VEL TECH MULTI TECH
Dr RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE

(An ISO 9001: 2008 Certified Institution)
(Owned by 'VEL Shree R. Rangarajan
Dr. Sakunthala Rangarajan Educational Academy)
(Approved by AICTE, New Delhi &
Govt. of Tamil Nadu and affiliated to Anna University)

SYLLABUS

WEEKLY SCHEDULE

IV SEMESTER 2014 - 2015

DEPARTMENT OF ECE

IV YEAR DEGREE COURSE

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WEEKLY SCHEDULE

ACADEMIC YEAR: 2013– 2014

Sl.No	WEEKS	DATE	
		FROM	TO
1	WEEK1	02.01.15	09.01.15
2	WEEK2	12.01.15	16.01.15
3	WEEK3	19.01.15	23.01.15
4	WEEK4	27.01.15	30.01.15
5	WEEK5	02.02.15	06.02.15
6	WEEK6	09.02.15	13.02.15
7	WEEK7	16.02.15	20.02.15
8	WEEK8	23.02.15	27.02.15
9	WEEK9	02.03.15	06.03.15
10	WEEK10	09.03.15	13.03.15
11	WEEK11	16.03.15	20.03.15
12	WEEK12	23.03.15	27.03.15
13	WEEK13	30.03.15	01.04.15
14	WEEK14	06.04.15	10.04.15
15	WEEK 15	13.04.15	17.04.15
16	WEEK16	20.04.15	24.04.15
17	WEEK17	27.04.15	30.04.15

SUBJECT CONTENTS

SL.NO	SUBJECT CODE	SUBJECT NAME
THEORY		
1	**MA6451**	**Probability and Random Processes**
2	**EC6401**	**Electronic Circuits II**
3	**EC6402**	**Communication Theory**
4	**EC6403**	**Electromagnetic Fields**
5	**EC6404**	**Linear Integrated Circuits**
6	**EC6405**	**Control System Engineering**
PRACTICAL		
7	**EC6411**	**Circuit and Simulation Integrated Lab**
8	**EC6412**	**Linear Integrated Circuit Lab**
9	**EE6461**	**Electrical Engineering and Control System Lab**

TEST / EXAM SCHEDULE

SL. NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	UNIT TEST III	UNIT TEST IV	UNIT TEST V
1	MA6451	Probability and Random Processes	22.01.15 FN	11.02.15 FN	03.03.15 FN	23.03.15 FN	13.04.15 FN
2	EC6401	Electronic Circuits II	22.01.15 AN	11.02.15 AN	03.03.15 AN	23.03.15 AN	13.04.15 AN
3	EC6402	Communication Theory	23.01.15 FN	12.02.15 FN	04.03.15 FN	24.03.15 FN	15.04.15 FN
4	EC6403	Electromagnetic Fields	23.01.15 AN	12.02.15 AN	04.03.15 AN	24.03.15 AN	15.04.15 AN
5	EC6404	Linear Integrated Circuits	24.01.15 FN	13.02.15 FN	05.03.15 FN	25.03.15 FN	16.04.15 FN
6	EC6405	Control System Engineering	24.01.15 AN	13.02.15 AN	05.03.15 AN	25.03.15 AN	16.04.15 AN

MODEL EXAM

SL.NO	SUBJECT CODE	SUBJECT NAME	DATE
1	MA6451	Probability and Random Processes	20.04.2015
2	EC6401	Electronic Circuits II	21.04.2015
3	EC6402	Communication Theory	22.04.2015
4	EC6403	Electromagnetic Fields	23.04.2015
5	EC6404	Linear Integrated Circuits	24.04.2015
6	EC6405	Control System Engineering	27.04.2015

MA6451 PROBABILITY AND RANDOM PROCESSES

UNIT I RANDOM VARIABLES

WEEK-1

Discrete and continuous random variables – Moments - Moment generating functions Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and normal distributions

WEEK-2

UNIT TEST-1

UNIT II TWO DIMENSIONAL RANDOM VARIBLES

WEEK-3

Joint distributions - Marginal and conditional distributions

WEEK-4

Covariance - Correlation and Linear Regression

WEEK-5

Transformation of random variables

WEEK- 6

UNIT TEST-2

UNIT III RANDOM PROCESSES

WEEK-7

Classification-Stationary process-Markov process-

WEEK-8

Poisson process -Random telegraph process.

