Scheme & Syllabus of UG

Engineering Program

Bachelor of Technology

(B.Tech.)

Electronics & Communication Engineering

2022-23

IPS ACADEMY

INSTITUTE OF ENGINEERING & SCIENCE, INDORE

(A UGC Autonomous Institute affiliated to RGPV)

IPS Academy, Institute of Engineering & Science, Indore

(A UGC Autonomous Institute, Affiliated to RGPV)

Scheme Based on AICTE Flexible Curriculum

Department of Electronics & Communication Engineering

Bachelor of Technology (B.Tech.) III Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	BSC-MA04(A)	BSC	Numerical Method & Transform Calculus	60	25	15	-	-	100	2	1	-	3
2.	PCC-EC01	PCC	Electronic Devices	60	25	15	-	-	100	2	1	-	3
3.	PCC-EC02	PCC	Digital System Design	60	25	15	-	-	100	2	1	-	3
4.	PCC-EC03	PCC	Electronic Measurement and Instrumentation	60	25	15	-	-	100	3	-	-	3
5.	PCC-EC04	PCC	Network Analysis	60	25	15			100	2	1	-	3
6.	HSMC-HS03	HSMC	Innovation and Creativity	-	-	-	-	100	100	-	-	2	1
7.	LC-EC01 (P)	LC	Electronic Devices Lab	-	-	-	60	40	100	-	-	2	1
8.	LC-EC02 (P)	LC	Digital System Design Lab	-	-	-	60	40	100	-	-	2	1
9.	LC-EC03 (P)	LC	Electronic Measurement and Instrumentation Lab	-	-	-	60	40	100	-	-	2	1
10.	SBC-EC02 (P)	SBC	Electronics Workshop-I (Circuit Simulation and Design) Lab	-	-	-	60	40	100	-	-	4	2
11.	MLC01	MLC	Professional Laws, Ethics, Gender, Human Values and Harmony	-	-	-	-	-	-	1	-	-	Audit
				300	125	75	240	260	1000	12	4	12	21

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

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Department of Electronics & Communication Engineering

BSC-MA04(A)	Numerical Methods & Transform Calculus	2L:1T:0P (04hrs)	Credits:03

Prerequisite(s): Basic Mathematics

Course Objective: The objective of this course is to serve the potential engineers with techniques of numerical mathematics, Transform calculus, Fourier series and their applications. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Module 1 **(06 hrs)**

Fourier series: Fourier series and its types, Periodic functions and its Fourier series with spectrum analysis, Fourier series for even and odd functions, , Perceval's identity, Complex form of Fourier series.

Module 2 **(06 hrs)**

Fourier Transform: Definition and properties of Fourier transformation, Convolution of Fourier transformation, Fourier transformation on function spaces, solution of ordinary and partial differential equation by Fourier transformation.

Module 3 **(07 hrs)**

Laplace Transform: Properties of Laplace transform, Laplace transform of periodic functions, Finding inverse Laplace transform by different methods, Convolution theorem, Evaluation of integrals by Laplace transforms, Solution of ODEs by Laplace transform method.

Module 4 **(06 hrs)**

Z transform - Definition and its properties, Convolution theorem, Z transform: impulse, unit step, ramp, sine and cosine functions etc. Region of Convergence (RoC) and properties of RoC,relation between S plane and Z plane, Inverse Z transform.

Module 5 **(07 hrs)**

Numerical Methods- Solution of algebraic and transcendental equations: Newton-Raphson method and Regula-Falsi method, Finite differences, Interpolation using Newton's forward and backward difference formulae, Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae, Inverse interpolation by Lagrange's method.

Course Outcomes: After successful completion of course students will be able to:

CO1: Apply the basic concepts of Fourier series in real world engineering problems.

CO2: Interpret and apply the concepts of Fourier transform in engineering problems.

CO3: Apply the Laplace transform for the analysis of engineering problems.

