemann equations, Cauchy's theorem and Cauchy's integral formula to find the complex integration, to find the real integrals using Cauchy's Residue theorem around contours also to study biliear transformations, conformal mapping	**At the end of the course students should be able to:** • The student is able to understand the laplace transforms and Z-transforms to solve differential and difference equations • The student is able to understand the concepts of fourier transforms and its applications • The student is able to understand the basics of differentiation and integration of complex functions using Cauchy-Riemann equations, Cauchy's theorem and Cauchy's integral formula to find the complex integration, to find the real integrals using Cauchy's Residue theorem around contours also to study biliear transformations, conformal mapping

UNIT- I

Laplace Transforms: Introduction to Laplace transforms - Inverse Laplace transform - Sufficient Condition for Existence of Laplace Transform –Properties of Laplace Transform- Laplace Transform of Derivatives - Laplace Transform of Integrals - Multiplication by t^n - Division by t – Evaluation of Integrals by Laplace Transforms- Convolution Theorem - Application of Laplace transforms to Linear Differential Equations with Constant Coefficients.

UNIT –II

Z-Transforms: Introduction - Z-transforms of Standard sequences - Linearity Property – Damping Rule - Shifting Properties- Multiplication by n - Initial and Final value theorems – Inverse Z-Transforms- Convolution Theorem – Application of Z-Transforms to Difference Equations.

UNIT-III

Fourier Transforms: Fourier Integral Theorem - Fourier Transforms – Inverse Fourier Transform - Properties of Fourier Transform –Fourier Cosine & Sine Transforms - Convolution Theorem.

UNIT-IV

Functions of Complex Variables: Limits and Continuity of function - Differentiability and Analyticity - Necessary & Sufficient Condition for a Function to be Analytic - Milne-Thomson's method - Cauchy-Riemann Equations in Polar Form - Harmonic Functions - Complex Integration - Cauchy's Theorem - Extension of Cauchy's Theorem for multiply connected regions- Cauchy's Integral Formula.

UNIT-V

Power series - Taylor's Series - Laurent's Series - Zeros and Singularities –Residues – Cauchy's Residue Theorem -Evaluation of Real Integrals using Residue Theorem -Bilinear Transformation - Conformal Mapping.

Suggested Reading:

1. Advanced Engineering Mathematics - R.K.Jain & S.R.K.Iyengar 3rd Edition, Narosa Publications
2. Higher Engineering Mathematics, Dr.B.S Grewal 40th Edition, Khanna Publishers.
3. Laplace's and Fourier transforms Goyal & Gupta, Pragati prakashan
4. Kreyszig E, Advanced Engineering Mathematics, 8 th Edition, John Wiley & Sons Ltd, 2006.
5. A text book of Engineering Mathematics by N.P.Bali & Manish Goyal, Laxmi Publication.
6. Higher Engineering Mathematics, H.K. Dass, Er.Rajnish Verma 2011 Edition S.Chand & company Ltd.
7. R.V. Churchill, "Complex Variables & its Applications".Mc Graw-Hill Book Company, INC.

EC 2150

ANALOG ELECTRONIC CIRCUITS

Instruction	4 + 1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
To familiarize the students with design and working of various amplifiers and analyze concepts of positive and negative feedback.	**At the end of the course students should be able to:** • Analyze and design various amplifier circuits. • Apply feedback concepts in the amplifier and oscillator circuits. • Design power amplifiers and their stability considerations. • Distinguish ideal and practical Op-amp characteristics

UNIT – I

Small signal amplifiers: Classification of amplifiers, BJT and FET high frequency equivalent circuits, Mid-band analysis if single and multistage amplifiers, low frequency and high frequency analysis of single and multistage RC coupled and Transformer coupled amplifiers with BJT and FET..

UNIT – II

Feedback amplifiers: The feedback concept, general characteristics of negative feedback, Effect of negative feedback on input output impedances, voltage 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 amplifier, 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, Class –AB operations, Qualitative analysis on R.F. Tuned amplifiers.

