ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

UNIVERSITY COLLEGE OF ENGINEERING

COURSE STRUCTURE & SYLLABUS

II B.TECH I SEMESTER

ECE

(With effect from 2017-2018 admitted batches onwards)
Under Choice Based Credit System (CBCS)

Sub Code	Subject	Hrs/week		Max Marks		Total Marks	Credits
		Theory	Lab	Internal	External		
BTECE301	Digital Logic Design	4	--	25	75	100	4
BTECE302	Signals and Systems	4	--	25	75	100	4
BTECE303	Object Oriented Programming Using C++	4	--	25	75	100	4
BTECE304	Network Analysis	4	--	25	75	100	4
BTECE305	Electronic Circuit Analysis	4	--	25	75	100	4
BTECE306	Random Variables and Stochastic Processes	4	--	25	75	100	4
BTECE307	Electronic Devices and Circuits lab	--	3	50	50	100	2
BTECE308	OOP Using C++ LAB	--	3	50	50	100	2
TOTAL		**24**	**6**	**250**	**550**	**800**	**28**

BTECE301: DIGITAL LOGIC DESIGN

Theory	**: 4 Hrs/week**	**Credits**	**: 4**
Int Marks	**: 25**	**Ext Marks**	**: 75**

UNIT-I

Digital Systems

Binary Numbers, Octal, Hexa Decimal And Other Base Numbers, Number Base Conversions, Complements, Signed Binary Numbers, Floating Point Number Representation, Binary Codes, Error Detecting And Correcting Codes, Digital Logic Gates (AND, NAND, OR, NOR, Ex-OR, Ex-NOR), Boolean Algebra, Basic Theorems and Properties, Boolean Functions, Canonical and Standard Forms.

UNIT-II

Logic Gates

Gate –Level Minimization and Combination Circuits, The K-Maps Methods, Three Variable, Four Variable, Five Variable, Sum of Products, Product of Sums Simplification, Don't Care Conditions, NAND and NOR Implementation and Other Two Level Implementation.

UNIT-III

Combinational Circuits (CC)

Design Procedure, Combinational Circuit for Different Code Converters and Other Problems, Binary Adder, Subtractor , Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

UNIT-IV

Synchronous Sequential Circuits

Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, Design of Counters, Up-Down Counters, Ripple Counters , Registers, Shift Registers, Synchronous Counters

Asynchronous Sequential Circuits

Reduction of State and Follow Tables, Role Free Conditions

TEXT BOOKS:

1. Digital Design- M. Morris Mano.

REFERENCE BOOKS:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education.
3. Digital Principles and Design – Donald D. Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

BTECE302: SIGNALS AND SYSTEMS

Theory	**: 4 Hrs/week**	**Credits**	**: 4**
Int Marks	**: 25**	**Ext Marks**	**: 75**

UNIT- I

SIGNAL ANALYSIS : Definition, Classification of Signals &Systems, time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function, signal function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT –II

FOURIER SERIES AND FOURIER TRANSFORM: Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function.

SAMPLING THEOREM – For Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing,.

UNIT-III

ANALYSIS OF LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time. Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –IV

Z–TRANSFORMS : Fundamental difference between continuous-time and discrete-time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
3. Signals and Systems – K Raja Rajeswari, B VisweswaraRao, PHI, 2009

BTECE303: OBJECT ORIENTED PROGRAMMING USING C++

Theory	**: 4 Hrs/week**	**Credits**	**: 4**
Int Marks	**: 25**	**Ext Marks**	**: 75**

UNIT- I

Principles of Object Oriented Programming: Software Evolution, Procedure- Oriented Programming, OOP Paradigm, Basic Concepts and applications of OOP.

Beginning with C++: A Simple C++ Program, Structure of a C++ Program, Creating the Source File, Compiling and Linking.

Tokens, Expressions and Control Structures: Tokens, Identifiers and Constants, Basic and User – Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator, Expressions and Their Types, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.

Functions In C++: The Main Function, Function Prototyping, Call By Reference, Return By Reference, Inline Functions, Default Arguments, Const Arguments, Function Overloading, Friend and Virtual Functions, Math Library Functions.

UNIT- II

Classes and Objects: A C++ Program with Class and member functions, Inline Functions, Private Member Functions, Arrays within a class, Memory Allocation for Objects, Static Data Members and Member Functions, Arrays of Objects, Object as Function Arguments, Friend Functions, Returning Objects, const Member Functions, Local classes.

