Shri Vaishnav VidyapeethVishwavidyalaya, Indore

Name of Program: Bachelor of Technology in Electronics and Communication

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		Th	T	P	CREDITS
		END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTMA 301	Applied Mathematics-III	60	20	20	-	-	3	1	-	4

Course Objective:

To introduce the students with the Fundamentals of the Calculus of the Complex Variable, Random Variable and Fourier Analysis.

Course Outcomes:

After the successful completion of this course students will be able to

1. Understand and apply the basics of the Calculus of the Complex variables.
2. Know the fundamentals of the Probability Theory and Random Process.
3. Apply the concepts of the Fourier Analysis
4. Know the techniques of the Fourier Transform.
5. Find the solution of the PDE.

Syllabus:

UNIT – I

Complex Analysis:

Complex numbers, geometric representation, powers and roots of complex numbers. Functions of a complex variable: Limit, Continuity, Differentiability, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Harmonic conjugates. Elementary Analytic functions (polynomials, exponential function, trigonometric functions), Complex integration, Cauchy's integral theorem, Cauchy's integral formula. Taylor series and Laurent series. Zeros, Singularities and its classifications, Residues, Residue theorem and its applications

UNIT – II

Probability Theory and Random Process:

Axiomatic construction of the theory of probability, independence, conditional probability, and basic formulae, random variables, binomial, poisson and normal random variable, probability distributions, functions of random variables; mathematical expectations, Definition and classification of random processes, discrete-time Markov chains, Poisson process, Correlation and Regression; Expectation and Variance

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UNIT – III

Fourier series:

Fourier Integral, Fourier series of 2p periodic functions, Fourier series of odd and even functions, Half-range series, Convergence of Fourier series, Gibb's phenomenon, Differentiation and Integration of Fourier series, Complex form of Fourier series.

UNIT – IV

Fourier Transformation:

Fourier Integral Theorem, Fourier Transforms, Properties of Fourier Transform, Convolution and its physical interpretation, Statement of Fubini's theorem, Convolution theorems, Inversion theorem

UNIT – V

Partial Differential Equations:

Introduction to PDEs, basic concepts, Linear and non-linear first order PDE, Higher order linear homogeneous PDE, Separation of variable and its application to the one dimensional wave and heat equation.

Text Books:

1. R. V. Churchill and J. W. Brown, Complex Variables and Applications, 5th Edition, McGraw-Hill, 1990.
2. K. Sankara Rao, Introduction to Partial Differential Equations, 2nd Edition, 2005.
3. G. R. Grimmett and D. R. Stirzaker, Probability and Random Processes, Oxford University Press, 2001.
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2000.
5. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edition, Wiley, 1968.
6. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, Prentice Hall of India, 1998.
7. A. Papoulis and S. Unnikrishna Pillai, Probabilities, Random Variables and Stochastic Processes, 4th Edition, Tata McGraw-Hill, 2002.
8. S.M. Ross, Stochastic Processes, 2nd Edition, Wiley, 1996.
9. J. Medhi, Stochastic Processes, New Age International, 1994.
10. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi

Reference Books:

1. J. H. Mathews and R. W. Howell, Complex Analysis for Mathematics and Engineering, 3rd Edition, Narosa, 1998.
2. I. N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1957.
3. E. Kreyszig, Advanced Engineering Mathematics, 5th / 8th Edition, Wiley Eastern / John Wiley, 1983/1999.

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BTEC302	EC	Network Analysis & Synthesis	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

Being one of the fundamental courses of Electronics stream its prime objective is to make the students capable of analyzing given electrical network composed by passive element and some active element. To make the students learn how to synthesize an electrical network from a given impedance/admittance function.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

The students will be able to

1. Apply the fundamental concepts in solving and analyzing different Electrical networks.
2. Select appropriate and relevant technique for solving the Electrical network in different conditions.
3. Apply mathematics in analyzing and synthesizing the networks in time and frequency domain.
4. Estimate the performance of a particular network from its analysis.

Syllabus

Unit-I

Network Theorems: Preliminaries of Electrical elements R, L, C, and circuits; Kirchhoff's laws Basic elements: Voltage and current sources, Linearity of elements, Power and energy in electrical elements. Circuit Analysis Methods: Nodal analysis, Mesh analysis, Circuit Theorems: Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Superposition theorem, Reciprocity theorem.

Unit-II

Transient Analysis: Source free RL and RC circuits, Elementary function unit step, unit ramp, unit impulse function and synthesis from source free parallel and series RLC circuit, complete response of the RLC circuit, lossless LC circuit.

