SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

Department Electronics Engineering
Program Electronics & Communication Engineering

Semester/Year	IVth/IInd	Program	B.Tech.
Subject Category: DC	Subject Code: EC-402	Subject Name:	Analog Circuits

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Assignment	Quiz	End Sem	LW	Quiz					
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

1. Basic Electrical
2. Electronic Devices and Circuits
3. Network Analysis
4. Network Synthesis

Course Objective:

1. To study the behaviour of opamp under open loop and closed loop, and understand its performance.
2. To study the impact of positive and negative feedback on opamp performance..
3. Study how to analyse opamp circuits.
4. Derive various linear and nonlinear circuit applications of opamp.

Course Outcomes:

After completion of the course, students would be able to -

CO 1: Acquire knowledge and demonstrate the basics of Operational Amplifier, filters, oscillators.signal generators and other aplications

CO 2: Analyze different op-amp circuits and linear and nonlinear applications of opamp..

CO 3: Evaluate the performance of opamp circuits for different applications

CO 4: Design active filters, oscillators and derive opamp circuits for different applications.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	1	1	-	-	-	2	1
CO2	3	3	2	3	3	1	1		2	-	2	1
CO3	3	2	2	3	3	1	1	-	2	-	2	1
CO4	3	2	3	2	3	1	1	-	-	-	2	2
Avg.	3	2.5	2.5	2.75	2.25	1	1	-	1	-	2	1.25

Contents

S.No	Descriptions	Hrs.	CO's
I	**Unit I:** Feedback Amplifiers & Oscillators: Concept of feedback, positive and negative feedback, voltage and current feedback, series and shunt feedback, effect of feedback on performance characteristics of an amplifier, stability criterion. Condition for sustained oscillation, Barkhausan criterion.	5	1,2
II	**Unit-II:** Operational Amplifier Fundamentals: Introduction to op-amp, Block diagram representation, pin diagram , characteristics of ideal and practical op – amp, Equivalent circuit, open loop op amp, configuration, open loop and closed loop frequency response of opamp, op amp parameters - offset voltage and current, bias current ,drift ,CMRR, slew rate and its effect on frequency response, offset nulling methods, compensated and non compensated opamp.	5	1,2,3
III	**Unit-III:** Linear Applications: Differential ,inverting and non-inverting , Differential amplifier with one op amp ,two op amp and three op amp, DC and AC amplifiers, summing, scaling and averaging amplifiers, Instrumentation amplifier, integrator, differentiator and comparator, Zero crossing detector, peak detector, window detector, Precision rectifiers.	10	1,2,3,4
IV	**Unit-IV:** Non-linear Op-Amp Circuits: Schmitt trigger and applications, log and antilog amplifier, analog computation, voltage controlled oscillator, phase locked loop, principle and building block of PLL, Lock and capture ranges ,capture process and application of PLL .	08	1,2,3,4
V	**Unit-V:** Analyze and Design Active filters, characteristics ,frequency response and different types of filters ,order and cut off frequency ,Butterworth Low pass filters , high pass filters ,band pass filter ,band stop filter R-C phase shift, Hartley, Colpitts, Crystal and Wein bridge Oscillators, Negative resistance Oscillator, Relaxation Oscillator, Square, triangular and sawtooth wave generator, Timer IC - 555, functional diagram Mono stable.	12	1,2,3,4
Guest Lectures (if any)		Nil	
Total Hours		40	

Suggestive list of experiments:

