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Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. (EC/ECIOT)
(2021-2025)

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	3	0	4	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. Understand principles of object-oriented programming paradigm including abstraction, encapsulation, inheritance, and polymorphism.
2. Understand Java as a dynamic programming language.
3. Solve computing problems using advanced programming techniques.
4. Apply various system libraries for problem solving.

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. Create, debug, and run Java programs using the Java SDK environment.

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, Autoboxing 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", 11th Edition, McGraw-Hill Education, 2018.
2. E Balagurusamy, "Programming with Java: A Primer", 6th Edition, McGraw Hill Education, 2019.

References:

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

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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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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

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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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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BTEC304	DCC	Electronic Devices and 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 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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BTEC304	DCC	Electronic Devices and Circuits	60	20	20	30	20	3	1	2	5

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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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							THEORY			PRACTICAL	
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BTEE307	DCC	Electrical Instrumentation	3	0	2	4	60	20	20	30	20

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):

1. To enable the students to learn in detail about the various instruments available for monitoring/measuring electrical parameters encountered in domestic / industrial applications.
2. To introduce the fundamental concepts of electrical instrumentation.

Course Outcomes (COs):

1. To test and calibrate ammeter, voltmeter, wattmeter and energy meter.
2. Learn the measurement of magnetic parameters.
3. Understand the operating principles of energy and power meters.
4. Measure low, medium & high Resistances using suitable bridges.
5. To select proper instrument for measurement various electrical elements

Syllabus

UNIT I **9 Hrs.**

Introduction: SI units, static and dynamic characteristics of electrical instruments, measurement and error, accuracy and precision, sensitivity resolution, error & error analysis, effect of temperature, internal friction, stray field, hysteresis and frequency variation & method of minimizing them, loading effects, due to shunt connected and series connected instruments, testing & calibration of instruments.

Galvanometers: Galvanometer equation dc and ac measurement, theory & operation of D'arsonal galvanometer, ballistic galvanometer and vibration galvanometer, definition of analog & digital instruments, classification of analog instruments, their operating principle, operating force, types of supports, damping, controlling.

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BTEE307	DCC	Electrical Instrumentation	3	0	2	4	60	20	20	30	20

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UNIT II **9 Hrs.**

Ammeters and Voltmeters: PMMC, moving iron, electrostatic meter, hotwire, rectifier and, electrodynamometer ,expression for control & deflection torque, their advantages, disadvantages & error, extension of range of instruments using shunt & multiplier.

Wattmeters: Electrodynamometer and induction wattmeters, construction, theory, operation, errors and their compensation, measurement of power in three phase circuit, one, two & three wattmeter method, low power factor & UPF wattmeter, measurement of reactive power, double element and three element dynamometer wattmeter.

UNIT III **9 Hrs.**

Energy Meters: Single phase induction type energy meter –construction & operation, driving and braking torques, calibration devices, errors and their compensation, polyphase energy meter, Testing by phantom loading, Smart energy meter -construction, operation and advantages. Prepaid meter.

Special Meters: Maximum demand indicator, bi-vector and Tri-vector meter, power factor and Frequency meter –Vibrating reed, Resonance type & Weston type, synchronoscope.

UNIT IV **9 Hrs.**

Resistance Measurement: Classification of resistance, measurement of low, medium and high resistances, voltmeter and ammeter method, Wheatstone bridge, Kelvin's double bridge & loss of charge methods for resistance measurement, Ohmmeter –series & shunt type, multi-meter, Megger, earth resistance measurement.

Potentiometer: DC potentiometer, application of DC potentiometer, AC polar type and coordinate type potentiometer, their construction and applications.

UNIT V **8 Hrs.**

Instrument Transformers: Potential and current transformers, construction, phasor diagrams, ratio and phase angle errors, difference between CT and PT, errors and reduction of errors, testing of instrument transformers.

Magnetic Measurements: Magnetic Measurement –B-H Curve, Hysteresis Loop determination.

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BTEE307	DCC	Electrical Instrumentation	3	0	2	4	60	20	20	30	20

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Textbooks:

1. Golding E. W. and Widdis F. C., "Electrical Measurements and Measuring Instruments", 5th Ed., A.H. Wheeler and Company,1994
2. A.K. Sawhney "A course in Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co.,2012
3. K. S. K. Weranga and D. P. Chandima "Smart Metering Design and Applications" Springer,2014

References:

1. Helfrick and Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 1988.
2. Jones, B.E., "Instrumentation Measurement and Feedback", Tata McGraw-Hill, 1986.
3. Golding, E.W., "Electrical Measurement and Measuring Instruments", 3rd Edition, Sir Issac Pitman and Sons, 1960.

List of Experiments:

1. Measurement of low resistance using Kelvin's Double bridge
2. Measurement of medium resistance using Whetstone's bridge
3. Measurement of high resistance by loss of charge method
4. Measurement of Insulation resistance using Megger
5. Measurement of earth resistance by fall of potential method and verification by using earth tester
6. Measurement of power in a single phase ac circuit by three voltmeter/ three Ammeter method
7. Calibration of a dynamometer type of wattmeter with respect to a standard/Sub Standard wattmeter
8. Calibration of single phase digital/ Electronic type energy meter.
9. Calibration of a dynamometer type of wattmeter by Phantom Loading method.
10. Measurements using Instrument Transformers.
11. Study of various types of Indicating Instruments.
12. Measurement of Power in three phase circuit by one, two & three wattmeters.

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B.Tech.(EC/ECIOT/RA)
(2021-2025)

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*				
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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