Guru Nanak Dev Engineering College, Ludhiana

Department of Electronics and Communication Engineering
B. Tech. (Electronics and Communication Engineering)

Subject Code: MnPCEC-101
Subject Name: Analog Circuits

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 0
Semester: NA	**Teaching Hours:** 39+13(T)= 52 hours
Theory/Practical: Theory	**Credits:** 4
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 30-40%
External Marks: 60	**Duration of End Semester Exam (ESE):** 3 hours
Total Marks: 100	**Elective Status:** Minor Theory Course

Prerequisites: Basic understanding of Electronic Components
Additional Material Allowed in ESE: NIL

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

CO#	Course Outcomes	POs	PSOs
1.	Comprehend the operation of amplifiers on the basis of different coupling techniques and feedback topologies.	1(2)	1(1)
2.	Analyze the behavior of different large signal amplifiers and oscillators.	2(2)	1(2)
3.	Interpret the characteristics and performance parameters of operational amplifier and use it for various linear and non-linear applications.	2(3)	1(2)
4.	Design circuits like integrator, differentiator and active filters satisfying desired needs within realistic constraints.	3 (3)	1(2)
5.	Describe the working principal of multivibrators and voltage regulators using application specific ICs.	1(2)	1(1)
6.	Engage in self-study to demonstrate applications of electronic circuits.	9(2)	1(2)

Detailed Contents:

Part A

Multistage Amplifiers **7+2(T)=9 hours**

Coupling of transistor amplifiers, frequency response of coupled amplifiers, Types of coupling: RC coupling, Transformer coupling, direct coupling, Cascode amplifier, Darlington amplifier. Tuned Amplifiers: single tuned, double tuned and stagger tuned amplifiers.

Large Signal Amplifiers **6+3(T)=9 hours**

Class A direct coupled with resistive load, Transformer coupled with resistive load, harmonic distortion, variation of output power with load, push-pull amplifiers, operation of Class A push-pull amplifier, Class B push-pull amplifier, crossover distortion, Class AB push-pull amplifier, Transistor phase inverter, Complementary- symmetry amplifier.

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Feedback in Amplifiers **6+2(T)=8 hours**

Types of feedback, effect of negative feedback on gain, input impedance, output impedance, bandwidth, stability, distortion and frequency response, voltage series, current series, voltage shunt, current shunt feedback circuits and their analysis.

Oscillators **5+1(T)=6 hours**

Sinusoidal oscillators, Criterion for oscillation, Different types of oscillators: RC Phase Shift, Wien Bridge, Hartley, Colpitt, Crystal Oscillators and Derivation of frequency for these oscillators.

Part-B

Op-Amp Theory **9+3(T)=12 hours**

Introduction, Differential Amplifier- Basic Circuit and its operation, Differential Amplifier circuit configurations- their dc analysis, Current mirror circuit, Block diagram of an Op-Amp, schematic symbol, Ideal Op-amp and its characteristics, Ideal voltage transfer characteristics, performance parameters of an Op-Amp, Input bias current, input offset current, output offset voltage, differential gain, common mode gain, CMRR, SVRR.

Applications of Op-Amp **9+3(T)=12 hours**

Basic configuration of Op-Amp-Differential, Inverting & Non-inverting, Integrator, differentiator, summing amplifier, Basic comparator, Zero crossing detector, Schmitt trigger, Active filters: Low pass, High pass, Band pass and Band stop, Square wave generator, Triangular wave generator, IC 555 timer : Block diagram and its operation, IC 555 as a monostable multivibrator, voltage regulators: fixed, adjustable and switching.

Text Books:

1. J. Millman, C. Halkias and C. D. Parikh, "Integrated Electronics: Analog and Digital Circuits and Systems", McGraw Hill Education, 2nd Edition, 2010.
2. R. Boylested and L. Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall of India, 10th Edition, 2009.
3. R. Gayakwad, "Op-Amp and Linear Integrated Circuits", Pearson prentice hall.