UNIT – V

Differential Amplifiers: Classification, DC and AC analysis of single/dual input Balanced and unbalanced output Configurations using BJTs. Level Translator.
Operational Amplifier: Op-amp Block Diagram, ideal Op-amp Characteristics, op-amp and its features, Op-Amp parameters & Measurements, Input and Output Offset voltages and currents, Slew Rate, CMRR, PSRR. Frequency Response and Compensation techniques.

Suggested Reading:

1. Adel S.Sedra and Kenneth C.Smith “Micro Electronic Circuits theory and applications” sixth edition Oxford publications.
2. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009
3. Donald Schilling, Charles Belove, TuviaApelewicz Raymond Saccardi, "Electronic Circuits: Discrete and Integrated", TMH, 3rd Edition
4. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008
5. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 6th Edition, PHI, 1998
6. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6th Edition, Pearson Education, 2005
7. Roody and Coolen, "Electronic Communications", 4th Edition, Pearson Education, Reprint 2007.

EC 2160

ELECTROMAGNETIC THEORY

Instruction	4 + 1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
• To understand and analyze electromagnetic field theory, with an emphasis's on electromagnetic waves.	At the end of the course students should be able to: • Define and describe various laws related to static and dynamic EM fields. • Formulate and apply the Maxwell's equations and Electromagnetic field problems. • Describe and analyze the EM wave propagation.

UNIT - I

Cartesian, Cylindrical and spherical coordinate systems - review of vector analysis - Coulomb's Law. Electric Field Intensity. Electric field due to different charge distributions. Line of charge, sheet of charge and volume charge distributions. Electric flux, flux density, Gauss's Law and application. Divergence theorem.

UNIT-II

Energy and potential, Potential field of system of charges, potential gradient. Energy density, Boundary conditions in static electric field, Capacitance of two-wire line, Continuity equation, current density, Poisson's equation, Laplace equation, Uniqueness theorem, Applications of simple practical cases.

UNIT-III

Steady magnetic field, Biot-Savart's law, Ampere's law, Stroke's theorem, Magnetic scalar and vector potentials. Magnetic boundary conditions, Magnetomotive force, Permeability, self and mutual inductances, Evaluation of inductance of solenoid, toroid, coaxial cable, two-wire transmission line.

UNIT-IV

Time varying fields, Maxwells equations, Boundary conditions in Em field. Em wave equations in free space and conductors. Sinusoidal variations. Uniform plane wave, wave motion in free space. Wave motion in perfect dielectrics, lossy dielectrics and conductors. Polrization - linear, elliptical and circular polarizations.

UNIT-V

Energy theorem and Poynting vector, Instantaneous, average and complex Poynting vector. Reflection of plane waves by a perfect conductor, normal and oblique incidence. Reflection of plane waves by a perfect dielectric, normal and oblique incidence. Reflection coefficient. Transmission coefficient, power and energy calculations.

Suggested Text Books:

1. Jordan, E.C., Balmain, K.G. electromagnetic Waves and Radiating Systems, 2nd Edition, Prentice Hall of India, 2001.
2. Hayt. W.H. Engineering Electromagnetics, Tata McGraw Hill, 5th Edition, 1994
3. J.D.Krauss and Fleish, Electromagnetics with applications, 5th Edition, McGraw Hill, 1999.
4. Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, 6th edition, 2009.
5. Matthew N.O.Sadiku, Principles of Electromagnetics, 4th edition, Oxford Univ. Press, 2009.

EC 2170

NETWORKS AND TRANSMISSION LINES

Instruction	4 +1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
To provide a good insight into the characteristics of symmetrical and asymmetrical networks. Design of various filters and synthesis of networks using RC and RL functions. Properties of transmission lines and impedance matching in the transmission line.	**At the end of the course students should be able to:** • Analyze and design the four terminal network for different source and load impedances. • Synthesize the passive one port network in various forms using transfer function. • Characterize the properties of transmission lines at VHF, UHF and able to match impedance using transmission lines.

