No	Course Information for Electronic Engineering Circuit (2019-2020)	
1	Unit name:	Electronic Engineering Circuit I
2	Code:	EcE 21001
3	Classification:	Engineering Subject
4	Credit value:	3 (2-0-2)
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	EcE 11011& EcE 12011 Fundamental of Electronic Circuits
7	Mode of delivery:	Lecture and Demonstration
8	Assessment system and breakdown of marks:	Lab performance , Lab report , Assignment and Exam
	Class Activity and Presentation	0%
	Tutorial	3%
	Assignment	2%,
	Practical	10 %
	Mid- term Exam	35%
9	Academic staff teaching unit:	Electronic Engineering
10	Course outcome of unit: After completion of this course, students will be able to • To calculate the value of current, voltage and power by using Ohm's Law, KCL, KVL and AC circuit power analysis based on building of circuits. • To apply network theorems for analysis of electrical circuits(Nodal/Mesh analysis, superposition/Thevenin/Norton/Maximum Power Transfer Theorems) • To construct and simulate the series and parallel resistance circuits based on Ohm's Law & various circuit analysis	
11	Synopsis of unit: The course involves four main categories of the circuit analysis. The course covers basic electrical quantities and associated units (charge, current, voltage and power), new circuit terms (node, path, loop and branch), basic nodal and mesh analysis, superposition, characteristics of ideal op-amps.	

12	**Topic:** **1 Introduction** 1.1 Overview of Text 1.2 Relationship of Circuit Analysis to Engineering 1.3 Analysis and Design 1.4 Computer-Aided Analysis 1.5 Successful Problem-Solving Strategies **2 Basic Components and Electric Circuits** 2.1 Units and Scales 2.2 Charge, Current, Voltage, and Power 2.3 Voltage and Current Sources 2.4 Ohm's Law **3 Voltage and Current Laws** 3.1 Nodes, paths, Loops, and Branches 3.2 Kirchhoff's Current Law 3.3 Kirchhoff's Voltage Law 3.4 The Single-Loop Circuit 3.5 The Single-Node-Pair Circuit 3.6 Series and Parallel Connected Sources 3.7 Resistors in Series and Parallel 3.8 Voltage and Current Division **4 Basic Nodal and Mesh Analysis** 4.1 Nodal Analysis 4.2 The Supernode 4.3 Mesh Analysis 4.4 The Supermesh 4.5 Nodal VS, Mesh Analysis: A Comparison 4.6 Computer-Aided Circuit Analysis

	10.7 Superposition, Source Transformations and Thevenin's Theorem 10.8 Phasor Diagrams **11 AC Circuit Power Analysis** 11.1 Instantaneous Power 11.2 Average Power 11.3 Effective Values of Current and Voltage 11.4 Apparent Power and Power Factor 11.5 Complex Power **12 Polyphase Circuits** 12.1 Polyphase Systems 12.2 Single-Phase Three-Wire System 12.3 Three-Phase Y-Y Connection 12.4 The Delta (Δ) Connection 12.5 Power Measurement in Three-Phase Systems **13 Magnetically Coupled Circuits** 13.1 Mutual Inductance 13.2 Energy Considerations 13.3 The Linear Transformer 13.4 The Ideal Transformer
14	Main reference: **Main References:** Basic Engineering Circuit Analysis, 10th Edition, J. David Irwin, R.MarkNelms
15	Additional references: www.amazon.com/loose-leaf-Engineering- circuit-Analysis/dp/0077753623

Information on Lab Practical

Lab	Activities
1	**Topic**: **Ohm's Law** **Task**: • To proof Ohm's law. • To get more familiar with basic electronic components in the circuit • To test and understand ohm's law **Resources**: **Electronic Devices**
2	**Topic**: **Series and Parallel resistor circuit** **Task**: (a) To study the resistance in series. (b) To study the resistance in parallel. (c) To understand the voltage division method and current division method. **Resources**: **Electronic Devices**
3	**Topic**: **Nodal Analysis** **Task**: • To construct resistive circuits using nodal analysis (Multisim Software) • To test and demonstrate the validity of nodal analysis through experimental measurements **Resources: Multisim Software**
4	**Topic**: **Mesh Analysi** **Task**: • To construct resistive circuits using mesh analysis (Multisim Software) • To test and demonstrate the validity of mesh analysis through experimental measurements **Resources: Multisim Software**
5	**Topic: Superposition Theorems** **Task**: ❖ To verify the Superposition Theorems **Resources**: **Multisim Software**