CO4: Interpret and apply the concepts of Z transform in engineering problems.

CO5: Illustrate numerical methods for the solutions of algebraic and transcendental equations.

Textbooks/ References:

(i) Dr Sanjay Sharma "A Textbook of Signals & Systems", Kataria Publications
(ii) A. Anand Kumar "Signals and Systems", PHI Publications.
(iii) R. J. Beerends "Fourier and Laplace Transforms", Cambridge University Press, 2003.
(iv) Chandrika Prasad and Reena Garg "Advanced Engineering Mathematics", Khanna Publishing, 2018.

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Department of Electronics & Communication Engineering

PCC-EC01	Electronic Devices	2L: 1T: 0P (03hrs)	Credits:03

Recommended Prerequisite: Engineering Mathematics, Engineering Physics

Course Objective: To acquaint the students with construction theory and characteristics of electronic devices, Analyze BJT in different types of configurations such as CC, CE, CB with their applications and limitations, To design and analyze Power Amplifiers like Class A, Class B and Class AB, To know FET, MOSFET and UJT with their construction, characteristics, To understand Feedback Amplifier, Oscillators and introduction to IC

Module 1 **(08 hrs)**

Theory of PN juction, breakdown mechanism (Rectifying Diodes, Zener Diodes), Metal Semiconductor Junction. Special diodes: Tunnel diodes, Varactor diodes, Schottky diode, Photo diodes, Photodetector, LED, solar cell, Design of voltage regulator using Zener diode. Diode circuits: Ideal and Practical diode, Clipper, Clamper. Power Supply: Rectifiers-Half wave, Full wave, Bridge rectifier, filter circuits, Voltage regulation using shunt & series regulator circuits, Voltage regulation using IC,Design of power supply

Module 2 **(08 hrs)**

Fundamentals of BJT: 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. 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, Design of Audio amplifier.

Module 3 **(08 hrs)**

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 cascode 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.

Module 4 **(08 hrs)**

FET construction- JFET: Construction, n-channel and p-channel, transfer and drain 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) and Thyristors: UJT: Principle of operation, characteristics, UJT relaxation oscillator.

Module 5 **(08 hrs)**

Feedback Amplifier and Oscillators: Concept of feedback and their types, Amplifier with negative feedback and its advantages. Feedback Topologies.

Oscillators: Concept of Positive feedback, Classification of Oscillators, Barkhausen criterion, Types of oscillators: RC oscillator, RC Phase Shift, Wien Bridge Oscillators. LC Oscillator: Hartley, Colpitt's, Clapp and Crystal oscillator.

Introduction to integrated circuits: Advantages and characteristic parameters of IC's, basic building components, data sheets.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Illustrate and Review Fundamentals of diode and to analyze different types of diodes with their characteristics and their applications such as clipper, clamper and rectifier circuits.
2. Illustrate and Analyze BJT in different types of configurations such as CC, CE, CB with their applications and limitations.
3. Illustrate and Design and analyze Power Amplifiers like Class A, Class B and Class AB.
4. Illustrate and Analyze FET, MOSFET and UJT with their construction, characteristics etc.
5. Illustrate and Analyze Feedback Amplifier, Oscillators and introduction to ICs.

Text/Reference Books:

1. Millman & Halkias, "Electronic Devices and Circuits", 4th edition, TMH. 2015
2. Salivahanan, Kumar & Vallavaraj, "Electronic Devices And Circuits", 3rd edition, TMH, 2012
3. Boylestad & Neshelsky, "Electronic Devices & Circuits", 11th edition, PHI, 2015.
4. Schilling & Belove, "Electronic Circuits, Discrete & Integrated", TMH, 2009.
5. Chattopadhyay & Rakhshit, "Electronic Fundamentals & Applications", Two colour edition, New Age, 2018
6. Adel S. Sedra & Kenneth C. Smith, "Microelectronic Circuits", 6th edition, OUP, 2015.
7. R. A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 11th edition, PHI, 2015
8. Theodore F. Bogart, Jeffrey S. Beasley, Guillermo Rico, "Electronic Devices & Circuits", 6th edition, Pearson/Prentice Hall, 2004.
9. Allen Mottershead, "Electronic Devices & Circuits", 1st edition, Prentice Hall, 2013.