Reference Books:

1. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 2011.
2. A. Malvino and D. J. Bates, "Electronic Principles", Tata McGraw-Hill, 7th Edition, 2007.
3. T. L. Floyd, "Electronic Devices", Pearson Education, 9th Edition, 2012.
4. J. Millman, C. C. Halkias and S. Jit, "Electronic Devices and Circuits", Tata McGraw- Hill, 3rd Edition, 2010.
5. R.F Coughlin and F.F Driscoll, "Operational Amplifier and Linear Integrated Circuits", Prentice Hall.
6. Malvino, "Electronic principles", Tata McGraw-Hill Publications.

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E books and online learning materials:

1. https://lecturenotes.in/subject/429/electronic-devices-and-circuits-edc
2. https://hristotrifonov.files.wordpress.com/2012/10/electronic-devices-9th-edition-by-floyd.pdf
3. https://www2.mvcc.edu/users/faculty/jfiore/OpAmps/OperationalAmplifiersAndLinearICs_3E.pdf
4. https://www.scribd.com/document/356463964/Linear-Integrated-Circuit-2nd-Edition-D-Roy-Choudhary-pdf

MOOCS and Video Course:

1. http://nptel.ac.in/courses/117103063/20
2. http://nptel.ac.in/courses/117103063/33
3. http://nptel.ac.in/courses/108106068/4
4. http://nptel.ac.in/courses/108106068/10

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Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: MnPCEC-102
Subject Name: Linear Control Systems

Programme: B.Tech.	**L:** 3 **T:** 1 **P:** 0
Semester: NA	**Teaching Hours:** 39+13(T)= 52 hours
Theory/Practical: Theory	**Credits:** 4
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 50-60%
External Marks: 60	**Duration of End Semester Exam (ESE):** 3 hours
Total Marks: 100	**Elective Status:** Minor Theory Course

Prerequisites: Knowledge of Ordinary Differential Equations, Linear Algebra and Complex Analysis
Additional Material Allowed in ESE: NIL

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

CO#	Course Outcomes	POs	PSOs
1.	Classify different types of control system and analyze their use in various practical applications	1(2)	1(1)
2.	Use different techniques for mathematical modelling of various types of physical systems	1(1)	1(2)
3.	Analyze the nature of time response of feedback control systems and find out system stability using Routh Hurwitz's criteria and root locus technique	2 (3)	1(2)
4.	Discuss procedure for determining the stability of a control system based on sinusoidal frequency response	2 (2)	1(2)
5.	Design a stable network meeting desired needs within realistic constraints using concept of feedback compensation	3(3)	1(1)
6.	Demonstrate the domain knowledge of various control system components such as error detectors, synchro's, potentiometers etc.	1(3)	1(2)

Detailed Contents:

Part A

Introductory Concepts **7+2(T)=9 hours**

Plant, Systems, Servomechanism, regulating systems, disturbances, Open loop control system, closed loop control systems, linear and non-linear systems, time variant & invariant, continuous and sampled data control systems, Block diagrams, some illustrative examples.

Modelling **6+2(T)=8 hours**

Formulation of equation of linear electrical, mechanical, thermal, pneumatic, hydraulic system, electrical, mechanical analogies, Transfer function, Block diagram representation, Signal flow graphs and associated algebra, characteristics equation.

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Time domain analysis **6+2(T)=8 hours**

Typical test–input signals, Transient response of first and second order systems, Time domain specifications, Dominant closed loop poles of higher order system, Steady state error and coefficients, pole- zero location and stability, Routh-Hurwitz Criterion.

Part B

Root Locus Technique **6+2(T)=8 hours**

The extreme points of the root loci for positive gain, Asymptotes to the loci, Breakaway points, intersection with imaginary axis, location of roots with given gain, sketch of the root locus plot.

Frequency Domain Analysis **7+2(T)=9 hours**

Closed loop frequency response, Bode plots, stability and loop transfer function. Frequency response specifications, Relative stability, Relation between time and frequency response for second order systems, Log. Magnitude versus Phase angle plot, Nyquist criterion for stability.