UNIT-I

Asymmetrical networks, Image and Iterative impedances. Image transfer constant and iterative transfer constant. Symmetrical networks, characteristic impedance and propagation constant. Properties of L, T and Pi section types.

UNIT-II

Constant K-filters – low pass, high pass, band pass, band elimination filter design, m-derived -- low pass, high pass, band pass, band elimination filter design
and composite filter design.

UNIT-III

Network synthesys: Hurwitz polynomials,positive real functions, L-C Immitance functions, RC impedance functions and RL admittance functions. RL impedance functions and RC admittance functions. Cauer And Foster's forms of RL impedance and RC admittance
Attenuators and their design. Equalizers and their design. Impedance matching networks. Inverse network elements.

UNIT-IV

Properties of transmission lines. Transmission line equations from source and load end. The finite and infinite lines. Velocity of propagation, input impedance. Open and short circuited lines, telephone cables, distortion less transmission, loading of cables, Campbell's formula.

UNIT-V

Properties of Transmission lines at UHF, Reflection co-efficient, Standing waves and SWR, Distribution of voltages and currents on loss less line. Characteristics of half wave, Quarter-wave and one eighth wave lines. Construction and applications of Smith chart. Transmission line matching. Single and double stub matching.

Suggested Reading:

1. John D. Ryder, Networks, Lines and Fields, PHI, 2nd edition, 2009.
2. M.E. Van Valkenburg, Network Analysis, PHI, 3rd edition, 2009.
3. C.L Wadhwa, *Network Analysis and Synthesis*, New age Internal publishers revised 3rd edition.
4. Roy, Choudhury D., Networks and Systems, New Age International Publishers, 2nd edition, 2010.
5. Smarjit Ghosh, Network Theory : Analysis and Synthesis, PHI, 2009.

EC 2180

SIGNAL ANALYSIS AND TRANSFORM TECHNIQUES

Instruction	4 +1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
To define and classify continuous and discrete time signals & systems and to determine the frequency domain characteristics of signals using various transform techniques and to perform the Convolution and correlation of signals.	**At the end of the course students should be able to:** • Understand the concepts of continuous and discrete time signals & systems, and to transform the time domain signal into frequency domain signal using various transform techniques. • Convert a continuous time domain signal to a discrete time domain signal using Sampling. • Perform the convolution and correlation of continuous and discrete time signals.

UNIT-I

Continuous Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Analogy between vectors and signals - signal representation by a set of mutually orthogonal functions, Evaluation of mean square error, Orthogonality in complex functions.

Fourier Series: Review of Fourier series, Existence and Convergence, Trigonometric and exponential Fourier series representations and their relations, Symmetry conditions, Properties, Complex Fourier spectrum, Power Spectral Density (PSD).

UNIT-II

Signal Representation by Continuous Exponentials: Introduction to Fourier Transform, Existence, Fourier transform of singularity functions and signals, Properties, Fourier transform of a periodic function, Energy Spectral Density (ESD).

Signal Transmission Through Linear Systems: Introduction to Linear Time Invariant (LTI) system, Unit Impulse and step response, Transfer function of an LTI system, Filter characteristics of an LTI system, Distortion less transmission, Signal bandwidth, System bandwidth, Ideal filter characteristics, Causality and Paley-wiener criterion for physical realization.

UNIT-III

Sampling: Introduction to Sampling, Sampling Theorem, Aliasing, Sampling Techniques, Reconstruction.

Signal Representation by Generalized Exponentials: Introduction to Laplace transforms, Existence, Region of convergence (ROC) and it properties. Properties of Laplace transform. Inverse Laplace transform. Analysis and characterization of continuous LTI systems using Laplace Transform.

