Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. III Semester

Syllabus

Electronic Devices and Circuits

Subject Code: EC301T	**Subject Name : Electronic Devices and Circuits**
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 3 (L)	**Theory (E): 60** Marks **& T(I):** 40 Marks
Theory: 3 Hrs./Week	**Duration of End Semester Exam (ESE):** 3 Hrs.

Course Objectives:

1	To understand the internal structure and Characteristics of JFET
2	To understand the internal structure and Characteristics of MOSFET
3	Analyze and Design various power amplifiers
4	To study the different types of oscillators
5	To Study Different feedback Amplifiers

Course Outcomes: At the end of the course the students will able to

CO1	Understand and analyze FET Characteristics & Compare its biasing techniques
CO2	Apply the knowledge of MOSFET in circuit analysis
CO3	Analyze the performance of amplifiers circuits.
CO4	Analyze and design various types of oscillators circuits.
CO5	Analyze various types of negative feedback

UNIT I: FIELD EFFECT TRANSISTORS (7 Hours) (12 Marks)

Construction & working of JFET, JFET characteristics, JFET parameters, Comparison of JFET and BJT, JFET Amplifiers, Biasing of JFET, JFET as VVR or VDR, Small Signal model of JFET .

UNIT II: MOSFET (7 Hours) (12 Marks)

MOSFET (E-type & D-type), Operation of n-channel and p-channel D-MOSFET & E-MOSFET, Drain and Transfer characteristics of D-MOSFET and E-MOSFET, Comparison of JFET and MOSFET, Applications of MOSFET, Biasing of MOSFET.

UNIT III: POWER AMPLIFIERS (7 Hours) (12 Marks)

Classification of Amplifiers: Class A, B, AB and C, Class A Amplifier : Series fed directly coupled class A power amplifier, Transformer coupled class A power amplifier, Class B Amplifier : Push-pull and complementary symmetry class B amplifier, Distortions in Amplifier, Crossover Distortions &

Harmonic Distortion, Power Dissipation in Transistor.

UNIT IV: OSCILLATORS **(8 Hours) (12 Marks)**

Introduction to Positive Feedback, Classification of oscillator, Stability Criterion & Barkhausen Criterion, RC Phase shift oscillator, Wien Bridge oscillator, Colpitt's oscillator, Hartley oscillators, & Crystal oscillators, Introduction to Multivibrator.

UNIT V: FEEDBACK AMPLIFIERS **(7 Hours) (12 Marks)**

Classification of Basic Amplifier, Basic Concept of feedback, Transfer gain with feedback, General Characteristics of Negative Feedback, Effects of Negative Feedback on I/P & O/P Resistance, Method of Identifying Feedback Topology and Feedback factor, Voltage Series feedback, Current Series Feedback, Voltage Shunt feedback, Current Shunt Feedback

List of Books:

Text books:

1) "Electronic Devices and Circuits", Millman Halkias, "TMH", 2000
2) "Electronic devices and circuits " , Salivahanan, Suresh Kumar, Vallavaraj, Mc Graw Hill.

Reference books:

1. "Electronic Devices and Circuits", David A. Bell, PHI Publications , 4th Edition
2. "Electronic devices and Circuit Theory", R. Boylestad, Pearson Education, 9th Edition
3. "Electronic devices and Circuits-I and II", A. P. Godse, Technical Publications, 3rd Edition

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. III Semester
Syllabus
Electronic Devices & Circuits Lab

Subject Code: EC301P	**Subject Name :** Electronic Devices & Circuits Lab
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 1(P)	**Theory (E): 25** Marks **& T(I):** 25 Marks
Practical: 2 Hrs./Week	**Duration of End Semester Exam (ESE):** 2 Hrs.

Course Objectives:

1	To understand the characteristics and biasing techniques of FETs and MOSFETs.
2	To develop the ability to design and analyze small-signal amplifiers and feedback amplifiers.
3	To study and evaluate the performance of power amplifiers and their efficiency.
4	To analyze the design and working principles of RC and LC oscillators.
5	To implement and simulate multivibrator circuits and basic electronic applications like LED blinking.