WEEK- 9

UNIT TEST-3

UNIT IV CORRELATION AND SPECTRAL DENSITIES

WEEK-10

Auto correlation Functions - Cross correlation Functions - Properties

WEEK-11
Power spectral density– Cross spectral density – Properties

WEEK-12
UNIT TEST-4

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS
WEEK-13
Linear time invariant system - System transfer function – Linear systems with random inputs

WEEK-14
Auto correlation and cross correlation functions of input and output.

WEEK-15
UNIT TEST-5

WEEK-16
MODEL EXAMINATION (5 UNITS)

WEEK-17
MODEL PRACTICAL

TEXT BOOKS:
1. Ibe.O.C., “Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.
2. Peebles. P.Z., "Probability, Random Variables and Random Signal Principles", Tata Mc Graw Hill, 4th Edition, New Delhi, 2002.

REFERENCES:
1. Yates. R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
2. Stark. H., and Woods. J.W., "Probability and Random Processes with Applications to Signal Processing", 3rd Edition,Pearson Education, Asia, 2002.

3. Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2004.

4. Hwei Hsu, "Schaum‟s Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata Mc Graw Hill Edition, New Delhi, 2004.

5. Cooper. G.R., Mc Gillem. C.D., "Probabilistic Methods of Signal and System Analysis", 3rd Indian Edition, Oxford University Press, New Delhi, 2012.

EC6401 ELECTRONIC CIRCUITS II

UNIT I FEEDBACK AMPLIFIERS

WEEK1

General Feedback Structure – Properties of negative feedback – Basic Feedback Topologies –Feedback amplifiers – Series – Shunt, Series – Series, Shunt – Shunt and Shunt – Series Feedback – Determining the Loop Gain – Stability Problem – Nyquist Plot – Effect of feedback on amplifier poles – Frequency Compensation.

WEEK2

UNIT TEST-1

UNIT II OSCILLATORS

WEEK-3

Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley,

WEEK-4

Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift – Wienbridge - Twin-T Oscillators, Frequency range of RC and LC Oscillators

WEEK-5

Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators.

WEEK-6
UNIT TEST-2

UNIT III TUNED AMPLIFIERS
WEEK-7
Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier and double tuned amplifiers on bandwidth– Stagger tuned amplifiers

WEEK-8
Large signal tuned amplifiers – Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method.
week

WEEK-9
UNIT TEST-3

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS
WEEK-10
RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of Transistor Switching Times – Speed-up Capaitor - Diode clippers, Diode comparator - Clampers.

WEEK-11
Collector coupled and Emitter coupled Astable multivibrator - Monostable multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators - Schmitt trigger circuit.

WEEK-12
UNIT TEST-4

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS
WEEK-13
UJT sawtooth waveform generator, Pulse transformers – equivalent circuit – response - applications, Blocking Oscillator – Free running

blocking oscillator - Astable Blocking Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing.

WEEK-14

Frequency control using core saturation, Triggered blocking oscillator – Monostable blocking oscillator with base timing – Monostable blocking oscillator with emitter timing, Time base circuits - Voltage-Time base circuit, Current-Time base circuit - Linearization through adjustment of driving waveform.

