Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Proficiency	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
3140411	DC	Digital Communication	50	10	20	20	60	20	20	200	2	1	2	4

Digital Communication (3140411)

Course Objectives: The main objective of this course is to understand the basic concepts of digital modulations and digital transmission techniques.

Unit I Sampling Techniques: Sampling theorem for Low pass signal, Ideal sampling, Natural sampling and Flat top sampling, Time division Multiplexing, Generation and detection of PAM, PPM and PWM.

Unit II Waveform coding techniques: Introduction, Quantization, Quantization noise, Companding, Types of companding: A law and µlaw, Eye pattern, Delta modulation, Adaptive delta modulation and Differential Pulse Code Modulation.

Unit III Band Pass Data Transmission: Binary amplitude shift keying (BASK), Binary phase shift keying (BPSK), Quadrature phase shift keying(QPSK), Differential phase shift keying (DPSK), Coherent and Non coherent Binary frequency shift keying (BFSK), Quadrature amplitude modulation (QAM).

UNIT IV Detection Techniques: Optimum filter, Matched filter and Correlator detector, Gram Schmidt orthogonalization procedure and Concept of signal space for the computation of probability of error, Calculation of error probability for BPSK, QPSK and coherent BFSK, Comparison of different modulation techniques.

Unit V Information Theory & Coding: Concept of information theory, Entropy and Information rate, Channel capacity, Shannon's theorem, Shannon Hartley theorem, Coding Efficiency, Shannon Fano coding, Huffman coding.

Text Books:

1. Singh, R.P. & Sapre, S.D, "Communication Systems: Analog & Digital", Tata McGraw-Hill, 5threprint, 2000.
2. John G. Proakis, "Digital Communication", McGraw Hill Inc, 5th Edition, 2008.

Reference Books:

1. Simon Haykin, "Communication Systems", John Wiley & Sons, 4th Edition, 2000.
2. Taub & Schilling, "Principle of Communication Systems", 2nd Edition, 2003.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1: Explain the sampling process and reconstruction.
CO2: Analyze the performance of waveform coding techniques.
CO3: Describe the mathematical model of digital modulation techniques.
CO4: Determine the error probability of band pass transmission techniques.
CO5: Illustrate the concepts of information theory and coding.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	2	2	1	2	1	2	3	3	-	-
CO2	2	3	3	2	3	3	-	1	1	1	3	3	2	2
CO3	2	2	2	2	3	2	1	-	1	1	1	2	1	1
CO4	2	2	2	1	2	2	-	2	1	1	1	2	2	2
CO5	2	3	3	2	3	3	1	1	1	1	2	3	2	3

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Proficiency	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
3140412	DC	Linear Control Theory	50	10	20	20				100	2	1		3

Linear Control Theory (3140412)

Course Objectives: Learning of control system theory and its implementation in practical systems using electronic devices.

UNIT I: Introduction to Control Systems: Basic control system terminology, Open loop and Closed loop system, Feedback control, Different modeling of physical systems, Linear approximation of physical systems. Transfer function of linear systems, Block diagram algebra and Signal flow graphs, Effects of negative feedback.

UNIT II: **Time Domain Analysis:** Test input signals, First order systems, Second order systems, Effects of addition of poles and zeros to open and closed loop transfer functions, Steady state error, Constant and error coefficients for type 0, 1, and 2 systems.

UNIT III: Stability Analysis: Concept of stability of linear systems, Relation between the closed loop poles and stability, Relative stability, Absolute stability, Routh Hurwitz criteria and its applications, Root locus plot.

UNIT IV: Frequency Domain Analysis: Performance specifications in frequency domain, Co-relation between frequency domain and time domain, Polar plots and Bode plots of transfer function, Nyquist stability criterion, Assessment of relative stability.

Unit V: Introduction to Controllers: Introduction to Proportional, Integral, and Derivative controller, PD controller, PI controller, PID controller, Design of various controllers and their limitations.

