NOTIFICATION

No.81/2017 Date : 13/07/2017

Subject :- Continuation of Prospectus No. 121741 prescribed for Sem. III & IV B.E. (Electronnics & Telecommunications) (CGS) for the session 2017-2018.

It is notified for general information of all concerned that the Prospectus No.121741 prescribed for Semester **III & IV B.E. (Electronnics & Telecommunications) (CGS)** for the session 2011-2012 and continued upto the session 2016-2017 shall be continued for the academic session 2017-2018 as per **Appendix – A** appended herewith as given below:-

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Appendix – A

3ET2 - OBJECT ORIENTED PROGRAMMING

Course Requisite:

1. (IB3) Computer Programming

Course Objective:

1. To learn object oriented concepts and build simple applications using C++ and Java.
2. To understand the basic concepts and techniques which form the object oriented programming paradigm.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Justify the basics of object-oriented programming concepts such as data types, functions, classes, objects, constructors, inheritance, overloading etc.
2. Design, implement, test, and debug simple programs in C++.
3. Describe how the class mechanism supports encapsulation and information hiding.
4. Design and test the implementation of C++ and Java programming concepts.

	Theory : Object Oriented Programming	**L**
Unit-1	Principles of object oriented Programming: OOP'S paradigm, basic concept of OOP'S, benefits of OOP'S, structure of C++ programming, basic data types, user defined data type, derived data type operator and control statement.	8
Unit-2	Functions classes and object in C++: Functions, Function over loading, Friend Functions, types of classes and its use, concept of object and its implementation, constructor and destructors.	8
Unit-3	Operator and their definition, overloading unary and binary operator, rules for overloading operators, overloading binary operators using friends and string manipulation. Concept of Inheritance in C++	10
Unit-4	Introduction to Java programming, JVM, Java programming constructs: variables, primitive data types, identifier, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.	8
Unit-5	Classes and Objects: Classes, Objects, Creating Objects, Methods, Constructors, Cleaning up unused Objects, Class variable and methods, "this" keyword, Arrays, Command line arguments	8
Unit-6	Multiple Inheritance in Java, Defining interfaces, Extending interfaces, Implementing interfaces, Accessing interface variables.	10
	Total	**52**

Text Books:

1. E Balagurusamy, "Object Oriented Programming Using C++ and JAVA", Tata McGraw-Hill.
2. E Balagurusamy, "Object Oriented Programming Using C++" ,Tata McGraw-Hill.

References:

1. Bjarne Stroustrup, "C++ Programming Language", Pearson Education.
2. H.M.Dietel and P.J.Dietel, "Java How to Program" Pearson Education/PHI, Sixth Edition.
3. Robert Lafore, "Object-Oriented Programming in C++ ",Pearson Education India , (4th Edition).
4. Herbert Schildt , "Java : The Complete Reference" Tata McGraw-Hill (7th Edition).
5. Yeshwant Kanetkar "Let us C++", BPB Publications.
6. Dr. N.B. Vekateswarlu, Dr. E.V. Prasad, "Learn Object Oriented Programming Using Jawa: An UMS based", S. Chand Publication.

3ET3 – ELECTRONIC DEVICES & CIRCUITS

Course Requisite:

1. (IA2) Engineering Physics

Course Objectives:

1. To provide an overview of the principles and operation of electronic devices.
2. To explore use of electronic devices for various applications in electronic circuits.
3. To analyze various electronic circuits.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Comprehend the knowledge of diode and its applications in rectifier and regulator circuits.
2. Understand basics of BJT, JFET, MOSFET, UJT and their operational parameters.
3. Understand feedback concept, topologies and their applications.
4. Implement and analyze various electronic circuits such as oscillators, multistage amplifiers and power amplifiers using BJT.

	Theory : Electronic Devices & Circuits	**L**
Unit-1	**PN diode** : Formation of p-n junction, biasing the diode, current equation and V-I characteristics of diode, static and dynamic resistance, HWR, FWR, theory of C, L, LC and CLC filters and analysis of C-input filter, Zener diodes, its application as voltage regulator, Construction, working and characteristics of LED, photo diode, Schottky diode, and tunnel diode.	10
Unit-2	**Bipolar Junction Transistors** : Operation of PNP and NPN transistor, CB, CE and CC configurations with characteristics and parameters, transistor as an amplifier, transistor biasing methods, dc load line, operating point, bias stability, analysis of various dc bias circuits, small signal analysis of voltage divider biased CE amplifiers using h-parameter model.	10
Unit-3	**Feedback amplifiers**: Feedback concept, effects of negative feedback, basic feedback topologies. **Sinusoidal oscillators**: Barkhausen's criteria, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators.	8
Unit-4	**Multistage Amplifiers**: Need of multistage, direct coupled amplifier, RC coupled amplifier, transformer coupled amplifier, emitter follower, Darlington emitter follower, bootstrapping principle, Cascode stage.	8
Unit-5	**Power Amplifiers:** Classification, Class A, Transformer coupled Class A, harmonic distortion, Class B, Class AB, crossover distortion, capacitor coupled and direct coupled output stages, modifications to improve power amplifier performance, Class C amplifier and analysis.	8
Unit-6	**JFET:** Theory, construction and characteristics: parameters (μ, gm & rd), biasing of JFET amplifiers. **MOSFET**: Theory, construction and characteristics of enhancement & depletion type MOSFET. **UJT**: Theory, construction and characteristics; UJT as relaxation oscillator.	8
	Total	**52**

Text Books:

1. David Bell: Electronic Devices and Circuits, Oxford University Press, 2010.
2. Milliman H. and Halkies: Integrated Electronics, Tata McGraw Hill, New Delhi.