UNIT-IV

Discrete Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Linear Shift invariant systems, Stability and Causality, Linear constant coefficient systems. Discrete Fourier Series (DFS), Discrete Time Fourier Transform (DTFT).

Z-Transforms: Introduction to Z-Transform, Existence, Region of Convergence (ROC) and its properties. S-plane and Z-plane correspondence, Properties of Z-Transform, Inverse Z-Transform, Analysis and characterization of discrete LTI systems using Z-Transform

UNIT-V

Convolution & Correlation: Continuous convolution - Graphical interpretation and Convolution properties. Discrete convolution- Graphical interpretation and Convolution properties. Continuous correlation-Cross correlation and Auto correlation, their graphical interpretation and properties. Discrete correlation- Cross correlation and Auto correlation, their graphical interpretation and properties.

Suggested Reading:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed., PHI.
3. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 Ed.
4. Signals and Systems – A.Rama Krishna Rao – 2008, TMH.
5. M.J. Robert " Fundamentals of signals and systems", McGraw Hill, 2008

EC 2190

PULSE, DIGITAL AND SWITCHING CIRCUITS

Instruction	4 +1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
▪ To familiarize the students with the concepts of wave shaping using linear & nonlinear circuits, switching characteristics of diodes. ▪ To design & analyze various Multivibrators. ▪ To understand the concepts of combinational and sequential circuits, analyze and Design the Combinational and sequential systems.	**At the end of the course students should be able to:** ▪ Construct different linear wave shaping networks and demonstrate their response. ▪ Analyze switching characteristics of diodes. ▪ Construct various multivibrators. • Design different combinational and sequential circuits.

UNIT- I

Wave-Shaping: RC, RL and RLC circuits, response to Step, Pulse, Square, Exponential and Ramp 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). Time base generators: Speed, transmission and displacement errors.

Analysis and Design of sweep circuits using UJT and SCR.

UNIT- III

Boolean – Algebra: Introduction to Boolean Algebra, Demorgan's theorem, Canonical forms and standard forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Simplification of switching functions using theorems,

Karnaugh map method, Quine McCluskey /Tabular method. Realization of Logic functions using AND-OR, OR-AND and NAND / NOR.

UNIT- IV

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

Introduction to Sequential Logic: Types of Flip-Flops, Excitation Tables and Flip-Flop Conversions, Classification of sequential circuits.

UNIT- V

Sequential Logic Design: State Diagram and State Table, Design of synchronous and asynchronous counters, registers.

Finite State Machines: Moore Type and Mealy Type FSM, Design of Sequence Detector using Moore and Mealy FSM. One Hot Encoding.

Suggested Reading:

1. Jacob Millman and Herbert Taub, 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.
4. David A. Bell, Pulse, Switching and Digital Circuits, 5th edition, OXFORD Higher Education, 2015.
5. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, TMH, 3rd edition, 2010.

HS 2020

FINISHING SCHOOL

Instruction	2+1 Periods per week	External Examination - Duration	--
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	02		

Course Objective:	Course Outcomes
Identify the various features and functions of human language and communication. Develop the habit of listening effectively so as to analyze the speaker's tone and tenor. Choose the appropriate words so as to speak and write accurately. Read various types of texts and sift information correctly. Write notes and letters for personal and official purposes.	**At the end of the course students should be able to:** • Listen and analyze context, tone and tenor before responding to others. • Begin, sustain and end conversation. • Respond to people in different situations. • Read with adequate speed and comprehend various texts. • Use words appropriately in different contexts for speaking and writing. • Use markers in written discourse. • Construct grammatically correct sentences to write effectively.