Course Outcomes: After completion of practical the students will able to

CO1	Analyze and interpret the transfer and drain characteristics of FETs and MOSFETs, including calculation of device parameters.
CO2	Design biasing circuits for FETs and analyze their role in amplifier performance.
CO3	Construct and test amplifier circuits (JFET and power amplifiers) and evaluate frequency response and power output.
CO4	Demonstrate the working of various sinusoidal oscillators and multivibrator circuits using discrete components.
CO5	Compare the behavior of feedback amplifiers with and without feedback, and implement simple electronic circuits using breadboards.

List of Experiment :	
1	To study FET drain and transfer characteristics.
2	To study JFET as an Amplifier and plot the frequency response of JFET Amplifier.

3	To calculate JFET parameters.
4	To study transfer and output characteristics of an n-channel MOSFET
5	To study input and output power of Class A power Amplifier.
6	To design complementary symmetry class B power amplifier and calculate its efficiency.
7	To Study RC Oscillator (RC-Phase Shift and Wien Bridge Oscillator).
8	To Study LC Oscillators (Colpitt‟s and Hartley Oscillator).
9	To study transistorized Astable Multivibrator.
10	Design and Analysis of Multivibrator Circuits (Astable / Monostable)
11	To find the gain of the Voltage Series feedback amplifier with & without feedback.
12	To study the current shunt feedback amplifier
13	Design a LED Blinking Circuit on Bread Board.
14	To study MOSFET as a Switch / Amplifier
15	To study JFET as a Voltage Variable Resistor (VVR)

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. III Semester

Syllabus

Digital Circuits and Fundamentals of Microprocessor

Subject Code: EC302T	**Subject Name :** Digital Circuits and Fundamentals of Microprocessor
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 3 (L)	**Theory (E): 60** Marks **& T(I):** 40 Marks
Theory: 3 Hrs./Week	**Duration of End Semester Exam (ESE):** 3 Hrs.

Course Objectives:

1	To learn various digital fundamentals and its application in digital system.
2	To familiarize with the design of various combinational digital circuits and sequential digital circuit.
3	To familiarize with the design of various sequential digital circuit.
4	To Study fundamentals of microprocessor 8085 & concept of Assembly language programming.

Course Outcomes: At the end of the course the students will able to

CO1	Understand and apply the knowledge of Logic gates and Karnaugh map reduction method to build various digital system.
CO2	Design basic combinational circuits and realize it for given application.
CO3	Understand and design various types of flip-flop.
CO4	Design and analyze Synchronous and asynchronous sequential circuits using different flip flops.
CO5	Explain the fundamentals of 8085 microprocessor and write basic programs of 8085.

UNIT I: INTRODUCTION TO DIGITAL CIRCUITS (7 Hours) (12 Marks)

Introduction of logic families based on characteristics -Speed of operation, power dissipation, figure of merit, fan in, fan out, Karnaugh map representation in SOP & POS forms, Minimization of logical functions for min-terms and max-terms, Implementation of Boolean expression in SOP and POS form using gates.

UNIT II: COMBINATIONAL CIRCUITS (7 Hours) (12 Marks)

Arithmetic Circuits: Adders and subtractor, ALU, Binary Comparator, Parity generators/checkers, BCD Adder, Multiplexer, Demultiplexer, Encoders & Decoders, Code converters.

UNIT III: SEQUENTIAL CIRCUITS **(7 Hours) (12 Marks)**

Latches and flip-flops, Edge & Level triggered flip-flop, RS-FF, D-FF, JK-FF, Master-Slave JK-FF & T-FF, Excitation & Truth Table, Flip-flop conversions.

UNIT IV: APPLICATION OF FLIP-FLOPS **(8 Hours) (12 Marks)**

Registers, Shift registers, Synchronous and Asynchronous sequential Circuits, Ring counter, Up/Down counters, Synchronous counters , Counters Design, lock out, Clock Skew

UNIT V: 8085 MICROPROCESSOR **(7 Hours) (12 Marks)**

Introduction to microprocessor: Architecture of 8085microprocessor, Pin diagram of 8085, Addressing modes, Interrupts, Instructions set of 8085, Basic programs.

List of Books:

Text Books:

1. Morris Mano : " An approach to digital Design", Pearson Publications.
2. Ramesh Gaonkar : " Microprocessor Architecture, Programming and Applications with the 8085", Penram International Publications.
3. W. Fletcher : "Engg. Approach to Digital Design", PHI Publications.