References:

1. Robert L.Boylestad, "Electronic Devices and Circuit theory", Publ. Pearson Education.
2. Floyd, "Electron Devices" Pearson Asia 5th Edition, 2001.
3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.

3ET4 – INSTRUMENTATION & SENSORS

Course Requisite:

2. (IB4) Electrical Engineering

Course Objectives:

1. To provide the fundamental knowledge of transducers, instrumentation & measurement systems.
2. To understand functional elements of instrumentation / measurement systems.
3. To impart the knowledge of static and dymanic charcteristics of instruments.
4. To discuss the principle, design and working of transducers.
5. To impart the knowledge of electronic transducers in industrial applications.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Desribe various sensors, transducers and their performance specifications.
2. Understand woring principle of various transducers.
3. Make comparative study of various transducers and understand their applications in industry.
4. Understand data acquisition systems.

Unit-1	**Basics of transduders** : **Transducer**:Definition, Classification, Selection criteria, Errors, loading effects, Transducer Specifications, calibration, Generalized Instrumentation diagram. **State charasteristics** : Accuracy, precision, Sensitivity, Threshold, Resolution, Repeatability and Hystresis. **Errors**: Gross error, Systematic error, Random error, Limiting error. Statistical Parameters : Arithmatic mean, Average derivation, Standard deviation, Probable error, Histogram, Normal & Gaussian curve of errors. [T1, T2]	8
Unit-2	**Measurement of Displacement, Liquid level.** **Measurement of Displacement :** Resistive, Capacitive, Inductive**.** **Measurement of Liquid level:** Resistive, Capacitive, Inductive, Ultrasonic, Gamma Rays. [T1, T2]	8
Unit-3	**Measurement of Temperature** **Measurement of Temperature: Resistance temperature detector (RTD)**: Principle, types, Configurations, construction and working of RTD, Material for RTD, advantages, disadvantages and applications of RTD. **Thermistors:** Principle, types (NTC and PTC), characteristics, Construction and working of Thermistor, Materials, specifications of Thermistor, applications. **Thermocouples:** Principle, thermoelectric effect, See beck effect, Peltier effect, laws of thermocouple, cold junction Compensation method, thermopile, thermocouple emf measurement method. **Pyrometers:** Principle, Construction and working of Radiation and optical pyrometers and its Applications, LM 335. [T1,T2]	10
Unit-4	**Measurement of Pressure, Flow, Humidity.** **Measurement of Pressure: Primary pressure sensors** - elastic elements like bourdon tube, diaphragm, and bellows. **Electrical/Secondary Pressure Transducers:** Capacitive, piezo-electric and its material, variable reluctance, LVDT. **Differential pressure measurement:** Capacitive. **Low Pressure (Vacuum):** Pirani gauge, thermocouple gauge, hot cathode ionization gauge. **Flow Measurement:** ultrasonic, electromagnetic & hotwire Anemometer. **Humidity Measurement:** using resistive, Capacitive & Crystal transducers. [T1,T2]	9
Unit-5	**Measurement of Velocity, Strain & Miscellaneous Sensors** **Velocity Measurement:** Using photo detectors (both linear & angular velocity), Stroboscope. **Strain Measurement:** Introduction, types of strain gauge, gauge factor calculation, materials for strain gauge, resistance strain gauge bridges, temperature compensation and applications of strain gauges. **Miscellaneous Sensors:** Noise (sound) Sensors-Characteristics of sound, levels of sound pressure, sound power and sound intensity. Smart sensors: Objective, block diagram, advantages and disadvantages. [T1,T2,T3]	9
Unit-6	**Data acquisition and applications of Electronic Instruments** **Analog & Digital data acquisition system**.: Generalized block diagram of data acquisition system(DAS), objective of DAS, signal conditioning of inputs, single channel DAS, Multichannel DAS, computer based DAS Digital transducer: optical encoders, shaft encoders pH and blood pressure measurement. [T1,T2,T3]	8
	Total	**52**

Text Books:

1. H. S. Kalsi, Electronic Instrumentation, McGraw Hill Education Pvt Ltd., New Delhi, 1995.
2. A.K.Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Rai and Sons, New Delhi, 1999
3. B.C.Nakra and K.K.Chaudary, Instrumentation Measurement and Analysis, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1985.

References:

1. David A. Bell, Electronic Instrumentation and Measurements, Third Edition, Oxford Higher Education,
2. D.Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Pub. Ltd., New Delhi, 1999.
3. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
4. Ernest O.Doebelin, Measurement systems Application and Design, International Student Edition, IV Edn., McGraw Hill Book Company, 1998.

3ET5 – ELECTROMAGTIC FIELDS

Course Requisite:

1. (IA1) Engineering Mathematics-I
2. (IB1) Engineering Mathematics-II
3. (3ET1) Engineering Mathematics-III

Course Objectives:

1. To understand fundamentals of orthogonal coordinate systems and interrelation with 1-D, 2-D & 3-D vectors.
2. To impart knowledge of Static Electric & Magnetic Field and the associated laws.
3. To analyze time varying electric and magnetic fields at various boundary conditions.
4. To understand concepts of propagation of EM waves.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Apply vector calculus to understand the behavior of static electric/magnetic fields.
2. Formulate and solve problems in electrostatics and magnetostatics in dielectric media.
3. Describe and analyze electromagnetic wave propagation in free-space.
4. Analyze plane electromagnetic waves at boundaries between homogeneous media.
5. Analyze the electromagnetic radiation from localized charges considering retardation effects.