UNIT-I
ORAL COMMUNICATION: LANGUAGE FUNCTIONS IN CONTEXT

- Interpreting a conversation
- Apologizing and responding to apologies
- Expressing opinions
- Complimentary close to a conversation
- Expressing sympathy and condolences
- Describing a process

UNIT-II
AURAL COMMUNICATION: LISTENING TO VARIOUS SPEAKERS AND TEXTS

- Listening for gist and specific information
- Listening to identify cohesive devices and coherence in discourse
- Note-taking

UNIT-III
READING: COMMUNICATING WITH A GIVEN TEXT

- For supporting details
- Note Making
- For basic referential and inferential information

UNIT –IV
WRITING: PERSONAL AND OFFICIAL COMMUNICATION

- Letter-writing
- Email Etiquette
- Reports
- Resume writing

UNIT –V
GRAMMAR- ADVANCED LEVEL

- Relative clauses
- Subject-verb Agreement
- Prepositions
- Common errors

VOCABULARY- ADVANCED LEVEL

- Collocations
- Phrasal verbs
- Idioms
- Adjectives for descriptions

HS 2150

VALUES AND ETHICS

Instruction	2 Periods per week	External Examination - Duration	03 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	01		

Course Objective:	Course Outcomes
	At the end of the course students should be able to: •

EC 2411

ELECTRONICS CIRCUITS LAB

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To develop an understanding of the underlying concepts of analog electronic circuits ,wave shaping circuits and low pass/high pass filters.	**At the end of the course students should be able to:** • Design different types of clippers, clampers and multivibrators • Analyze the circuit behavior with and without feedback • Distinguish between symmetrical and asymmetrical networks and also between T and π section filters

List of Experiments Proposed:

1. Frequency response of single stage and two stage RC-Coupled amplifier using BJT.
2. Frequency response of single stage and two stage RC-Coupled amplifier using FET .
3. Clipping and Clamping Circuits
4. Measurement of Image impedance and characteristic impedance
5. Frequency response of Voltage series feedback amplifier
6. Frequency response of Current Shunt feedback amplifier
7. Bistable Multivibrator, Schmitt trigger
8. Astable Multivibrator and Voltage to frequency Converter
9. Monostable Multivibrator
10. Design and verification of constant K- LPF (Frequency response)
11. Design and verification of m-derived- HPF (Frequency response)
12. Design and verification of L type matching network
13. Design of Oscillators: RC Phase Shift , Hartley, Colpitts
14. Design of tuned Amplifier
15. Design of Power amplifiers : Class – A
    Class – B

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", 7thEdition, TMH 2001.

EC 2421

SIMULATION LAB FOR SIGNALS AND SYSTEMS

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To impart the knowledge to write MATLAB codes for the generation of signals, to perform different operations and to verify various transforms for converting time domain signal to frequency domain signal.	**At the end of the course students should be able to:** • Write MATLAB codes for the generation of signals. • Apply Various transforms on signals to find it's Spectrum using MATLAB. • Correlate two signals and can remove noise using correlation. • Find the response of the system using convolution function in MATLAB.

List of Experiments:

1. Basic operations on Matrices
2. Signal Representation.
3. Continuous Systems
4. Convolution Representation
5. Fourier Series
6. The Fourier Transform
7. Mini project-1
8. Frequency domain analysis of Systems
9. Fourier analysis of Discrete time signals and Systems
10. The Laplace transform and the transfer function representation
11. System analysis using the transfer function
12. State space and linear systems
13. Verification of Sampling theorem
14. Correlation between signals and Systems
15. Mini project -2

Suggested Reading:

1. Taan S. ElAli and Mohammad A. Karim, "Continuous Signals and systems with MATLAB", 2/e, 2009, CRC Press.
2. Edward W.Kamen and Bonnie S. Heck, "Fundamentals of Signals and Systems Using MATLAB", PHI Inc.

EC 2280

APPLIED ELECTRONICS
(For ME)

Instruction	4+1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective	Course Outcomes
• The course enables the students to acquire the knowledge of various electronic devices & their applications.	After the completion of course, students will able to: • Employ different electronic devices to build electronic circuits such as rectifiers, amplifiers, regulators & oscillators. • Implement digital circuits such as adder & sub-tractors using logic gates. • Convert real time signals into corresponding electrical signals using transducers. • Program 8051 Microcontroller for real-time interfacing applications.