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Unit-III

Frequency Domain Analysis: The phasor concept, sinusoidal steady state analysis; Resonance. Network theorem in ac domain. AC circuit power analysis, Laplace transform: Application in circuit analysis, frequency response of simple passive filters.

Unit-IV

Two Port Networks: Z, Y, h and ABCD parameters, analysis of interconnected (magnetically coupled) two port networks. Transfer function, immitance function.

Unit V

Network Synthesis: Positive real function, Hurwitz polynomial LC, RL, RC, and RLC network synthesis, Foster and Cauer network realization, Brune's method, Synthesis-Coefficient.

Text Books:

1. M.E. Van Valkenburg, Network Analysis, Pearson Education India; 3rd edition. 2015.
2. S P Ghosh A K Chakraborty, Network Analysis & Synth. Tata McGraw-Hill Education, 7st edition 2015.
3. Franklin F. Kuo, Network analysis and synthesis. Wiley publication, 2nd Edition 2013.

References Books:

1. Gordon J. Alexander and Matthew N.O. Sadiku, Fundamentals of Electric Circuits, McGraw-Hill Education; 5th edition. 2013
2. Jack Ellsworth Kemmerly and William H. Hayt, Engineering Circuit Analysis, McGraw-Hill Education; 8th edition. 2013
3. Pen-Min Lin and Raymond A DeCarlo, Linear Circuit Analysis, Oxford university press, 2nd edition . 2012
4. http://www.nptelvideos.in/2012/11/networks-and-systems.html

List of Experiments:

1. Introduction of Simulation software Tina-TI.
2. To verify Thevenin's Theorem and Norton's Theorem.
3. To verify Superposition Theorem and Reciprocity Theorem.
4. To verify Maximum Power Transfer Theorem.
5. To determine Open Circuit and Short Circuit parameters of a Two Port Network.
6. To determine A, B, C, D parameters of a Two Port Network.
7. To determine h-parameters of a Two Port Network.
8. To find Frequency Response of RLC Series Circuit RLC parallel Circuit.
9. To determine resonance and 3dB frequencies.
10. To determine charging and discharging times of Capacitors.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC303	EC	Electronic Measurement & Instrumentation	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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COURSE OBJECTIVES

1. Be able to identify the different latest measurement techniques available for specific engineering applications
2. Be able to understand the construction and working of different types of Analog and Digital Instruments.
3. Understand the various measurement techniques.
4. Understand the errors in measurements and their rectification.

COURSE OUTCOMES

1. An ability to understand the different types of Analog and Digital Instruments.
2. An ability to define the errors and their elimination.
3. An ability to measure different quantities like voltage, current, resistance etc
4. An ability to understand principle and working of various instruments.
5. An ability to operate different measuring instruments like Multimeter, CRO, DSO, Transducers etc

Syllabus

Unit I

Principles of Measurements – Principles of Measurement, Static/dynamic characteristics of measurement systems, Types of Errors, Statistical analysis, Measurement of resistance, inductance and capacitance – Wheatstone's bridge, Maxwell's bridge, Hay's bridge, De Sauty's bridge, Schering Bridge Wien's bridge, Wagner's earth connection, Q meter.

Unit II

Analog and Digital Measuring Instruments – Comparison of Analog & Digital techniques, Analog Instruments – DC ammeters, Multirange voltmeter, AC voltmeter using Rectifiers – Half wave and full wave, Chopper type, Peak responding and True RMS voltmeters. Series and Shunt Type Ohmmeter, Digital Instruments – Digital voltmeter, Multimeter.

Unit III

Oscilloscopes – Introduction, CRT, Principle of signal display, Dual Trace & Dual Beam Oscilloscopes, Measurement of voltage, frequency and phase by CRO, Sampling Oscilloscope, Storage Oscilloscope – Analog and Digital Storage Oscilloscopes, DSO Applications.

Unit IV

Transducers – Introduction, Electrical transducers, Resistive transducer, Resistive Strain gauges, Resistance thermometer, Inductive transducer, LVDT & RVDT, Thermistor, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, Thermocouple.

Unit V

Signal Generators & A/D, D/C Converters – Sine Wave Generator, Sweep Frequency Generator; Function Generator, Pulse and Square wave Generator,
D/A conversion – Variable Resistance network, Binary Ladder, R/2R ladder DAC, A/D conversion – Successive approximation method, Flash type and dual slope.

Text Books:

1. H. S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill Publishing Company Ltd., Third Edition.
2. A.K.Sawhney, "Electronic Instrumentation", Dhanapat Rai & Sons, 2013.