WEEK-15
UNIT TEST-5

WEEK-16
MODEL EXAMINATION (5 UNITS)

WEEK-17
MODEL PRACTICAL

TEXT BOOK:

1. Sedra and Smith, "Micro Electronic Circuits"; Sixth Edition, Oxford University Press, 2011.

REFERENCES:

1. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education / PHI, 2008

2. David A. Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2008.

3. Millman J. and Taub H., "Pulse Digital and Switching Waveforms", TMH, 2000.

4. Millman and Halkias. C., Integrated Electronics, TMH, 2007.

EC 6402 COMMUNICATION THEORY

UNIT 1 AMPLITUDE MODULATION

WEEK-1

Generation and detection of AM wave-spectra-DSBSC, Hilbert Transform, Pre-envelope & complex envelope - SSB and VSB – comparison -Superheterodyne Receiver.

WEEK-2

UNIT TEST-2

UNIT II ANGLE MODULATION

WEEK-3

Phase and Frequency Modulation

WEEK-4

Narrow Band and Wideband FM; Spectrum, FM Modulation and Demodulatin

WEEK 5

FM Discriminator- PLL as FM Demodulator - Transmission bandwidth.

WEEK-6

UNIT TEST-2

UNIT III RANDOM PROCESS

WEEK-7

Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean, Correlation & Covariance functions,

WEEK-8

Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

WEEK-9

UNIT TEST-3

UNIT IV NOISE CHARACTERIZATION

WEEK-10

Noise sources and types – Noise figure and noise temperature – Noise in cascaded systems. Narrow band noise – PSD of in-phase and quadrature noise –

WEEK-11

Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect.

WEEK-12

UNIT TEST-4

UNIT V INFORMATION THEORY

WEEK-13

Entropy - Discrete Memoryless channels - Channel Capacity -Hartley - Shannon law

WEEK-14

Source coding theorem - Huffman & Shannon - Fano codes

WEEK-15

UNIT TEST-5

WEEK-16

MODEL EXAMINATION (5 UNITS)

WEEK-17

MODEL PRACTICAL

TEXT BOOKS:

1. J.G.Proakis, M.Salehi, "Fundamentals of Communication Systems", Pearson Education 2006.

2. S. Haykin, "Digital Communications", John Wiley, 2005.

REFERENCES:

1. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3rd Edition, Oxford University Press, 2007.

2. B.Sklar, “Digital Communications Fundamentals and Applications”, 2nd Edition Pearson Education 2007

3. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006

4. Couch.L., "Modern Communication Systems", Pearson, 2001.

EC 6403 ELECTROMAGNETIC FIELDS

UNIT I STATIC ELECTRIC FIELDS

WEEK-1

Vector Algebra, Coordinate Systems, Vector differential operator, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulombs law, Electric field intensity, Point, Line, Surface and Volume charge distributions, Electric flux density, Gauss law and its applications, Gauss divergence theorem, Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

WEEK-2

UNIT TEST-1

UNIT II CONDUCTORS AND DIELECTRICS

WEEK-3

Conductors and dielectrics in Static Electric Field, Current and current density, Continuity equation, Polarization, Boundary conditions, Method of images, Resistance of a conductor,

WEEK-4

Capacitance, Parallel plate, Coaxial and Spherical capacitors, Boundary conditions for perfect dielectric materials, Poisson‟s equation,

WEEK-5

Laplace‟s equation, Solution of Laplace equation, Application of Poisson‟s and Laplace‟s equations.

WEEK-6

UNIT TEST-2

UNIT III STATIC MAGNETIC FIELDS

WEEK-7

Biot -Savart Law, Magnetic field Intensity, Estimation of Magnetic field Intensity for straight and circular conductors, Ampere‟s Circuital Law, Point form of Ampere‟s Circuital Law,

WEEK-8

Stokes theorem, Magnetic flux and magnetic flux density, The Scalar and Vector Magnetic potentials, Derivation of Steady magnetic field Laws.