Compensation **5+2(T)=7 hours**

Necessity of compensation, series and parallel compensation, compensating networks, applications of lag and lead- compensation.

Control Components **5+2(T)=7 hours**

Error detectors – potentiometers and synchro's, servo motors, ac and dc techno generators, magnetic amplifiers.

Text Books:

1. B. S. Manke, "Linear Control Systems", Khanna Publishers, 11th Edition, 2012.
2. J. Nagrath and M. Gopal, "Control System Engineering", Wiley Eastern Ltd, 3rd Edition, 2000.

Reference Books:

1. R. C. Dorf and R. H. Bishop, "Modern Control System", Addison –Wesley, Pearson Education, 8th Edition, 2004.
2. K. Ogata, "Modern Control Engineering", Prentice Hall, 5th Edition, 2010.
3. B. C. Kuo, "Automatic Control System", Prentice Hall, 7th Edition, 2000.
4. S. Janardhanan and Y. Singh, "Modern Control Engineering", Cengage Learning, 2010.

E books and online learning materials:

1. http://www.ece.mcmaster.ca/~davidson/EE3CL4/slides/Feedback_handout.pdf.
2. https://www3.nd.edu/~pantsakl/Publications/348A-EEHandbook05.pdf.

MOOCS and Video Course:

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1. http://nptel.ac.in/courses/108101037/3.
2. http://nptel.ac.in/courses/108101037/15

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B. Tech. (Electronics and Communication Engineering)

Subject Code: MnPCEC-103

Subject Name: Digital Communication Systems

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 0
Semester: NA	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 3
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 30%
External Marks: 60	**Duration of End Semester Exam (ESE):** 3 hours
Total Marks: 100	**Elective Status:** Minor Theory Course

Prerequisites: Fundamentals of Analog Communication System.
Additional Material Allowed in ESE: Scientific calculator

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

CO#	Course Outcomes	POs	PSOs
CO1	Comprehend the basic concept of signal processing sub-systems in digital communications.	1(2)	1(3)
CO2	Apply the knowledge of working principles of various signal processing operations for conversion of signals from analog to digital.	1(3), 2(2)	1(3)
CO3	Demonstrate the basic concept of source coding theorem, sampling theorem, Nyquist's criterion and applying them for the designing of digital communication system.	1(2), 2(3), 3(2)	1(3)
CO4	Select and utilize tools to analyze the performance of digital communication system.	2(3)	1(3)
CO5	Demonstrate the basic concept of Noise in Pulse Code & Delta Modulation Systems	2(3),3(1)	1(3)
CO6	Engage in self-learning of advanced concepts and application of Digital Communication.	2(3), 3(1), 12(1)	1(3)

Detailed Contents:

Part -A

Introduction: **5 hours**

Block Diagram of Digital Communication System, Advantages & disadvantages of Digital communication system, Applications, Sampling theorem, Aliasing.

Analog to Digital Conversion: **7 hours**

The sampling Theorem, low pass signals and band pass signals, pulse Amplitude modulation, channel bandwidth for a PAM signal, signal recovery & holding, Quantization of signal, Quantization error, pulse code modulation (PCM), Differential pulse code modulation, Delta Modulation, adaptive delta modulation.

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Digital Modulation Techniques: **8 hours**

Amplitude Shift Keying (ASK), ASK Spectrum, ASK Modulator, Coherent ASK Detector, Noncoherent ASK Detector, Frequency Shift Keying (FSK), FSK Bit Rate and Baud, FSK Transmitter, Non-coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, Quadrature Phase Shift Keying (QPSK), Binary Phase Shift Keying, Quadrature Amplitude Modulation (QAM), Differential PSK.

Part-B

Data Transmission: **6 hours**

Base band signal receiver, the optimum filter, the matched filter, correlation, correlative coding, Intersymbol interference, Nyquist's criterion for distortion less baseband binary transmission, correlative coding, , adaptive equalization for data transmission.

