B.TECH SEMESTER-V
ELECTRICAL ENGINEERING

THEORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-301T	Control System(EC,EI & EE)	4	310	4
2.	EE-303T	Power Electronics(EC,EI & EE)	4	310	4
3.	EE-305T	Power System-I	4	310	4
4.	EE-307T	Instrumentation	4	310	4
5.	EI-301T	Microprocessor & their applications	4	310	4
6.	EC-202T	Signal & System	4	310	4
Total			**24**		**24**

LABORATORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-303P	Power Electronics(EC,EI & EE)	2	003	3
2.	EC-309P	Instrumentation Lab	2	003	3
3.	EI-301P	Microprocessor Lab	2	003	3
Total			**6**		**12**
TOTAL (THEORY + LABORATORY)			**30**		**36**

B.TECH SEMESTER-VI
ELECTRICAL ENGINEERING

THEORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-302T	Power System -II	4	310	4
2.	EE-304T	Power Plant Engineering	4	310	4
3.	EE-306T	Computer Simulation Of Power system	4	310	4
3.	EE-308T	Digital & Non Linear Control System	4	310	4
4.	EE-310T	Special Purpose Machines	4	310	4
5.	EC-312T	Elements of Communication Engg.	4	310	4
Total			**24**		**24**

LABORATORY COURSES:

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total Hrs.
1.	EE-302P	Control System(EE,EC & EI)	2	003	3
2.	EC-312P	Communication Lab	2	003	3
3.	EE-304P	Computer simulation of Electrical ckt Lab	2	003	3
Total			**6**		**9**
TOTAL (THEORY + LABORATORY)			**30**		**33**

Subject: Microprocessor & their Applications ***Code: EI-301T*** ***Credits: 4***

Branches: EC, EI, EE, ME and CSIT ***SEM: V Semester*** ***L P T: 3 1 0***

Unit 1:- General features of Microprocessor: Microprocessor architecture and its operation, Memory, Memory Organisation, Memory Mapped I/O mapped I/O Scheme.

Unit 2:- Architecture of 8085 Microprocessor: 8085 Microprocessor pin configuration, Internal architecture and its operation, Control signals, Flag register, Timing control unit, Decoding, Execution of an instructions and memory interfacing. Timing instruction cycle, Opcode Fetch, memory and input output read/write cycle of an instruction set.

Unit 3:- Programming Techniques of 8085 Microprocessor: How to write and execute a simple program timing and execution of the instructions, Addressing modes, programming techniques, programming technique for looping, counting and indexing, counter programs and timing delay program and timing calculations, stack operation and subroutine programs.

Unit 4:- Interrupts of 8085 Microprocessor: Hardware and software interrupts, interrupts call locations, RIM, SIM, RST 7.5, 6.5 and 5.5.

Unit 5:- Programmable interfaces of 8085 microprocessor: Programmable peripheral interface 8255, programmable interval timer 8253/8254, DMA controller 8257, and interrupt controller 8259.

Unit 6:- Microprocessor Applications: Delay subroutine, seven segment display, water level indicator, microprocessor based traffic control.

Unit 7:- Introduction of 8086 microprocessor: Internal Architecture organisation, Maximum mode and minimum mode, instruction set, initialization instructions, constructing the machine codes for 8086 instruction. Assembler directives, addressing modes, procedure and macros, re-entrant and recursive procedures.

Unit 8:- 8087 Coprocessor, Features and internal organization, RS-232, RS-442, IEEE-488, Features and architecture of 80186, 80286, 80386 & 80486.

REFERENCES BOOKS

1. Microprocessor Architecture programming and application with 8085/8080 by Ramesh S. Gaonkar.
2. Fundamentals of Microprocessor & Microcontroller by B. Ram.
3. Microprocessor and interfacing Programming and Hardware by Douglas V. Hall.
4. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386 80486, Pentium and Pentium pro-processor, Architecture, Programming and interfacing by Berry b. Bery.