Reference Books

1. Wakerly Pearon : "Digital Design: Principles and Practices", Pearon Education Publications.
2. Mark Bach : "Complete Digital Design", Tata MCGraw Hill Publications
3. R.P. Jain : "Modern digital electronics" , TMH Publications.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. III Semester
Syllabus
Digital Circuits & Fundamentals of Microprocessor Lab

Subject Code: EC302P	**Subject Name :** Digital Circuits & Fundamentals of Microprocessor Lab
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 1(P)	**Theory (E): 25** Marks **& T(I):** 25 Marks
Practical: 2 Hrs./Week	**Duration of End Semester Exam (ESE):** 2 Hrs.

Course Objectives:

1	To simplify and implement Boolean functions using logic gates.
2	To design basic combinational logic circuits.
3	To implement multiplexers and demultiplexers.
4	To analyze and build sequential circuits.
5	To program basic operations using the 8085 microprocessor.

Course Outcomes: After completion of practical the students will able to

CO1	Simplify and implement Boolean expressions using logic gates.
CO2	Design and verify combinational circuits like adders and comparators.
CO3	Implement MUX/DEMUX and use MUX for logic functions.
CO4	Analyze flip-flops and design counters.
CO5	Write and execute 8085 programs for basic operations.

List of Experiment :	
1	Simplification and implementation of a Boolean function using k map technique.
2	Implementation of Boolean expression using Universal Gates.
3	To design and verify operation of half adder and full adder.
4	To design and verify operation of half subtractor and full subtractor.
5	To design and implement 2-bit binary comparator.

6	Design and implementation of code converters using Logic gates.
7	Design and implementation of multiplexer and demultiplexer.
8	Implementation of function using multiplexer.
9	Verification of state tables of RS and D flip-flops.
10	Verification of state tables of JK and T flip-flops.
11	Conversion of D flip-flop to T-flip flop.
12	Design and implementation of ripple and synchronous counters.
13	To study 8085 microprocessor.
14	Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
15	Write a program using 8085 to find the 2's complement of 8-bit number.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING
An Autonomous Institute Affiliated to RTM, Nagpur University,
Nagpur Accredited with Grade "A" by NAAC
Harpur Nagar, Umred Road (Near Bada Tajbagh), Nagpur – 440 024
Tel: +91-712-2710281,2710282; Fax: 91-712-2710283
Email:- principalpbcoe@gmail.com website:-www.pbcoe.edu.in

DEPARTMENT OF HUMANITY AND MANAGEMENT

SYLLABUS OF SECOND YEAR BACHELOR OF TECHNOLOGY

(A Four-Year Degree Programme) SEMESTER III

Course Code	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
		L	T	P		Continuous Evaluation	End Sem Exam	Total	
HUM305T	Engineering Economics	2	--	--	2	20	30	50	2

Course Objectives:

1.	This Course is designed to gain basic knowledge in Economics and understand the concept of macro and micro level Economics with important economic terminologies and key concepts of Engineering

Course Outcomes:

On completion of this course, learner will be able to

CO1:	Understand the concept of Demand and Supply and distinguish between Micro and Macro Economics its relationship with the Price.
CO2:	Relate various Factors of Production with reference to different Economic Sectors, Business cycle and Understand the Market Structure.
CO3:	Analyze the Various Concepts of Cost, Causes and Effects of Inflation, Recession and Taxations system.

UNIT I: Basic Concepts of Economics	**(8 Hours) (10 Marks)**
Definition & Scope of Economics, Difference between Micro and Macroeconomics, Concept of Top and Bottom line of the Organization (Growth), Economic analysis of business, Economics of Operations, Law of Demand, Types of Demand, Law of Supply, Concept and Types of Elasticity of Demand.	
UNIT II: Theory of Production and Market Structure	**(8 Hours) (10 Marks)**
Factors of Production, Firm and Industry, Market and Market Structures, Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly, Pricing strategies in various markets, Various Phases of Business Cycle, Economies of scale.	
UNIT III: Theory of Cost , Inflation and Taxation	**(8 Hours) (10 Marks)**
Various Concepts of Cost, Fixed, Variable, Average, Marginal and Total Cost, Inflation , Effect of Inflation, Deflation, Recession, Monetary and Fiscal Measures to Control Inflation, Direct and Indirect Taxes	

List of Books:

Text Books:

1. Modern Economic Theory – K.K. Dewett, S.Chand Publishers
2. Modern Economics – H. L. Ahuja , S.Chand Publishers
3. Engineering Economics - D.N. Dwivedi, A. Dwivedi ,Vikas Publishing House
4. Industrial Economics. By, Ranjana Seth, Ane Book Pvt Ltd.
5. Industrial Economics. By, Jagdish Sheth, Pearson Publication.