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Department of Electronics & Communication Engineering

PCC-EC02	Digital System Design	2L: 1T: 0P (03hrs)	Credits:03

Recommended Prerequisite: Engineering Physics, Electronic Devices

Course Objective: To acquire the basic knowledge of digital logic levels and application of digital electronics circuits. To impart how to design Digital Circuits. To understand the basic software tools for the design and implementation of digital circuits and systems.

Module 1 **(10 hrs)**

Review of Number Systems, Codes-BCD, Excess- 3, Gray Reflected ASCII, EBCDIC, review of Logic gates and binary operations, Implementations of Logic Functions using gates, NAND–NOR implementations. Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality, Boolean function, Canonical and standard forms, Minimization of Boolean functions, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization, Quine-McCluskey method of minimization.

Module 2 **(08 hrs)**

Combinational logic circuits: Adder, subtractor Carry Look Ahead adder, BCD adder, Binary Multiplier, Multiplexer/De-multiplexer, decoder/encoder, code converters, designing of combinational Circuits, Races, Hazards.

Module 3 **(08 hrs)**

Flip- Flop & its types like RS, JK, D & T, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits, Asynchronous and Synchronous counters, Registers.

Module 4 **(08 hrs)**

Logic Families and its Specifications: TTL, ECL, CMOS, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices, PLDs, Memories ROM. Introduction to digital ICs & data sheets.

Module 5 **(06 hrs)**

Digital hardware description methodology, HDL, different modeling in VHDL, VHDL construct and codes for combinational and sequential Circuits.

Assessment: Mid Term tests, Assignments, Tutorial, Quiz and End semester exams.

Course Outcomes:

Students earned credits will develop ability to:

1. Illustrate basic postulates of Boolean algebra. To design Boolean functions by applying the methods for simplifying Boolean expressions.
2. Illustrate fundamental concepts and design of digital combinational circuits.
3. Illustrate the basic methods for the design of sequential circuits.
4. Illustrate the operation of Logic families and analyze and design of programmable logic devices
5. Design and simulate the Logic circuits using HDL and appropriate EDA tool.

Text /Reference Books:

1. R. P. Jain, "Modern digital Electronics", 4th edition, Tata McGraw Hill, 2009.
2. W. H. Gothmann, "Digital Electronics- An introduction to theory and practice", 2nd edition, PHI, 2006.
3. D. V. Hall, "Digital Circuit and System", Tata McGraw Hill, 1989.
4. S. Salivahanan & S. Arivazhagan, "Digital Circuits and Design", Vikas Publishing.
5. M. Morris Mano, "Digital Logic and Computer Design", 1st edition, Pearson India Education, 2012.
6. Douglas Perry, "VHDL Programming by example", 1st edition, McGraw Hill, 2002.
7. J. Bhaskar, "VHDL: Primer", 3rd edition, PTR Prentice Hall, 1999.

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PCC-EC03	Electronic Measurements & Instrumentation	3L: 0T: 0P (03hrs)	Credits:03

Recommended Prerequisite: Engineering Mathematics, Engineering Physic

Course Objective: This course is electronics based course dealing with measurements and instrumentation designed for students. The objectives of this course are to introduce students to the use of various electrical/electronic instruments, their construction, applications, and principles of operation, standards and units of measurements and provide students with opportunities to develop basic skills in the design of electronic equipments.