	Theory :Electromagtic Fields	**L**
Unit-1	**Review of Vector Analysis:** Cartesian, Cylindrical and Spherical Co-ordinate Systems, Vector products, Projection of Vectors, Gradient, Divergence and Curl, line, surface, volume integrals, Divergence Theorem and Stokes theorem.	9
Unit-2	**Electrostatics**: Coulomb's Law, Electric field intensity, Evaluation of Electric field intensity due to line charge, Surface charge and Volume charge distribution, Electric flux and Electric flux density, Gauss Law, Electrostatic potential, Potential gradient, Electric dipole and Polarization.	8
Unit-3	**Magnetostatics:** Biot–Savart Law, Ampere's Circuital Law, Magnetic field intensity, Magnetic field intensity evaluation due to infinite, finite and circular current carrying conductors, Magnetic flux and Flux density, Magnetic dipole and Magnetization.	9
Unit-4	**Boundary Conditions & Maxwell's Equations:** Boundary condition at Dielectric – Conductor interface, Dielectric – Dielectric interface, Boundary conditions for magnetic materials interface, Current continuity equation, Maxwell's equations.	8
Unit-5	**Electromagnetic wave propagation:** Electromagnetic wave equation for free space, lossy dielectric material and perfect conductor, Propagation constant, Attenuation constant & Phase shift constant, Skin depth, Poynting Theorem, Reflection of a plain wave in a normal incidence at Dielectric – Dielectric interface, Dielectric – Conductor interfaces.	10
Unit-6	**Radiation:** Scalar and Vector magnetic potential, Retarded potential, Electric & Magnetic fields, Power radiated and Radiation resistance due to oscillating dipole, Quarter wave monopole & Half wave dipole.	8
	Total	**52**

Text Books:

1. Hayt W.H.: "Engineering Electromagnetic" Tata Mc Grawhill
2. Jordan E.C. and Balamin K.C.: "Electromagnetic Waves and Radiating System " Prentice Hall of India Pvt. Ltd.

References:

1. Mathew N.O., Sadiku "Principles of Electromagnetics" (Fourth Edition), Oxford University Press
2. Kranss J.D.: "Electromagnetic" Mc Grawhill Books co. (Third Edition)
3. Ramo S. and Whinnery R.: "Fields and Waves in Communication Electronics" John Wiley and sons, New Delhi.
4. Dr. TVS Arun Murthy, "Electromagnetic Fields(Theory & Problems) "S.Chand & Company Ltd

3ETp7 - OBJECT ORIENTED PROGRAMMING- LAB.

Course Requisite:

1. (IB3) Computer Programming
2. (3ET2) Object Oriented Programming

Course Objectives:

1. Design, implement, test, and debug simple programs in an object-oriented programming language.
2. Design and test the implementation of C++ programming concepts.
3. Design and test the implementation of java programming concepts.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Understand the basics of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism
2. Design, implement, test, and debug simple programs in an object-oriented programming language.
3. Describe how the class mechanism supports encapsulation and information hiding.
4. Design and test the implementation of C++ and java programming concepts.

Exp.No.	Experiment List
Expt-1	Write a C++ program using Scope resolution operator
Expt -2	Write a C++ program to swap two variables a) Using third variable b) Without using third variable
Expt -3	Write a C++ program using function overloading and constructor overloading
Expt -4	Write a C++ program using friend function.
Expt -5	Write a C++ program to overload unary operator for inverting the value of data variable using member function
Expt -6	Write a java program to Calculate Circle Area using Java
Expt -7	Write a program to find Largest and Smallest Number in an Array using java
Expt -8	Write a java program to find factorial of a number
Expt -9	Write a java program to swap two variables a) Using third variable b) Without using third variable
Expt-10	Introduction to MySQL **Objectives:** a) To learn MySQL database b) To learn how to create databases and tables in MySQL server
Expt-11	Introduction to servlet programming in Java **Objectives:** a) To learn servlet concept in advance java b) To learn structure of a servlet

* Minimum 10 experiments based on/relevant to the above list.

3ETp8 – ELECTRONIC DEVICES & CIRCUITS – LAB.

Course Requisite:

1. (IA2) Engineering Physics
2. (3ET3) Electronic Devices and Circuits

Course Objectives:

1. To verify characteristics of various semiconductor devices.
2. To determine and verify various performance parameters of electronic devices and circuits.
3. To provide basic experimental exposure about operation and applications of electronic devices.

Course Outcomes:

1. Acquiring basics of parameters and operation of various semiconductor devices.
2. Implementation of basic circuits using electronic devices.
3. Verification and analysis of performance of electronic circuits.

Exp.No.	Experiment List :
Exp-1	To verify V-I characteristics of p-n junction diode and obtain static and dynamic resistance values.
Exp -2	To obtain the efficiency and ripple factor of half-wave, full-wave rectifiers without and with filters (C-input filter).
Exp -3	To verify of Zener diode as a voltage regulator.
Exp -4	To verify characteristics of CE mode of BJT and compute its parameters.
Exp -5	To demonstrate voltage divider biasing of CE mode of BJT and determine operating point.
Exp -6	To Compute theoretical and practical frequency of oscillation of RC Phase shift and Hartley oscillators.
Exp -7	To obtain frequency response of RC coupled amplifier and verify cut off frequencies and bandwidth.
Exp -8	To Compute theoretical and practical gain and efficiency of class B / class AB power amplifier.
Exp -9	To plot the drain and transfer characteristics of JFET (Junction Field Effect Transistor) and calculate rd, gm and μ.
Exp-10	To plot the characteristics of UJT and to calculate the Intrinsic Stand-Off Ratio (η).

* Minimum 8 experiments based on/relevant to the above list.

