

**B.TECH ELECTRICAL ENGINEERING SYLLABUS
VI SEMESTER**

INSTRUMENTATION-II

Subject Code : E-351

UNIT I

Classification, selection of transducers, Resistance, inductance and capacitance type of transducers, measurement of displacement, strain, force, liquid level, pressure, velocity and acceleration. Introduction to Biomedical Instrumentation and Sensors.

UNIT II

Measurement of low, medium, and high resistance. A.C. Bridges, Measurement of inductance and capacitance, R.L.C. Measurement, Wagner's earthing device, De-Sauty's, Maxwell's, Anderson's, Schering and Campbell's bridges, Q & D measurements, errors in bridge measurements.

UNIT III

Potential and current transformers, Phase Angle and Ratio errors, testing of instrument transformers, Ratio meter, construction and design considerations. Applications of CTs and PTs for relays.

UNIT IV

Hall effect devices, Rectifier instruments, electronic voltmeter, differential voltmeters, multimeters, display devices, U-V and X-Y Recorders, Digital meters.

UNIT V

Methods of Data transmission, General telemetry systems, DC and AC telemetry system. Modulation, Pulse telemetry systems, Digital telemetry.

Reference Books:

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| 1. Electrical Measurement & Measuring Instruments | - E.W.Golding |
| 2. Electrical Measurement | - A.K.Sawhney |
| 3. A Course in Electronic and Electrical Measurements & Instrumentation | - J.B.Gupta |
| 4. Biomedical Instrumentation | - Khandpur |

CONTROL SYSTEM –I

Sub. Code: E-352

UNIT-I CONTROL SYSTEM COMPONENTS AND TRANSFER FUNCTION

System concept, open loop and closed loop systems, mathematical modeling of mechanical and electrical systems, Transfer function of linear systems, Block diagram representation, and reduction techniques. Signal flow graph. Mason's gain formula, system components, potentiometer, tachogenerator, a.c. and d.c. servomotors, synchros, stepper motor.

UNIT-II TIME RESPONSE

Time response of first, second and higher order systems to impulse, step and ramp inputs, Time response specifications, types of systems, steady state error and error constants. Basic control action and automatic controllers, Effect of P, I, D, PI, PD and PID controllers on system performance, Sensitivity of system.

UNIT-III STABILITY ANALYSIS OF LINEAR SYSTEMS :

Concept of stability, necessary condition for stability, absolute and relative stability, Routh Hurwitz criterion, Construction of Root loci and its application, Stability analysis of electrical systems.

UNIT-IV FREQUENCY DOMAIN ANALYSIS :

Correlation between time and frequency response, frequency domain analysis, Bode plot, Gain Margin, Phase Margin, Polar plot, Nyquist Criterion, effect of feed back on frequency domain analysis, constant M circle, N circle.

UNIT-V DESIGN AND COMPENSATION

Design consideration of control system, lead, lag, lead-lag compensation, Design of compensating network using bode plots and root locus.

Reference Books :

1. Modern control system – Ogata
2. Automatic control system – B.C.Kuo
3. Modern control system – Nagrath & Gopal
4. Control system design – Graham C.Goodwin
5. Linear control system - Prof. B.S.Manke

MICROPROCESSORS

Subject Code: E-353

UNIT I

Evolution and overview of Microprocessor, micro computer organization. Microprocessor Architecture - introduction and pin diagram of 8085, ALU timing and control unit, registers, data and address bus, timing and control signals, fetch and execute operations, instruction and data flow, system timing diagram, minimum system configuration for 8085.

UNIT II

Instruction type classification of instructions addressing modes, instruction format, assembler directives, over view of instruction set, writing assembly language programs with and without subroutines, concepts of stack, interrupts, interrupt service subroutine.

UNIT III

Memory types, memory organization, static RAM interfacing memory, use of RAMs and EPROMs, RAM-6116, 6164, EPROM-2716, 2732, 2764, Programmable Peripherals Interface (8255). Programmable Interval Timer 8253, Basic concepts in serial I/O and data transfer schemes and their classification.

UNIT IV

Types of A/D & D/A converters, Interfacing & programming of ADC-0808/0809 and DAC-0800. Multiplexers and demultiplexers, 8085 based data acquisition system, stepper motor control, DC motor control, temperature control, traffic control.

UNIT V

16-bit Microprocessor 8086 and its internal architecture, instruction set. Introduction to programming of 8086, 8086 interrupts, multi-user, multitasking, Introduction to microcontrollers- 80286, 80386, 80486, microprocessor family, Comparison of microprocessors.