Subject: Microprocessor Lab ***Code: EI-301P*** ***Credits: 2***

Branches: EC, EI, EE, ME and CSIT ***SEM: V Semester*** ***L P T: 0 0 3***

1. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
3. To perform multiplication and division of two 8 bit numbers using 8085.
4. To find the largest and smallest number in an array of data using 8085 instruction set.
5. To write a program to arrange an array of data in ascending and descending order.
6. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.
7. To write a program to initiate 8251 and to check the transmission and reception of character.
8. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes.
9. To interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave.
10. Serial communication between two 8085 through RS-232 C port.

Note :-In addition, Institutes may include two more experiments based on the expertise

B-TECH. SEMESTER-V

CONTROL SYSTEM

EE-301T

L	T	P	TOTAL
3	1	0	4

***Branches** : EE, EC & EI*

Unit-I:

The Control System:

Open loop & closed control; servomechanism, Physical systems. Principle of feedback Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback.

Unit-II:

Time Response analysis:

Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants, Design specifications of second order systems: basic concept of P, PD, PI, PID controllers.

Unit-III:

Stability and Algebraic Criteria:

Concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations.

Root Locus Technique:

The root locus concepts, construction of root loci

Unit-IV:

Frequency response Analysis:

Frequency response, correlation between time and frequency responses, polar plots, Bode plots

Stability in Frequency Domain:

Frequecy Domain specifications, Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

Text Books:

1. Nagrath & Gopal, "Control System Engineering", 4th Edition, New age International.
2. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
3. B.C. Kuo & Farid Golnaraghi, "Automatic Control System" Wiley IndiaLtd, 2008.
4. D.Roy Choudhary, "Modern Control Engineering", Prentice Hall of India.

Reference Books:

5. Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co.
6. Ajit K Mandal, "Introduction to Control Engineering" New Age International, 2006.
7. R.T. Stefani, B.Shahian, C.J.Savant and G.H. Hostetter, "Design of Feedback Control Systems" Oxford University Press.
8. N.C. Jagan, " Control Systems", B.S. Publications,2007.

B-TECH. SEMESTER-V

POWER SYSTEM-I

EE-305T

L	T	P	TOTAL
3	1	0	4

Unit-I:

Power System Components:

Single line Diagram of Power system, Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator

Supply System:

Different kinds of supply system and their comparison, choice of transmission voltage

Transmission Lines:

Configurations, types of conductors, resistance of line, skin effect, Kelvin's law.Proximity effect

***Unit-II*:**

Over Head Transmission Lines

Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines,Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading

Unit-III:

Corona and Interference:

Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference.Electrostatic and electromagnetic interference with communication lines

Overhead line Insulators:

Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

Unit-IV:

Mechanical Design of transmission line:

Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers

Insulated cables:

Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

Text Books:

1. W. D. Stevenson, "Element of Power System Analysis", McGraw Hill,
2. C. L. Wadhwa, "Electrical Power Systems" New age international Ltd. Third Edition
3. Asfaq Hussain, "'Power System", CBS Publishers and Distributors,
4. B. R. Gupta, "Power System Analysis and Design" Third Edition, S. Chand & Co.
5. M. V. Deshpande, "Electrical Power System Design" Tata Mc Graw Hill.

Reference Books:

6. M. V. Deshpandey, "Elements of Power System Design", Tata McGraw Hill,
7. Soni, Gupta & Bhatnagar, "A Course in Electrical Power", Dhanpat Rai & Sons,
8. S. L. Uppal, "Electric Power", Khanna Publishers
9. S.N.Singh, " Electric Power Generation, Transmission& distribution." PHI Learning

Subject: Signals and Systems ***Code: EC-202T*** ***Credits: 4***

Branches: EE ***SEM: V Semester*** ***L P T: 3 1 0***

Unit 1:- Fourier analysis of signals, Amplitude, Phase and Power spectrum, Orthogonality of functions, Types of signals, Fourier transform of some useful functions, Singularity functions & its properties, Dirac Delta function & its properties, Sampling function, Laplace transform of some useful functions.

