Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
Bachelor of Technology
(EC, ECIOT, EE, EX, SE, RA, MTX) w.e.f. 2024

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC301	**DCC**	**Advanced Programming Concepts**	60	20	20	30	20	2	0	4	4

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. Understand Java as a dynamic programming language.
2. Learn and apply principles of object-oriented programming paradigm including abstraction, encapsulation, inheritance, and polymorphism.
3. Use advanced programming techniques to solve computing problems.
4. Identify various system libraries.

Course Outcomes (COs):
After completion of this course the students will be able to-
1. Explain the object-oriented concepts.
2. Write programs using object-based programming techniques including classes, objects and inheritance.
3. Demonstrate understanding of Java by implementing test cases.
4. Use the Java SDK environment to create, debug and run Java programs.

Syllabus

UNIT I **9 Hrs.**
Introduction
Review of Object-oriented concepts, Features of Java, Java Environment setup, JVM, JRE and JDK, Java Classes and Objects, Basic syntax, Basic Data Types, Variable Types, Basic Operators, Loop Control, Decision Making, Arrays.

UNIT II **9 Hrs.**
Java Fundamentals
Constructors, Methods and Variables, Method Overloading, Use of this and static keyword in Java, Static and Instance Initializer Blocks, Inner and Nested classes, Wrapper Classes, Auto boxing and Unboxing, Enumerations, Garbage collection.

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UNIT III

Inheritance and Polymorphism **9 Hrs.**

Understanding Inheritance, Types of Inheritance, Use of super keyword in Java, Polymorphism, Types of polymorphism, Method Overloading, Constructor Overloading, Method Overriding, Access Specifier, Packages, Interfaces, Abstract classes.

UNIT IV

Exception Handling and Multithreading **9 Hrs.**

Exceptions and errors, Exception hierarchy: Checked Unchecked exceptions, Types of Exception, Exception Handling using try, catch, finally, throw, throws, User Defined Exceptions.
Understanding Threads, Need of Multi-Threaded Programming, Thread Life cycle, Priorities and scheduling, Thread Synchronization, Inter Communication of Threads, Deadlock.

UNIT V

Java Library **8 Hrs.**

Java String class, String Buffer, String Builder, String Handling. Exploring java.lang, Object class. Exploring java.util package. Exploring java.io package.

Text Books:

1. Herbert Schildt, "Java: The Complete Reference", Eleventh Edition, McGraw-Hill Education, 2018.
2. E Balagurusamy, "Programming with Java: A Primer", Fifth Edition, McGraw Hill Education, 2014.

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BTEC301	**DCC**	**Advanced Programming Concepts**	60	20	20	30	20	2	0	4	4

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References:

1. T. Budd, "Understanding Object-Oriented Programming with Java", 2nd Edition, Pearson Education, 2002.
2. J. Nino, F. A. Hosch, "An Introduction to programming and OO design using Java", John Wiley & Sons, 2002.
3. Y. Daniel Liang, "Introduction to Java programming", 7th edition, Pearson Education, India, 2010.
4. Cay Horetmann, Gary Cornelll, "Core Java 2", Volume II-Advanced Features, 7th Edition by Pearson Education, 2013

List of Experiments:

1. Write a program to show concept of Class in Java.
2. Write a program to show Scope of Variables.
3. Write a program showing Type Casting.
4. Write a program to demonstrate use of different types of constructors
5. Write a program for inheritance.
6. Write a program in java to demonstrate access modifiers in java.
7. Write a program showing different types of Polymorphism.
8. Write a program for Exception Handling in Java.
9. Write a Multithreaded program in Java.
10. Write a program for string handling using different methods.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC302	DCC	Network Analysis and 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):
The objective of this course is -
1. To make the students capable of analyzing given electrical network composed by passive elements and some active elements.
2. 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:
1. Apply the fundamental concepts in solving and analyzing different Electrical networks.
2. Identify 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. Analyze the performance of a particular network from its analysis.

Syllabus

UNIT I **9 Hrs.**

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 **8 Hrs.**

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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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC302	DCC	Network Analysis and Synthesis	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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UNIT III **8 Hrs.**

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 **9 Hrs.**

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

UNIT V **9 Hrs.**

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, 2019.
2. S P Ghosh A K Chakraborty, "Network Analysis &synthesis". Tata McGraw-Hill Education, 7th Edition, 2015.
3. Franklin F. Kuo, "Network analysis and synthesis", Wiley publication, 2nd Edition, 2013.

References:

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.

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BTEC302	DCC	Network Analysis and Synthesis	60	20	20	30	20	3	1	2	5

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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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COURSE CODE	CATE-GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
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BTEC303	DCC	Electronic Measurement and Instrumentation	60	20	20	30	20	3	0	2	4

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***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. Identify the different measurement techniques available for specific engineering applications.
2. Understand the errors in measurements and their rectification.
3. Understand the construction and working of different types of Analog and Digital Instruments.

Course Outcomes (COs):

The students will be able to:

1. Understand the different types of Analog and Digital Instruments.
2. Define the errors and their elimination.
3. Measure different quantities like voltage, current, resistance etc.
4. Understand principle and working of various instruments.
5. Operate different measuring instruments like Multimeter, CRO, DSO, Transducers etc.

Syllabus

UNIT I **9 Hrs.**

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 **8 Hrs.**

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 **9 Hrs.**

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.

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			THEORY			PRACTICAL		L	T	P	CREDITS
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BTEC303	DCC	Electronic Measurement and Instrumentation	60	20	20	30	20	3	0	2	4

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.

UNIT IV **9 Hrs.**

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 **9 Hrs.**

Signal Generators: Sine Wave Generator, Sweep Frequency Generator, Function Generator, Pulse and Square wave Generator,

A/D and D/A Converters: 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., 3rd Edition, 2017.
2. A.K. Sawhney, "Electronic Instrumentation", Dhanapat Rai & Sons, 2016.