No	Course Information (2019-2020)	
1	Unit name:	Communication Principles I
2	Code:	EcE 21002
3	Classification:	Engineering subject
4	Credit value:	2.5 (2-0-1)
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	EcE 11011 &12011 Fundamental of Electronic Circuit I&II
7	Mode of delivery:	Lecture, Demonstration for practical
8	Assessment system and breakdown of marks:	Lab report, Tutorial, Exam
	Practical, Tutorial	30% (20%+10%)
	Mid-term Examination	70%
9	Academic staff teaching unit:	Department of Electronic Engineering
10	Course outcome of unit: In this course students will be able • To describe fundamental and some processes of Electronic communication and circuit configurations, operations, advantages and disadvantages of filters, modulation and demodulation. • To determine the parameters of amplifiers, tuned circuits, filters, modulations, demodulations. • To demonstrate the signals and responses of the circuits using MATLAB, Function Generator and Oscilloscope.	
11	Synopsis of unit: The course introduces students to the study of electronic communication components and systems. Course covers methods used to transmit analog and digital signals such as AM, FM, and digital transmitter modulation and demodulation techniques, transmission lines, antennas and signal propagation. The course is designed to familiarize the student with transmitters, receivers, modems, sampling, coding, multiplexing, and other signal-processing techniques used in commercial broadcasting and data transmission systems. Electronic communication systems are a comprehensive course in AM, FM and single-sideband communication systems and an introduction to digital transmission.	
	Topic: **Chapter** **Title** **1.** **Introduction to Electronic Communication** 1.1 The Significance of Human Communication 1.2 Communication Systems 1.3 Types of Electronic Communication	

	1.4 Modulation and Multiplexing 1.5 The Electromagnetic Spectrum 1.6 Bandwidth 1.7 A Survey of Communication Applications 1.8 Jobs and Careers in the Communication Industry **2. Electronic Fundamentals for Communications** 2.1 Gain, Attenuation, and Decibels 2.2 Tuned Circuits 2.3 Filters 2.4 Fourier Theory **3. Amplitude Modulation Fundamentals** 3.1 AM Concepts 3.2 Modulation Index and Percentage of Modulation 3.3 Sidebands and the Frequency Domain 3.4 AM Power 3.5 Single-Sideband Modulation 3.6 Classification of Radio Emissions **4. Amplitude Modulator and Demodulator Circuits** 4.1 Basic Principles of Amplitude Modulation 4.2 Amplitude Modulators 4.3 Amplitude Demodulators 4.4 Balanced Modulators 4.5 SSB Circuits **5. Fundamentals of Frequency Modulation** 5.1 Basic Principles of Frequency Modulation 5.2 Principles of Phase Modulation 5.3 Modulation Index and Sidebands 5.4 Noise-Suppression Effects of FM 5.5 Frequency Modulation versus Amplitude Modulation
14	Main references: Principles of Electronic Communication Systems, 3th Editioin, Louis E. Frenzel Jr, Special Indian Edition 2008, ISBN-13: 978-0-07-066755-6, ISBN-0-07-066755-1
15	Additional references: http://www.mhhe.com/frenzel/ecs3e and 2: https//www2.tesc.edu>current>Elc-201