Module 1 **(08 hrs)**

Measurement and their techniques, Static and Dynamics Characteristics of Instruments and measurement systems, Static and Dynamics Error, DC and AC Ammeter, DC Voltmeter- Chopper type and solid state, AC voltmeter using Rectifier. Average, RMS, Peak responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.

Module 2 **(08 hrs)**

CRO: Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration. Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs- Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital) Oscilloscope, Digital display system and indicators, Classification of Displays, Display devices: Light Emitting diodes (LED) and Liquid Crystal Display (LCD), 7 Segment Display.

Module 3 **(08 hrs)**

(Transducer): Classification of Transducers, Strain gauge, Displacement Transducer Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer- Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor.

Bridges: Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge, Wein bridge. Impedance measurement by Q meter

Module 4 **(07 hrs)**

Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) and Analog-to digital Conversion (ADC), Resolution and sensitivity of digital multi-meter. Signal and Function Generators, Beat Frequency Oscillator, Signal Analyzer, Vector Analyzer.

Module 5 **(07 hrs)**

Classification of biomedical instruments, Components of Medical Instrumentation System: Bio amplifier, Blood Pressure measurement, Cardiac Pacemakers, Oximeter, Basic principles of ventilators, Introduction to ECG, EEG and EMG.

Assessment: Mid-term test, Assignment, Quiz and End semester exam.

Course outcomes:

Students earning credits will develop ability to:

1. Understand dynamics characteristics of instruments and measurement systems.
2. Analyze and measure amplitude, frequency, phase and other parameter of the various test signals using oscilloscope.
3. Illustrate the physical parameter by using transducer.
4. Apply and design various operations for analog to digital and digital to analog conversions.
5. Analyze and understanding of principles & design of monitoring instruments like ECG, EEG, EMG

Text/Reference Books:

1. H.S. Kalsi, "Electronics Instrumentation", 2nd Edition, TMH, 2004.
2. A.K. Sawhney, P. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", 2nd Edition, Dhanpat Rai & Co. 2012.
3. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Edition, Prentice Hall, 1994.
4. Kularatna, N, "Modern Electronic Test and Measuring Instruments", 2nd Edition, IEE, London, 1996.
5. A. D. Helfrick and W. D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 2nd Edition, PHI Learning Press, 2008.
6. John G. Webster, "Medical Instrumentation: Application and design", 3rd Edition, John Wiley, 2012.
7. Khandpur R.S, "Hand-book of Biomedical Instrumentation", 2nd Edition, Tata McGraw Hill, 2003.

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Department of Electronics & Communication Engineering

PCC-EC04	Network Analysis	2L: 1T: 0P (03 hrs.)	Credits:03

Recommended Prerequisite: Engineering Mathematics, Fundamental of Electrical circuits.

Course Objective: To make the students understand the fundamental concepts and theories about networks. Apply this knowledge to solve real-world, network-centric problems. Use advanced network analysis methods and tools to visualize and analyze networks.

Module 1 **(06 hrs)**

Introduction to circuit theory: basic circuit element R, L, C and their characteristics in terms of linearity & time dependent nature, voltage & current sources, controlled & uncontrolled sources KCL and KVL analysis, nodal & mesh analysis, analysis of magnetically coupled circuits. Dot convention.

Module 2 **(8 hrs)**

Network Theorems: Thevenin's & Norton's, Superposition's, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources. Design the network and verify the output of the network by applying the different-different theorems.

Module 3 **(10 hrs)**

Transient analysis: Transients in RL, RC & RLC Circuits, initial & final conditions, time constants. Steady state analysis Laplace transform: solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain.

Module 4 **(08 hrs)**

Two port parameters: Z, Y, ABCD-Transmission parameters, Hybrid parameters, their inverse & image parameters, relationship between parameters.

Module 5 **(08 hrs)**

Network Graph theory: Concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability 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. Analyze the circuits in steady state and transient state and evaluate the response.
4. Apply mathematics in analyzing and synthesizing the networks in time and frequency domain.
5. Estimate the performance of a particular network from its analysis.

