GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: PCEC-110
Subject Name: Analog Communication Systems

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 0
Semester: 5	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 3
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 20%
External Marks: 60	**Duration of End Semester Exam(ESE):** 3 hours
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Fundamentals of Signal and Systems

Additional Material Allowed in ESE: Scientific calculator

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Develop basic understanding of different functional blocks in an analog communication system.
2.	Comprehend and analyze the various analog modulation techniques.
3.	Apply the knowledge of analog modulation techniques to solve various communication related problems.
4.	Generate and detect various analog modulation schemes by using fundamentals of analog communication systems.
5.	Understand the concept of super-heterodyne receiver and apply it to standard radio broadcasting.
6.	Illustrate the use of sampling theorem for the generation and detection of various analog pulse modulation techniques.

Detailed Contents:

Part -A

Analog Modulation Techniques: **7 hours**

Introduction to Elements of a Communication System, Modulation & Demodulation, Need of modulation, Types of analog modulations, theory of amplitude modulation, AM power calculations, AM current calculations, AM modulation with a complex wave, theory of frequency modulation, mathematical analysis of FM, spectra of FM signals, Narrowband FM, Wideband FM, theory of phase modulation, phase modulation obtained from frequency modulation, Comparison of AM & FM, Comparison of PM & FM.

AM Transmission and Reception: **12 hours**

AM Transmission: Basic principle of AM generation, Low level and high level modulation, Basic principle of AM generation, AM generation using Square law modulation, Collector modulation of Class C transistor amplifiers, Balanced modulator and Ring modulator (Suppressed carrier AM generation), Product modulator.

AM Reception: Receiver parameters; Selectivity, Sensitivity, Noise figure, Image frequency & its

rejection, double spotting, Tuned radio frequency receiver, Basic elements of AM super heterodyne receiver; RF amplifier circuit, IF amplifier circuit, Self excited Mixer, local oscillator circuit, AGC, Envelope detector and Practical diode detector, AM receiver using Phase locked loop.

Part-B

FM Transmission and Reception: 9 hours

FM Transmission: FM allocation standards, generation of FM by direct methods:Varactor diode modulator, Reactance modulator, Phase locked loop direct FM transmitter, indirect generation of FM: Armstrong method, Frequency stabilized reactance FM transmitter, Noise triangle.

FM Reception**:** Balanced Slope detector, Foster Seeley discriminator, Ratio detector, FM detection using PLL, Pre-emphasis & De-emphasis, Limiter circuit, FM Receiver.

SSB Transmission and Reception: 6 hours

Advantages and disadvantages of SSB transmission, Generation of SSB; Filter method, Phase shift method, Third Method, Pilot carrier SSB transmitter, Independent Sideband (ISB) Transmitter, Vestigial Sideband (VSB) transmission. Balanced modulator as SSB demodulator, Pilot carrier SSB Receiver, and ISB Receiver.

Pulse Modulation Transmission and Reception: 5 hours

Introduction to analog pulse modulation, Sampling theorem, Pulse Amplitude Modulation(PAM), Natural PAM, Frequency spectra for PAM, Flat-top PAM, PAM modulator, PAM demodulator, Pulse Width Modulation (PWM) & demodulation, Pulse Position Modulation & demodulation, spectra of pulse modulated signal, SNR calculation for pulse modulation systems.

Text Books:

1. Kennedy G. & Davis B., " Electronic Communication Systems",McGraw-Hill Education Private Limited, 5th Edition, Glencoe Publishers, 2015.
2. Tomasi, W., "Electronic Communications Systems-Fundamental through Advanced", Pearson Education, 6th Edition, 2004.

Reference Books:

1. Mithal, G.K., Mittal, R., "Radio Engineering", Khanna Publishers, Edition 15, 1990.
2. Roddy D. & Coolen, J., "Electronic Communications", Pearson Education, 4th edition, 2014.
3. Taub H. & Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill Education, 4th Edition, 2010.
4. Haykin S., "Communication Systems", John Willey, 5th Edition, 2009.
5. Couch L. W., "Digital and Analog Communication Systems", Pearson Education, 8th Edition, 2012.
6. Shanmugam, K. S., "Digital and Analog Communication Systems", Student Edition, Wiley India Publications, 2008.