Reference Books:

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| 1. Fundamentals of Microprocessors and Microcomputers | - B.Ram |
| 2. Microprocessors and programmed logic | - Kenneth B.Short |
| 3. Introduction to Microcomputer | -Albert Paul Malvino |
| 4. Microprocessors Architecture Programming and Applications | - Ramesh S.Gaonkar. |
| 5. Assembly language programming | -Lance P. Levanthal |
| 6. Microprocessors and Interfacing Programming and Hardware | - Douglas V.Hall |

POWER SYSTEM-I
Subject Code: E-354

UNIT I

Function of electric systems, transmission of power by different systems, influence of voltage on cost and efficiency, comparison of different systems of transmission, types of conductors and spacing of conductors, constants of overhead transmission lines:

Main parameters of overhead transmission lines, resistance of conductor, skin and proximity effect, calculation of inductance and capacitance of single phase and three phase lines with equal and unequal spacings for single and bundle conductors, application of GMD, GMR methods.

UNIT II

Representation and performance of short, medium and long lines ABCD constants, power circle diagrams, static and synchronous phase modifiers, surge impedance loading of transmission lines, efficiency, regulation and phasor diagrams of transmission lines, Ferranti effect.

Phenomenon of corona, potential gradient, break down voltages, corona power loss, effect of atmospheric conditions, Radio interference phenomenon: General effect of positive and negative polarities as well as of a.c. and d.c. supplies on corona. Methods to improve corona performance.

UNIT III

Mechanical Design of Transmission Lines: Main considerations in the design of transmission lines, calculation of sag, variation of sag with load and temperature, stringing chart, sag template, uplift in insulator string, earth wires, type of towers, vibration dampers, line supports, spacing of conductors and guards.

Type of insulators, voltage distribution on suspension insulator string, string efficiency, shielding and grading.

UNIT IV

Types of distribution system and their application, calculation of size and voltage drop. Feeders-Kelvin's law and modified Kelvin's law for feeder conductor size, limitations of Kelvin's laws.

Comparison of cables and overhead lines, types of cables, insulation resistance, stress and capacitance of single and multicore cables, charging current, grading of cables, sheath effects, dielectric loss, power factor-thermal resistance.

UNIT V

Introduction, comparison of a.c. and d.c. transmission system, Advantages and limitations of HVDC transmission, principal parts, control and applications of HVDC transmission.

Reference Books :

1. Electric Power System : By – C.L.Wadhwa
2. Electric Power System : By - Asfaq Husain
3. Elements of Power System Analysis : By – William D.Stevenson
4. Power System Analysis & Design : By – B.R.Gupta
5. HVDC Transmission : By K.R. Padiyar

UTILIZATION OF ELECTRICAL ENERGY

Subject code: E-355

UNIT I ILLUMINATION ENGINEERING

Nature of light, units, sensitivity of the eye, luminous efficiency, glare. Production of Light; Incandescent lamps, arc lamps gas discharge lamps- fluorescent lamps-polar curves, effect of voltage variation on efficiency and life of lamps, Distribution and control of light, lighting calculations, solid angle, inverse square and cosine laws, methods of calculations, factory lighting, flood lighting and street lighting.

UNIT II HEATING AND WELDING

Electrical heating-advantages, methods and application, resistance over general construction, design of heating elements, efficiency and losses control. Induction heating: core type furnaces, core less furnaces and high frequency eddy current heating, dielectric heating: principle and special applications, arc furnaces: direct arc furnaces, Indirect arc furnaces, electrodes, power supply and control.

Different methods of electrical welding and electrical equipment for them.

Arc furnaces transformer and welding transformers.

UNIT III TRACTION

Advantages and disadvantages, system of electric traction, diesel electric locomotives. Mechanics of train movement: simplified speed time curves, average and schedule speed, tractive effort, specific energy consumption, factors affecting specific energy consumption.

UNIT IV TRACTION MOTORS

DC motors, single phase and three phase motors, starting and control of traction motors, braking of traction motors. Modern 25 KV a.c. single phase traction systems: advantages, equipment and layout of 25 KV, single phase power frequency A.C. traction.

UNIT V ELECTRIC DRIVES

Individual and collective drives- electrical braking, plugging, rheostatic and regenerative braking load equalization use of fly wheel criteria for selection of motors for various industrial drives.

Reference Books:

1. Utilization of Elect. Energy - E.O. Taylor
2. Utilization of Elect. Energy - H. Pratab
3. Utilization of Elect. Energy - J.B. Gupta