References:

1. Albert.D. Helfrick and William. D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Pearson education, 2016.
2. A.J. Bouwens, "Digital Instrumentation", McGraw Hill, 16th reprint 2008.

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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BTEC304	EC	Electronic Devices and Circuits	60	20	20	30	20	3	0	2	4

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***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The objectives of this course are to introduce students with
1. Fundamental electronic devices, e.g. PN junction, BJT, MOSFETs, Op-Amp and Multivibrators.
2. Construction, V-I characteristic, principles of operation, and applications.
3. Standard circuits, and their overall performance.

Course Outcomes (COs):
After completion of this course the students are expected to be able to:
1. Understand the fundamentals of operation of the main semiconductor electronic devices.
2. Analyze the basic parameters of electronic devices, their performance, and limiting factors.
3. Apply the basic principles of electronic device operation for various applications.

Syllabus

UNIT I **8 Hrs.**

PN Junction Diode: PN junction diode in forward and reverse bias, temperature dependence of V-I characteristics, diode resistances, diode junction capacitance, Clipper and Clamper, Zener Diode as voltage regulator.

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.

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BTEC304	EC	Electronic Devices and Circuits	60	20	20	30	20	3	0	2	4

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UNIT II **9 Hrs.**

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.

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, Current Mirror circuits.

UNIT III **8 Hrs.**

FET: 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.

Power Amplifiers: Class A, Class B, Class AB, Class C, Class D, Transformer coupled and Pusf-Pull amplifier.

UNIT IV **7 Hrs.**

Feedback and Oscillator Circuits: Effect of positive and negative feedback, basic feedback topologies and their properties, Sinusoidal Oscillators, Operation of Oscillators, types of Transistor Oscillators, Multivibrators: Monostable and Astable Multivibrator, basic operation of 555 timer.

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BTEC304	EC	Electronic Devices and Circuits	60	20	20	30	20	3	0	2	4

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

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UNIT V **8 Hrs.**

Op Amps: Block diagram of Op-Amp, ideal and practical Op-Amp circuit, Input offset voltage, offset current, Bias Current, thermal drift, Effect of variation in power supply voltage, common mode rejection ratio, Slew rate and its Effect

Linear Applications of Op-Amp: Op-Amp configurations: inverting, non-inverting and differential amplifier configurations, Feedback amplifiers, Voltage follower, Summing amplifier, Integrators and differentiators, Instrumentation amplifier.

Textbooks:

1. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition TMH, 2017.
2. Boylested, R. L. and Nashelsky, L., "Electronic Devices and Circuit Theory", 11th Edition, Pearson Education, 2013.
3. Ramakanth A. Gayakwad, "Op-Amps and Linear [ntegrated Circuits", Pearson, 4th Edition,

References:

Adel S.Sedra, Kenneth C.Smith, Tony Chan Carusone, Vincent Gaudet, " Microelectronic Circuits", Oxford Press, 2020.

DavidA. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford Press, 2008'

3. D. Roy Chowdhury Shail B. Jain " Linear Integrated Circuits", New Age International (P) Ltd, 4th Edition, 2018.

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BTEC304	EC	Electronic Devices and Circuits	60	20	20	30	20	3	0	2	4

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

***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

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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BTEE105	SEC	Basics of MATLAB	0	0	0	30	20	0	0	4	2

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 main objectives are:

1. Understanding the MATLAB environment.
2. Being able to do simple calculations using MATLAB.
3. Being able to carry out simple numerical computations and analyses using MATLAB

Course Outcomes (COs):
Upon completion of the subject, students will be able to:

1. Understand the main features of the MATLAB and basic programming.
2. Design simple algorithms to solve problems.
3. Write simple programs in MATLAB to solve scientific and mathematical problems.
4. Understand the need for simulation/implementation for the verification of mathematical functions.
5. Interpret and visualize simple mathematical functions and operations thereon using plots/display.

Syllabus

UNIT I **9 Hrs.**

MATLAB: An Overview, Brief history of MATLAB, About MATLAB, Installation of MATLAB, help browser, Arranging the desktop, Basic functions of MATLAB, mostly used symbols in MATLAB, debugging in MATLAB; Building MATLAB expressions: MATLAB datatype, command handling, MATLAB basics.

UNIT II **9 Hrs.**

MATLAB Vector and Matrix: Scalar and vector, elementary features in a vector array, matrices, eigen values and eigen vectors, matrix operations, matrix operators, creating matrix arrangement, indexing array value, other operations, mathematical operations on array, array types

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Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. in Electrical Engineering
(Common to EE/EX)
(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEE105	SEC	Basics of MATLAB	0	0	0	30	20	0	0	4	2

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.

UNIT III **6 Hrs.**

Graphics in MATLAB: 2D plots, parametric plots, contour lines and implicit plots, field plots, multiple graphics display function, 3D plots

UNIT IV **8 Hrs.**

MATLAB Programming: Reading and writing data, file handling - Personalized functions - Toolbox structure - MATLAB graphic functions

UNIT V **8 Hrs.**

Introduction to Simulink: Numerical simulations – Simple Models.

Textbooks:

1. Rudra Pratap, Getting Started With MATLAB 7. Oxford University Press, 2006.
2. MATLAB & Its Applications in Engineering By: Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma.

References:

1. A Guide to MATLAB: For Beginners & Experienced Users By: Kevin R. Coombes, John E. Osborn, Garrett J. Stuck.
2. S. Swapna Kumar, S V B Lenina: MATLAB – Esay way of learning, PHI Learning, 2016.
3. Amos Gilat ," An Introduction with Applications ,4ed " , wiley India

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