Text/Reference Books:

1. M. E. Van Valkenburg, "Network Analysis", 3th edition, Pearson Education. 2014.
2. Franklin F. Kuo, "Network Analysis and Synthesis", 2th edition, John Wiley & Sons, 2006.
3. J. David Irwin, "Engineering Circuit Analysis", 10th edition, Wiley India. 2013.
4. Pankaj Swarnkar, "Network Analysis and Synthesis", 9th edition, Satya Prakashan, New delhi, 2015.
5. A. Sudhakar, Shyammohan S Palli, "Network Analysis & Synthesis", 3th edition MGH, 2009.
6. William Hayt and Jack E. Kemmerly, "Engineering circuit analysis", 6th edition, MGH, 2016.

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Department of Electronics & Communication Engineering

HSMC- HS03	Innovation and Creativity	1L: 0T: 0P (01 hrs)	Credits:01

Pre requisite(s): Nil

Course Objectives:

1. To give an insight into creativity and innovation
2. To develop an appreciation for innovation among students, and
3. To enhance sensitivity to creativity and innovation

Module 1 **(06 hrs)**

Meaning and concept of creativity, Process, Nature and characteristics of creativity, Factors affecting creativity.

Module 2 **(06 hrs)**

Difference between Invention & Innovation, Importance & Principles of Innovation, Process of Innovation, Domain wise Innovations, How to safe guard innovations.

Module 3 **(06 hrs)**

Traditional V/s Creative Thinking, Individual Creativity Techniques: Meditation, Self-Awareness, & Creative Focus Group Creative Techniques: Brain Storming, off The Wall Thinking.

Module 4 **(06 hrs)**

Evaluation of Effectiveness of Innovation- Legal Aspects like IPR, patent filing, copyright, Patenting Procedures, Design patents etc.

Module 5 **(06 hrs)**

Concept, Scope, Characteristics, Evolution of Innovation Management, Significance, Factors Influencing Innovation. Organizational Aspects- Economic Aspects like venture capital, angel investors.

Case Studies on Innovation business ideas i.e. RedBus, Flipcart, Ola, Big Basket, Patented products, Chemical products and Materials, special patents of procedures.

Course Outcomes:

After completion of the course the student will be able to

1. Analyze creativity concepts and principles & process for problem solving.
2. Understand innovation & apply creativity for innovation.
3. Understand innovative products or services.
4. Apply design thinking tools techniques for IPR.
5. Understand the concept of Innovation Management.

Text /Reference Books:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking", Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly, 2017.
3. Michael G. Luchs, Scott Swan, Abbie Griffin, "Design Thinking – New Product Essentials from

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Department of Electronics & Communication Engineering

LC-EC01(P)	Electronic Devices Lab	0L: 0T: 2P (02hrs)	Credits:01

Recommended Prerequisite: Engineering Mathematics, Engineering Physics

Course Objective: To acquaint the students with construction theory and characteristics of electronic devices, Analyze BJT in different types of configurations such as CC, CE, CB with their applications and limitations, to design and analyze Power Amplifiers like Class A, Class B and Class AB, to know FET, MOSFET and UJT with their construction, characteristics, To understand Feedback Amplifier, Oscillators and introduction to IC

List of Experiments:

1. To study and implement V-I characteristics of Silicon Diode. (Installation and Analysis)
2. To study and implement V-I characteristics of Germanium Diode.
3. To study and implement Zener diode Voltage regulator.
4. To study and implement Half wave rectification.
5. To study and implement Full wave rectification.
6. To study and implement Capacitive rectification for half wave rectifier.
7. To study and implement Capacitive rectification for full wave rectifier.
8. To design a power supply.
9. To study and implement BJT common emitter Characteristics.
10. To study and implement BJT common base Characteristics.
11. To study and implement Analysis of BJT CE amplifier.
12. To plot the Characteristics curve of various clipper circuits.
13. To plot the Characteristics curve of various clamper circuits.