E books and online learning materials:

1. http://web.eecs.utk.edu/~roberts/ECE342/AnalogCommunicationSystems.pdf
2. http://www.ee.iitm.ac.in/~giri/pdfs/EE4140/textbook.pdf

MOOCS and Video Course:

1. https://nptel.ac.in/courses/117105143/
2. https://nptel.ac.in/courses/117102059/

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: PCEC-111
Subject Name: Digital Signal Processing

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 0
Semester: 5	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 4
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 50%
External Marks: 60	**Duration of End Semester Exam(ESE):** 3 hours
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Fundamentals of signals and Systems

Additional Material Allowed in ESE: Scientific Calculator

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Apply the knowledge of convolution sum method, difference equations, z-transforms and DFT to analyze digital signal processing systems.
2.	Identify, formulate, and solve engineering problems in the area of digital signal processing.
3.	Utilize appropriate methods to design and synthesize digital filters to meet the designed specifications within given constraints.
4.	Select and use the appropriate type of structure for the efficient development of DSP systems
5.	Analyze the effects of finite word-length on filter performance.
6.	Summarize the contextual knowledge to assess the architecture & characteristics of various digital signal processors.

Detailed Contents:

Part-A

Introduction: **2 hours**

Basic elements of a DSP system, Advantages and disadvantages of DSP over analog processing, Applications of digital signal processing.

Discrete-Time Signal and Systems: **8 hours**

Elementary discrete-time signals, Classification of discrete-time signals, Manipulation of discrete-time signals, Input-Output description of discrete-time systems, Block diagram representation of discrete-time systems, Classification of discrete-time systems, Interconnection of discrete-time systems, Analysis of Linear Time-invariant (LTI) systems using Convolution Sum method, Causal LTI systems, Stability of LTI systems, Analysis of LTI system using Difference equation, Cross-correlation and auto-correlation of Discrete-time signals.

Z-Transforms: **9 hours**

Direct z-transforms and importance of ROC, Properties of z-transform, Rational z-transforms, System function of LTI Systems, Inverse z-transform methods, One sided z-transform, Analysis of LTI systems in z-domain

Part-B

Discrete Fourier Transform (DFT): **8 hours**

Frequency domain sampling and reconstruction of discrete time signal, DFT, DFT as linear transformation, Relationship of DFT to other Transforms, Properties of DFT, Circular Convolution and DFT, Use of DFT in Linear Filtering, Fast Fourier Transform (FFT) Algorithms, Radix-2 Decimation-in-time FFT Algorithm, Radix-2 decimation-in-frequency FFT algorithm

Design of Digital Filters: **8 hours**

Types and realization of digital filters, Steps of filter design, Linear-phase response filter, Design of FIR filter using window method, Design of IIR Filter by Impulse Invariance, Bilinear Transformation and Matched z-Transform Technique, Analog and Digital Domain Frequency Transformation, Representation of Numbers and Finite Word Length Effects.

Digital Signal Processors: **4 hours**

Introduction, Computer architecture for signal processing, Difference between general and special-purpose digital signal processors, Selecting digital signal processors, Overview of ADSP 2100 and TMS320C50 processors.

Text Books:

1. Digital Signal Processing: J.G. Proakis and D. G. Manolakis ; Pearson Education, New Delhi

Reference Books:

1.Digital Signal Processing-A.V. Oppenheim & R. W. Schafer, Pearson Education, New Delhi.
2. Digital Signal Processing : E. C. Ifeachor and B.W. Jervis, Pearson Education, New Delhi.
3. Digital Signal Processing : S. Salivahanan, A. Vallavaraj, and C. Gnanapriya; Tata Mc-Graw Hill, New Delhi.