Text Books:

1. Control System Engineering- I. J. Nagrath & M. Gopal, New Age International.
2. Modern Control Engineering –K. Ogata, Prentice Hall.
3. Control System- A. Anand Kumar, PHI
4. Control System Engineering –B.S. Manke, Khanna publications.

Reference Books:

1. Automatic Control System— B. C. Kuo,Wiley.
2. Control System Engineering- Norman Nise, John Wiley & Sons.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1. **Analyze** and model linear systems using Block diagram reduction and signal flow graph.
CO2. **Analyze** the time domain behavior of the linear systems.
CO3. **Compute** the steady state error for type 0,1,2 systems.
CO4. **Analyze** the stability of control system using time and frequency domain methods.
CO5. **Design** proportional, integral, and derivative controller, PD, PI, PID controllers.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	1	1	1	1	2	1	2	3	1
CO2	3	3	2	2	2	1	1	1	1	1	1	2	3	1
CO3	3	3	2	2	1	1	1	1	1	2	1	2	3	1
CO4	3	3	3	3	3	2	1	1	1	2	1	2	3	1
CO5	3	3	3	3	3	3	1	1	1	2	3	2	3	3

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Proficiency	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
3140413	DC	Microprocessor & Interfacing	50	10	20	20	60	20	20	200	2	1	2	4

Microprocessor and Interfacing (3140413)

Course objectives: To introduce the basic concepts of microprocessor and microcontroller and to develop assembly language programming skills along with their use in various applications.

Unit I: Introduction to Microprocessor: Introduction to microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, Interrupts, Interrupts and interrupt service routine.

Unit II: 8085 Assembly Language Programming: 8085 instruction set, Data transfer operations, Arithmetic operations, logic operations, Branch operations, 8085 assembly language programming, Debugging the program, Addressing modes of 8085.

Unit III: Timing diagram and interfacing with 8085: Counters and Time delays, Instruction cycle, Machine cycle, T-states, timing diagram for different 8085 arithmetic, logical and branch instructions, Introduction to Memory interfacing and I/O interfacing with 8085.

Unit IV: Peripheral ICs: Memory interfacing and various interfacingschips like: Programmable input/output ports 8155/8255(PPI), Programmable interval timer 8253/8254 (PIT), Programmable interrupt controller 8259 (PIC) and DMA controller 8257.

Unit V: Architecture and Programming of 16-Bit Microprocessor: 8086 Block diagram and Architecture, Pin configuration of 8086, Execution Unit (EU) and Bus Interface Unit(BIU), Minimum mode & Maximum mode operation, Memory segmentation, Instruction set and addressing modes of 8086, Introduction to 8086 assembly language programming.

Text Book:

1. Ramesh. S. Gaonkar, Microprocessor architecture Programming and Application with 8085 Penram International Publishing, 4th Edition.
2. B. Ram, "fundamentals of Microprocessors and Microcomputer" DhanpatRai, 5th Edition.

Reference Books:

1. Douglas V Hall.,"Microprocessor and Interfacing"Tata Mcgraw Hill.
2. A.K.Ray and K.M. Bhurchandi,"Advance Microprocessor and Peripheral",Tata Mcgraw Hill

Course Outcomes

After successful completion of the course, students will be able to:
CO1. Describe the architecture and organization of 8085, 8086 microprocessors.
CO2. Describe the instruction sets of 8085, 8086 microprocessors.
CO3. Develop assembly language programs for 8085.
CO4. Design memory and I/O interfacing circuits with 8085.
CO5. Explain interface of 8085 with 8255 PPI, 8254 PIT, 8259 PIC and 8257 DMA controller.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	1	1	1	1	2	1	2	3	1
CO2	3	3	2	2	2	1	1	1	1	1	1	2	3	1
CO3	3	3	2	2	1	1	1	1	1	2	1	2	3	1
CO4	3	3	3	3	3	2	1	1	1	2	1	2	3	1
CO5	3	3	3	3	3	3	1	1	1	2	3	2	3	3