Unit 2:- Convolution of signals, Graphical & analytical methods of convolution, sampling theorem, Nyquist rate & Nyquist interval, Aliasing, Aperture effect, Recovery from sampled signal, natural sampling, flat top sampling. Time convolution theorem, Frequency convolution theorem.

Unit 3:- Power & Energy signals, Energy & Power spectral densities of signals, Cross correlation, Auto correlation.

Unit 4:- Systems & Filters: Linear system, Time invariant & LTI system, Impulse response, Causal systems, Filter characteristics of linear systems, Low pass filter High pass filters, Band pass filters, Band pass, Band stop filters.

Unit 5:- Random variables and probability theory, PDF, CDF and their properties, Normal and Gaussian distribution.

REFERENCES BOOKS

1. Modern Digital & Analog System by B.P. lathi
2. Communication systems by Singh & Spare
3. Communication systems by Simon Haykins
4. Digital communication systems by Taub & Schilling
5. Probability theory and Queuing methods

B-TECH. SEMESTER-V

POWER ELECTRONICS

EE-303T

L	T	P	TOTAL
3	1	0	4

***Branches** : EE, EC & EI*

Unit-I: **Power semiconductor Devices:** Power semiconductor devices their symbols and static characteristics. Characteristics and specifications of switches, types of power electronic circuits. Operation, steady state & switching characteristics & switching limits of Power Transistor. Operation and steady state characteristics of Power MOSFET and IGBT

Thyristor :

Operation, V- I characteristics, two transistor model, methods of turn-on. Operation of GTO, MCT and TRIAC.

Unit-II: Power Semiconductor Devices(Contd): Protection of devices. Series and parallel operation of thyristors. Commutation techniques of thyristor ,R, R-C, UJT & Static Firing Circuits

DC Choppers: Principles of step-down chopper, step down chopper with R-L load ,Principle of step-up chopper, and operation with RL load, classification of choppers

Unit-III:_Phase Controlled Converters: Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode. Single phase fully controlled and half controlled bridge converters.

Performance Parameters. Three phase half wave converters. Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters.

Unit-IV:_AC Voltage Controllers: Principle of On-Off and phase controls. Single phase ac voltage controller with resistive and inductive loads. Three phase ac voltage controllers (various configurations and comparison only)

Single phase transformer taps changer.

Unit-V: Inverters: Single phase series resonant inverter. Single phase bridge inverters. Three phase bridge inverters Voltage control of inverters. Harmonics reduction techniques. Single phase and three phase current source inverters.

Unit-VI: Cycloconverters: 1- φ & 3- φ Cyclo-converters, mid-point & bridge type cyclo-converters, advantage of cyclo-converters.

Text Books:

1. Power Electronics by A.K.Gupta , Dhanpat Rai publishers**.**
2. M.H.Rashid,"Power Electronics:Circuits,Devices & Applications",Prentice Hall of India Ltd.3rd Edition,2004.
3. M.D. Singh and K.B.Khanchandani, "Power Electronics"Tata MC Graw Hill, 2005
4. V.R. Moorthy, " Power Electronics : Devices, Circuits and Industrial Applications" Oxford University Press,2007.

Reference Books:

4. M.S. Jamil Asghar, "Power Electronics" Prentice Hall of India Ltd., 2004
5. Chakrabarti & Rai, "Fundamentals of Power Electronics &Drives"Dhanpat Rai & Sons.
6. Ned Mohan, T.M.Undeland and W.P.Robbins, "Power Electronics:Converters, Applications and Design", Wiley India Ltd,2008.
7. S.N.Singh, "A Text Book of Power Electronics" Dhanpat Rai & Sons

B-TECH. SEMESTER-V

INSTRUMENTATION

EE-307T

L	T	P	TOTAL
3	1	0	4

Unit-I:

Transducer – I: Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain guages, Resistance thermometer, Thermistors,
Thermocouples, LVDT,RVDT

Unit-II:

Transducer – II : Capacitive, Piezoelectric Hall effect and opto electronic transducers. Measurement of Motion, Force pressure, temperature, flow and liquid level.