3ETp8 – SKILL DEVELOPMENT LAB- I (Measurements, Testing & Instrumentation)

Course Requisite:

1. (IB4) Electrical Engineering
2. (3ET4) Instrumentation & Sensors

Course Objective:

1. To understand different types of electronic testing and measuring equipments.
2. To understand use of various signal/function generators and analyzers used in electronics measurements.
3. Use of transducers/sensors for measurements of various physical parameters.
4. To understand PCB designing and making.

Course Outcomes:

After successfully completing the course, the students will able to

1. Understand the principles and operation of different measuring instruments
2. Selecting the appropriate instrument for measurement and observing, reading and interpreting the values from different measurements.
3. Read the specifications from datasheets and learning the precautions & applications of the instruments.
4. Explore use of various transducers/sensors in measurement of various physical parameters.
5. Design the PCB layout and to prepare PCB for given circuit
6. Develop the skill of mounting /demounting components and testing of developed circuits.

	Theory	**L**
Unit-1	**Digital Meters and Function/Signal Generators** **(a) Digital Meters**: Resolution, Sensitivity and Accuracy of digital display. Commercial Digital Multimeter- Block Diagram and operation. Voltage, Current, Resistance measurement and component testing using DMM. Auto zeroing, Auto ranging in digital instruments. LCR Q meter- Circuit diagram and operation. Digital frequency meter- Block Diagram and operation. Analog and Digital IC tester. **(b) Function/Signal Generators:** Signal generator-AF and RF type- Block diagram and operation. Function generator and pulse generator- Block diagram and operation. Arbitrary waveform generator- Block diagram and operation, Power supplies- Single, Dual and SMPS.	9
Unit-2	**Oscilloscope and Analyzers :-** **(a)** Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, CRO Probes, Lissajous method of phase measurement, standard specifications of CRO. Oscilloscope operating precautions. Digital storage oscilloscope: Block diagram of Digital storage oscilloscope. Difference between CRO and DSO. **(b) Analyzers-** Concept of time domain and frequency domain instruments, Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzer, Logic analyzer, Network Analyzer.	9
Unit-3	**PCB Design :-** Basics of Electronic Component layout, PCB material, Properties and specifications, Basic manufacturing process of PCB, Soldering and De-soldering Techniques.	8
	Total	**26**

Part A : Electronics Measurement and Testing

Exp.No.	**Experiment List :**
Expt-1	To explore the use of Digital Multi-meter for various parameter measurements and testing of the various components.
Expt -2	To explore the use of LCR- Q meter for the measurement of Resistance (R), Inductance (L), capacitance(C) and quality factor (Q) of a coil using LCR-Q meter.
Expt -3	To explore the front panel controls and specifications of typical CRO and measurement of amplitude, frequency, phase difference of the test signal using CRO and observe Lissagous pattern.
Expt -4	Testing of various components using CRO.
Expt -5	To explore the control panel of AF/RF signal/ function generator available in the lab and observe the various types of signal waveforms along with their range using CRO.

Expt -6	To explore the use of Digital Storage Oscilloscope [DSO] and to verify Half wave/ Full wave/ rectifier and Clamper circuits using DSO
Expt -7	To explore front panel controls and specifications of a typical spectrum analyzer for observing spectrum of various test signals.
Expt -8	Study and explore front panel controls and specifications of a typical spectrum analyzer for observing spectrum of various test signals.
Expt -9	To measure Frequency Response of various filters using spectrum analyzer.
Expt -10	To explore the use of Logic analyzer.
	Part B : Instrumentation & Sensors
Expt -1	Measurement of linear and angular displacement by (i) linear potentiometer (ii) Rotary potentiometer.
Expt -2	Measurement of linear displacement using Photosensitive Transducer (LDR).
Expt -3	Measurement of Temperature using Temperature sensitive transducers.
Expt -4	Strain measurement using strain gauges.
Expt -5	Determination of sensitivity of linear variable differential transducers (LVDT).
Expt-6	Measurement of pressure using silicon piezo resistive sensor.
	Compulsory Experiment :
	To Design PCB for simple IC based circuit preferably containing all types of basic electronic components.

*Minimum 10 experiments should be conducted based on/relevant to the above list, out of which, minimum 5 experiments should be from Part A, 4 experiments from Part B and one compulsory experiment as a **Mini Project**.

Text Books:

1. David A. Bell- "Electronic Instrumentation and Measurements", Third Edition, Oxford Higher Education.
2. K.A.Bakshi, A.V.Bakshi, U.A.Bakshi- "Electronic measurement systems" Technical Publications, 01-Jan-2008.
3. Bosshart, " Printed Circuit Board" TMH.

References:

1. Kalsi Electronic Instruments Tata Mc Graw Hill.
2. W.D. Cooper-Modern Electronic Instrumentation & Measurement Techniques Pearson Educn., New Delhi.
3. Stanley Wolf & Richard Smith Student Reference Manual for Electronic Instrumentation laboratory. Prentice Hall.
4. B.C.Nakra, K. K.Chawdhary-Instrumentation Measurement and Analysis Tata McGraw Hill.

SEMESTER - IV

4ET1 – SIGNALS & SYSTEMS

Course Requisite:

1. (IA1) Mathematics-II
2. (IB1) Mathematics-III
3. (3ET1) Engineering Mathematics -III

Course Objective:

1. Understanding the fundamental characteristics of signals and systems.
2. Understanding signals and systems in terms of both the time and transform domains.
3. Development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Describe signals mathematically and understand how to perform mathematical operations on signals and systems.
2. Analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.
3. Classify systems based on their properties and determine the response of LTI system.
4. Analyze system properties based on impulse response and Fourier analysis.
5. Understand the process of sampling and the effects of under sampling.
6. Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time systems.