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Proficiency	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini proj		L	T	P	
3140415	MC	Cyber Security	50	10	20	20	-	-	-	100	2	1	-	3

TOPIC-WISE MOOC LINKS FOR CYBER SECURITY (3140415)

UNIT - 1:

Topic of the lecture: Overview of Cyber Security
Topic of the lecture: Introduction to Cyber Security, Cyber-crime
Topic of the lecture: Types of Cyber Attacks
Topic of the lecture: Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy

UNIT - 2:

Topic of the lecture: Basics of Internet and Networking
Topic of the lecture: Network Topologies
Topic of the lecture: Wired and Wireless networks, E-commerce
Topic of the lecture: OSI Model:
Topic of the lecture: Internetworking Devices:
Topic of the lecture: Firewall:

UNIT - 3:

Topic of the lecture: Security Principles and Attacks
Topic of the lecture: Cryptography:
Topic of the lecture: Symmetric key Cryptography **Topic of the lecture:** Symmetric key Ciphers **Topic of the lecture:** Public key cryptography **Topic of the lecture:** SSL

UNIT - 4:

Topic of the lecture: Hacker, Types of Hacker **Topic of the lecture:** Malicious Softwares (Part 1) **Topic of the lecture:** Malicious Softwares (Part 2)

UNIT - 5:

Topic of the lecture: Introduction of Intellectual Property and patent
Topic of the lecture: More About Patent **Topic of the lecture:** All about Trademark **Topic of the lecture:** Industrial Design
Topic of the lecture: Geographical Indication **Topic of the lecture:** All about copyright **Topic of the lecture:** IT act 2000
Topic of the lecture: Digital Crime Investigation

Course Outcomes

After successful completion of the course, students will be able to:

CO1. **Discuss** the basic terminologies of cyber security.
CO2. **Explain** the basic concept of networking and internet.
CO3. **Apply** various methods used to protect data in the internet environment in real-world Situations.
CO4. **Examine** the concept of IP security and architecture.
CO5. **Compare** various types of cyber security threats/vulnerabilities.
CO6. **Develop** the understanding of cybercrime investigation and IT ACT 2000

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	1	1	1	1	2	1	2	3	1
CO2	3	3	2	2	2	1	1	1	1	1	1	2	3	1
CO3	3	3	2	2	1	1	1	1	1	2	1	2	3	1
CO4	3	3	3	3	3	2	1	1	1	2	1	2	3	1
CO5	3	3	3	3	3	3	1	1	1	2	3	2	3	3

Subject: Digital Communication
Subject Code: 3140411

Course Objective

This course gives the ability to the students to learn the concepts of communication for digital signals using various modulation techniques.

List of Experiment

1. Perform sampling and reconstruction.
2. Analysis of the process of Time Division Multiplexing and demultiplexing.
3. Analyze Pulse Amplitude Modulation on MATLAB.
4. Analyze Pulse Width Modulation on MATLAB.
5. Analyze Pulse Position Modulation on MATLAB.
6. To generate Amplitude Shift Keying signal using MATLAB
7. To generate Phase Shift Keying signal using MATLAB software
8. To generate Frequency Shift Keying signal using MATLAB
9. To generate Quadrature Phase Shift Keying signal using MATLAB
10. To generate Pulse code modulation signal using MATLAB
11. To generate Time Division Multiplexing signal using MATLAB

Course Outcomes:

On completion of this Lab the student will be able to:

CO1. Verify sampling theorem.

CO2. Demonstrate digital modulation techniques.

CO3. Evaluate the performance of the digital communication system using MATLAB.

Subject Name: Microprocessor & Interfacing
Subject Code: 3140413

Course Objective

This course gives the ability to the students to learn the assembly language programming of 8085 and 8086 microprocessors and their interfacing with different peripherals.