    Also simulate all experiments using Tina Pro/E-Sim software.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Illustrate and Review Fundamentals of diode and to analyze different types of diodes with their characteristics and their applications such as clipper, clamper and rectifier circuits.
2. Illustrate and Analyze BJT in different types of configurations such as CC, CE, CB with their applications and limitations.
3. Illustrate and Design and analyze Power Amplifiers like Class A, Class B and Class AB.
4. Illustrate and Analyze FET, MOSFET and UJT with their construction, characteristics etc.
5. Illustrate and Analyze Feedback Amplifier, Oscillators and introduction to ICs.

Text/Reference Books:

1. Millman & Halkias, “Electronic Devices and Circuits”, 4th edition, TMH. 2015

2. Salivahanan, Kumar & Vallavaraj, "Electronic Devices And Circuits", 3rd edition, TMH, 2012
3. Boylestad & Neshelsky, "Electronic Devices & Circuits", 11th edition, PHI, 2015.
4. Schilling & Belove, "Electronic Circuits, Discrete & Integrated", TMH, 2009.
5. Chattopadhyay & Rakhshit, "Electronic Fundamentals & Applications", Two colour edition, New Age, 2018
6. Adel S. Sedra & Kenneth C. Smith, "Microelectronic Circuits", 6th edition, OUP, 2015.
7. R. A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 11th edition, PHI, 2015
8. Theodore F. Bogart, Jeffrey S. Beasley, Guillermo Rico, "Electronic Devices & Circuits", 6th edition, Pearson/Prentice Hall, 2004.
9. Allen Mottershead, "Electronic Devices & Circuits", 1st edition, Prentice Hall, 2013.

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Department of Electronics & Communication Engineering

LC-EC02	Digital System Design Lab	0L: 0T: 2P (02hrs)	Credits:01

Recommended Prerequisite: Engineering Physics, Electronic Devices

Course Objective: To acquire the basic knowledge of digital logic levels and application of digital electronics circuits. To impart how to design Digital Circuits. To understand the basic software tools for the design and implementation of digital circuits and systems.

List of Experiments:

1. Design and implement half Adder and half Subtractor.
2. Design and implement Multiplexer, De-multiplexer.
3. Design and implement BCD to Gray Code converters.
4. Design and implement Encoder, Decoder.
5. Design and implement a Shift Registers.
6. Design and implement a modulo-4 Asynchronous counter.
7. Design and implement a modulo-8 Synchronous counter.
8. Design and simulate full Adder and full Subtractor.
9. Design and simulate a Boolean function using multiplexer.
10. Design and simulate BCD to Excess-3 Code convertor.
11. Design and simulate a modulo-10 Asynchronous counter.
12. Design and simulate a modulo-12 Synchronous Counter.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course Outcomes:

Students earned credits will develop ability to:

1. Illustrate basic postulates of Boolean algebra. To design Boolean functions by applying the methods for simplifying Boolean expressions.
2. Illustrate fundamental concepts and design of digital combinational circuits.
3. Illustrate the basic methods for the design of sequential circuits.
4. Illustrate the operation of Logic families and analyze and design of programmable logic devices
5. Design and simulate the Logic circuits using HDL and appropriate EDA tool.

Text /Reference Books:

1. R. P. Jain, “Modern digital Electronics”, 4th edition, Tata McGraw Hill, 2009.
2. W. H. Gothmann, “Digital Electronics- An introduction to theory and practice”, 2nd edition, PHI, 2006.
3. D. V. Hall, “Digital Circuit and System”, Tata McGraw Hill, 1989.
4. S. Salivahanan & S. Arivazhagan, “Digital Circuits and Design”, Vikas Publishing.