	Theory :Signals & Systems	L
Unit-1	**Signals and Systems**: Energy, Power Signal, Signal Operations, Signal Classification, Signal models, Even and Odd functions, System Classification. **Time-Domain Analysis of Continuous-Time Systems:** System response to Internal condition, Unit Impulse Response, System response to External Input, Classical Solution of Differential Equation, System Stability.	08
Unit-2	**Continuous-Time Signal Analysis -The Fourier Series:** Periodic Signal Representation by Trigonometric Fourier Series, Existence and Convergence of Fourier Series, Exponential Fourier Series, LTIC system response to Periodic inputs, Generalized Fourier Series: Signals as Vectors, Computation of D_n	08
Unit-3	**Continuous-Time Signal Analysis-The Fourier Transform:** Relation between Fourier & Laplace, Aperiodic Signal Representation by Fourier Integral, Properties of Fourier Transform, Signal Transmission Through LTIC Systems, Signal Energy, Data Truncation (Window Functions)	10
Unit-4	**Continuous-Time System Analysis Using Laplace Transform**: Laplace Transform and properties, Inverse transform, Solution of Differential and Integro-Differential Equations, System Realization., Frequency response of LTIC system, The Bilateral Laplace Transform.	08
Unit-5	**Time-Domain Analysis of Discrete-Time Signals & Systems:** Signal Operations, Classification of Discrete-Time Systems, Discrete-Time System Equations, System response to Internal condition, Unit Impulse Response, System response to External Input, Classical Solution of Linear Difference Equations, System Stability. **Sampling & Reconstruction:** Sampling Theorem, Signal Reconstruction, Spectral Sampling.	10
Unit-6	**Fourier Analysis of Discrete-Time Signals:** Discrete-Time Fourier Series (DTFS), Aperiodic Signal Representation by Fourier Integral, Properties of DTFT, LTI-Discrete-Time System Analysis by DTFT, Relationship between DTFT & CTFT, DFT & its properties. **Discrete-Time System Analysis (Z-Transform):** Definition of Z-Transform, Inverse Z-Transform, Relation between Laplace & Z-Transform.	08
	Total	**52**

Text Books:

1. Lathi B. P., "Principles of Linear Systems and Signals" Second Edition (International Version) Oxford University Press.
2. Alan V. Oppenheim & Alan S. Willsky with S. Hamid Nawab, "Signal & Systems" PHI-Publication, Second Edition.

References:

1. Ambardar A., "Analog And Digital Signal Processing" , Thomson Learning-2005.
2. Simon Haykin, Barry Van Veen, "Signals & Systems", IInd Edition, Wiley Publication.

4ET2 – NETWORK ANALYSIS

Course Requisite:

1. (1B4) Electrical Engineering
2. (3ET1) Engineering Mathematics - III

Course Objectives:

1. To understand fundamental concepts of node and mesh analysis for linear circuits.
2. To study graph theory for network analysis.
3. To understand Laplace Transform technique for analysis of linear circuits.
4. To study network theorems and network functions.
5. To study two port network parameters and their inter-relationships.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Analyze electrical circuits using mesh and node analysis.
2. Draw oriented graph of the network to determine their currents and voltages.
3. Apply Laplace Transform for circuit analysis.
4. Apply suitable network theorems to analyze electrical circuits.
5. Relate various two port network and apply two-port network theory for network analysis.

	Theory :Network Analysis	L
Unit-1	**Node and Mesh analysis**: Circuit components, assumptions for circuit analysis; Sources of electrical energy, standard input signals; Source transformation, Kirchoff's laws, Node and Mesh analysis, Network equations for RLC networks, Magnetic coupling.	10
Unit-2	**Graph theory and network equations**: Graph of a network, Trees, cotrees and loops, Incidence matrix, Tie set and Cut set of a network, Analysis of a network using Tie set and Cut set matrix, Network equilibrium equations, Duality.	7
Unit-3	**Network Analysis using Laplace Transform**: Review of Laplace transform, Gate function, Impulse function, Laplace transform of periodic signals, Transformed equivalent of inductance, capacitance, mutual inductance, Node and mesh analysis of the transformed circuits. Node admittance matrix and Mesh impedance matrix in transform domain. Solution of transformed circuits including mutually coupled circuits.	8
Unit-4	**Network theorems**: Superposition theorem, Receprocity theorem, Thevenin's theorem, Norton's theorem, Millman's theorem, Maximum power transfer theorem, Substitution theorem, Compensation theorem, Tellegen's theorem.	10
Unit-5	**Network functions**: Ports and terminal pairs, Network functions, poles and zeros, Necessary conditions for driving point function, Necessary conditions for transfer function, Application of network analysis in deriving functions, Time domain behaviour from pole-zero plot, driving point and transfer impedance functions of LC networks.	6
Unit-6	**Two port networks**: Open circuit impedance parameters, Short circuit admittance parameters, Transmission parameters, Inverse transmission parameters, Hybrid and Inverse hybrid parameters, Condition for reciprocity and symmetry of a two port network, Interrelationship between parameters, Interconnection of two port networks, Input impedance in terms of two port network parameters, Output impedance, Image impedance.	9
	Total	**52**

Text Book:

1. D. Roy Choudhary, "Networks and Systems", New Age International.

References:

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall,3rd Edition.
2. W. H. Hayt, J. E. Kemmerly and S. M. Durbin, "Engineering Circuit Analysis", 7th Edition, McGraw-Hill higher education.
3. C. K. Alexander and M. N. O. Sadiku, "Fundamentals of Electric Circuit" McGraw-Hill Companies.inc.
4. I.S.K.V. Iyer, "Circuit Theory", Tata McGraw-Hill Education 1985.