Constructors and Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Instructor, Dynamic Constructors, Constructing Two-Dimensional Arrays, const Objects, Destructors

Operator Overloading : Overloading Unary and Binary Operators, Overloading using Friends, String Manipulation Using Operators, Rules for operator Overloading.

UNIT- III

Inheritance: Extending Classes: Defining Derived Classes, Single Inheritance, Inheriting a Private Member, Multilevel, Hierarchical and Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes: Nesting of Classes

Pointers, Virtual Functions and Polymorphism: Introduction, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT- IV

Managing Console I/O Operations: C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators.

Working With Files: Classes for File Stream Operations, Opening and Closing a file, Detecting End-of File, More about Open(): File Modes, File Pointers and their Manipulations, Sequential Input and Output operations, Updating a File: Random Access, Error handling During File Operations, Command-Line Arguments.

Templates: Class Templates, Multiple Parameters, Function Templates, Multiple Parameters, Overloading of Template Functions, Member Function Templates

TEXT BOOKS:

1. Object Oriented Programming with C++, 6e by E Balagurusamy, TMH.

REFERENCE BOOKS:

1. Programming: Principles and Practice using C++, Bjarne Stroustrup,Addison-Wesley Professional; 2 edition
2. Mastering C++ KR Venugopal, RajKumar Buyya,2 Edition, McGraw Hill Education
3. The Complete Reference C++ Herbert Schildt, McGraw Hill Education; 4 edition

BTECE304: NETWORK ANALYSIS

Theory	**: 4 Hrs/week**	**Credits**	**: 4**
Int Marks	**: 25**	**Ext Marks**	**: 75**

UNIT–I

Introduction to Electrical Circuits

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular). Kirchhoff's laws –network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation. Nodal analysis, Mesh analysis, Super Node and Super Mesh analysis of Networks with Independent and Dependent voltage and current sources.

UNIT–II

Magnetic Circuits

Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit – Analysis of series and parallel magnetic circuits

Single Phase A.C Circuits

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – concept of power factor.

UNIT–III

Locus Diagrams and Resonance

Locus diagrams – series R-L, R-C, R-L-C and parallel combination with variation of various parameters – Resonance – series, parallel circuits, concept of band width and Q factor.

UNIT–IV

Network Topology and Network Theorems

Definitions – Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks -Duality and Dual networks. Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Tellegen's, Millman's and Compensation theorems for d.c. and a.c.excitations.

TEXT BOOKS:

1. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc GrawHillCompany, 6th Edition.
2. Network Analysis by A. Sudhakar, ShyammohanPalli, Mc Graw Hill Company,
3. Circuit Theory by A. Chakrabarti, Dhanipat Rai and Co., 6th Edition.

REFERENCE BOOKS:

1. Network Analysis by M. E Van valkenburg, PHI.
2. Linear circuit analysis (time domain phasor, and Laplace transform approaches) byRAYMOND A.DECARLO and PEN-MIN-LIN, Oxford University Press.2nd Edition,2004.
3. Network Theory by N.C. Jagan and C.Lakshminarayana, B.S Publications.
4. Electrical Circuit theory by K. Rajeswaran, Pearson Education 2004.
5. Basic Circuit analysis by D.R, Cunningham and J.A Stuller, Jaico Publications.

BTECE305: ELECTRONIC CIRCUIT ANALYSIS

Theory	**: 4 Hrs/week**	**Credits**	**: 4**
Int Marks	**: 25**	**Ext Marks**	**: 75**

UNIT I

SINGLE STAGE AMPLIFIERS: Small Signal Low Frequency Amplifier Circuits: CE, CB, CC Amplifier Circuits, Small Signal Analysis of Junction Transistor: Analysis of CE, CB, CC using Hybrid Model, Analysis of CE Amplifier with Collector to Base Bias, Millers Theorem, Analysis of CE Amplifier with Emitter Resistance: Exact and Approximate Analysis. **MULTI STAGE AMPLIFIERS:** Need for cascading, Methods of Inter stage Coupling, Gain, Selection of Configuration in cascading Amplifiers, RC Coupled CE-CE Amplifier, CE-CB Cascade Amplifier, CE-CC Amplifier, Effect of cascading on Bandwidth and Gain.

