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 Electronics and Communication
(2023-2027)

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.

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.

Syllabus

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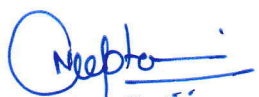### Java Fundamentals   9 Hrs.
Constructors, Methods and Variables, Method Overloading, Use of this and static keyword in Java, Static and Instance Initializer Blocks, Inner and Nested classes, Wrapper Classes, Auto boxing and Unboxing, Enumerations, Garbage collection.

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.

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UNIT IV
Exception Handling
9 Hrs.

Exceptions and errors, Exception hierarchy: Checked Unchecked exceptions, Types of Exception, Exception Handling using try, catch, finally, throw, throws, User Defined Exceptions.

UNIT V
Multithreading
8 Hrs.

Understanding Threads, Need of Multi-Threaded Programming, Thread Life cycle, Priorities and scheduling, Thread Synchronization, Inter Communication of Threads, Deadlock.

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.

References:

1. J. Nino, F. A. Hosch, "An Introduction to programming and OO design using Java", John Wiley & Sons, 2002.
2. Y. Daniel Liang, "Introduction to Java programming", 7th edition, Pearson Education, India, 2010.
3. 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 the 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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Choice Based Credit System (CBCS) in the Light of NEP-2020
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(2021-2025)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
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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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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BTEC302	DCC	Network Analysis and Synthesis	60	20	20	30	20	3	1	2	5

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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.
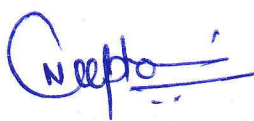
Text Books:
1. M.E. Van Valkenburg, "Network Analysis", Pearson Education India, 3rd Edition, 2019.
2. S P Ghosh A K Chakraborty, "Network Analysis &synthesis". Tata McGraw-Hill Education, 7th Edition, 2015.
3. Franklin F. Kuo, "Network analysis and synthesis", Wiley publication, 2nd Edition, 2013.

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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			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

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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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Name of Program: Bachelor of Technology in Electronics & Communication with Specialization in IOT

SUBJECT CODE	Category	SUBJECT 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*				
BTECIOT 401	EC	Sensors and Signal Conditioning	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):
1. Be able to identify the different sensors available for specific engineering applications
2. Be able to understand the construction and working of different types signal conditioning
3. Understand the various measurement techniques.
4. Understand the errors in measurements and their rectification.

Course Outcomes (COs):
Student will be able to
1. Understand the different types of Sensor.
2. Understand the significance of signal conditioning circuits
3. Sense and analyze different physical parameters.
4. Identify and implement different signal conditioning circuit as per the physical requirement.

Syllabus

UNIT I   10 Hrs.
Introduction to Sensor-Based Measurement Systems
Concepts and Terminology: Measurement systems, Sensors and Actuators, Transducers, Sensor/transducers specifications, Signal conditioning and display, Interfaces, data domains, and conversion, Sensor Classification-Analog and Digital type.

UNIT II   9 Hrs.
Primary Sensors
Temperature sensors: Bimetals, Pressure sensors-U Tube Manometer, Fluid pressure sensor, Strain Gauge as force Sensor, Tactile sensors, Liquid flow sensor- Orifice plate, Turbine meter, Fluid-level sensor.
Materials for Sensor: Conductors, semiconductors, and dielectrics, Magnetic materials, Thick-Film technology, Thin-Film technology, Micromachining technologies.
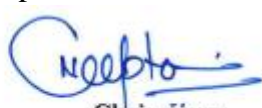
UNIT III   10 Hrs.
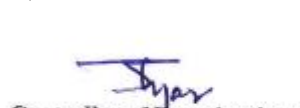**Resistive Sensors**
Resistive Sensors: Potentiometers, Strain Gauges Fundamentals: Piezoresistive effect, types and applications. Resistive Temperature Detectors (RTDs), Thermistors: Models, Thermistor Types and

Application, Magneto-resistors, Light-Dependent Resistors (LDRs), Resistive Hygrometers, Resistive Gas Sensors, Liquid Conductivity Sensors.

UNIT IV   9 Hrs.
Reactance Variation based Sensors
Inductive Sensors: Eddy current proximity sensors, Inductive proximity switch, LVDT, Hall-effect Sensor. Capacitive Sensors: Capacitive element based sensor. Capacitive proximity switch.

Self-Generating Sensors and its Signal Conditioning
Thermoelectric Sensors: Thermocouples, Piezoelectric Sensors, Pyroelectric Sensors, Photovoltaic Sensor, Electrochemical Sensors.