E-Books and online learning material:

1. https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Guide_to_Digital_Signal_Process.pdf
2. https://www.cl.cam.ac.uk/teaching/0809/DSP/slides-2up.pdf

Online Courses and Video Lectures:

1. MOOCS and Video Course: 1. http://nptel.ac.in/courses/114102060/5
2. http://nptel.ac.in/courses/114102060/7

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: PCEC-112
Subject Name: Microprocessors and Microcontrollers

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 0
Semester: 5	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 4
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 35%
External Marks: 60	**Duration of End Semester Exam(ESE):** 3 hours
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Digital Electronics

Additional Material Allowed in ESE: Scientific Calculator

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Recall and apply basic concepts of digital electronics to microprocessor and microcontroller.
2.	Describe and differentiate between the architecture, features and functioning of microprocessor and microcontroller.
3.	Apply the knowledge of instruction set for performing various operations on microprocessor and microcontroller.
4.	Assess and solve basic math operations using the microprocessor and microcontroller
5.	Discuss the interfacing of various devices with microcontroller.
6.	Develop programs for engineering problems.

Detailed Contents:

Part-A

Introduction to 8085 microprocessors: **12 hours**

Architecture and pin configuration, Flags, Buses, Data transfer instructions, Arithmetic instructions, Logic instructions, Branch instructions, Conditional call and return instructions, Addressing modes, Assembly language programming, 8085 interrupts, Basic interrupt processing, RIM, SIM.

Introduction to 8051 microcontrollers: **10 hours**

Comparison of microprocessor and microcontroller, architecture and pin configuration of 8051, flag bits and PSW register, Register banks and stacks, Internal memory organization, Types of Special Function Registers and their uses, Timer/Counter.

Part-B

8051 Assembly Language programming: **8 hours**

Introduction to 8051 assembly language programming, Arithmetic instructions, Logic instructions, Single bit instructions, Jump, loop and call instructions, I/O port programming, timer/counter programming, Addressing modes, Data types and assembler directives, 8051 interrupts.

Interfacing: **9 hours**

8051 connection to RS 232, interfacing of 8051 microcontroller: LCD, ADC, DAC, Stepper motor.

Text Books:

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 5th Edition, Penram International Publishing, New Delhi, 2007.
2. Muhammed Ali Mazidi, Rolin McKinlay, Janice Gillispe "The 8051 Microcontroller and Embedded Systems", Pearson Education, 2007

Reference Books:

1. K. J. Ayala, "The 8051 Microcontroller", Cengage Learning, 2004.
2. D.V. Hall, "Microprocessor and Interfacing-Programming and Hardware", 2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008.
3. K. L. Short, "Microprocessors and Programmed Logic", 2nd Ed.,Pearson Education, 2008.
4. Davies J H, "Microcontroller Basics", Elsevier, 2011.
5. Subrata Ghoshal, "Microcontroller: Internals, Instructions, Programming and Interfacing", Pearson Education, 2010

E-Books and online learning material:

1. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/notused/Microprocessors%20and%20Microcontrollers/Learning%20Material%20%20Microprocessors%20and%20microcontrollers.pdf
2. https://courses.cs.washington.edu/courses/cse466/15au/pdfs/lectures/02-Microprocessors-Microcontrollers.pdf

Online Courses and Video Lectures:

1. http://nptel.ac.in/courses/108107029/1
2. http://nptel.ac.in/courses/108107029/10

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: PCEC-113
Subject Name: Antenna and wave Propagation

Programme: B.Tech.	**L:** 3 **T: 0 P:** 0
Semester: 5	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 3
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 20%
External Marks: 60	**Duration of End Semester Exam(ESE):** 3hours
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Fundamentals of Electromagnetics.

Additional Material Allowed in ESE: Scientific calculator

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Comprehend the fundamental principles of antenna theory
2.	Apply the concepts & properties of Electro-magnetism to obtain parameters of wave propagation
3.	Design different types of antenna arrays.
4.	Analyse the antenna arrays on the basis of their properties and characteristics.
5.	Illustrate the characteristics of radio-wave and their propagation in the atmosphere.
6.	Discriminate the working principle and use of different types of antennas.

Detailed Contents:

Part-A

Basics of Antenna: **4 hours**

Types of Antennas, Radiation Mechanism in single, two wire and dipole, Current Distribution on a Thin Wire Antenna.