UNIT - I

Semiconductor theory: Energy levels, Intrinsic and extrinsic semiconductors, Mobility, diffusion and drift current, Hall effect.

Diodes - PN junction diodes,. V-I characteristics, dynamic & static resistance, principle of working and V-I characteristics of Zener diode, Working of simple zener voltage regulator, V-I characteristics and applications of SCR and TRIAC. Working and characteristics of UJT.

UNIT - II

Rectifiers & power supplies - block diagram description of a dc power supply, circuit diagram & working of half-wave & full wave rectifier, final equations of V_{rms}, V_{dc}, ripple factor and peak inverse voltage in each case. Principle of working of series inductor and shunt capacitor filters. Photoelectric devices-principle of operations of Photodiode, Phototransistor, Photovoltaic cell, Solar cell & LED.

UNIT - III

Bipolar junction transistors: NPN & PNP transistors, structure, typical doping, working of NPN & PNP transistors. Concepts of common base, common emitter & common collector configurations. Comparison of three configurations with reference to voltage & current gains, input & output resistances and applications.

Amplifiers & Oscillators: Circuit diagram & working of common emitter amplifier, function of each component in the circuit, need of proper biasing, frequency response, voltage gain and 3dB bandwidth. Concepts of feedback, working principles of oscillators, circuit diagram & working of RC, LC and Crystal oscillators.

UNIT - IV

Integrated circuits: Advantages of ICs, Analog and Digital ICs. Functional block diagram of operational amplifier, ideal operational amplifier, Inverting amplifier, Non inverting amplifier, Summing Amplifier, Differentiator, Integrator and Comparator.

Digital ICs: Boolean Algebra, Logic gates, realization of logic functions. Principle of combinational and sequential logic circuits, Flip-flops.

UNIT - V

Transducers - Resistive and Capacitive transducers, Strain Guage, Thermistor, LVDT.

Micro controllers - Intel 8051 - Architecture, Memory organization, Register banks, Special function registers, Addressing modes. Instruction set of 8051 - Programming examples (addition, subtraction, 8 bit multiplication and 8 bit division, only), Interfacing of 8051 with DC and Stepper motor.

***Suggested Reading*:**

1. Jocob Millman, Christos C. Halkias and Satyabrata Jit, Electronics Devices and Circuits, Mc Graw Hill, 3/e., 2010.
2. S.Shalivahnan, N. Suresh Kumar, A Vallavea Raj, Electronics Devices and Circuits TMH, 2003.
3. Rama Kanth A. Gaykward, Op-AMPS and Linear Integrated Circuits -, EEE, 3/e., 1998.
4. Moris Mano, Digital Design, PHI, 3/e., 2009.
5. Mazidi M.A, Mazidi J.G & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C," 2/e, Pearson Education, 2007.

EC 2290

ELECTRONICS ENGINEERING – II
(For EEE)

Instruction	4+1 Periods per week	External Examination - Duration	3 Hours
Sessionals	30 Marks	External Examination - Marks	70 Marks
Credits	03		

Course Objective:	Course Outcomes
To familiarize the students with design and working of various amplifiers and oscillators and analyze concepts of linear and non-linear circuits.	**At the end of the course students should be able to:** • Analyze and design various feedback amplifies and large signal amplifiers. • Design a sinusoidal oscillator. • Analyze drift compensation techniques and differential amplifiers. • Design and analyze linear and non-linear wave shaping circuits.