Information on Lab Practical

Lab	Activity
1	**Experiment 1:** Analog and Digital Signals Generation **Objectives:** • To be familiar with function generator and oscilloscope • To distinguish Analog and Digital signals • To apply function generator and oscilloscope for generating the signals **Experiment required:** • function generator and oscilloscope
2	**Experiment 2:** RC Low Pass Filter Circuit **Objectives:** • To be familiar with function generator and oscilloscope • To determine the cutoff frequency for RC low pass filter • To construct simple RC circuit • To determine the effect of varying frequency to the output voltage of low pass filter **Experiment required:** • Resistor, Capacitor, Project board, Function Generator and Oscilloscope
3	**Experiment 3:** RC High Pass Filter Circuit **Objectives:** • To determine the cutoff frequency for RC high pass filter • To construct simple RC circuit • To determine the effect of varying frequency to the output voltage of high pass filter **Experiment required:**

	• Resistor, Capacitor, Project board, Function Generator and Oscilloscope
4	**Experiment 4:** Generate Amplitude Modulation Signal using MATLAB **Objectives:** • To be familiar with MATLAB software • To generate input signal and carrier signal for Modulation process using MATLAB codes • To generate AM signal using AM formula in MATLAB software **Experiment required:** • MATLAB software, Computer
5	**Experiment 5:** Generate Amplitude Shift Keying Signal **Objectives:** • To be familiar with MATLAB software • To generate input digital pulse signal and carrier signal for digital Modulation process using MATLAB codes • To generate amplitude shift keying signal using formula in MATLAB software **Experiment required:** • MATLAB Software, Computer

Approved By

Prepared By
Daw Than Than Min
Associate Professor
Department of Electronic Engineering

No	Course Information for Technical Programming (2019-2020)	
1	Unit name:	Technical Programming
2	Code:	EcE-21014
3	Classification:	Engineering subject
4	Credit value:	3(2-0-2)
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture, Discussion
8	Assessment system and breakdown of marks:	Examination, Lab performance and report, Assignments
	Assignments	10%
	Practical	20%
	Examination	70%
9	Academic staff teaching unit:	Department of Electronic Engineering
10	Course outcome of unit: In this course students will be able ❖ To trace and correct the errors in C programs ❖ To write C statements/programs using relevant C syntax and structure ❖ To develop C programs for simple real-world applications ❖ To identify, formulate and solve problems using C programming language ❖ To write, run and debug C program codes using C compiler software	
11	Synopsis of unit: The course introduces students to the study of computer system and programming Language. Course covers the various structures and statements in C programming language. The course is designed to familiarize the student with C programming language. Technical programming is a comprehensive course in electronic engineering and can be applied in the field of industrial control, communication and any other various applications.	

	Topic: **Chapter Title** **2 Introduction to C programming** 2.1 Introduction 2.2 A simple C program: Printing a line of text 2.3 Another Simple C program: Adding two integers 2.4 Memory concepts 2.5 Arithmetic in C 2.6 Decision Making: Equality and Relational Operators **3 Structured program Development in C** 3.1 Introduction 3.2 Algorithms 3.3 Pseudocode 3.4 Control Structures 3.5 The if Selection Statement 3.6 The if…else Selection Statement 3.7 The while Repetition Statement 3.8 Formulating Algorithms Case Study 1: Counter-Controlled Repetition 3.9 Formulating Algorithms with TopDown, Stepwise Refinement Case Study 2: Sentinel-Controlled Repetition 3.10 Formulating Algorithms with Top-Down, Stepwise Refinement Case Study 3: Nested Control Structures 3.11 Assignment Operators 3.12Increment and Decrement Operators **4 Program Control** 4.1 Introduction 4.2 Repetition Essentials 4.3 Counter-Controlled Repetition 4.4 for Repetition Statement 4.5 for Statement: Notes and Observations 4.6 Examples Using the for Statement 4.7 switch Multiple-Selection Statement