Reference Books:

1. Business Economics. By, K.Rajgopalchar. Atalantic Publishers.
2. Microeconomics. By, Robert Pindyk

Business Economics.By, H.L. Ahuja

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING
An Autonomous Institute Affiliated to RTM, Nagpur University,
Nagpur Accredited with Grade "A" by NAAC
Harpur Nagar, Umred Road (Near Bada Tajbagh), Nagpur – 440 024
Tel: +91-712-2710281,2710282; Fax: 91-712-2710283
Email: - principalpbcoe@gmail.com website: -www.pbcoe.edu.in

DEPARTMENT OF CHEMISTRY

SYLLABUS OF SECOND YEAR BACHELOR OF TECHNOLOGY

(A Four-Year Degree Programme)

SEMESTER III

Course Code	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
		L	T	P		Continuous Evaluation	End Sem Exam	Total	
HUM306T	Environmental Science	2	--	--	2	20	30	50	2

Course Objectives:

1.	To introduce various natural resources available.
2.	To attain the knowledge about ecosystem and biodiversity.
3.	To understand and evaluate the global scale of environmental problems.

Course Outcomes:

On completion of this course, learner will be able to

CO1:	Utilize the knowledge on natural resources and understand the ecosystem thoroughly.
CO2:	Explain the bio-diversity and its conversion.
CO3:	Identify and analyze the consequences of pollution, application of knowledge for sustainability

UNIT I: Introduction to Natural Resources & Ecosystems (8 Hours)[10 Marks]

Renewable and Non-Renewable resources: Natural resources and associated problems.

a. **Forest resources:** Use and over-exploitation, deforestation, case studies. Timber extraction mining, dams and their effects on forest and tribal problems.
b. **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological, succession. Food chains, food webs and ecological pyramids.

a. Introduction, types, characteristic features, structure and function of the following ecosystem: - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries.

UNIT II: Biodiversity and its Conservation (8 Hours)[10Marks]

Introduction - Definition: genetic, species and ecosystem diversity. Bio geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, National and local levels. India as a mega diversity nation Hot-sports of biodiversity.Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III: Environmental Pollution & Control (8 Hours)[10Marks]

- Definition, Cause, effects and control measures of: - Air pollution, Water pollution ,Soil pollution, Marine pollution, Noise pollution ,Thermal pollution
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act.
- Sustainable Development

Text Books:

1. Benny Joseph, "Environmental Studies", 3rd Edition, McGraw Hill Education Publication, 2017.
2. D. D. Mishra, and S.S. Dara, "A Textbook of Environmental Chemistry and Pollution Contol", 7th Edition, S. Chand & Company Ltd., 2004.
3. Textbook of Environmental Studies, Erach Bharucha, Universities Press.
4. A Textbook of Environmental Studies, D.K. Asthana and Meera Asthana, 1st edition, S. Chand.
5. A Textbook of Environmental Studies, Dr. Rajan Misra, Laxmi Publications Pvt. Ltd.

Reference Books:

1. P Aarne Vesilind, J. Jeffrey Peirce, and Ruth F. Weiner, “Environmental Pollution and Control” 4th Edition, Butterworth-Heinemann Publication, 1998.
2. Shibani Ghosh, “Indian Environmental Law: Key concepts and Principles”, 1st Edition, Orient BlackSwan Publication, 2019.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. III Semester

Syllabus

Field Project / Internship

Subject Code: EC307P	**Subject Name : Field Project / Internship**
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 2	**Practical(P) T : 100 marks**
Theory: 4 Hrs./Week	**Duration of End Semester Exam (ESE): --**

Course Objectives:

1	To make students familiar with test and measuring instruments.
2	To make students familiar with Industry standards.
3	To understand manufacturing process
4	To design project based on software and hardware.
5	To enable students to design & fabricate their own Hardware

Course Outcomes: Upon completion of this course, students will demonstrate the ability to:

CO1	Use of various tools in respective industry.
CO2	Interface peripherals with computer.
CO3	Design and test product.
CO4	Design & fabricate mini project.

Students can join Electronics based Industrial Internship.