Fundamental parameters of antennas: **6 hours**

Radiation Pattern, Radiation Power Density, Radiation intensity, Directivity, Gain, Antenna efficiency, Bandwidth, Polarisation, Antenna Input Impedance, Antenna Vector Effective length and equivalent areas, Maximum Directivity and Maximum Effective Area, Return Loss, Friis Transmission equation, Effective aperture, Antenna Temperature.

Linear Wire Antennas: **7 hours**

Retarded potential, Infinitesimal dipole, Current distribution of short dipole and half wave dipole, Far-field, Radiating near-field and reactive near-field region, Monopole and Half wave dipole.

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Part-B

Antenna Arrays: **8 hours**

Array of two point sources, Array factor, n-element linear array with uniform amplitude and spacing, Analysis of Broadside array, Ordinary end-fire array, Hansen-woodyard end fire array, n-element linear array with non-uniform spacing, Analysis of Binomial and DolphTschebyscheff array, Scanning Array, Superdirective array

Aperture and Microstrip Antennas: **7 hours**

Field Equivalence principle, Rectangular aperture antennas, Horn antenna, Babinet's Principle, Slot Antenna, Reflector antenna, microstrip antennas and its feed networks.

Wave Propagation: **7 hours**

Free space equation, Reflection from earth's surface, Surface and Space wave propagation, Range of space wave propagation, Effective earth's radius, Duct propagation, Troposphere propagation. Structure of ionosphere, propagation of radio waves through ionosphere, Critical frequency, Maximum usable frequency, Optimum working frequency, lowest usable high frequency, virtual height, Skip Distance, Effect of earth's magnetic field.

Text Books:

1. Balanis C.A, "Antenna Theory", John Wiley & sons, 3rd edition, 2005.
2. Krauss J.D, "Antenna Theory", McGraw Hill,1985

Reference Books:

1. Jordan E. C, "Electromagnetics and radiating systems", PHI, 2007.
2. Collins R. E., "Antenna and radio wave propagation", McGraw Hill,2001.
3. Kennedy, G. "Electronic Communication Systems", TMH, Fifth Edition ,2015.
4. Prasad,K.D., " Antenna and Wave propagation", Satya Prakashan, 3rd edition, 2003.

E books and online learning materials:

1. http://www.crectirupati.com/sites/default/files/lecture_notes/AWP%20Lecture%20Notesfinal.pdf
2. https://khasimgriet.files.wordpress.com/2016/07/harish-a-r-_-sachidananda-m-antennas-andwave-propagation-oxford-university-press-2007.pdf

MOOCS and Video Course:

1. http://nptel.ac.in/courses/108101092/4
2. http://nptel.ac.in/courses/108101092/14

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: PCEC-114
Subject Name: Computer Networks

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 0
Semester: 5	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 3
Internal Marks: 40	**Percentage of Numerical/Design Problems:** NA
External Marks: 60	**Duration of End Semester Exam(ESE):** 3hours
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Basic Information of computer networks

Additional Material Allowed in ESE: NIL

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Describe the concepts of networking and classify the different networks and their topologies.
2.	Discuss the network protocols and apply this knowledge to make efficient networks
3.	Comprehend various flow and error control mechanism in networking.
4.	Demonstrate and analyze the impact of congestion in the network and apply appropriate techniques for congestion avoidance.
5.	Design solutions for routing issues in the network.
6.	Assess the security issues in the network and apply ethical principles to address them.

Detailed Contents:

Part-A

Introduction : **7 hours**

Introduction to networking concepts, Network topologies, Categories of networks: LAN, MAN, WAN, Internet, Intranet & Extranet, Virtual LANs, Network connecting devices (Repeaters, Bridges, Hubs, Routers and Switches).Introduction to control area networks (CAN), Mod bus.

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Network Protocols and switching technologies: **7 hours**

Need of Protocols Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access, OSI and TCP/IP reference Model, Comparison of OSI & TCP/IP, Ping and Telnet, switching technologies: circuit switching, message switching and packet switching.