	4.8 do…while Repetition Statement 4.9 break and continue Statements 4.10 Logical Operators 4.11 Confusing Equality (==) and Assignment (=) Operators 4.12Structured Programming Summary **5 C Functions** 5.1Introduction 5.2 Program Modules in C 5.3 Math Library Functions 5.4 Functions 5.5 Function Definitions 5.6 Function Prototypes 5.7 Function Call Stack and Activation Records 5.8 Headers 5.9 Calling Functions By Value and By Reference 5.10 Random Number Generation 5.11 Example: A Game of Chance 5.12 Storage Classes 5.13 Scope Rules 5.14 Recursion 5.15 Example Using Recursion: Fibonacci Series 5.16Recursion vs. Iteration
14	Main references: C How to Program, 6th Edition, Paul Deitel and Harvey Deitel, Prentice Hall.
15	Additional references: Sams Teach Yourself C in 21 Days, Bradley L. Jones and Peter Atiken, Sams Publishing

Information on Lab Practical

Lab	Activity
1	Topic : Simple input/output statements, arithmetic operators and decision making Outcomes: 1. To use simple input and output statements 2. To use arithmetic operators 3. To write simple decision-making statements 4. To identify the problem and solve it Resources: C Free compiler, PC
2	Topic : While Loop and Decision Making Outcomes: 1. To write the repetition structure using **while** loop 2. To write decision-making statements using **if** or **if else** 3. To identify the problem and solve it Resources: C Free compiler, PC
3	Topic : For Loop Outcomes: 1. To write the repetition structure using **for** loop 2. To identify the problem and solve it Resources: C Free compiler, PC
4	Topic : Switch Statements Outcomes: 1. To write the multiple selection process using **switch** statements 2. To identify the problem and solve it Resources: C Free compiler, PC
5	Topic : Functions Outcomes: 1. To write C programs using **functions** 2. To identify the problem and solve it Resources: C Free compiler, PC

No	Course Information (2019-2020)	
1.	Unit name	Microelectronics I
2.	Code	EcE-21011
3.	Classification	Engineering Subject
4.	Credit value	3 (2-1-1)
5.	Semester/ Year Offered	1/2
6.	Pre-requisites	EcE-11011& 12011 Fundamental of Electronic Circuit
7.	Mode of delivery	Lecture, Demonstration
8.	Assessment System and breakdown of marks	Tutorial, Lab report, Exam
	Practical	20%
	Tutorial	10%
	Mid-term and Final Examination	70%
9.	Academic staff teaching unit	Electronic Engineering
10.	Course outcome of unit: After the completion of this course, students will be able: ▪ To recognize the concept of semiconductor and how a p-n junction is formed. ▪ To explain the types, operations and application of diode, bipolar-junction transistor (BJT) and field-effect transistor (FET). ▪ To calculate the voltage, current and voltage gain of BJT amplifier, power amplifier, FET amplifier and diode. ▪ To simulate and construct the rectifier circuit (full-wave & half-wave), DC power supply (by using voltage regulator & zener diode) and amplifier circuit.	
11.	Synopsis of unit: The analog circuit will teach the fundamentals of diodes and transistors. With the assumed knowledge on physical characteristics and operation of major semiconductor devices, this course introduces basic circuits employing semiconductor devices and its utilization in switching and amplification applications.	
1	**Introduction to Electronics** 1.1 The Atom	

5.1 The DC Operating Point

5.2 Voltage – Divider Bias

5.3 Other Bias Methods

Main References:

Electronic Devices (Electron Flow Version) Handbook: Microelectronics, Seven Edition, Thomas L. Floyd, 2012 Prentice Hall. Cloth, 976 pp, IBSN-10: 0132549859, ISBN-13: 9780132549851.

Additional References:

http://www.pearsonhighered.com/electronics

http//www.learnabout-electronics.org/bipolar

http//www.seas.upenn.edu/lec_9_....