5. M. Morris Mano, "Digital Logic and Computer Design", 1st edition, Pearson India Education, 2012.
6. Douglas Perry, "VHDL Programming by example", 1st edition, McGraw Hill, 2002.
7. J. Bhaskar, "VHDL: Primer", 3rd edition, PTR Prentice Hall, 1999.

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Department of Electronics & Communication Engineering

LC-EC03	Electronic Measurements & Instrumentation Lab	0L: 0T: 2P (02hrs)	Credits:01

Recommended Prerequisite: Engineering Mathematics, Engineering Physic

Course Objective: This course is electronics based course dealing with measurements and instrumentation designed for students. The objectives of this course are to introduce students to the use of various electrical/electronic instruments, their construction, applications, and principles of operation, standards and units of measurements and provide students with opportunities to develop basic skills in the design of electronic equipments.

List of Experiments:

1. To perform & analysis the basic operations of Digital Multimeter.
2. To perform & analysis the basic operations of Function Generator.
3. To perform & analysis Hay's Bridge for self-inductance L.
4. To perform & analysis Wien's Bridge for unknown frequency.
5. To perform & analysis De Sauty's Bridge for unknown capacitor.
6. To perform & analysis Characteristics of NTC Thermistor.
7. To perform & analysis voltage and frequency of unknown signals using CRO.
8. To perform & analysis measurement of displacement using LVDT.
9. To perform & analysis Analog to Digital converter.
10. To perform & analysis Digital to Analog converter.
11. To perform and analyze the operation of Hartley Oscillator.
12. To perform and analyze the Wien Bridge Oscillator and effect on output frequency with variation in RC combination.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course outcomes:

Students earning credits will develop ability to:

1. Understand dynamics characteristics of instruments and measurement systems.
2. Analyze and measure amplitude, frequency, phase and other parameter of the various test signals using oscilloscope.
3. Illustrate the physical parameter by using transducer.
4. Apply and design various operations for analog to digital and digital to analog conversions.
5. Analyze and understanding of principles & design of monitoring instruments like ECG, EEG, EMG

Text/Reference Books:

1. H.S. Kalsi, "Electronics Instrumentation", 2nd Edition, TMH, 2004.

2. A.K. Sawhney, P. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", 2nd Edition, Dhanpat Rai & Co. 2012.
3. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Edition, Prentice Hall, 1994.
4. Kularatna, N, "Modern Electronic Test and Measuring Instruments", 2nd Edition, IEE, London, 1996.
5. A. D. Helfrick and W. D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 2nd Edition, PHI Learning Press, 2008.
6. John G. Webster, "Medical Instrumentation: Application and design", 3rd Edition, John Wiley, 2012.
7. Khandpur R.S, "Hand-book of Biomedical Instrumentation", 2nd Edition, Tata McGraw Hill, 2003.

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Scheme Based on AICTE Flexible Curriculum

Department of Electronics & Communication Engineering

SBC- EC02(P)	**Electronic Workshop-I (Circuit Simulation and Design)**	**0L: 0T: 4P (04 hrs)**	**Credits:02**

Recommended Prerequisite: Engineering Mathematics, Engineering Physics, and BEEE.

Course Objective: The focus of this course is to introduce the fundamental concepts and tools of electronic circuit designing software & amp; let students acquaint with the software being used in the electronic circuit designing industries

List of Experiments:

1. Introduction to EDA Tool (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
2. Simulation & analysis of CMOS inverter transient & DC characteristics (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
3. Simulation & analysis of 2 input NAND/NOR gate using CMOS. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
4. Simulation & analysis of 2:1 MUX using pass transistor. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
5. Simulation & analysis of CMOS logic for Half Adder/ Full Adder using CMOS. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
6. Layout design of a 2-input CMOS Inverter using any layout design tool. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
7. Layout design of a 2-input CMOS NAND gate/NOR gate using any layout design tool. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit)
8. To design and simulate a clipper circuit using a PN junction diode. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit/ TinaPro /E-Sim /Tinkercad Softwares)
9. To design and simulate a clamper circuit using a PN junction diode and capacitors. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit/ TinaPro /E-Sim /Tinkercad Softwares)
10. To design and simulate a peak detector circuit using an OPAMP and an NPN BJT. (Tanner/Synopsis/Cadence/Xilinx/FPGA Kit/ TinaPro /E-Sim /Tinkercad Softwares)

(Simulation of experiments can be done using Tanner/Synopsis/Cadence/Xilinx/FPGA Kit/ TinaPro /E-Sim /Tinkercad Softwares.)