1. Draw and examine Decibels and Bode Plots—CO2
2. Design of Dual input Balance output Differential Amplifier using Transistor—CO4
3. Design of Comparator circuit using operational amplifier-CO4
4. Design of Inverting/Non-inverting Voltage Amplifier -CO4
5. Design of Differential Amplifier, Using 741 opamp IC—CO4
6. Analysis of Gain-Bandwidth Product—CO2
7. Analysis of Slew Rate and Power Bandwidth—CO2
8. Analysis of Non-compensated OpAmp—CO2
9. Analysis of DC Offset voltage.—CO2
10. Design of Operational Trans-conductance Amplifier—CO4
11. Design of Precision Rectifiers—CO4.
12. Design of Triangle-Square waveform Generator—CO4
13. Design of Wien Bridge Oscillator—CO4.
14. Design of Integrator/ Differentiator circuit using 741 opamp IC—CO4
15. Design of Bandpass Filter using 741 opamp IC.—CO4

program or conduct a case study relevant to the subject curriculum

Text Books-1. Linear integrated circuit- Ramakant Gayakwad (PHI)
2. OP-Amps their Design and Application- Tobby et all. (Tata Mcgraw Hill)
3. Linear integrated circuit- D. Roychowdhary and Shail B. Jain (New Age International)
4. Integrated Electronics- Millman Halkias (Tata Mcgraw Hill)

Reference Books-
1. Analog Integrated Circuit Design - Ken Martin and David Johns
2. Op Amps for Everyone- Texas Instruments

Modes of Evaluation and Rubric

There will be continuous evaluation during the semester for 40 sessional marks and 60 semester End term Marks. The practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Dr. Jyotsna V. Ogale
Checked and approved by	

Changes Done-
1. Reshuffled the content within different units.
2. 10% Extra content added.
3. Nothing removed.
4. Per unit contact hour distribution changed.
5. CO-PO Mapping revised.
6. Few practicals are removed
7. Recommend same syllabus for program Electronics and Instrumentation too.

Suggestions-1. Course comes first then course outcomes and then CO-PO Mapping therefore this order should be changed.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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Department Electronics Engineering
Program: Electronics & Communication Engineering

Semester/Year	IVth/IInd	Program	B. Tech.
Subject Category: DC	Subject Code: EC-403	Subject Name:	Antenna and Wave Propagation

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:(Only for open electives)

- Vector Algebra
- Electromagnetic Field Theory

Course Objective:

This course will introduce students to the concepts of Antenna theory and design as well as wave Propagation in various media. He will be able to understand the working of antenna systems and thus will be able to develop his own design.

Course Outcomes:

On successful completion of this course student should be able to:

CO1: Explain the radiation mechanism of EM waves by antennas and their radiation patterns.
CO2: Interpret the relationships between antenna performance parameters.
CO3: Design and analyze different antennas and antenna arrays.
CO4: Analyze and distinguish different type of antennas.
CO5: Discuss atmospheric structure and its impact on radio wave propagation.

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

Contents:			
UNITs	**Descriptions**	**Hrs.**	**COs**
I	**Antenna Fundamentals:** Retarded Potential, Radiation Equation. Radiation Mechanism of Antennas. Radiation Integral and Auxiliary Potential Functions. Radiation from Linear Wire Antennas i.e. Infinitesimal Dipole, Small Dipole, Finite Length Dipole and Half Wave Dipole.	8	1
II	**Antenna Performance Parameters:** Radiation pattern i.e. Isotropic, Directional, and Omnidirectional Patterns, Radiation Intensity and Power density, Gain and Directivity, Effective area and Aperture, Band width and beam width, Antenna impedance, Antenna Efficiency, Polarization. Friis Transmission Equation and reciprocity. Antenna Radar Cross Section and SAR.	8	2
III	**Antenna array and Fundamentals:** Linear, planar and circular. End fire & broad side arrays, Two and multi-element arrays, Technique of multiplication of patterns, Binomial and Dolph Chebycsheff arrays. Phased array, Smart antennas and Beam forming techniques. Antenna Synthesis and techniques.	8	1
IV	**Types of Antennas and Analysis:** Linear wire antenna and dipole, MF & HF antennas, Tower antenna, VHF & UHF antenna, GSM antennas, Loop Antenna, Rhombic antenna, Aperture antennas, Broad band antennas, Equiangular and Conical equiangular spiral antenna, Frequency independent antennas, Log periodic antenna, Reflector and Horn antennas, Micro strip antennas, measurement and Design approach.	10	3
V	**Radio Wave Progation:** Ground wave propagation, reflection from earth's surface, Space wave and sky wave propagation, Tropospheric wave and tropospheric scattering. Duct propagation. Ionosphere propagation. Structure of troposphere and ionosphere, Critical frequency, Maximum usable frequency, Lowest usable frequency, Virtual heights and skip distance.	8	1
Guest Lectures (if any)			
Total Hours		42	