Information on Lab Practical (EcE-21011, Microelectronics I)

Lab	Activities
1.	**Experiment I: Half-wave Rectifier** **Objectives:** ▪ To construct the half-wave rectifiers. ▪ To describe the output voltage waveform. ▪ To measure voltage and current by using software. **Required equipment:** ▪ Multisim Software, Computer
2.	**Experiment II: Full-wave Rectifier** **Objectives:** ▪ To construct a full-wave bridge rectifier. ▪ To describe the output voltage waveform with capacitor and without capacitor. ▪ To measure voltage and current by using software. **Required equipment:** ▪ Multisim Software
3.	**Experiment III: Regulated DC Power Supply** **Objectives:** ▪ To observe waveform at the output voltage of (bridge) rectifier with and without filter capacitor. ▪ To measure output voltage from the rectifier and regulator. **Required equipment:** ▪ Step-down transformer, Diode, Capacitor, Resistor, Voltage Regulator Breadboard, Connecting wire, Oscilloscope, Meter
4.	**Experiment IV: Testing the operation of Zener diode** **Objectives:** ▪ To measure output voltage from the rectifier and regulator. ▪ To determine the type number and output voltage. **Required equipment:** ▪ DC power supply, Zener diode, Multimeter, Connecting wires, Breadboard, Resistor.

5.	**Experiment V: Flip-flop circuit and two state transistor amplifier circuit** **Objectives:** ▪ To construct the flip-flop circuit and two state transistor amplifier circuit. **Required equipment:** ▪ Transistor, Resistor, 9V battery, LED, LDR, Connecting wires, Bread board

6.	**Experiment VI: Common-Emitter Amplifier** **Objectives:** ▪ To construct the common-emitter amplifier. ▪ To generate the input and output waveform by using oscilloscope. **Required equipment:** ▪ Transistor, Resistor, Capacitor, Multimeter, Function generator, Oscilloscope, Breadboard, Power supply
7.	**Experiment VII: Common-Collector Amplifier** **Objectives:** ▪ To construct the common-collector amplifier. ▪ To generate the input and output waveform by using oscilloscope. **Required equipment:** ▪ Transistor, Resistor, Capacitor, Multimeter, Function generator, Oscilloscope, Breadboard, Power supply
8.	**Experiment VIII: Common-Base amplifier** **Objectives:** ▪ To construct the common-base amplifier. ▪ To generate the input and output waveform by using oscilloscope. ▪ To compare the voltages between measuring values and calculation values. **Required equipment:** ▪ Transistor, Capacitors, Resistor, Multimeter, Voltmeter, Connecting wire, Bread board, Oscilloscope, Function Generator, Power Supply
9.	**Experiment IX: Class-AB Push-Pull amplifier** **Objectives:** ▪ To construct the class-AB push-pull amplifier. ▪ To generate the input and output waveform by using oscilloscope. ▪ To compare the voltage difference between measuring values and calculation values of each transistor. **Required equipment:** ▪ Transistor, Capacitors, Resistors, diodes, Multimeter, Voltmeter, Connecting wire, Bread board, Oscilloscope, Function Generator, Power Supply

10.	**Experiment X: Testing the transistor type of NOT, NAND and NOR gate** **Objectives:** ▪ To test the NOT, NAND and NOR gate by using transistor. **Required equipment:** ▪ Transistors, Resistors, LED, Bread board, 9V battery, Connecting Wire

No	Course Information (2019-2020)	
1	Unit name	Digital Electronics
2	Code:	EcE-21021
3	Classification:	Engineering subject
4	Credit value:	2.5
5	Semester/ Year Offered:	1/2 **(2-0-1)**
6	Pre-requisite	Basic Electronics
7	Mode of delivery	Lecture, Practical, Tutorial
8	Assessment system and breakdown of marks:	Lab report, Tutorial, Exam
	Tutorial, Practical	30%
	Mid-term/Final Examination	70%
9	Academic staff teaching unit	
10	Course outcome of unit: In this course, students will be able 1. to covert the analog signal to digital and several types of logic operation. 2. to explain about digital number systems , logic gate ,the basic laws , rules of Boolean expression, the functions of various digital integrated circuits and the basic concepts of a digital signal processor (DSP). 3. to apply a combinational logic circuit for a given Boolean output expression and adder, decoders, encoders, multiplexers, de-multiplexers , flip-flops, counters, registers . 4. To demonstrate the knowledge gained in the digital integrated circuits through practical experiment.	
11	Synopsis of unit: This course covers the fundamental of digital, their related devices and applications. Digital technology pervades almost everything in our daily lives. This course aims to provide students with all information about digital signals and systems, pulse waveforms, logic technologies and families, digital integrated circuits technology, tri-state, ECL family, MOS technology, operation and types, MOS inverter, NMOS, PMOS, CMOS, dynamic MOS, CMOS transmission circuits. Interfacing, TTL driving CMOS, flip-flop, multivibraters, monostables, astables, Schmitt trigger, bistables, 555 IC timer, memory elements and types, programmable	