After successfully completion of Internship He/ She can develop mini project

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. IV Semester

Syllabus

Analog & Digital Communication

Subject Code: EC402T	**Subject Name :** Analog & Digital Communication
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 3 (L)	**Theory (E): 60** Marks **& T(I):** 40 Marks
Theory: 3 Hrs./Week	**Duration of End Semester Exam (ESE):** 3 Hrs.

Course Objectives:

1	Understand the fundamental concepts and components of analog communication systems.
2	Learn different analog modulation techniques like AM, FM, and PM, including their generation and detection methods.
3	Explore various pulse analog modulation schemes and multiplexing techniques.
4	Comprehend the concepts of digital communication including PCM, DPCM, and line coding.
5	Analyze and compare different digital modulation techniques and understand basic error detection and correction strategies.

Course Outcomes: At the end of the course the students will able to

CO1	Explain the components and functioning of analog communication systems.
CO2	Analyze and evaluate AM, FM, and PM techniques including bandwidth and power requirements.
CO3	Demonstrate knowledge of pulse analog modulation techniques and multiplexing.
CO4	Describe and analyze digital communication techniques such as PCM, DPCM, and line coding.
CO5	Compare and evaluate digital modulation schemes (ASK, FSK, PSK) and apply error control coding techniques.

UNIT I: AMPLITUDE MODULATION (7 Hours) (12 Marks)

Basic elements of a communication system, Types of communication: Analog and Digital, Baseband and Passband, Need of Modulation, Amplitude Modulation (AM): Need, waveform, equation, modulation index, Power relations in AM, Generation of AM: Square law modulator, switching modulator, Demodulation of AM: Envelope detector.

UNIT II: FREQUENCY MODULATION (7 Hours) (12 Marks)

Frequency Modulation (FM): Concept, equation, modulation index, Phase Modulation (PM) and comparison with FM, Frequency spectrum and bandwidth of FM, Generation of FM: Armstrong method, Reactance modulator, Detection of FM: Foster-Seeley discriminator, Ratio detector.

UNIT III: PULSE ANALOG MODULATION (7 Hours) (12 Marks)

Sampling Theorem, Pulse Amplitude Modulation, Pulse Width Modulation , Pulse Position Modulation , Time Division Multiplexing and Frequency Division Multiplexing (FDM).

Concept of Noise and its types, Noise figure, Noise Figure for cascade networks.

UNIT IV: DIGITAL COMMUNICATION FUNDAMENTALS (8 Hours) (12 Marks)

Block diagram of digital communication system, Advantages of digital communication over analog communication, Pulse Code Modulation (PCM): Block diagram, quantization, encoding, Signal-to-noise ratio in PCM, Differential PCM, Delta modulation, Adaptive DM, Line coding schemes: NRZ, RZ, Manchester, AMI, Sampling, quantization noise, and companding.

UNIT V: DIGITAL MODULATION TECHNIQUES (7 Hours) (12 Marks)

Digital Modulation: ASK, FSK, PSK – concept, waveforms, bandwidth, M-ary modulation techniques: QPSK, QAM (overview), Bit Error Rate (BER) and its significance, Basics of Error Detection and Correction: Parity, Hamming code, LZ coding and convolution coding.

List of Books:

Text Books:

1. “Principles of Communication”, Taub and Schilling, McGraw Hill Education Publication
2. “Analog and Digital Communication”, Simon Haykin, Wiley India Publication
3. “Communication System”, Sanjay Sharma, S.K. Kataria & Sons Publication
4. “Analog and Digital Communication”, B.P. Lathi and Zhi Ding, Oxford University Press

Reference Books :

1. “Modern Digital and Analog Communication Systems”, B.P. Lathi, Oxford University Press
2. “Digital and Analog Communication Systems”, Leon W. Couch II, Pearson Education
3. “Communication Systems”, A. Bruce Carlson and Paul B. Crilly, McGraw Hill Education,
4. “Electronic Communication Systems”, George Kennedy and Bernard Davis, McGraw Hill Education

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. IV Semester

Syllabus
Analog & Digital Communication Lab

Subject Code: EC402P	**Subject Name :** Analog & Digital Communication Lab
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 1(P)	**Theory (E): 25** Marks **& T(I):** 25 Marks
Practical: 2 Hrs./Week	**Duration of End Semester Exam (ESE):** 2 Hrs.