Suggestive list of experiments:

1. To Plot the Radiation Pattern of an Omni Directional Antenna.-CO2
2. To Plot the Radiation Pattern of a Directional Antenna.-CO2
3. To Plot the Radiation Pattern of a Parabolic Reflector Antenna.-CO2
4. To Plot the Radiation Pattern of a Log Periodic Antenna.-CO2
5. To Plot the Radiation Pattern of a Patch Antenna.-CO2
6. To Plot the Radiation Pattern of a Dipole/ Folded Dipole Antenna.-CO2
7. To Plot the Radiation Pattern of a Yagi (3-EL/4EL) Antenna.-CO2
8. To Plot the Radiation Pattern of a Monopole/ WHIP/ Collinear Antenna.-CO2
9. To Plot the Radiation Pattern of a Broad site Antenna.-CO2
10. To Plot the Radiation Pattern of a Square Loop Antenna.-CO2
11. Design a loop and dipole antenna.-CO3
12. Design a collinear antenna.-CO3

Batch of students have to develop a mini project in form of circuit design, hardware fabrication, simulation program or conduct a case study relevant to the subject curriculum

Text Books-

1. Antenna Theory: Analysis and Design, 2nd ed., 2000, Wiley Publication.
2. Kraus J.D., Antennas, 2nd ed., 2000, McGraw Hill.
3. Prasad K. D., Antenna & Wave Propagation, 2nd ed., 2001, Khanna Publication.

Reference Books-

1. Collin R.E., Antennas & Wave Propagation, 3rd ed., 2001, McGraw Hill.
2. Chatterjee Rajeshwari, Antenna theory and practice, 2nd ed. 1998, New Age Publ.
3. Jordan & Ballman, Electromagnetic Wave & Radiation System, 2nd ed., 2006, PHI.

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. The practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work and quiz. Out of 40 sessional marks, 20 shall be awarded for Mid semester test, 20 marks to be awarded for day to dayperformance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the normsof AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1. Munna Lal Jatav
Checked and approved by	Name 1.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, IVth Semester

Subject Category: **DC**	Subject Code : **EC-404**	Subject Name: **Digital Communication**

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites: Analog Communication

Course Objective:

This course provides an introduction to the basic principles and techniques used in digital communications. The course will help us to understand the principles of sampling & quantization techniques, waveform coding schemes, multiplexing and different digital modulation techniques. The course also introduces analytical techniques to evaluate the performance of communication systems.

Course Outcomes:

After completion of the course, students would be able to -

CO 1: Acquire knowledge, understand and demonstrate about the elements of digital communication system, sampling, quantization, waveform coding, multiplexing, different digital modulation and demodulation techniques. (BL1,BL2)
CO 2: Conduct analysis of baseband signals in time domain and frequency domain.(BL3,BL4) CO 3: Design communication systems to meet desired needs.(BL3,BL6)
CO4: Evaluate the performance of modulation and demodulation techniques in various transmission environments. And evaluate fundamental communication system parameters such as bandwidth, power and signal to noise ratio.(BL3,BL5)

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

Contents:

UNITs	Descriptions	Hrs.	CO's
I	**Elements of Digital Communication system with its block diagram:** source, channel, transmitter, receiver; Communication channel characteristics: bit rate, baud rate, bandwidth, repeaters; Concept of Entropy and Information rate; Channel capacity: Hartley's law, Shannon Hartley's theorem; Source coding; Channel coding; Classification of line codes.	09	1, 2, 3, 4
II	**Sampling and quantization process:**types of sampling; Nyquist samplingtheorem (only statement); Aliasing effect; Quantization process; Quantization error/noise; Companding; Pulse code modulation (PCM); Differential pulse code modulation (DPCM); Delta modulation (DM); Adaptive Delta modulation (ADM); Intersymbol interference (ISI).	10	1, 2, 3, 4
III	**Digital modulation techniques:** Types and their advantages; Amplitude Shift Keying (ASK); Frequency shift keying (FSK); Phase shift keying (PSK); Differential Phase shift keying (DPSK); Quadrature Phase shift keying (QPSK); M-ary encoding: Need, M-ary FSK and M-ary PSK; Quadrature amplitude Modulation(QAM).	09	1, 2, 3, 4

IV	**Multiplexing techniques:** definition, block diagram and comparison of Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Code Division multiplexing (CDM); **Access techniques:** Need and methods of Time division multiple access (TDMA), Frequency division multiple access (FDMA), Code division multiple access (CDMA).	06	1, 2, 3, 4
V	**Introduction to spread spectrum (SS) modulation:** advantages over fixed frequency; application of SS modulation; Types of SS modulation: Direct sequence spread spectrum (DSSS) and Frequency hopped spread spectrum (FHSS).	06	1, 2, 3, 4
Guest Lectures (if any)		Nil	
Total Hours		40	

Suggestive list of experiments: NIL

Text Books-

1. B.P. Lathi: Modern Analog and Digital Communication System. Oxford University Press.
2. J.G Proakis, —Digital Communicationl, 4th Edition, Tata Mc Graw Hill Company, 2001.

Reference Books-

1. Simon Haykins: Communication Systems, 4th Edition, John Wiley.
2. B. Sklar, —Digital Communication Fundamentals and Applications, 2nd Edition, Pearson Education, 2009.
3. Singh and Sapre: Communication System, TMH

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Dr. Neelesh Mehra
Checked and approved by	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, IVth Semester

Subject Category: **DC**	Subject Code: **EC 405**	Subject Name: **Control System**

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

- Signal & System
- Basic Mathematics

Course Objective:

- To make the students capable understanding the fundamental concept of control system and mathematical modelling of the system
- To make the students capable analyzing the time response, frequency response and stability of system.

Course Outcomes:

After completion of the course, students would be able to -

CO 1: Acquire knowledge and understanding of different type of system and their representation stability time domain and frequency behaviour controller and compensators to obtain mathematics. (BL1,BL2)
CO 2: Apply knowledge to obtain mathematical modelling of different systems, find out transfer function and obtain knowledge about the signal flow graph. (BL2,BL3)
CO 3: Analyze the time domain and frequency domain behaviour of different types of signal and system stability
(BL3,BL4)
CO4: Design feedback controller and compensation circuits. (BL3,BL5)

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

Contents:

UNITs	Descriptions	Hrs.	CO's
I	**Introduction:** Control system, Mathematical modeling of physical system, Differential equation representation of physical system, Transfer function concepts, Block diagram representation, Signal flow graph.	08	1, 2, 3, 4
II	**Feedback characteristics of control system:** Introduction Reduction of parameter variation by use of feedback, control system dynamics by use of feedback, control of effects of disturbance signals by use of feedback, Regenerative feedback, Illustrative examples.	08	1, 2, 3, 4
III	**Time Response Analysis:** Introduction, standard test signal, performance indicator, Time response of first order system, Time response of second order system, Design specification of second order system, compensation scheme, design specification of higher order system.	07	1, 2, 3, 4

IV	**Stability Analysis in Time domain:** The concept of stability from pole position, Necessary condition for stability, Routh Stability Criteria, Relative stability analysis, Root locus technique: Introduction, root locus concept, root locus construction rules, Root contours.	07	1, 2, 3, 4
V	**Frequency Response Analysis:** Introduction, performance indices Frequency response of second order system, Polar plot, Nyquist plot, Bode plot, All pass system, minimum phase and non minimum phase system, Design problem, Concept of cascade and feedback compensation, Realisation of basic compensators, case study. Concept of state, state variable and state model, State model of linear continuous time system, Concept of controllability and Observability Illustrative examples.	10	1, 2, 3, 4
Guest Lectures (if any)		Nil	
Total Hours		40	