Noise in Pulse Code & Delta Modulation Systems: **7 hours**

Calculation of quantization noise, the O/P signal power in PCM, the effect of thermal noise, O/P signal to noise ratio in PCM, Delta Modulation, Quantization noise in delta modulation, the O/P signal to quantization noise ratio in delta modulation, O/P signal to noise ratio in delta modulation.

Elements of Information Theory: **6 hours**

Basic signal processing operations in digital communications, uncertainty, information and entropy, source coding theorem, Huffman coding, discrete memory less channels, mutual information, channel capacity, channel coding theorem, differential entropy, channel capacity theorem,

Text Books:

1. S. Haykin, "Digital Communications", Wiley publication, 2012.
2. W. Tomasi, "Advanced Electronic Communication System", PHI, 6th Edition, 2015.

Reference books and other resources:

1. G. M. Miller, "Modern Electronic Communication", Prentice-Hall, 6th edition, 1999.
2. F. G. Stremler, "Introduction to Communication Systems", Addison- Wesley, 1990.
3. E.A. Lee and D.G. Messerschmitt, "Digital Communication", Kluwer Academic Publishers, 1994.
4. H. Meyr, M. Moeneclaey, and S.A. Fechtel, "Digital Communication Receivers", Wiley, 1998.
5. J. G. Proakis, "Digital communications", McGraw-Hill Education, 4th edition, 2001.

E books and online learning materials:

1. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Data%20Communication/Learning%20Material%20%20DataCommunication.pdf
2. http://home.iitk.ac.in/~vasu/book0.pdf

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MOOCS and Video Course:

1. http://nptel.ac.in/courses/114101051/3
2. http://nptel.ac.in/courses/114101051/6

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B. Tech. (Electronics and Communication Engineering)

Subject Code: MnPCEC-104
Subject Name: Electronic Devices

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 0
Semester: NA	**Teaching Hours:** L:39
Theory/Practical: Theory	**Credits:** 3
Internal Marks: 40	**Percentage of Numerical/Design Problems:** 20-30 %
External Marks: 60	**Duration of End Semester Exam (ESE):** 3 hours
Total Marks: 100	**Elective Status:** Minor Theory Course

Prerequisites: Concepts of Physics.
Additional Material Allowed in ESE: NIL

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

CO#	Course Outcomes	POs	PSOs
1.	Apply the basic mechanism of semiconductors in various types of diodes, bipolar junction transistors and field effect transistors.	1(2)	1 (2)
2.	Analyze the behavior of different electronic components in terms of V-I characteristics.	2(3)	1(1)
3.	Select suitable techniques to provide stabilization in electronic circuits against external factors like temperature and component variations.	3(2)	1(2)
4.	Design solutions for problems pertaining to electronic circuits under given operating conditions and specifications.	3(3)	1(2)
5.	Comprehend the operation of low and high frequency transistor models.	1(2)	1(1)
6.	Illustrate the applications of electronic circuits by inspecting the function of each discrete electronic component.	2(2)	1(2)

Detailed Contents:

Part A

Introduction **7 hours**

Energy bands in silicon, intrinsic and extrinsic silicon, carrier transport in silicon: diffusion current, drift current, mobility, and resistivity, generation and recombination of carriers.

Diode Circuits **8 hours**

Theory of PN junction diode, volt ampere characteristics, band structure of open circuited PN junction, small signal equivalent circuit of diode, temperature dependence of PN diode, rectifiers, filter circuits, special purpose diodes: zener diode as voltage regulator, tunnel diode, LED, LCD and photodiodes.

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Transistor Biasing and Stabilization **10 hours**

PNP & NPN transistor, construction and characteristics in CB, CE and CC modes, transistor as an amplifier, transistor series and shunt regulators, UJT, photo-transistors, operating point, bias stability, various biasing circuits, stabilization against I_{CO}, V_{BE} and beta, bias compensation methods, thermal resistance.