Reference Books:

1. Albert.D. Helfrick and William. D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Pearson education.
2. A.J.Bouwens, "Digital Instrumentation", McGraw Hill, 1986.

List of Experiment:

1. To study and test the operation of different types of Ammeters and Voltmeters.
2. To learn the technique of measurement of Inductance by using Maxwell's bridge.
3. To learn the technique of measurement of Inductance by using Hay's bridge.
4. To learn the technique of measurement of Capacitance by using Schering's bridge.
5. Learning the techniques of measurement of Q Factor by using Q Meter.
6. Demonstration of Cathode Ray Oscilloscope.
7. To study the use of CRO for measurements
8. To learn the construction and operation of LVDT.
9. To study Load measurement using Strain Gauge.
10. Study of Function Generator.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC305	EC	Electronic Circuits	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit:
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The objective of this course is to-
1) Use abstractions to analyze and design simple electronic circuits.
2) Design and construct circuits, take measurements of circuit behavior and performance, compare with predicted circuit models and explain discrepancies.

Course Outcomes (COs):
Students who are successful in this class will be able to:
1. Understand the basic physics of carrier transport in bulk semiconductors and real device structures.
2. Understand the fundamentals of operation of the main semiconductor electronic devices.
3. Understand the basic parameters of electronic devices, their performance, and limiting factors.
4. Understand the basic principles of electronic device.

SYLLABUS

Unit-I

Physical Electronics: Electrons and holes in semiconductors, Carrier Statistics, Energy bands in intrinsic and extrinsic silicon; Mechanism of current flow in a semiconductor; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations, Hall Effects.

Unit-II

PN junction diode: PN junction diode in forward and reverse bias, temperature dependence of V-I characteristics, diode resistances, diode junction capacitance. Types of diodes: Zener Diode, Varactor Diode, Tunnel Diode, PIN Diode, Schottky Diode, LED and Photo Diodes, Switching characteristics of diode.
Bipolar junction transistor: Construction, basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation in transistor (Pd, max rating), Photo transistor.

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Unit-III

Transistor biasing circuits and analysis: Introduction, various biasing methods: Fixed bias, Self bias, Voltage Divider bias, Collector to base bias, Load-line analysis: DC and AC analysis, Operating Point and Bias Stabilization and Thermal Runaway. Transistor as a switch.

Unit-IV

Small Signal analysis: Small signal Amplifier, Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and cas-code amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid π model, Current Mirror circuits.
Large Signal analysis and Power Amplifiers: Class A, Class B, Class AB, Class C, Class D, Transformer coupled and Push-Pull amplifier

Unit-V

FET: JFET- Construction, n-channel and p-channel transistors, drain and transfer characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics.
Uni-junction Transistor (UJT): UJT - Principle of operation, characteristics, UJT relaxation oscillator, PNPN Diode and its characteristics,
Thyristors: Silicon controlled rectifier: V-I characteristics, DIAC and TRIAC, Thyristors parameters and applications.

Text Books:
1. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education
2. Sedra and Smith: Microelectronics, Oxford Press.

Reference Books:
1. Solid State Electronic Devices, Ben G. Streetman, Sanjay Bannerjee.
2. Graham Bell: Electronic Devices and Circuits, PHI.
3. Millman and Halkias: Integrated electronics, TMH
4. Donald A Neamen: Electronic Circuits Analysis and Design.
5. Semiconductor Device Fundamentals Robert F. Pierret

LIST OF EXPERIMENTS:
1. To determine and analyze the V-I characteristics of PN Junction diode.
2. To determine and analyze the V-I characteristic of Zener diode and its load regulation capability.
3. To design clipper and clamper circuits.
4. To determine input and output characteristics of transistor amplifiers in CE configurations.
5. To determine input and output characteristics of transistor amplifiers in CC configurations.
6. To determine input and output characteristics of transistor amplifiers in CB configurations.
7. To determine the frequency response of CE amplifier, direct coupled and RC coupled amplifier.
8. To determine Drain and Transfer Characteristics of JFET Amplifier.
9. To determine Drain and Transfer Characteristics of MOSFET Amplifier.
10. To determine characteristics of class A and B power amplifiers.

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SEMESTER III

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS305	CS	Object Oriented Programming	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To explain abstract data types, classes and different types of objects.
2. To distinguish among types of relationships between classes and express the associations diagrammatically.
3. To analyze the public, protected and private modes of inheriting the classes.
4. To demonstrate the overloading of functions and operators to grant them a different meaning.
5. To formulate programs using the concepts of object oriented programming languages.