4ET3 – ANALOG ELECTRONICS - I

Course Requisite:

1. (3ET3) Electronic Devices and Circuits

Course Objectives:

1. To analyze the behavior of linear wave shaping circuits using RC Networks, diode and BJT.
2. To learn switching characteristics of semiconductor devices.
3. To understand the basics and internal structure of Op-Amp.
4. To analyze linear and non-linear applications of Op-Amp.
5. To understand and apply the functionalities of PLL.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Analyze different wave shaping circuits.
2. Perform evaluation of the switching behavior of semiconductor devices.
3. Comprehend the knowledge of basic concepts and performance parameters of Op-Amp.
4. Use Op-Amp for implementation of linear and non-linear applications.
5. Comprehend the knowledge of PLL, its applications and data converters.

	Theory : Analog Electronics – I	L
Unit-1	Linear wave shaping using RC circuits, analysis and calculations of RC low pass and high pass filters, analysis of clipping and clamping circuits using diodes and transistors	08
Unit-2	Switching characteristics of semiconductor devices : Diode as switch, transistor as a switch, characteristics and analysis, FET as a switch, MOS switch, collector coupled bistable, monostable and astable multivibrators.	08
Unit-3	Operational amplifier, block diagram of Op-Amp, differential amplifier configurations, analysis for dual i/p- balanced o/p differential amplifier using h-parameters, constant current source, level shifting, transfer characteristics, frequency response, frequency compensation methods, study of ICuA741, Op-Amp parameters, offset nulling and it's importance.	10
Unit-4	Linear applications of Op-Amp: Inverting and non inverting amplifiers, voltage followers, integrator, differentiator, differential amplifier, instrumentation amplifiers, precision rectifiers, V to I and I to V converters, sinusoidal RC oscillators.	08
Unit-5	Non linear applications of Op-Amp and filter circuits: Clipping and clamping circuits, comparator, zero crossing detector, Schmitt trigger, peak detector, astable, monostable and bistable multivibrators, Butterworth filters using Op-Amp., log and antilog amplifiers.	08
Unit-6	PLL: Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC LM 565 and its applications as AM detector, FM detector and frequency translator. A to D converters, D to A converters and their types.	10
	Total	**52**

Text Books:

1. Jacob Millman & Herbert Taub, "Pulse Digital & Switching Waveforms", McGraw Hill Int. Book Co.
2. Gayakwad R.A., "Op-Amps and Linear Integrated Circuits", Prentice Hall of India Pvt. Ltd., New Delhi.

References:

1. Robert F. Coughlin, Frederick F. Driscoll, "Operational Amplifier and Linear Integrated Circuits", Sixth Edition, PHI Pub.
2. T.R. Ganesh Babu, B. Suseela, "Linear Integrated Circuits", Third Edition, Scitech Publications.
3. Rao K., "Pulse & Digital Circuits", Pearson Education.
4. Rao K., "Switching Theory & Logic Design", Pearson Education.
5. Dr. R.S. Sedha, "Textbook of Applied Electronics", S. Chand Publications.

4ET4 – DIGITAL ELECTRONICS

Course Requisite:

1. (3ET3) Electronic Devices & Circuits

Course Objectives:

1. To study basic concepts of Boolean algebra, number systems and codes.
2. To study techniques of minimization of Boolean expression.
3. To learn digital logic families and their characteristics.
4. To study the formal procedures for the analysis and design of combinational circuits and sequential circuits.
5. To learn the concept of memories, programmable logic devices and digital ICs.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Use Boolean algebra to solve logic functions, number systems and its conversion.
2. Understand digital logic families and their characteristics.
3. Identify, analyze and design combinational and sequential circuits.
4. Use the knowledge of semiconductor memories, programmable logic devices in digital design.

	Theory :Digital Electronics	L
Unit-1	Boolean Algebra, Number systems and their conversions, BCD code, Octal Code, Hexadecimal code, Excess-3 code, Gray code, Arithmetic operations using Two's compliment. Study and analysis of Digital Logic Families : RTL, TTL, ECL, IIL, CMOS and their characteristics, tri-state logic, Logic gates	10
Unit-2	Combinational Logic Design: Functions of binary variables, Standard form of logic functions, K-Map up to 5 variables, Don't Care Condition and its effect, Simplification of logic expressions using K-Map, adders and subtractors using logic gates, 4 bit adder/subtractor, BCD adder/subtractor, Look ahead carry adder.	08
Unit-3	Combinational logic design using 74XX/54XX MSI chip series concerning to MUX, DEMUX, Decoders, Encoders, Code Converters, Comparators, Parity Generator/Checker and BCD to Seven Segment Decoder. Combinational logic design using ROM, PLA, PAL.	08
Unit-4	Flip-flops: R-S, J-K, Master slave J-K, D-type, T-type. Registers: SISO, SIPO, PISO, PIPO, Universal Shift Register. Counters: Asynchronous and Synchronous counter, up/down counter, MOD-N counter, Ring counter, Johnson counter, Frequency Division counter.	10
Unit-5	Analysis of Clocked Sequential Networks, Moore and Mealy Machine, State table, State Reduction State Transition diagram, Design of clocked sequential networks.	08
Unit-6	Semiconductor memories and Programmable Logic Devices: memory organization and operation, expanding memory size, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM.	08
	Total	**52**

Text Books:

1. M.Morris Mano and M.D.Ciletti, "Digital Design", Pearson Education.
2. R P Jain, "Modern Digital Electronics", TMH.

References:

1. Wakerly, "Digital Design: Principles and Practices", 3rd edition, Pearson Education, 2004.
2. Charles H. Roth, "Fundamentals of Logic Design", 4th Edition, Jaico Publication
3. Lee S.C,"Digital Circuits and Logic Design", PHI

4ET5 – COMMUNICATION ENGINEERING - I

Course Requisite:

1. (3ET1) Engineering Mathematics-III
2. (1A2) Engineering Physics

Course Objectives:

1. To understand different modulation and demodulation techniques in analog communication.
2. To interpret the performance of analog communications systems in presence of noise.
3. To understand concept of various antennas and their radiation patterns.
4. To study the fundamentals of transmission lines and their properties.