Unit-III:

Telemetry : General telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data
Acquisition System: Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.

Unit-IV:

Display Devices and Recorders: Display devices, storage oscilloscope, spectrum analyzer, strip chart & x-y recorders, magnetic tape & digital tape recorders.
Recent Developments: Computer aided measurements, fibre optic transducers, microsensors, smart sensors, smart transmitters.

Unit-V:

Process Control : Principle, elements of process control system, process characteristics, proportional (P), integral (I), Derivative (D), PI, PD and PID control modes. Electronic, Pneumatic & digital controllers.

UNIT VI: Cathode Ray Oscilloscope : Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its components **, a**pplication of CRO in measurement ,Lissajous Pattern.

Text Books:

1. A.K.Sawhney, “Advanced Measurements & Instrumentation”, Dhanpat Rai & Sons
2. B.C. Nakra & K.Chaudhry, “Instrumentation, Measurement and Analysis”, Tata Mc Graw Hill 2nd Edition.
3. Curtis Johns, “Process Control Instrumentation Technology”, Prentice Hall

Reference Books:

4. E.O. Decblin, “Measurement System – Application & design”, Mc Graw Hill.
5. W.D. Cooper and A.P. Beltried, “Electronics Instrumentation and Measurement Techniques” Prentice Hall International
6. Rajendra Prasad,”Electronic Measurement and Instrumentation Khanna Publisher
7. M.M.S. Anand, “Electronic Instruments and Instrumentation Technology” PHI Learning.

B-TECH. SEMESTER-VI

POWER SYSTEM-II

EE-302T

L	T	P	TOTAL
3	1	0	4

Unit-I:

Representation of Power System Components:
Synchronous machines, Transformers,Transmission lines, One line diagram, Impedance and reactance diagram, per unit System

Symmetrical components:
Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.

Unit-II:

Insulation Coordination :
Introduction, Definitions, Determincation of Insultation, Impulse Level and Insulation Level of Sub Station Equipment – Lighting Arrester Selection and Location

Unit-III:

Traveling Waves:
Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of traveling waves under different line loadings. Bewlay's lattice diagram, protection of equipments and line against traveling waves

Unit-IV:

Neutral grounding:
Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices

Unit-V:

Electrical Design of Transmission Line:
Design consideration of EHV transmission lines, choice of voltage, number of circuits, conductor configuration, insulation design, selection of ground wires.

Text Books:

1. W.D. Stevenson, Jr. " Elements of Power System Analysis", Mc Graw Hill.
2. C.L. Wadhwa, "Electrical Power System", New Age International.
3. Chakraborthy, Soni,Gupta & Bhatnagar, "Power System Engineering", Dhanpat Rai & Co.
4. T.K Nagsarkar & M.S. Sukhija, "Power System Analysis" Oxford University Press,2007.

Reference Books:

5. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International
6. Hadi Sadat; "Power System Analysis", Tata McGraw Hill.
7. D.Das, " Electrical Power Systems" New Age International, 2006.
8. J.D. Glover, M.S. Sharma & T.J.Overbye, "Power System Analysis and Design" Thomson, 2008.
9. P.S.R. Murthy " Power System Analysis" B.S. Publications,2007.
10. Stagg and El-Abiad, "Computer Methods in Power System Analysis" Tata Mc Graw Hill
11. Kothari & Nagrath, "Modern Power System Analysis" Tata Mc. Graw Hill.

Subject: Element of Communication Engineering ***Code: EC-312T*** ***Credits: 4***

Branches :EE ***SEM: VI Semester*** ***L P T: 3 1 0***

Unit 1:- Modulation Process: Definition of amplitude modulation, frequency modulation & phase modulation, DSB-AM, DSB-SC-AM, using linear modulation and non linear modulation.

Unit 2:- Linear Modulation: Collector modulator or plate modulator and base modulator.

Unit 3:- Non linear modulation: Balanced moduling & ring modulator

Unit 4:- Generation of frequency modulation: Indirect method of FM i.e. Armstrong method of frequency modulation direct method of FM: reactance modulator.