Course Outcomes:

Upon the completion of the course, students will be able to:

1. Identify and describe the components of object-oriented technology and justify their relevance.
2. Classify and model the relationships/associations that exist between classes and objects.
3. Perform experiments on inheritance by implementing code reusability and polymorphism by overloading the functions as well as operators.
4. Develop programs for real world scenarios using the object oriented approach.

Syllabus:

UNIT I **8 Hrs.**

Abstract data types, Objects and classes, Attributes and Methods, Objects as software units, Encapsulation and Information hiding, Objects instantiations and interactions, Object lifetime, Static and dynamic objects, global and local objects, Metaclass, Modeling the real world objects.

UNIT II **7 Hrs.**

Relationships between classes, Association of objects, Types of Association, Recursive Association, Multiplicities, Navigability, Namedassociation, Aggregation of objects. Types of Aggregation, Delegation, Modeling Association and Aggregation.

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SEMESTER III

UNIT III **8 Hrs.**

Inheritance and Polymorphism, Types of polymorphism, Static and dynamic polymorphism, Operator and Method overloading, Inherited methods, Redefined methods, the protected interface, Abstract methods and classes, Public and protected properties, Private operations, Disinheritance, Multiple inheritance.

UNIT IV **8 Hrs.**

Container Classes, Container types, typical functions and iterator methods, Heterogeneous containers, Persistent objects, stream, and files, Object oriented programming languages.

UNIT V **10 Hrs.**

Study of C++/Java as Object-oriented programming language.

Text Books:

1. David Parsons; Object oriented programming with C++; BPB publication.
2. Object oriented programming in C++ by Robert Lafore: Galgotia.

References:

1. Balagurusamy; "Object oriented programming with C++"; TMH.
2. Herbert Schildt, "Java Complete Reference", McGraw Hill.
3. Hubbard, "Programming in C++ (Schaum)" TMH.
4. Venugopal, "Mastering C++", TMH.

List Of Experiments:

1. Program To Demonstrate Default Arguments.
2. Program To Demonstrate Call By Value.
3. Program To Demonstrate Call By Reference.
4. Program To Demonstrate Call By Address.
5. Program To Demonstrate Classes And Objects.
6. Program To Demonstrate Static Member Function.
7. Program To Demonstrate Constant Member Function.
8. Program To Demonstrate Object As Argument
9. Program To Demonstrate Function Returning An Object.
10. Program To Add Two Distances In Feet And Inch Using Friend Function.
11. Program To Demonstrate A Function Friend Of Two Classes.
12. Program To Demonstrate Friend Class.
13. Program To Demonstrate Different Constructors And Destructor.
14. Program To Demonstrate Constructor With Default Argument.
15. Program To Demonstrate Function Overloading.
16. Program To Demonstrate Function Overriding.

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SEMESTER III

17. Program To Demonstrate Unary Operator Overloading.
18. Program To Demonstrate Binary Operator Overloading.
19. Program To Demonstrate Multiplication Of Postive Numbers Using Single Inheritance.
20. Program To Demonstrate Employee Details Using Multiple Inheritance.
21. Program To Demonstrate Calculation Of Area Of Shapes Using Virtual Function.
22. Program To Demonstrate Student Mark List Using Virtual Base Class.
23. Program To Demonstrate Function Template.
24. Program To Demonstrate Class Template.
25. Program To Demonstrate Sequential File Access.
26. Program To Demonstrate Random File Access.

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BTEC307	EC	Software Lab-1 (PCB Designing)	0	0	0	30	20	0	0	2	1

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Syllabus

Overview and Study of the key features and applications of the software LIVEWIRE & DIPTRACE. Applications of the software in the field of Electronic Circuits and Digital Electronics. Design, Optimization, simulation and verification of Electronic circuits. Realization and verification of various digital electronic circuits. To design PCB for the various Electronics and Digital Circuits.

Experiment List

E.N.	Aim
1.	To Familiarize with Livewire
2.	To Design and Simulate Basic Electronic Circuits
3.	To Familiarize with PCB Wizard
4.	To Design Basic Electronics Circuits PCB
5.	To Familiarize with DipTrace
6.	To Design the Basic Electronic Circuits and PCB Layouts using DipTrace
7.	To Design PCB for Diode Based Circuits
8.	To Design PCB for Transistor Based Circuits
9.	To Design PCB for Digital Gates
10.	To Design PCB for Digital Circuits

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