WEEK-9

UNIT TEST-3

UNIT IV MAGNETIC FORCES AND MATERIALS

WEEK-10

Force on a moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions involving magnetic fields,

WEEK-11

The magnetic circuit, Potential energy and forces on magnetic materials, Inductance, Basic expressions for self and mutual inductances, Inductance evaluation for solenoid, toroid, coaxial cables and transmission lines, Energy stored in Magnetic fields.

WEEK-12

UNIT TEST-4

UNIT V TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

WEEK-13

Fundamental relations for Electrostatic and Magnetostatic fields, Faraday‟s law for Electromagnetic induction, Transformers, Motional Electromotive forces, Differential form of Maxwell‟s equations, Integral form of Maxwell‟s equations,

WEEK-14

Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Poynting‟s theorem, Time harmonic fields, Electromagnetic Spectrum.

WEEK-15

UNIT TEST-5

WEEK-16

MODEL EXAMINATION (5 UNITS)

WEEK-17

MODEL PRACTICAL

TEXT BOOKS:

1. William H Hayt and Jr John A Buck, "Engineering Electromagnetics" , Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, 2008

2. Sadiku MH, "Principles of Electromagnetics", Oxford University Press Inc, New Delhi, 2009

REFERENCES:

1. David K Cheng, "Field and Wave Electromagnetics", Pearson Education Inc, Delhi, 2004

2. John D Kraus and Daniel A Fleisch, "Electromagnetics with Applications", Mc Graw Hill Book Co, 2005

3. Karl E Longman and Sava V Savov, “Fundamentals of Electromagnetics”, Prentice Hall of India, New Delhi, 2006
4. Ashutosh Pramanic, “Electromagnetism”, Prentice Hall of India , New Delhi, 2006

EC 6404 LINEAR INTEGRATED CIRCUITS

UNIT - 1 BASICS OF OPERATIONAL AMPLIFIERS

WEEK-1

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations

WEEK-2

UNIT TEST-1

UNIT - II APPLICATIONS OF OPERATIONAL AMPLIFIERS

WEEK-3

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator,

WEEK-4

Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier,

WEEK-5

peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

WEEK-6

UNIT TEST-2

UNIT - III ANALOG MULTIPLIER AND PLL

WEEK-7

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell - Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis

WEEK-8

Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

WEEK-9

UNIT TEST-3

UNIT - IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

WEEK-10

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode $R-2R$ Ladder types - switches for D/A converters, high speed sample-and-hold circuits.

WEEK-11

A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type - Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters.

WEEK-12

UNIT TEST-4

UNIT – V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs

WEEK-13

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC

555, IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator

WEEK-14

Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

WEEK-15

UNIT TEST-5

WEEK-16

MODEL EXAMINATION (5 UNITS)

WEEK-17

MODEL PRACTICAL

TEXT BOOKS:

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 3rd Edition, Tata Mc Graw-Hill, 2007.

REFERENCES:

1. Ramakant A. Gayakwad, "OP-AMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2001.

2. Robert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth Edition, PHI, 2001.

3. B.S.Sonde, "System design using Integrated Circuits" , 2nd Edition, New Age Pub, 2001

4. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley International, 2005.

5. Michael Jacob, "Applications and Design with Analog Integrated Circuits", Prentice Hall of India, 1996.

6. William D.Stanley, "Operational Amplifiers with Linear Integrated Circuits", Pearson Education, 2004.

7. S.Salivahanan & V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", TMH, 2008.

EC6405 CONTROL SYSTEM ENGINEERING

UNIT 1 CONTROL SYSTEM MODELING

WEEK 1

Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems
Block diagram reduction Techniques - Signal flow graph

WEEK-2

UNIT TEST-1

UNIT II TIME RESPONSE ANALYSIS

WEEK-3

Time response analysis - First Order Systems

WEEK-4

Impulse and Step Response analysis of second order systems - Steady state errors

WEEK-5

P, PI, PD and PID Compensation, Analysis using MATLAB

WEEK 6

UNIT TEST-2

UNIT III FREQUENCY RESPONSE ANALYSIS

WEEK-7

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Use of Nichol's Chart in Control System Analysis

WEEK-8

Series, Parallel, series-parallel Compensators - Lead, Lag, and Lead Lag Compensators, Analysis using MATLAB.