Part B

Field Effect Transistors **7 hours**

Construction and characteristics of junction field effect transistor (JFET), MOSFETs: Enhancement and depletion type, FET parameters, Biasing of FETs, applications of FETs, MOS capacitor.

Low Frequency and High Frequency Transistor Models **10 hours**

h-parameter equivalent circuit of transistor, analysis of transistor amplifier using h-parameters in CB, CE and CC configuration, frequency response of amplifier, effect of an emitter bypass capacitor, coupling capacitor, emitter resistance and shunt capacitors on frequency response of amplifier, High frequency T model, common base short circuit current frequency response, alpha cutoff frequency, common emitter short circuit current frequency response, hybrid pi CE transistor model, hybrid pi conductance in terms of low frequency h parameters.

Text Books:

1. J. Millman, C., C. Halkias, "Electronic Devices & Circuits", Tata McGraw Hill.
2. R. L. Boylestad, "Electronic Devices & Circuits Theory", Prentice Hall India.

Reference Books:

1. A. Mottorshead, "Electronic Devices & Circuits", Prentice Hall India.
2. A. Malvino, D. J. Bates, "Electronics Principles", Tata McGraw Hill, 2007.
3. J. Millman, C. C. Halkias, "Integrated Electronics: Analog & Digital Circuits and Systems", Tata McGraw Hill.

E-Books and online learning material

1. Basic Electronics
   http://engineering.nyu.edu/gk12/amps-cbri/pdf/Basic%20Electronics.pdf
2. Electronic Devices & Circuits by J. Millman, C. C. Halkias
   https://archive.org/details/ElectronicDevicesCircuits/page/
3. Electronic Devices and Circuits Notes (EDC)
   https://www.smartzworld.com/notes/electronic-devices-and-circuits-edc/
4. Electronic devices and circuits By Salivahanan
   https://www.scribd.com/doc/130840933/Electronic-devices-and-circuits-By-Salivahanan-pdf
5. Introduction to Electronics by Y.N. Singh
   https://nptel.ac.in/courses/122104013/main1.html

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Online Courses and Video Lectures

1. https://www.nptel.ac.in/courses/117103063/
2. https://nptel.ac.in/courses/117106091/
3. http://www.nptelvideos.in/2012/11/basic-electronics-prof-tsnatarajan.html
4. https://www.youtube.com/watch?v=PSdHf6yozyc

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Department of Electronics and Communication Engineering
B. Tech. (Electronics and Communication Engineering)

Subject Code: MnPCEC-105
Subject Name: Analog Communication Systems

Programme: B.Tech.	**L:** 3 **T:** 0 **P:** 0
Semester: NA	**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:** Minor Theory Course

Prerequisites: NA
Additional Material Allowed in ESE: NIL

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

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

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.

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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.

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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/

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B. Tech. (Electronics and Communication Engineering)

Subject Code: MnLPCEC-101

Subject Name: Measurement and Control Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: NA	**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:** Minor Laboratory Course

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

CO#	Course Outcomes	POs	PSOs
1.	Calculate the displacement using LVDT.	1(2)	1(2)
2.	Measure inductance, resistance and capacitance using different bridges.	1(2)	1(2)
3.	Examine the output characteristics of thermocouple.	1(2)	1(2)
4.	Analyze the characteristics of various control components like potentiometer, synchro's and servomotor.	2(3)	1(3)
5.	Analyze the control action of PID controller.	2(3)	1(3)
6.	Formulate and design Composite-type filters.	2(3), 3(2)	1(3)

Detailed Contents:

Experiment 1. Measurement of displacement using LVDT and determine its output characteristics.

Experiment 2. Measurement of medium resistance by Wheatstone bridge.

Experiment 3. Measurement of inductance by Maxwell's bridge.

Experiment 4. Measurement of small resistance by Kelvin's bridge.

Experiment 5. Measurement of capacitance by Schering Bridge.

Experiment 6. Measurement of frequency by Wein Bridge.