List of Experiments

1. Write an assembly language program to perform addition operation on two immediately given 8 bit numbers using 8085 microprocessor.
2. Write an assembly language program to perform addition operation on two 8 bit numbers stored in memory using an 8085 microprocessor.
3. Write an assembly language program to find whether the number is even or odd using an 8085 microprocessor.
4. Write an assembly language program to obtain 2's complement of a given number using 8085 microprocessor.
5. Write an assembly language program to perform arithmetic operations of two BCD numbers using an 8085 microprocessor.
6. Interface a Stepper Motor to the 8085 microprocessor system using 8255 and write an 8085 assembly language program to control the Stepper Motor.
7. Write an assembly language program to generate standard waveforms using DAC and display waveforms on CRO with an 8085 microprocessor.
8. Write an assembly language program to Move a Block of Data from one memory location to another with an 8086 microprocessor.
9. Write an assembly language program to Multiply Two 16-Bit Numbers with 8086 microprocessor.
10. Write an assembly language program to find the square of a given number with an 8086 microprocessor.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1. Develop the assembly language programs for the different arithmetic and logical operations using 8085 and 8086 microprocessors.

CO2. Design interfacing circuits for different I/O devices using PPIs with 8085.

B.Tech IV Semester (Electronics Engineering)

Subject Name: Software Lab Subject Code: 3140414

List of Experiments

1. Study of MATLAB.
2. Write a program performing the MATRIX manipulation using the MATLAB command window.
3. Write a program to plot the various ANALOG functions using plot command. Also label x axis ,y axis and provide the title of figure.
4. Write a program to plot the various DISCRETE functions using plot command. Also label x axis, y axis and provide the title of figure.
5. Write a program to plot more than one ANALOG function in a single window using subplot.
6. Write a program to plot more than one DISCRETE function in a single window using subplot.
7. Write a program to plot Amplitude Modulated signal along with baseband signal.
8. Write a program to plot SSB Modulated signal along with baseband signal.
9. Write a program to plot Frequency Modulated signal along with baseband signal.
10. Write a program to plot Phase Modulated signal along with baseband signal.
11. Write a program to draw root locus of the given function.
    1/(2s^4+5s^3+4s^2+6s+8)
12. Write a program to draw the Bode Plot of the given function.
    1/(2s^4+5s^3+4s^2+6s+8)
13. Write a program to draw Nyquist Plot of the given function.
    1/(2s^4+5s^3+4s^2+6s+8)

Course Outcomes:

After successful completion of the course, students will be able to:

CO1. **Develop** MATLAB codes for signal representation and modulation techniques.
CO2. **Use** MATLAB tools for analysis of system performance.
CO3. **Simulate** the real life problems for performance analysis using MATLAB Simulink.

Subject Name: Digital Communication Lab Subject Code: 3140411

Skill Based Mini Project

1. Implementation of sampling theorem. (a) Sampling at Nyquist rate (b) Over sampling and (c) Under sampling.
2. Implementation of Eye Diagram/Eye Pattern for any of the modulation technique.
3. PPM using IC 555.
4. PAM using IC 555.
5. PWM using IC 555.
6. Generation of On-off Keying signal.
7. Generation of ASK, FSK and PSK signal.
8. Generation of QAM signal and its constellation diagram.
9. To develop a GUI based project in MATLAB for PCM.
10. To develop a GUI based project in MATLAB for Differential-PCM.
11. To develop a GUI based project in MATLAB for Delta Modulation.
12. To develop a GUI based project in MATLAB for Adaptive Delta Modulation
13. Digital Communication through Audio Signals
14. Develop a digital pulse counter system to count pulses in a given signal using digital communication
15. Implement a basic digital signal encryption system for secure communication
16. Explore techniques for digital signal compression and implement a simple compression algorithm
17. Create a MATLAB project to visualize signal constellations for different digital modulation schemes
18. Implement a basic error detection system for digital signals using techniques like parity checks
19. Extend the Delta Modulation project to incorporate adaptive techniques for better performance
20. Develop a system to digitize and transmit voice signals using basic digital communication principles.