WEEK-9

UNIT TEST-3

UNIT 1V STABILITY ANALYSIS

WEEK-10

Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles

WEEK-11

Application of Root Locus Diagram - Nyquist Stability Criterion - Relative Stability, Analysis using MATLAB

WEEK-12

UNIT TEST-4

UNIT V STATE VARIABLE ANALYSIS

WEEK-13

State space representation of Continuous Time systems – State equations – Transfer function from State Variable Representation – Solutions of the state equations - Concepts of Controllability and Observability

WEEK-14

State space representation for Discrete time systems. Sampled Data control systems – Sampling Theorem – Sampler & Hold – Open loop & Closed loop sampled data systems.

WEEK-15

UNIT TEST-5

WEEK-16

MODEL EXAMINATION (5 UNITS)

WEEK-17

MODEL PRACTICAL

TEXTBOOK:

1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007.

REFERENCES:

1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.
3. Schaum‟s Outline Series, "Feed back and Control Systems" Tata Mc Graw-Hill, 2007.
4. John J.D‟Azzo & Constantine H.Houpis, "Linear Control System Analysis and Design‟", Tata Mc Graw-Hill, Inc., 1995.
5. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Addison – Wesley, 1999.

EC6411 CIRCUITS AND SIMULATION INTEGRATED LABORATORY

DESIGN AND ANALYSIS OF

1. Half and Full wave rectifiers
2. Fixed Bias Amplifier Circuit using BJT.
3. Voltage Divider Bias Circuit – CE configuration.
4. Differential Amplifier Using BJT.
5. Darlington Amplifier.
6. Source Follower with Bootstrapped Circuit.
7. Class A Power Amplifier.
8. Class B Complementary Symmetry Power Amplifier.

SIMULATION USING SPICE:

9. Frequency response of CE amplifier with Emitter resistance.
10. DC response of CS amplifier.
11. Frequency response of Cascode amplifier.
12. Transfer Characteristics of Class B Power Amplifier.
13. Design of a DC Power Supply using rectifier.

EC6412 LINEAR INTEGRATED CIRCUITS LABORATORY

DESIGN AND TESTING OF

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier
4. Active low-pass, High-pass and band-pass filters.
5. Astable & Monostable multivibrators and Schmitt Trigger using op-amp.
6. Phase shift and Wien bridge oscillators using op-amp.
7. Astable and monostable multivibrators using NE555 Timer.
8. PLL characteristics and its use as Frequency Multiplier.
9. DC power supply using LM317 and LM723.
10. Study of SMPS.

SIMULATION USING SPICE

1. Simulation of Experiments 3, 4, 5, 6 and 7.
2. D/A and A/D converters (Successive approximation)
3. Analog multiplier
4. CMOS Inverter, NAND and NOR

EE6461 ELECTRICAL ENGINEERING AND CONTROL SYSTEM LABORATORY

1. Study of DC & AC motor starters
2. Study of three phase circuits
3. Speed Control of DC shunt motor
4. Load Test on DC shunt motor
5. OCC & Load Characteristics of DC shunt generator
6. Transfer Function of separately excited D.C.Generator.

7. Regulation of three phase alternator
8. Open Circuit and Short Circuit test on single phase transformer to draw its equivalent circuit
9. Load test on single-phase transformer
10. Load test on single phase and three-phase Induction motor
11. Measurement of passive elements using Bridge Networks.
12. Study of transducers and characterization.
13. Digital simulation of linear systems.

14. Stability Analysis of Linear system using MATLAB or equivalent Software.
15. Study the effect of P, PI, PID controllers using MATLAB or equivalent Software.
16. Design of Lead and Lag compensator.

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