	logic devices, analog to digital converter and digital to analog converter. This course is designed to teach the students the fundamentals of digital systems. Both combinational and sequential circuit analysis and design are covered. Several logic gates and memory circuits are introduced. Troubleshooting procedures and problem solving are covered. Hands-on equipment and practical application design are emphasized. Projects on how to design combinational and sequential applications are assigned.
12	Topic **1 Introductory Concept** 1.1 Digital and Analogue Quantities 1.2 Binary Digits, Logic Levels, and Digital Waveforms 1.3 Basic Logic Operations 1.4 Introduction to the System Concept 1.5 Fixed- Function Integrated Circuits 1.6 Test and Measurement Instrunments 1.7 Introduction to Programmable Logic **2 Number System, Operations, and Codes** 2.1 Decimal Numbers 2.2 Binary Numbers 2.3 Decimal- to Binary Conversion 2.4 Binary Arithmetic 2.5 1's and 2's Complements of Binary Numbers 2.6 Signed Numbers 2.7 Arithmetic Operations with Signed Numbers 2.8 Hexadecimal Numbers 2.9 Octal Numbers 2.10 Binary Coded Decimal 2.11 Digital Codes 2.12 Error Detection Codes **3 Logic Gates** 3.1 The Inverter

		3.2 The AND Gate 3.3 The OR Gate 3.4 The NAND Gate 3.5 The NOR Gate 3.6 The Exclusive- OR and Exclusive-NOR Gates 3.7 Fixed-Function Logic 3.8 Troubleshooting 3.9 Programmable Logic
	4	**Boolean Algebra and Logic Simplification** 4.1 Boolean Operations and Expression 4.2 Laws and Rules of Boolean Algebra 4.3 DeMorgan's Theorems 4.4 Boolean Analysis of Logic Circuits 4.5 Simplification Using Boolean Algebra 4.6 Standard Forms of Boolean Expressions 4.7 Boolean Expressions and Truth Tables 4.8 The Karnaugh Map 4.9 Karnaugh Map SOP Minimization 4.10 Five-Variable Karnaugh Map 4.11 Describing Logic with an HDL (System Application Activity)
	5	**Combinational Logic Analysis** 5.1 Basic Combinational Logic Circuits 5.2 Implementing Combinational Logic 5.3 The Universal Property of NAND and NOR Gates 5.4 Combinational Logic Using NAND and NOR Gates 5.5 Logic Circuit Operation with Pulse Waveform Inputs 5.6 Troubleshooting 5.7 Combinational Logic with VHDL(System Application Activity)

	6	**Functions of Combinational Logic** 6.1 Basic Adders 6.2 Parallel Binary Adders 6.3 Ripple Carry versus Look – Ahead Carry Adders 6.4 Comparators 6.5 Decoders 6.6 Encoders 6.7 Code Converters 6.8 Multiplexers 6.9 Demultiplexers 6.10 Parity Generators/Checkers 6.11 Troubleshooting (System Application Activity)
13	Main references: 1. EcE-21021 &22021 Digital Electronics	
14	Additional references: • www.faadooengineers.com (Digital electronics ebook pdf free download) • https://www.scribd.com • www.mavenscientists.com	

Information on Lab Practical (Digital Electronics)