UNIT – I

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

UNIT – II

Oscillators: Barkhausen criterion, RC phase shift oscillator, Weinbridge oscillator, LC oscillators: Hartley and Colpitts, Crystal controlled oscillator (analysis of oscillators using only BJTs), Stability of oscillator

UNIT – III

DC 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 class B power amplifiers, Distortion in amplifiers, push pull amplifiers, complementary symmetry power amplifiers

UNIT – V

Wave shaping circuits: RC low pass and high pass circuits: response to step, pulse, ramp and square inputs, Differentiating and integrating circuits, Clipping circuits for single level and two level using diode, Clamping circuits.

Suggested Reading:

1. Jacob Millman, Christos C.Halkias, and Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009
2. Jacob Millman, Christos C.Halkias and Satyabrata Jit,Electronic Devices and Circuits, McGraw Hill,3/e,2010.
3. Jacob Millman & Herbert Taub,Pulse, Digital and switching waveforms,TMH,3/e, 2011.
4. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 6th Edition, PHI, 1998
5. Donald Schilling, Charles Belove, TuviaApelewicz Raymond Saccardi, "Electronic Circuits: Discrete and Integrated", TMH, 3rd Edition
6. Roody and Coolen, "Electronic Communications", 4th Edition, Pearson Education, Reprint 2007

EC 2491

APPLIED ELECTRONICS LAB

(For ME)

Instruction	3 Periods per week	External Examination – Duration	3 Hours
Sessionals	25 Marks	External Examination – Marks	50 Marks
Credits	02		

Course Objective	Course Outcomes
• Lab course enables the students to verify the characteristics of various electronic devices & circuits.	Students will able to: • Identify different electronic components & devices. • Verify Input/output characteristics of active devices and to compute their parameters. • Perform operations such as addition, subtraction, comparison of voltage levels using operational amplifiers • Implement digital adders & sub-tractors using logic gates. • Program 8051 microcontroller for simple 8-bit arithmetic operations & to interface 8051 with external peripherals.

1. Characteristics of Semiconductor and Zener diodes
2. CRO Applications
3. Full-wave rectifier with and without filter
4. Zener Voltage Regulator
5. Characteristics of BJT transistor (CB, CE, CC)
6. Feedback amplifier and amplifier without feedback
7. Phase shift oscillator
8. Hartley oscillator & Colpitts Oscillator.
9. Operational Amplifier and it's applications
10. Logic gates and flip flops-verifications
11. Realization of Half and Full adder
12. Characteristics of SCR
13. Arithmetic operations (8 bit) using 8051 Microcontroller
14. Interfacing applications using 8051 Microcontroller

General Note:

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

This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercises.

EC 2501

ELECTRONICS ENGINEERING – II Lab
(For EEE)

Instruction	3 Periods per week	External Examination - Duration	3 Hours
Sessionals	25 Marks	External Examination - Marks	50 Marks
Credits	02		

Course Objective:	Course Outcomes
To develop an understanding of the underlying concepts of analog electronic circuits including feedback amplifiers, power amplifiers & oscillators, and design linear wave shaping and non-linear wave shaping circuits.	**At the end of the course students should be able to:** • Analyze the small signal amplifiers behavior with and without feedback • Design and verify the functioning of various sinusoidal oscillators • Examine the characteristics of a difference amplifier • Design different types of clippers and clampers

List of Experiments Proposed:

1. Frequency response of Voltage series feedback amplifier
2. Frequency response of Voltage Shunt feedback amplifier
3. Frequency response of Current series feedback amplifier
4. Frequency response of Current Shunt feedback amplifier
5. Design of Hartley Oscillator
6. Design of Colpitt's Oscillator
7. Design of RC Phase Shift
8. Difference amplifier(Op-Amp)
9. Transformer coupled Class A power amplifier
10. Class B Power amplifier
11. Linear wave shaping-Integrator & Differentiator
12. Clipping circuits
13. Clamping Circuits

Suggested Reading:

1. 1.Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001.
2. Paul B. Zbar, Industrial Electronics,A Text-Lab Manual, 3rd Edition, TMH 1983.