Course Objectives:

1	Enable students to understand and practically implement various analog modulation and demodulation techniques.
2	Provide hands-on experience with pulse analog modulation schemes like PAM, PWM, and PPM.
3	Develop the ability to simulate and experiment with digital communication systems such as PCM, DM, and line coding.
4	Familiarize students with the generation, detection, and analysis of digital modulation techniques like ASK, FSK, and PSK.
5	Introduce students to error detection and correction techniques through practical implementation.

Course Outcomes: After completion of practical the students will able to

CO1	Demonstrate the generation and detection of analog modulated signals (AM, FM, PM).
CO2	Implement and analyze pulse modulation techniques (PAM, PWM, PPM) and multiplexing schemes (TDM).
CO3	Generate and decode digital signals using PCM, DM, and various line coding methods.
CO4	Perform and evaluate digital modulation techniques such as ASK, FSK, and PSK.
CO5	Apply error detection and correction techniques like parity and Hamming code in communication systems.

List of Experiment :	
1	Generation and detection of amplitude modulated signal.
2	Generation and detection of frequency modulated signal.
3	Generation and demodulation of Pulse Amplitude Modulation (PAM) signal.
4	Generation and demodulation of Pulse Width Modulation (PWM) signal.
5	Generation and demodulation of Pulse Position Modulation (PPM) signal.
6	Transmission and reception of binary data using ASK.
7	Transmission and reception of binary data using FSK.
8	Transmission and reception of binary data using PSK
9	Time Division Multiplexing (TDM) and demultiplexing of two signals
10	Generation of Pulse Code Modulated (PCM) signal
11	Generation of Delta Modulated (DM) signal
12	Study of line coding techniques (NRZ, RZ, Manchester, AMI)
13	Study of Quantization.
14	Study of Error Detection using Parity bits.
15	Study and implementation of Hamming Code for Error Correction

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. IV Semester
Syllabus
Microprocessor and Microcontroller

Subject Code: EC401T	**Subject Name :** Microprocessor and Microcontroller
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 3 (L)	**Theory (E): 60** Marks **& T(I):** 40 Marks
Theory: 3 Hrs./Week	**Duration of End Semester Exam (ESE):** 3 Hrs.

Course Objectives:

1	To study fundamentals of microprocessor and microcontroller systems.
2	To understand the microprocessor and microcontroller architecture and programming model.
3	To understand different interrupt techniques, PPI and I/O devices interfacing and its programming.
4	To study and impart different programming languages & tools for design of microcontrolller based systems.
5	To design microcontroller based application.

Course Outcomes: At the end of the course the students will able to

CO1	Differentiate microprocessors & microcontrollers.
CO2	Describe the concept of addressing modes of microprocessors & microcontrollers.
CO3	Interface 8086 & 8051 with memory, various I/Os and Hardware.
CO4	Demonstrate the concept of interrupts and its use.
CO5	Analysis Microprocessor and Microcontroller programmbale system.

UNIT I: Intel 8086/8088 microprocessor & Programming: (8 Hours) (12 Marks)

8086/8088 microprocessor, Pin diagram, Architecture, features and operating modes, Interrupt structure, Memory organization, Addressing modes, Instruction set.

UNIT II: 8086 & Peripheral Interfacing (8 Hours) (12 Marks)

Assembly language programming of 8086, Memory and I/O interfacing, Interfacing of peripherals like 8255 PPI, multiplexed 7-seg display & matrix keyboard, Stepper motor.

UNIT III: Various Peripheral IC (6 Hours) (12 Marks)

Programmable interval timer/counter 8254, Architecture, working modes, interfacing 8259 PIC, Organization, control words, interfacing, cascading of 8259's, Serial communication, Classification & transmission formats, USART 8251, Pins & block diagram, interfacing with 8086 & programming.

UNIT IV: 8051 microcontroller & programming (6 Hours) (12 Marks)

Introduction to 8051 microcontroller; Pin diagram, architecture, features & operation, Ports, memory organization, SFR's, Flags, Counters/Timers, Serial ports, 8051 Interrupt structure, Interrupt vector table with priorities, enabling & disabling of interrupts.

UNIT V: 8051 microcontroller interfacing (8 Hours) (12 Marks)

Instruction set of 8051: data transfer, logical, arithmetic & branching instructions, Addressing modes, Assembly language programming examples, Timer, Serial Communication , Interfacing of external RAM & ROM with 8051.