UNIT V   8 Hrs.
Signal Conditioning Devices
Signal Conditioning Operations, Amplification of input signal by using Op-amp, Filtering circuits for Low Pass Filter, High Pass Filter, Protection from high current and high voltage, Wheatstone bridge, Pulse Width Modulation, Data conversion devices- Basic components used in ADCs and DACs, Flash type ADC, Binary Weighted DAC and R-2R ladder type DAC.

Text Books:
1. Ramón Pallás-Areny, John G. Webster, "Sensors and Signal Conditioning", 2nd Edition, John Wiley & Sons, 2012.
2. Walt Kester, "Practical Design Techniques for Sensor Signal Conditioning", Analog Devices, 1999.

References:
1. E.O. Doebelin, D.N. Manik, "Measurement systems", 6th Edition, Tata McGraw Hill, 2012.
2. R. Pallas-Areny and J. G. Webster, "Analog Signal Processing", John Wiley & Sons, 1999.

List of Experiment:
1. To study various Primary sensors.
2. To study RTD for Temperature measurement.
3. To study Strain Gauge for pressure measurement.
4. To study operational characteristics of LVDT for measurement.
5. To study Photovoltaic for sensing light parameter.
6. Case study on Temperature sensing.
7. Case study on light sensing.
8. Case study on Humidity sensing.
9. Case study on Distance measurement.
10. Case study on Proximity Sensors.

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Choice Based Credit System (CBCS) in Light of NEP-2020
B.Tech. EEE All Branches w.e.f. 2024

COURSE-CODE	CATE-GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTEC304	EC	Electronic Devices and Circuits	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):
The objectives of this course are to introduce students to:
1. Fundamental electronic devices, e.g. PN junction, BJT, MOSFETs, Op-Amp and Multivibrators.
2. Construction, V-I characteristics, 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.

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.

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.

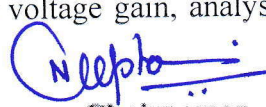## UNIT III   8 Hrs.
FET: Construction, n-channel and p-channel transistors, drain and transfer characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement

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and Depletion MOSFET drain and transfer Characteristics.

Power Amplifiers: Class A, Class B, Class AB, Class C, Class D, Transformer coupled and Push-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.

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.
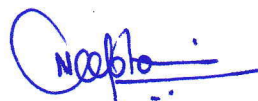
Textbooks:
1. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition TMH, 2017.
2. Boylested, R. L. and Nashelsky, L., "Electronic Devices and Circuit Theory", 11th Edition, Pearson Education, 2013.
3. Ramakanth A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson India, 4th Edition, 2021.

References:
1. Adel S. Sedra, Kenneth C. Smith, Tony Chan Carusone, Vincent Gaudet, " Microelectronic Circuits", Oxford Press, 2020.
2. David A. 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.

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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Common to EC-IOT/RA/RA-AI/EC-VLSI/MX/EE/EX
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COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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BTEC308		Design Lab	-	-	-	30	20	0	0	4	2

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Course Educational Objectives (CEOs)

By the end of this lab, students will:
1. Acquire fundamental skills in schematic entry and PCB layout design using DipTrace.
2. Understand the architecture and functional components of Arduino Uno.
3. Develop practical expertise in PCB fabrication, assembly, soldering, and testing.
4. Apply PCB design and Arduino programming knowledge to build and validate embedded system projects.

Course Outcomes (COs)

After successfully completing the course, students will be able to:
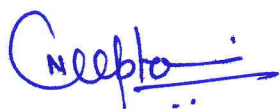1. Design and verify schematics in DipTrace with ERC and convert them into PCB layouts.
2. Perform DRC, modify design parameters, and generate PCB outputs for fabrication.
3. Fabricate, assemble, solder, and test Arduino Uno Board.
4. Integrate Arduino hardware and software to implement and validate simple embedded projects.

List of Experiments:

1. To Familiarize with DipTrace.
2. Study of Arduino Uno Components and Circuit Blocks.
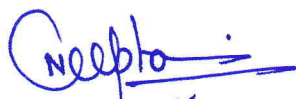3. Schematic creation of Arduino Uno in DipTrace.

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BTEC308		Design Lab	-	-	-	30	20	0	0	4	2

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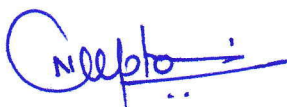
4. Electrical Rule Check (ERC) and Netlist Verification.
5. PCB layout creation using Arrangement, Placement & Routing for Single-Side PCB.
6. Design Rule Check (DRC) and Editing Trace Widths/Pad Sizes.
7. Printing of PCB layout and transfer it onto PCB board.
8. PCB Etching and Drilling for components.
9. Component mounting and Soldering on PCB Board.
10. Testing of Arduino board.

References:

1. DipTrace Tutorial available at- https://diptrace.com/support/tutorials/
2. Arduino Board info available at- https://www.arduino.cc/