Data Link Layer: **6 hours**

ARP, RARP, Framing and its methods, Sliding window protocols: One-Bit Sliding Window Protocol, Protocol Using Go Back n, Protocol Using Selective Repeat, High-Level Data Link Control (HDLC), PPP and SLIP

Part-B

Congestion Control in Data Networks: 6 hours

Congestion, Causes of congestion, Effects of Congestion, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control, Tunneling.

Routing Technologies: 7 hours

The optimality principle, Sink tree formation, Shortest path routing and solution of network problems using Dijkstra's Algorithm, Flooding, Routing protocols: Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts.

Internetwork Protocols: 6 hours

Internet Protocol & IP Addresses, Structure of IP, IPv4, IPv6, Virtual Private Networks, Security Issues and IP Security, Firewalls, Digital Signatures, Intrusion Detection Systems.

Text Books:

1. B. A. Forouzan, "Data Communications and Networking", Tata Mcgraw-Hill, 5th edition, 2004.
2. A.S. Tanenbaum, "Computer Networks", Pearson Education, 4th edition, 2011.

Reference Books:

1. W.Stallings, "Data and Computer Communication", Prentice Hall, 6th edition, 2002.
2. D. P. Bertsekas, "Data Networks", Prentice Hall, 2nd edition, 1992.
3. K. C. Mansfield and J. L. Antonakos , "An Introduction to Computer Networking", PHI.2001

E-Books and online learning material:

1. http://cnp3book.info.ucl.ac.be/2nd/cnp3bis.pdf
2. https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf

Online Courses and Video Lectures:

1. http://nptel.ac.in/courses/106105081/2
2. http://nptel.ac.in/courses/106105081/14http://nptel.ac.in/courses/108106068/10

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: MCI-102
Subject Name: Constitution of India

Programme: B.Tech.	**L:** 2 **T:** 0 **P:** 0
Semester: 5	**Teaching Hours:** L:26
Theory/Practical: Theory	**Credits:** Non Credit
Internal Marks: 40	**Percentage of Numerical/Design Problems:** NA
External Marks: 60	**Duration of End Semester Exam(ESE):** NA
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Nil

Additional Material Allowed in ESE: Nil

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Understand the constitutional design, frame and their actual working overtime.
2.	Realise the role and importance of citizenship
3.	Create awareness among engineers about the parliamentary form of the Government.
4.	Have an in-depth knowledge on union and state executives and politics.
5.	Figure out the significance of Emergency provisions in Indian constitution.
6.	Acquaint the students about the amendments of the constitution over time period.

Detailed Contents:

Part-A

Constitution of India, 1950: **4 hours**

Characteristics of the Indian Constitution, Salient Feature, Preamble, Federal Structure, Form of the Government

Citizenship: **3 hours**

Constitutional Provision and Dual Citizenship, Citizenship of Corporations.

Parliamentary Form of Government in India: **4 hours**

The constitution powers and status of the President of India

Union and State Executive: **3 hours**

The President, His Powers, viz., Executive, Legislative and Judicial, and Position including Ordinance Making Power, Prime Minister and Council of Ministers, Governor and his Powers.

PART B

Legislative Relations: **5 hours**

Distribution of Powers between Union, and the States, Extent of Legislative Powers, Doctrine of Territorial Nexus, Doctrine of Pith Substance, Doctrine of Colorable Legislation and Doctrine of Repugnancy, Residuary Powers.

Emergency Provision: **5 hours**

National Emergency, Failure of Constitutional Machinery, Civil Liberties and Emergency, Financial Emergency.

Amendment of the Constitution **2 hours**

Text Books:

1. Prof. GS, Pandey: Constitutional Law of India.
2. V.N. Shukla: Constitution of India,11th edition,EBC
3. M.P. Jain: constitutional law of India (Eng. A Hindi)
4. D.D. Basu: Introduction of the Constitution of India, 23rd Edition ,LexisNexis

Reference Books:

1. ParasDiwan: Constitution of India.
2. M.CJ. Kagzi: Constitution of India, metropolitan book co. Pvt ltd,1967

Reference: Constitution of India as amended up-to-date.