UNIT II

FET AMPLIFIERS: JFET Low Frequency small signal Model, Analysis of Common Source, Common Drain , Common Gate Amplifiers using small signal model. **FREQUENCY RESPONSE**: Amplifier Frequency Response, System Transfer Functions, Transistor Amplifiers with Circuit Capacitors, Bipolar Transistor Frequency Response, The FET Frequency Response, High Frequency Response of Transistor Circuits

UNIT III

POWER AMPLIFIERS: Power Amplifiers, Power Transistors, Classification of Amplifiers: Class-A, Class B, Class C, Class AB Power Amplifiers. **Tuned Amplifiers** : Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

UNIT IV

FEEDBACK AMPLIFIERS: Introduction to Feedback, Basic Feedback Concepts, Ideal Feedback Topologies, Voltage Amplifiers, Current Amplifiers, Transconductance Amplifiers, Transresistance Amplifiers. **OSCILLATORS**: Barkausen Criterion, The Phase Shift Oscillator, Resonant Circuit Oscillator and Crystal Oscillator

TEXT BOOKS:

1. Donald A. Neamen," Electronic Circuits Analysis and Design", 3rd Edition, TMH, 2007
2. Jacob Millman and Christos C. Halkias, "Integrated Electronics", TMH, 1972

REFERENCE BOOKS:

1. Rashid –"Electronic Circuit Analysis". Cengage Learning, 2013.
2. Uday A Bakshi-" Electronic Circuit Analysis" 1st Edition, 2008, Technical Publications

BTECE306: RANDOM VARIABLES AND STOCHASTIC PROCESSES

Theory	**: 4 Hrs/week**	**Credits**	**: 4**
Int Marks	**: 25**	**Ext Marks**	**: 75**

UNIT I

THE RANDOM VARIABLE : Introduction, Review of Probability Theory, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

UNIT II

OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable.

UNIT III

MULTIPLE RANDOM VARIABLES : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-order and Wide-Sense Stationarity, N^{th}-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

.TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4^{th} Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha, PHI, 4^{th} Edition, 2002.

REFERENCE BOOKS:

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3^{rd} Edition.
3. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
4. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

BTECE307: ELECTRONIC DEVICES AND CIRCUITS LAB

Lab	**: 3 Hrs/week**	**Credits**	**2**
Int Marks	**: 50**	**Ext Marks**	**50**

List of Experiments

1. P-N Junction Diode Characteristics
   - Part A: Germanium Diode (Forward bias & Reverse bias)
   - Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   - Part A: V-I Characteristics
   - Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with C-filter)
   - Part A: Half-wave Rectifier
   - Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
   - Part A: Input Characteristics
   - Part B: Output Characteristics
5. FET Characteristics (CS Configuration)
   - Part A: Drain Characteristics
   - Part B: Transfer Characteristics
6. BJT Biasing
7. FET Biasing
8. CRO Operation and its Measurements
9. BJT as Switch
10. Frequency Response of BJT-CE Amplifier
11. Frequency Response of BJT-CC Amplifier
12. Frequency Response of FET-CS Amplifier
13. SCR Characteristics
14. UJT Characteristics

REFERENCES:

1. Integrated Electronics by Jacob Millman and Christos C.Halkias, McGraw Hill.

BTECE308: OOP USING C++LAB

Lab	**: 3 Hrs/week**	**Credits**	**: 2**
Int Marks	**: 50**	**Ext Marks**	**: 50**

List of Programs

1. Write a Program in C++ that implements stack operations using classes and objects.
2. Write a Program in C++ for performing complex number addition using friend functions.
3. Write a Program in C++ for complex number addition using operator overloading.
4. Write a Program in C++ to perform string operations by overloading operators.
5. Write a Program in C++ on hierarchical inheritance showing public, private and protected inheritances.
6. Write a Program in C++ for computation of student's result using hybrid inheritance.
7. Write a Program in C++ implementing bubble-sort using templates.
8. Write a Program in C++ on virtual functions.
9. Write a Program in C++ for copying one file to another file using streams.
10. Write a Program in C++ for writing and reading a class object to a file.
11. Write a Program in C++ to implement one catch block and all Exceptions
12. Write a Program in C++ to implement Multiple Catch blocks.
13. Write a Program in C++ to implement pointers to a derived class and virtual base classes.
14. Write a Program in C++ to implement conversion of objects between different classes using conversion functions.
15. Write a Program in C++ to implement function overloading- with various data types, with different number of arguments.

REFERENCES:

1. Object Oriented Programming with C++, 6e by E Balagurusamy, TMH.
2. Mastering C++ KR Venugopal, RajKumar Buyya,2 Edition, McGraw Hill Education
3. The Complete Reference C++ Herbert Schildt, McGraw Hill Education; 4 edition
4. Programming: Principles and Practice using C++,Bjarne Stroustrup,Addison-Wesley Professional; 2 edition