List of Books:

Text Books:

1. Programming & Interfacing of 8086/8088, D.V. Hall, TMH.
2. Microprocessor 8086/8088 Family Programme Interfacing: Liu & Gibson
3. M.A. Mazidi & J.G. Mazidi, the 8051 Microcontroller and Embedded system, 3rd Indianreprint, Pearson Eduction
4. The Intel Microprocessor 8086 & 80486 Pentium and Pentium Pro. Architecture Programming and Interfacing – Brey.

Reference Books:

1. Intel Reference Manuals, Microprocessors & Microcontrollers: Intel
2. Microcontrollers – Peatman, Mc Graw Hill.
3. Microprocessors & Microcomputers based system design by Md. Rafiquzzaman.
4. 8086/8088 Microprocessors, Walter Triebel & Avtar Singh
5. Introduction to Microprocessors for Engineers and Scientists,P. K. Ghosh, P. R. Sridhar, PHI Publication.
6. The 8051 Microcontroller & Embeded Systems, Kenneth J. Ayala, Dhanvijay V. Gadre, CENGAGE Learning.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. IV Semester
Syllabus
Microprocessor and Microcontroller Lab

Subject Code: EC401P	**Subject Name :** Microprocessor and Microcontroller Lab
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 1(P)	**Theory (E): 25** Marks **& T(I):** 25 Marks
Practical: 2 Hrs./Week	**Duration of End Semester Exam (ESE):** 2 Hrs.

Course Objectives:

1	To perform a practical based on microprocessor and microcontroller based system.
2	To study assembly language programming skills.
3	Interface different peripherals with microprocessor and microcontroller with its use

Course Outcomes: After completion of practical the students will able to

CO1	Write and execute 8086 and 8051 assembly programs for arithmetic, logical, and memory operations.
CO2	Interface LEDs, LCDs, 7-segment displays, DACs, and keypads with 8051.
CO3	Develop 8051 programs for waveform generation, data manipulation, and string handling.
CO4	Use timers and I/O ports of 8051 for real-time applications.
CO5	Interface 8255 PPI with 8086 and design embedded applications using 8051.

List of Experiments	
1	Study of 8086 microprocessor trainer kit.
2	Write and execute 8086 assembly Language Programs to perform basic arithmetic operations on 8/16 bit numbers.
3	Write and execute 8086 assembly Language Programs to perform Logical operations.
4	Write and execute 8086 assembly Language Programs to perform string related operations.
5	Write and execute 8086 assembly Language Programs to perform memory related operations.

6	Study of Interfacing and programming of various IO devices with 8255 PPI with 8086.
7	Study of interfacing and programming of Stepper motor with 8086.
8	Write and execute 8051 assembly Language Programs to perform basic arithmetic and logical operations on 8 bit numbers.
9	Write and execute 8051 assembly Language Programs to perform memory related operations.
10	Write and execute 8051 assembly language program to generate square wave of 1 KHz (and any other frequency) on one of the pin of output port.
11	Write and execute ALP for 8051 to convert two digit decimal numbers present in external data memory into its equivalent ASCII code.
12	Write and execute ALP for 8051 to swap nibbles of 10 bytes present in external data memory.
13	Write an ALP for 8051 to finding the smallest and largest number from given data bytes stored in internal/external data memory location.
14	Write and execute ALP for 8051 to exchange two data strings present in external data memory.
15	Interface 8 LEDs with 8051 and write a program to glow alternate LEDs. Modify the experiment further to blink an LED lamp of 230V AC/10W with an on and off time of 1 Second
16	Interface microcontroller 8051 with LCD display and display a string of “Welcome to microcontroller Programming” and a table of 5
17	Interface seven segment display with microcontroller 8051 and generate all numbers from 0 to 9 with a time duration of 1 second.
18	Design a Stepper Motor Controller Using 8051 Microcontroller. Rotate this motor with an RPM of 150 both in clockwise and anticlockwise directions
19	Study of Interfacing and programming of 7 segment display with 8051.
20	Study of Interfacing and programming of matrix keypad with 8051.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. IV Semester
Syllabus
Signals & Systems

Subject Code: EC403T	**Subject Name :** Signals & Systems
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 2 (L)	**Theory (E): 30** Marks **& T(I):** 20 Marks
Theory: 2 Hrs./Week	**Duration of End Semester Exam (ESE):** 2 Hrs.