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: LPCEC-107

Subject Name: Analog Communication Systems Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: 5	**Teaching Hours:** 26 Hours
Theory/Practical: Practical	**Credits:** 1
Internal Marks: 30	**Percentage of Numerical/Design Problems:** NA
External Marks: 20	**Duration of End Semester Exam(ESE):** NA
Total Marks: 100	**Elective Status:** Compulsory

Prerequisites: Fundamentals of Electronics.

Additional Material Allowed in ESE: kits

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Generate & detect DSB AM & DSB-SC AM signals.
2.	Examine the generation & detection of SSB AM signals on a CRO.
3.	Generate & demodulate FM signals by using different methods.
4.	Comprehend the working of Super heterodyne receiver & be able to measure parameters such as sensitivity, selectivity & fidelity.
5.	Demonstrate the generation & detection different pulse modulation techniques.
6.	Construct a project in a team or individual for given problem using SIMULINK.

Detailed Contents:

Experiment 1. Create the DSB AM wave on a CRO and determine its modulation Index.

Experiment 2. Demonstrate the generation of DSB-SC AM signal using Balanced Modulator.

Experiment 3. Demodulate DSB AM signal using Diode detector.

Experiment 4. Examine the generation of SSB AM signal on a CRO.

Experiment 5. Detect SSB signal using product demodulator.

Experiment 6. Generate FM signal using Varactor diode.

Experiment 7. Create FM signal using Reactance modulator.

Experiment 8. Apply the principle of PLL for FM detection.

Experiment 9. Detect FM signals using Foster- Seeley discriminator & Ratio detector.

Experiment 10. Comprehend the operation of Superheterodyne receiver and measure the receiver parameters: sensitivity & selectivity.

Experiment 11. Generation & detection of PAM, PWM and PPM.

Experiment 12. Sampling & Reconstruction of signal from its samples using Natural/ Flat- top sampling & Sample & Hold circuit and observe the effect of Duty cycle.

Experiment 13. Discuss basics of SIMULINK.

Experiment 14. Simulation of various modulation techniques: AM, FM, PM, DSB-SC AM, SSB using SIMULINK

Reference Books and Other Resources:

Lab manuals available in lab.

MOOCS and Video Course:

1. https://www.youtube.com/watch?v=yHPe8XTr8eA
2. https://nptel.ac.in/courses/117105143/
3. https://nptel.ac.in/courses/117102059/

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: LPCEC-108
Subject Name: Digital Signal Processing Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: 5	**Teaching Hours:** 26 Hours
Theory/Practical: Practical	**Credits:** 1
Internal Marks: 30	**Percentage of Numerical/Design Problems:** NA
External Marks: 20	**Duration of End Semester Exam(ESE):** NA
Total Marks:100	**Elective Status:** Compulsory

Prerequisites: Fundamentals of signals and Systems.

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Make use of MATLAB tool to implement various elementary discrete time functions
2.	Develop code to process the given data in discrete time domain.
3.	Develop code to calculate convolution using different transforms
4.	Calculate and examine magnitude and phase response of LTI systems to estimate the behavior of systems.
5.	Design IIR and FIR filters using various methods.
6.	Construct a project in a team or individual for given problem using MATLAB features.

Detailed Contents:

Experiment 1. To develop elementary signal function modules (m-files) for unit sample, unit step, exponential and unit ramp sequences.

Experiment 2. To develop a program module to perform basic operations on sequences i.e. addition, multiplication, shifting, folding and scaling.

Experiment 3. To develop a program to find linear convolution and correlation of two discrete time sequences.

Experiment 4. To develop a program to find linear convolution using z-transforms

Experiment 5. To develop program for computing inverse z- Transform.

Experiment 6. To develop a program module to perform DFT and IDFT operation on discrete time sequences.

Experiment 7. To develop a program to find circular convolution of two sequences using DFT and IDFT method.

Experiment 8. To develop program for finding magnitude and phase response of LTI system described by system function H(z).

Experiment 9. To develop a program to design IIR filter with given specifications using Impulse invariance method.

Experiment 10. To develop a program to design IIR filter with given specifications using bilinear transformation method.

Experiment 11. To develop a program to design FIR filter with given specifications using

a. Rectangular Window

b. Hanning Window

Experiment 12. To develop a program to design FIR filter with given specifications using Kaiser window.