Lab	Activity

1	**Experiment 1: Basic logic gates circuit test experiment.** **Objectives:** • Familiar with gate circuit logic function **Required equipments:** 1. Experiment Accessories： XK-DEB1 TRAINING BOX Multimeter some jumper wires； 2. Experiment Content： Finish logic function test of AND gate OR gate NOT gate NAND gate and NOR gate and XOR gate;
2	**Experiment 2: Logic Expressions for an 3 input AND gate** **Objectives:** • Familiar with gate circuit logic function **Required equipments:** 1. Experiment Accessories： • XK-DEB1 TRAINING BOX Multimeter some jumper wires； 2. Experiment Content： Finish logic function test of AND gate
3	**Experiment 3: Logic Function and parameter test of TTL Integration Logic Gate** **Objectives:** • To know the basic concept of digital electronic. • To design and verify the truth table for TTL Integration Logic. **Required Equipments:** 1. Experiment Accessories： XK-DEB1 TRAINING BOX Multimeter Oscilloscope chip 74LS00 1pcs、some jumper wires； 2. Experiment Content： Logic function test of TTL NAND gate 74LS00 Parameter test of TTL

	NAND gate 74LS00
4	**Experiment 4 : Combinational Logic Circuit Analysis and Design** **Objectives:** • To know the basic concept of digital electronic. • To design and verify the truth table for half adder & full adder. 1. Experiment Accessories： XK-DEB1 TRAINING BOX Multimeter； Chip 74LS00 3pcs, 74LS86, 74LS10 1pce for each type some jumper wires； 2. Experiment Content： Verify logic function of half adder Using "NAND" gate to design one three-person vote circuit.
5	**Experiment 5: Decoder and its Application** **Objectives:** • To know the basic concept of digital electronic. • To design and verify the truth table for decoder. **Required Equipments:** 1. Experiment Accessories： XK-DEB1 TRAINING BOX、Multimeter、74LS138: 1pce、some jumper wires； 2. Experiment Content： Verify 74LS138 logic function Using 74LS138 to do data distributor Learning nixie tube display decoder

Program Educational Objectives (PEO)

1. Produce engineer who can apply the engineering knowledge and skills, complex problem solving skills and critical thinking in electronic engineering practices.
2. Nurture engineer who can apply effective communication, management, teamwork and leadership skills in electronic engineering and multidisciplinary environment.
3. Foster development of an engineer who adopts ethical and moral behavior considering safety, environment and sustainable development for professional careers in electronic engineering, and is committed to professional excellence through life-long learning.

Program Outcomes (PO)

Upon completion of the program, students will have:

1. an ability to apply the knowledge of mathematics, sciences, and fundamentals of electronic engineering to the solution of complex engineering problems;
2. an ability to identify, formulate and solve complex electronic engineering problems;
3. an ability to design solutions for complex electronic engineering problems and design systems, components or processes to meet desired needs within realistic constraints such as environmental, societal and safety consideration;
4. an ability to conduct investigation into complex electronic engineering problems using research-based knowledge and research methods including design of experiments, analysis, interpretation and synthesis of data to give proper conclusions;
5. an ability to employ necessary techniques, hardware and software tools for electronic engineering applications;
6. an ability to apply the contextual knowledge to assess societal, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice;
7. an ability to understand the significance of sustainable development and impact of professional engineering solutions in societal and environmental contents;
8. an ability to apply the professional and ethical responsibility;
9. an ability to communicate effectively in both oral and written form on complex engineering activities with the engineering community and with society at large;
10. an ability to function effectively as an individual and as a multidisciplinary team;
11. an ability to recognize the needs for and to engage in life-long learning;
12. an ability to demonstrate and apply electronic engineering and management principles in multidisciplinary environment.

No:	**Course Outcomes**	**Indicators**
1	1. to covert the analog signal to digital and several types of logic operation.	
2	1. to explain about digital number systems , logic gate ,the basic laws , rules of Boolean expression, the functions of various digital integrated circuits and the basic concepts of a digital signal processor (DSP).	
3	1. to apply a combinational logic circuit for a given Boolean output expression and adder, decoders, encoders, multiplexers, de-multiplexers , flip-flops, counters, registers .	
4	1. To demonstrate the knowledge gained in the digital integrated circuits through practical experiment.	

Matrix of CO and PO

CO	**Program Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	*											
2	*											
3	*	*										
4	*	*			*							