Course Objectives:

1	To introduce the fundamental types and properties of signals and systems.
2	To study the analysis and behavior of linear time-invariant (LTI) systems using convolution.
3	To develop mathematical tools like Laplace Transform for analyzing continuous-time systems.
4	To analyze discrete-time systems using the Discrete-Time Fourier Transform (DTFT).
5	To understand the stability, causality, and response characteristics of systems in both time and frequency domains.

Course Outcomes: At the end of the course the students will able to

CO1	Classify and represent different types of signals and systems based on their properties.
CO2	Use Fourier Transform and Discrete-Time Fourier Transform to analyze and interpret signals and systems.
CO3	Apply Laplace Transform techniques for system analysis in the s-domain.

UNIT I: CLASSIFICATION OF SIGNALS & SYSTEMS (8 Hours) (10 Marks)

Standard signals: Step, Impulse, Ramp, Real & complex exponentials, sinusoidal. Classification of signals: Continuous time (CT) and Discrete Time (DT) signals, Periodic and aperiodic signals, Deterministic and random signals, Energy and power signals. Classification of Systems: Continuous time and Discrete time, Static and dynamic, Linear and nonlinear, Time-variant and Time-invariant, Casual and non-casual, Stable and unstable, Invertible and Inverse system.

UNIT II: FOURIER TRANSFORM & DTFT	**(8 Hours) (10 Marks)**
Fourier Transform Properties: Linearity, Time Shifting, Time and frequency scaling, Duality, Multiplication property, Differentiation and Integration, Convolution property. The Discrete-Time Fourier Transform, Properties of Discrete-Time Fourier Transform	
UNIT IV: LAPLACE TRANSFORM	**(8 Hours) (10 Marks)**
Review of the Laplace Transform for continuous time signals and systems, Properties of Laplace Transform, system functions, poles and zeros of system functions and signals, Laplace domain analysis of LTI systems. Inverse Laplace Transform	

List of Books:

Text Books:

1. Signals and Systems, A. Anand Kumar, PHI Learning Private Limited.
2. Oppenheim, Wilsky, Nawab, “Signals and Systems”, Person Education Publications
3. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.

Reference Books :

1. Simon Haykin, Barry Wan Veen : “Signals and Systems”, John Wiley and Sons Publications.
2. K.Lindner, “Signals and Systems”, McGraw Hill International, 1999.
3. B.P. Lathi, "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford University Press
4. John G. Proakis, Dimitris G. Manolakis,“ Digital Signal Processing”, 4th Edition, Pearson Prentice Hall

Lokmanya Tilak Jankalyan Shikshan Sanstha's
Priyadarshini Bhagwati College of Engineering, Nagpur
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited by NAAC Grade 'A'
Harpur Nagar, Umred Road, Nagpur– 440024

Department of Electronics & Communication Engineering
B.Tech. IV Semester

Syllabus

Micro Project and PCB Design Lab

Subject Code: EC406P	**Subject Name :** Micro Project and PCB Design Lab
Teaching Scheme: BTECH/EC/NEP-25/R0	**Examination Scheme:**
Total Credit: 2(P)	**Theory (E): 50** Marks **& T(I):** 50 Marks
Practical: 4 Hrs./Week	**Duration of End Semester Exam (ESE):** 2 Hrs.

Course Objectives:

1	To introduce the students to schematic circuit design using PCB software tools.
2	To develop skills in PCB layout design and routing techniques.
3	To simulate electronic circuits to verify performance before fabrication.
4	To impart hands-on experience in PCB fabrication and soldering techniques.
5	To enable students to design, build, and test a complete mini/micro electronic project.

Course Outcomes: After completion of practical the students will able to

CO1	Design circuit schematics using standard PCB design software.
CO2	Create PCB layouts and perform manual or auto routing.
CO3	Simulate and verify circuit functionality before fabrication.
CO4	Fabricate single/double-layer PCBs using manual or outsourced methods.
CO5	Develop and demonstrate a working mini/micro electronic project integrating design, fabrication, and testing.

List of Experiments	
1	Schematic Design Using PCB Design Software
2	PCB Layout Design and Routing
3	Simulation of Circuit before PCB Fabrication
4	PCB Fabrication (Manual or Outsourced)
5	Component Mounting and Soldering on PCB
6	Mini/Micro Project Development