MOOCS and Video Course:

1. http://www.nptelvideos.in/2012/12/digital-signal-processing.html
2. http://freevideolectures.com/Course/2314/Digital-Signal-Processing-IIT-Delhi

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: LPCEC-109

Subject Name: Microprocessors and Microcontrollers Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: 5	**Teaching Hours:** 26 Hours
Theory/Practical: Practical	**Credits:** 1
Internal Marks: 30	**Percentage of Numerical/Design Problems:** NA
External Marks: 20	**Duration of End Semester Exam(ESE):** NA
Total Marks: 50	**Elective Status:** Compulsory

Prerequisites: Architecture and Instruction set of Microprocessor 8085 and Microcontroller 8051.

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1	Identify various modules related to 8085.
2	Demonstrate various arithmetic operations on 8-bit numbers using assembly language programming.
3	Demonstrate various arithmetic operations on 16-bit numbers using assembly language programming.
4	Demonstrate sorting operations using assembly language programming.
5	Identify various modules related to 8051.
6	Interface and develop source codes for peripheral devices with the 8051 microcontroller.

Detailed Contents:

Experiment 1. Introduction to the 8085 microprocessor kit.

Experiment 2. Write a program to add two 8-bit numbers whose result is of 16 bit using 8085.

Experiment 3. Write a program to subtract two 8-bit numbers using 8085.

Experiment 4. Write a program to add two 16-bit numbers using 8085.

Experiment 5. Write a program to subtract two 16-bit numbers using 8085.

Experiment 6. Write a program to multiply two 8 bit numbers by repetitive addition method using 8085.

Experiment 7. Introduction to 8051 microcontroller kit.

Experiment 8. Write a program to add and multiply two numbers lying at two different memory locations using 8051.

Experiment 9. Write a program to find largest of two numbers using 8051.

Experiment 10. Write a program to arrange four numbers stored at memory locations in chronological order and display the arranged numbers on four different ports using 8051.

Experiment 11. Write a program to flash LED using 8051 microcontroller.

Experiment 12. Write a program to interface LCD display with 8051 microcontroller.

Experiment 13. Write a program to interface ADC/DAC with 8051 microcontroller.

MOOCS and Video Course:

1. https://nptel.ac.in/courses/108105102/
2. https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers-IIT-Kharagpur

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: LPCEC-110
Subject Name: Computer Networks Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: 5	**Teaching Hours:** 26 hours
Theory/Practical: Practical	**Credits:** 1
Internal Marks: 30	**Percentage of Numerical/Design Problems:** NA
External Marks: 20	**Duration of End Semester Exam(ESE):** NA
Total Marks: 50	**Elective Status:** Compulsory

Prerequisites: Basic Information of computer hardware and computer networks

Additional Material Allowed in ESE: Software

On Completion of the course, the student will have the ability to:

CO#	Course Outcomes
1.	Apply the knowledge of different network components, transmission media and tools to solve various problems of computer communication.
2.	Design and develop different network design and logical models of networking to solve network related problems.
3.	Configure various network connecting devices.
4.	Design networks with addressing schemes and routing to solve networking problems.
5.	Utilize various troubleshooting methods to overcome networking problems.
6.	Develop team skills while working in groups in different network environments with the help of resource sharing.

Detailed Contents:

Experiment 1. To connect the computers in local area network.
Experiment 2. To implement basic network commands and Network configuration commands.
Experiment 3. To Perform an Initial Switch Configuration.
Experiment 4. To Perform an Initial Router Configuration.
Experiment 5. To Connect a Switch in a network.
Experiment 6. To implement the Cisco IOS show Commands.
Experiment 7. To Examine WAN Connections.
Experiment 8. To Interpret Ping and Trace route Output.
Experiment 9. To Implement an IP Addressing Scheme.
Experiment 10. To Observe Static and Dynamic Routing.
Experiment 11. To Configure Ethernet and Serial Interfaces.
Experiment 12. To Configure a Cisco Router as a DHCP Server.

Reference Books and Other Resources:
Lab manuals