Experiment 7. Study characteristics of temperature transducer like thermocouple.

Experiment 8. To study the I/O characteristics of potentiometer and to use two potentiometers as an error detector.

Experiment 9. Study the transmitter receiver characteristics of a synchro set and to use set as control component.

Experiment 10. To study the operation of dc positioned servomotor and ac positioned servomotor and obtain speed-torque characteristics of ac and dc servomotor.

Experiment 11. Design different compensation networks for the given cutoff frequencies and to plot frequency response of these networks.

Experiment 12. Study PID controller and to obtain the effect of proportional, integral and derivative control action.

Experiment 13. To design and obtain the characteristics of composite low pass filter and high pass filter.

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Reference Books and Other Resources:

Lab manuals available in lab.

Online videos:

1.https://www.youtube.com/watch?v=GeET9Z1dbnA&index=8&list=PLv_Pw5IjPpkKm9RACkDUrzr4RnoE1YdKv

2. https://www.youtube.com/watch?v=_Z9ZKCQJhiU

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Subject Code: MnLPCEC-102

Subject Name: Electronic Devices Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: NA	**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:** Minor Laboratory Course

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

CO#	Course Outcomes	POs	PSOs
1.	Examine the role of active and passive electronic components for different applications like rectification, filtering and amplification.	2(2)	1 (2)
2.	Assess the behavior of special purpose zener diode and photodiode.	1(1)	1(1)
3.	Demonstrate the current-voltage characteristics of bipolar junction transistor and field effect transistor in different mode.	1(2)	1(2)
4.	Conduct experiments to deduce the stability of various transistor biasing circuits.	4(2)	1(2)
5.	Distinguish the response of electronic circuits for given specifications.	3(3)	1(1)
6.	Work as an individual or in a team to demonstrate the applications of electronic components.	9(2)	1(1)

Detailed Contents:

Experiment 1. To perform the operation of half wave rectifier.
Experiment 2. To perform full wave & bridge rectifier and calculate efficiency and ripple factor.
Experiment 3. To study simple capacitive, T & π filters.
Experiment 4. To observe the application of Zener diode as voltage regulator.
Experiment 5. To implement any one application of photodiode.
Experiment 6. To plot the input and output characteristics of CE configuration.
Experiment 7. To plot the input and output characteristics of CB configuration.
Experiment 8. To determine h- parameters of a transistor using output characteristics.
Experiment 9. To design fixed bias circuit.
Experiment 10. To design potential divider transistor biasing circuit.
Experiment 11. To observe the operation of an emitter follower circuit.
Experiment 12. To plot JFET characteristics in CS configuration.

Reference Books and Other Resources:

Lab manuals available in lab.

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Electronics & Comm. Engg.

Guru Nanak Dev Engineering College, Ludhiana

Department of Electronics and Communication Engineering

B. Tech. (Electronics and Communication Engineering)

Subject Code: MnLPCEC-103

Subject Name: Analog Communication Systems Laboratory

Programme: B.Tech.	**L:** 0 **T:** 0 **P:** 2
Semester: NA	**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:** Minor Laboratory Course

Prerequisites: Fundamentals of Electronics

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

CO#	Course Outcomes	POs	PSOs
1.	Generate & detect DSB AM & DSB-SC AM signals.	2(1),3(3), 4(1)	1(3)
2.	Examine the generation & detection of SSB AM signals on a CRO.	2(2), 3(3)	1(3)
3.	Generate & demodulate FM signals by using different methods.	2(2),3(3), 4(1)	1(3)
4.	Comprehend the working of Super heterodyne receiver & be able to measure parameters such as sensitivity, selectivity & fidelity.	1(2), 2(1)	1(3)
5.	Demonstrate the generation & detection different pulse modulation techniques.	2(1), 3(3)	1(3)
6.	Construct a project in a team or individual for given problem using SIMULINK.	3(3), 9(3), 12(2)	1(3)

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.

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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/

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Electronics & Commn. Engg.,
Guru Nanak Dev Engineering College
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