Course Outcomes:

Upon successfully completing the course, the students will be able to

1. Understand the necessity of modulation and identify the various components of analog communication systems.
2. Understand different modulation and demodulation schemes in analog communication systems.
3. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
4. Describe the properties and characteristics of Transmission lines and antennas.

	Communication Enginering – I	L
Unit-1	**AM Transmitters:** Modulation, need of modulation, AM Modulation, Frequency spectrum, Principles of DSB-FC, DSBSC, SSB-SC modulation and their comparison, Details of DSBFC Transmitter, Generation of DSB-SC by using balanced modulators (FET & Diodes), DSB-SC Transmitter, Generation of SSB-SC by filter method, phase-shift method & third method (weavers). [T1,T2,R2]	10
Unit-2	**AM Receivers:** TRF receiver, Super heterodyne receiver, Details of each block such as RF amplifier, mixer oscillator, IF amplifier, Diode detector, Audio Amplifier. Need and type of AGC, selectivity sensitivity, fidelity Image rejection ration, communication receiver, SNR of DSB-FC, DSB-SC & SSB-SC. [T1,T3,R2]	10
Unit-3	**FM Transmitters:** FM Modulation, Frequency Spectrum, Circuits & Analysis for direct FM generation using FET and varactor diode. Circuit & analysis of Indirect FM generation, Narrow Band and Wide Band FM, their comparison, preemphasis and De- emphasis. Stereo FM Transmitter. [T1,T2]	08
Unit-4	**FM Receivers :** Details of FM receiver blocks such as R.F. amplifier, local oscillator, IF amplifier, Mixer, Audio Amplifier, AGC, Limiter, FM Discriminator, Single Slope and Balanced slope detector, Analysis of Foster Seeley and ratio detectors, Stereo FM receiver, Noise in FM Reception, FM threshold effect. Comparison of performance of AM & FM systems. [T1,T3,R2]	08
Unit-5	**RF Transmission Lines:** Parallel and coaxial transmission line, equivalent circuit of transmission line, standing wave, characteristic(shunt) impedance, quarter wave and half wave length transform, Smith chart, Single stub (shunt) matching using smith chart, balun. [T1,T2, R2]	08
Unit-6	**Antenna Basics & Types of Antenna :** Principle of radiation, antenna power gain, beam width, polarization, bandwidth and radiation resistance, Isotropic radiator, Resonant antenna: Half wave, Folded dipole antenna, Non resonant antenna, antenna arrays, parasitic reflector, parasitic director, design of yagi-uda antenna (up to 5 elements) Long, wire, helical, rhombic, discone, log periodic, loop antenna, low, medium and high frequency antenna. [T1,T2]	08
	Total	**52**

Text Books:

1. Wayne Tomasi, "Electronic Communication Systems" Pearson Education, (Fifth Edition).
2. Kennedy G. "Electronic Communication System" Tata Mc-Graw Hill Co., New Delhi (Third Ed).
3. Taub and Schilling D.L., "Principles of Communication Systems", Mc-Graw Hill Co., New Delhi (2nd Edn.).

References:

1. B. P. Lathi, "Modern Digital and Analog Communication systems", 3rd Edn, Oxford Uni. Press, New Delhi.
2. Collins Dennis, Collins John, "Electronic Communications" PHI.

4ETp7 – ANALOG ELECTRONICS – LAB.

Course Requisite:

1. (3ET3) Electronic Devices & Circuits.
2. (4ET3) Analog Electronics – I.

Course Objectives:

1. To verify operation of various wave shaping circuits.
2. To demonstrate linear and non-linear applications of Op-Amp.
3. To analyze multivibrator circuits using BJT and Op-Amp.
4. To understand functions and characteristics of PLL.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Implement wave shaping circuits using passive components, diode and BJT and perform their analysis.
2. Demonstrate linear and non-linear applications of Op-Amp.
3. Implement PLL in certain applications.

Exp.No.	Experiment List
Expt-1	To verify performance of RC low pass and high pass circuit for standard test input signals.
Expt -2	To demonstrate diode as a clipper and clamper for various reference levels.
Expt -3	To verify operation of BJT based astable multivibrator.
Expt -4	To analyze BJT based monostable multivibrator.
Expt -5	To verify Op-Amp IC 741 as an inverting and non- inverting amplifier with a specific gain value.
Expt -6	To demonstrate integrator and differentiator circuit using Op-Amp IC 741.
Expt -7	To verify RC- phase shift oscillator using Op-Amp IC 741.
Expt -8	To verify Op-Amp IC 741 as a Schmitt trigger and calculate the hysteresis voltage.
Expt -9	To verify operation of astable multivibrator using Op-Amp IC 741.
Expt - 10	To plot frequency response of first order Butterworth LPF for a specific pass-band gain and cut-off frequency.
Expt-11	To verify characteristics of PLL.
Expt-12	Application of PLL as AM detector/FM detector/frequency translator (Any one application)

* Minimum 10 experiments based on/relevant to the above list.