Assessment: Internal viva, Continuous evolution of experiments, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Analyze the mathematical and physical foundations of electronic circuits.
2. Critically evaluate alternate assumptions, approaches, procedures, tradeoffs, and results during electronic circuit designing.

3. Design variety of electronic circuits using simulation software.
4. Demonstrate their design and able to present views.
5. Get skilled and deliver technical presentation.

IPS Academy, Institute of Engineering & Science

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Department of Electronics & Communication Engineering

MLC01	Professional Laws, Ethics, Gender, Human Values and Harmony	1L: 0T: 0P (01 hrs)	Credits:00

Module 1 **(06 hrs)**

Basic features and problems of Indian Economy

Nature of Indian Economy, demographic features and Human Resource Development (HDI), Problems of Poverty, Unemployment, Inflation, Income inequality, Black money in India

Module 2 **(06 hrs)**

Sectoral composition of Indian Economy

Issues in Agriculture sector in India, Land Reforms, Green Revolution and agricultural policies of India, Industrial Development, Small Scale and cottage industries, Industrial Policy, Public sector in India, service sector in India.

Module 3 **(06 hrs)**

Economic Policies

Economic Planning in India, Planning Commission v/s NITI Aayog, Monetary Policy in India, Fiscal Policy in India, Centre State Finance Relations, Finance Commission in India, LPG Policy in India.

Module 4 **(06 hrs)**

External Sector in India

India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

Module 5 **(06 hrs)**

Law relating to Intellectual property

Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents, law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents>

Text/Reference Books:

1.Dutt Rudder and K.P.M. Sunderam, "Indian Economy", S.Chand & Co. Ltd. New Delhi

2.Mishra S.K. & V.K. Puri, "Indian Economy and -Its development experience." Himalaya Publishing House.

3.Bardhan, P.K, "The Political Economy of Development in India", Oxfird University Press, New Delhi., (9th Edition) (1999)

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Department of Electronics & Communication Engineering

LLC02	Liberal Learning Course-II	0L: 0T: 2P (02 hrs)	Credits: 01

Course Objective: The objective is to develop critically-thinking, interdisciplinary scholars who possess broad domain expertise, utilize evidence-based reasoning to solve complex problems, appreciate and connect diverse cultural and social experiences (including sports) to individual life, and are equipped for global citizenship through effective communication, self-awareness, and a commitment to lifelong learning.

Liberal Learning Course (LLC) -II, LLC02 (Any One Course from NCC/NSO/NCA)

A. NCC

B. NSO

- Any one Sports at State Level

C. NCA

(a) Music

(b) Dance

(c) Photography

(d) Cinematography

(e) Podcasting

(f) Theatre

(g) Painting

Course Outcomes:

1. Possess expertise and understanding across various domains; illustrate the interdisciplinary intersections between two or more liberal arts disciplines.

2. Display critical thinking skills by employing evidence-based reasoning to solve problems and make well-informed decisions.

3. Contemplate pluralism and cultural legacies; grasp and value human cultural, Sports, and social experiences, and adeptly connect them to individual experiences.

4. Effectively communicate to diverse audiences the significance of students' individualized liberal studies plans, their educational journey, and the knowledge they have acquired.

5. Equip oneself for global citizenship by fostering self-awareness, social responsibility, and a commitment to lifelong learning.