B.Tech IV Semester (Electronics Engineering)

Subject Name: Microprocessor & Interfacing Subject Code: 3140413

Skill Based Mini Project

1. Develop an 8085 microprocessor assembly language program to generate Fibonacci series using 8085 Simulator.
2. Develop an 8085 microprocessor assembly language program to calculate the square root using 8085 Simulator.
3. Develop an 8085 microprocessor assembly language program to check a string as palindrome or not on using 8085 Simulator.
4. Develop an 8085 microprocessor assembly language program to calculate the square root using 8085 Simulator.
5. Develop an 8085 microprocessor assembly language program to multiply two 16-bit numbers using 8085 Simulator.
6. Develop an 8085 microprocessor assembly language program to convert binary to BCD using 8085 Simulator.
7. Develop an 8085 microprocessor assembly language program to find the cube of a number using 8085 Simulator.
8. Develop an 8085 microprocessor assembly language program to divide two numbers using 8085 Simulator.
9. Develop an 8085 microprocessor assembly language program to check a given byte is bitwise palindrome or not using 8085 Simulator.
10. Develop an 8085 microprocessor assembly language program to find smallest no from the given array using 8085 Simulator.
11. Develop an 8086 microprocessor assembly language program to generate Fibonacci series using Simulator emu8086.
12. Develop an 8086 microprocessor assembly language program to calculate the square root using emu8086 Simulator.
13. Develop an 8086 microprocessor assembly language program to check a string as palindrome or not on using emu8086 Simulator.
14. Develop an 8086 microprocessor assembly language program to calculate the square root using emu8086 Simulator.
15. Develop an 8086 microprocessor assembly language program to multiply two 16-bit numbers using emu8086 Simulator.
16. Develop an 8086 microprocessor assembly language program to convert binary to BCD using emu8086 Simulator.
17. Develop an 8086 microprocessor assembly language program to find the cube of a number using emu8086 Simulator.
18. Develop an 8086 microprocessor assembly language program to divide two numbers using emu8086 Simulator.
19. Develop an 8086 microprocessor assembly language program to check a given byte is bitwise palindrome or not using emu8086 Simulator.
20. Develop an 8086 microprocessor assembly language program to find smallest no from the given array using emu8086 Simulator.

Skill Based Mini Project

1. Generation of wave of any given expression.
2. Calculator Design using MATLAB.
3. Draw and calculate the area of circle of given radius.
4. GUI model for various waveform generation and display.
5. GUI model for display of various transform of specific waves.
6. Create a GUI model in MATLAB to display various transforms (e.g., Fourier, Laplace) of input waveforms.
7. Perform filtering, convolution, and other signal processing operations using MATLAB Signal Processing ToolBox.
8. Develop a MATLAB script to generate and plot 3D surfaces based on mathematical expressions
9. Import data from Excel into MATLAB and create visualizations like bar charts, scatter plots, and histograms.
10. Use MATLAB to perform basic image processing operations like resizing, cropping, and filtering
11. Implement a script to fit curves to experimental data and visualize the best-fit curves.
12. Draw and calculate the area of any 3D object of given dimension.
13. Build a GUI in MATLAB for performing basic statistical analyses on datasets
14. Use MATLAB to perform spectral analysis on signals and visualize frequency content
15. Write a MATLAB script to generate a specified number of random numbers and visualize their distribution using histograms
16. Develop a GUI-based unit converter that allows users to input values in one unit and convert them to another (e.g., Celsius to Fahrenheit)
17. Create a simple digital clock using MATLAB's GUI capabilities, displaying the current time.
18. Import data from Excel into MATLAB and perform mathematical calculations such as mean, median, mode.
19. Write a MATLAB program to perform various operations on matrix like addition, multiplication, and inverse.