4ETp8 – DIGITAL ELECTRONICS – LAB.

Course Requisite:

1. (3ET3) Electronic Devices & Circuits.
2. (4ET4) Digital Electronics.

Course Objectives:

1. To impart the concepts of digital electronics practically.
2. To provide students basic experimental experiences in the operation of various digital logic Families.
3. To learn the operation of various logic gates and their implementation using digital IC's.
4. To learn the realization of various combinational and sequential circuits.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Apply practically the concepts of digital electronics.
2. Explain the operation and characteristics of various digital logic families.
3. Understand the operation of various logic gates and their implementation using digital IC's.
4. Design and implement various combinational logic circuits.
5. Design and implement various sequential logic circuits.

Exp.No.	Expeeriment List :
Exp-1	To study and verify the operation of various digital logic families.
Exp -2	To study and verify the operation of logic gates.
Exp -3	Design and implementation of Adders and Subtractors using logic gates.
Exp -4	Design and implementation of code converters using logic gates.
Exp -5	Design and implementation of multiplexer using logic gates and IC.
Exp -6	Design and implementation of demultiplexer using logic gates and IC.
Exp -7	Design and implementation of code converters using logic gates.
Exp -8	Design and implementation of Magnitude Comparator using logic gates and IC.
Exp -9	Design and implementation of odd/even parity checker /generator using IC.
Exp -10	Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
Exp -11	Construction and verification of ripple counters.
Exp -12	Design and implementation of 3-bit synchronous up/down counter.

* Minimum 10 experiments based on/relevant to the above list.

4ETp9 – COMMUNICATION ENGINEERING - I LAB.

Course Requisite:

1. (4ET5) Communication Engineering-I.

Course Objectives:

1. To demonstrate the performance of different modulation and demodulation techniques on the basis of various performance parameters.
2. To verify the performance of different analog communication systems.
3. To understand concept of various antennas and their radiation patterns.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Understand the concepts of modulation and able to apply in communication system practically.
2. Estimate the various performance characteristics of AM/FM receiver.
3. Demonstrate various antenna's and their radiation pattern.

Exp.No.	Experiment List :
Exp-1	To explore the AM Transmitter and Receiver in the communication system.
Exp -2	To estimate the output of Amplitude Modulation and Demodulation process.
Exp -3	To analyze the performance of radio receiver on the basis of sensitivity, selectivity and fidelity of radio receiver.
Exp -4	To explore the operation of FM Transmitter and Receiver.
Exp -5	To estimate the output of Frequency Modulation and Demodulation process.
Exp -6	To explore the generation of SSB-SC by using different methods.
Exp -7	To study the generation of DSB-SC Signal.
Exp -8	To observe the AM & FM frequency spectrum on spectrum analyzer.
Exp -9	To interpret the effect of Pre-emphasis and De-emphasis.
Exp -10	To verify the radiation patterns of various antenna's.

* Minimum 08 experiments based on/relevant to the above list.

4ETp10 – SKILL DEVELOPMENT LAB.-II ((Software)

Course Requisite:

1. (IB3) Computer Programming.
2. (3ET2) Object Oriented Programming

Course Objectives:

1. To get acquainted with various web development technologies such as HTML, MySQL, Javascript used for building web applications
2. To develop skills in Java programming
3. To explore the skills in Java programming for creation of web based applications.

Course Outcomes:

After successfully completing the course, the students will be able to

1. Use Java programming for developing applications.
2. Develop simple web based applications on their own.
3. Handle database applications.

	Theory : Skill Development Lab. – II (Software)	**L**
Unit-1	Principles of HTML language, developing HTML page using different tags, understanding Javascript, CSS. Developing static and dynamic web page using HTML,CSS, Javascript etc.	8
Unit-2	Servlets in Java programming, creating database connections using servlets. Understanding MySQL and creating tables in database. Accessing databases via Java programming.	8
Unit-3	Structure of a web application, interconnecting user interfaces to servlets via Java programming.	10
	Total	**26**

Exp.No.	Experiment LIst
Expt-1	Develop a static web page using HTML tags.
Expt -2	Enhance the look and feel of the web page using CSS(Cascaded Style sheets).
Expt -3	Use different JavaScript tags to validate the data entered in web page.
Expt -4	Use JQuery plug-in to enhance the look and feel of the web page.
Expt -5	Learn SQL to create the database.
Expt -6	Write Java programming using servlets to print “Hello World”.
Expt -7	Write Java programming using servlets to create and login into database.
Expt -8	Write Java programming using servlets to access created database.

* Minimum 8 experiments based on/relevant to the above list which lead to design and development of a student’s personal dynamic website as a **Mini Project**.

Text Books:

1. “HTML and CSS: Design And Build Websites”, Jon Duckette, John Wiley & Sons, inc.
2. “Javascript and Jquery: Interactive Front-End Web Development”, Jon Duckett, John Wiley & Sons, inc.
3. “Learning Web Design: A Beginner’s Guide To Html, Css, Javascript, And Web Graphics”, Jennifer Niederst Robbins, O'Reilly Media.
4. “Servlet And Jsp (A Tutorial)”, Budi Kurniawan, Brainysoftware.com.

References:

1. “Learning jQuery”, Alex Libby, Packt Publishing.
2. “HTML, CSS and JavaScript All in One, Sams Teach Yourself: Covering HTML5, CSS3, and jQuery”, Julie C. Meloni, SAM publications.
3. “Learn Object Oriented Programming Using Java: An UMS based”, Dr. N. B. Vekateswarlu, Dr. E.V. Prasad S., Chand Publication.
4. Robert Sheldon and Geoff Moes, “Beginning my SQL”, Wiley Publication.

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