

SYLLABUS FOR THE POST OF LECTURER (TECHNICAL)



SUBJECT INSTRUMENTATION ENGINEERING

1. Basic Electrical Engineering:

Network theorem, D.C Networks, AC network fundamentals and phasor concepts, Series-Parallel A.C. networks, Energy & Power in electrical circuits. Magnetic circuits, Three-phase AC circuits.

2. Electric circuit analysis:

Transients, