# Shri VaishnavVidyapeethVishwavidyalaya, Indore
## Shri Vaishnav Institute of Technology and Science
## Choice Based Credit System (CBCS) in the Light of NEP-2020
## B.Tech. (EC/EE/EI/EX/ECIOT/RA)
## (2021-2025)

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

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**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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**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 | DCC | Electronic Devices and Circuits | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 2 | 5 |

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**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** **9 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 clampers, 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.

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**UNIT III** **9 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 Push-Pull amplifier

**UNIT IV** **9 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** **9 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.

**Text Books:**


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, 4th Edition, 2015.


**References:**


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


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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, CC and CB configurations.
5. To determine the frequency response of CE amplifier, direct coupled and RC coupled amplifier.
6. To determine Drain and Transfer Characteristics of JFET.
7. To determine Drain and Transfer Characteristics of MOSFET Amplifier.
8. To determine characteristics of class A and B power amplifiers.
9. Measurements of Op-Amp parameters- CMRR, slew rate, open loop gain.
10. To develop an understanding of Inverting and non-inverting Op-Amp.
11. To analyze the characteristics of Integrator and Differentiator.
12. To analyze the working of Multivibrators.

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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 Electronics and Communication (Internet of Things)
## (2021-2025)

| COURSE CODE | CATE-GORY | COURSE NAME | TEACHING &EVALUATION SCHEME | | | | | | | | |
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| BTECIOT301 | DCC | Introduction to IOT and Embedded Systems | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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**Course Educational Objectives (CEOs):**
This course deals with Introduction of Embedded system and various aspects such as devices, platform and Technologies of Internet of Things (IOT).

**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. Understand the basics of Embedded System and IOT.
2. Get the knowledge of various IOT Devices and Technologies.
3. Understand the concepts of various IOT platforms, its barriers and Applications.

**Syllabus**

**UNIT I** **8 Hrs.**
**Background:** Background and Introduction of Embedded system, Basic Embedded System and its architecture, Major Application area and purpose of Embedded System, concepts of IOT and Basic Architecture of IOT.

**UNIT II** **9 Hrs.**
**IOT Devices:** various types of Amplifiers, Commonly used amplifier ICs, Analog to Digital converter (ADC) and Digital to Analog converter (DAC), Relays, Display, Switches, Actuators, overview of various sensors such as Light, Temperature, Weight, Gas sensor, Ultra Sonic, Light (LDR, Photo Diode)

**UNIT III** **9 Hrs.**
**IOT Technologies**: GPS, GSM, GPRS, RFID, Bluetooth, Zigbee, Introduction to Arduino and Raspberry-Pi.

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## (2021-2025)

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**UNIT IV** **9 Hrs.**

**IOT Platforms:** Wearable, Embedded, Cloud. Internet & Networking: Knowledge of networking, IP address, MAC address, routers, servers, cloud, client, webpage.

**UNIT V** **10 Hrs.**

**Application of IOT:** IOT Adoption barrier: Complexity, Security, Privacy & Trust. Networks and Communication, Overview of serial communication, Processes, Data Management, Device Level Energy Issues, IoT Related Standardization.

**Text Books:**


1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",1st Edition, Apress Publications, 2013


**References:**


1. Shibu K. V., "Introduction to Embedded Systems", TMH, 2009.
2. John Vetelino, Aravind Reghu, Introduction to Sensors, 1st edition, CRC Press, 2010.


**List of Experiments:**

1. Identify embedded systems features
2. Identify components, concepts and design methodologies
3. Interpret data-sheets, documentation and specifications
4. Design, build and troubleshoot an embedded system
5. Practice on modelling, analysis and design of embedded systems.
6. Practice on real-time programming and operating systems
7. Evaluate system performance.

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| COURSE CODE | CATE-GORY | COURSE NAME | TEACHING &EVALUATION SCHEME | | | | | | | | |
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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* | | | | |
| **BTEC307** | **SEC** | **PCB Designing Lab** | 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.

**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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