Unit 5:- Demodulation/detection process: Demodulation of AM waves, diode detection 1, average detection and 2. Envelop detection, superhetrodyne receiver.

Unit 6:- Demodulation of FM or frequency discriminators: Single tuned discriminators, double tuned discriminators, foster seely discriminators, ratio detectors, and phase locked loop (PLL) demodulator.

Unit 7:- Noise: SNR (signal to noise ratio), noise figure, noise temperature of a cascaded system, S/N in DSB-SC receiver, S/Nin SSB-SC receiver, S/N in FM receiver, pre-emphasis and de-emphasis.

Reference Books

1. Communication systems - B.P. Lathi
2. Communication system - Simon Haykin
3. Principles of communication - George Kennedy
4. Communication system - R.P. Singh & S.D. Spare
5. Principles of communication system - Taub Shilling

B-TECH. SEMESTER-VI

COMPUTER SIMULATION OF POWER SYSTEM

EE-306T

L	T	P	TOTAL
3	1	0	4

Unit-I:

Symmetrical fault analysis:

Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions

Unit-II:

Unsymmetrical faults:

Analysis of single line to ground fault, line-to-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance. Formation of Zbus using singular transformation and algorithm, computer method for short circuit calculations

***Unit-III*:**

Load Flows:

Introduction, bus classifications, nodal admittance matrix (*BUS Y*), development of load flow equations, load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and fast decoupled method

Unit-IV:

Power System Stability:

Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement

Text Books:

1. Advanced Power System Analysis and Dynamics by L.P. Singh.
2. Computer Methods in Power System Analysis by G.W. Stagg & Al. Abiad.

B-TECH. SEMESTER-VI

POWER PLANT ENGINEERING

EE-304T

L	T	P	TOTAL
3	1	0	4

UNIT-I:

INTRODUCTION:

Planning of electricity supply, prediction of load and energy demand forecast techniques.

UNIT-II:

THERMAL STATION:

Detailed description of thermal plant-coal handling plant, boiler,economizer,preheater, electrostatic precipitator, ash disposal.

***UNIT-III*:**

HYDRO-STATION:

Types of turbines, types of dams, description of hydro plant.

UNIT-IV:

NUCLEAR STATION:

Nuclear fuels, nuclear reaction, types of reactors, description of nuclear plant.

Text Books:

1. Power Plant Engineering by B.R.Gupta.
2. Power System analysis by W.D Stevenson Granger MGH.
3. Power System Engineering by Nagrath and Kothari TMH.

B-TECH. SEMESTER-VI

DIGITAL & NON-LINEAR CONTROL SYSTEM

EE-308T

L	T	P	TOTAL
3	1	0	4

UNIT-I:

Signal Processing in Digital Control:

Basic digital control system, advantages of digital control and implementation problems, basic discrete time signals, z-transform and inverse z-transform, modeling of sample-hold circuit., pulse transfer function, solution of difference equation by z-Transform method.

UNIT-II:

Design of Digital Control Algorithms:

Steady state accuracy, transient response and frequency response specifications, digital compensator design using frequency response plots and root locus plots.

UNIT-III:

State Space Analysis and Design:

State space representation of digital control system, conversion of state variable models to transfer functions and vice versa, solution of state difference equations, controllability and observability, design of digital control system with state feedback.

UNIT-IV:

Stability of Discrete System:

Stability on the z-plane and Jury stability criterion, bilinear transformation, Routh stability criterion on rth plane.

Lyapunou's Stability in the sense of Lyapunou, stability theorems for continuous and discrete systems, stability analysis using Lyapunor's method.

Text Books:

1. B.C.Kuo, "Digital Control System",Saunders College Publishing.
2. M.Gopal, "Digital Control and State Variable Methods", Tata McGraw Hill.

Reference Books:

3. J.R.Leigh, "Applied Digital Control", Prentice Hall, International
4. C.H. Houpis and G.B.Lamont, "Digital Control Systems:Theory, hardware, Software",MGH.