Suggestive list of experiments:

Text Books-

1. B.C. Kuo and F. Golnaraghi, Automatic control System.
2. J. NagrathMadan Gopal, Control system Engineering, New Age Internation Publishers Ltd-New Delhi.
3. B.S. Manke, Linear Control System.

Reference Books-

1. S. Hasan Saeed, Control System 7th Edition, S K Kataria & Sons.
2. Narasimham R. L., Analysis of Linear Control System.
3. Padmanabhank, Control System.
4. Bhattacharya, Control System Engineering.

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Prof. Niraj Kumar
Checked and approved by	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

Department Electronics Engineering

Program Electronics & Communication Engineering

Semester/Year		III/II	Program		B.Tech.
Subject Category	DL	Subject Code:	EC-406	Subject Name:	Simulation Lab-I

Maximum Marks Alloted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
-	-	-	-	60	30	10	100	0	2	2	3

Prerequisites: (Only for open electives)

NIL

Course Objective:

The primary objective of this course is to introduce students to the fundamental concepts and techniques of programming in the MATLAB language. This course helps students understand programming concepts and understand how to use them in a variety of engineering, scientific and mathematical applications. It is a mathematics-oriented language suitable for solving engineering problems and creation of graphical user interfaces (GUIs). This course covers topics like creating scripts, developing functions, executing programs, debugging, visualizing and creating plot, creating Simulation and GUI and more. By successfully completing this course, students will be able to write programs for various calculations and simulations in MATLAB. This course is highly recommended for engineering students who are interested in solving the mathematical problems and programming with MATLAB.

Course Outcomes:

On successful completion of this course student should be able to:

CO1: Ability to know about the syntax of the language used to solve engineering problems.

CO2: Ability to understand the concept of programming.

CO3: Ability to write programs, visualize and plot data and simulate engineering applications.

CO4: Ability to use programming skill required for the development of projects at higher semester.

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

Contents:			
UNITs	Descriptions	Hrs.	CO's
I	Introduction of MATLAB and history, MATLAB Windows, Elementary Math built in Functions.	4	CO1
II	Mathematical operations including Arrays, Mathematical Operations with arrays, Matrices, Matrix algebra with MATLAB.	4	CO2
III	Curve Plotting with MATLAB, Control Structures – Conditional statements, loops, Branch control structure,	4	CO2, CO3
IV	Input/output Functions, Script Files, Functions and Function files, Cell Arrays, Structure Arrays.	4	CO3, CO4
V	Basics of Toolboxes, Simulink and GUI.	4	CO4
Guest Lectures (if any)			
Total Hours		20	

Suggestive list of experiments :

Batch of students have to develop a mini project in form of circuit design, hardware fabrication, simulation program or conduct a case study relevant to the subject curriculum

Text Books-

1. Getting Started With Matlab: A Quick Introduction For Scientists And Engineers by Rudra Pratap, Oxford University Press
2. MATLAB and its applications in Engineering, R.K. Bansal, A. K. Goel, M. K. Sharma
3. MATLAB - An Introduction with Applications, Amos Gilat ,Wiley India.

Reference Books-

1. MATLAB Programming for Engineers S.J.Chapman, Thomson Learning
2. Essential MATLAB for Engineers and Scientists, B.H.Hahn, D.T.Valentine, Elsevier

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester. This laboratory work is prescribed as core departmental lab and the practical marks are 100, out of which 60 marks will be awarded for viva voce and 40 marks for lab work and assignment/quiz.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1. Dr. D. K. Shakya
Checked and approved by	Name 1. Dr Ashutosh Datar