B-TECH. SEMESTER-VI

SPECIAL PURPOSE MACHINE

EE-310T

L	T	P	TOTAL
3	1	0	4

UNIT-I:

INDUCTION MOTOR:

Deep bar & double cage type three phase induction motor, single phase induction motors-double field revolving theory & cross field theory, type s of single phase induction motor-capacitor start/run motor,shaded pole, hysteresis motor.

UNIT-II:

LINEAR INDUCTION MOTOR:

Principle , magnetic levitation, types of LIM.

UNIT-III:

COMMUTATOR MACHINES:

Universal motors-single phase and three phase, effect of motor EMF injection in induction motor, introduction to Schrage motor & repulsion motor.

UNIT-IV:

CROSS FIELD THEORY:

Cross field generator-Amplidyne and metadyne.

UNIT-V:

SPECIAL MACHINES:

Stepper motor-variable reluctance type and hybrid type, ac & dc servomotors, switched reluctance motor, permanent magnet motor.

Text Books:

1. ''Performance and Design of AC commutator motors'' by O.E.Taylor,A H Wheeler.
2. ''Generalized Theory of Electrical Machines'' by P.S.Bimbhra, Khanna pub.

Subject: Control system Lab ***Code: EE-302P*** ***Credits: 2***

Branches: EI, EE & EC ***SEM: VI Semester*** ***L P T: 003***

1. DC SPEED CONTROL SYSTEM

(a) To study D.C. speed control system on open loop and close loop.

(b) To study of Transient performance, another time signal is added at the input of control Circuit.

(c) To study how eddy current breaking is being disturbance rejected by close and open loop.

2. DC MOTOR POSITION CONTROL

(a) To study of potentiometer displacement constant on D.C. motor position control.

(b) To study of D. C. position control through continuous command.

(c) To study of D.C. position control through step command.

(d) To study of D.C. position control through Dynamic response.

3. AC MOTOR POSITION CONTROL

(a) To study of A.C. motor position control through continuous command.

(b) To study of error detector on A.C. motor position control through step command.

(c) To study of A.C. position control through dynamic response.

4. MAGNETIC AMPLIFIER

(a) To study Input / Output characteristic of a magnetic amplifier in mode (i) Saturable Reactor, (ii) Self Saturable Reactor.

5. SYNCHRO TRANSMITTER / RECEIVER

(a) To study of Synchro Transmitter in term of Position v/s Phase and voltage magnitude with respect to Rotor Voltage Magnitude/Phase.

(b) To study of remote position indication system using Synchro-transmitter/receiver.

6. PID CONTROLLER

(a) To observe open loop performance of building block and calibration of PID Controls.

(b) To study P, PI and PID controller with type 0 system with delay.

(c) To study P, PI and PID controller with type 1 system.

7. LEAD LAG COMPENSATOR

(a) To study the open loop response on compensator.

(b) Close loop transient response.

8. LINEAR SYSTEM SIMULATOR

(a) Open loop response

(i) Error detector with gain, (ii) Time constant, (iii) Integrator

(b) Close loop system

(I) First order system (II) Second order system (III) Third order system

9. Introduction to MATLAB (Control System Toolbox), Implement at least any two experiment in MATLAB.

a. Different Toolboxes in MATLAB, Introduction to Control Systems Toolbox.

b. Determine transpose, inverse values of given matrix.

c. Plot the pole-zero configuration in s-plane for the given transfer function.

d. Determine the transfer function for given closed loop system in block diagram representation.

e. Plot unit step response of given transfer function and find peak overshoot, peak time.

f. Plot unit step response and to find rise time and delay time.

g. Plot locus of given transfer function, locate closed loop poles for different values of k.

h. Plot root locus of given transfer function and to find out S, Wd, Wn at given root & to discuss stability.

i. Plot bode plot of given transfer function.

j. Plot bode plot of given transfer function and find gain and phase margins

k. Plot Nyquist plot for given transfer function and to compare their relative stability

l. Plot the Nyquist plot for given transfer function and to discuss closed loop stability, gain and phase margin.

Note:-In addition, Institutes may include more experiments based on the expertise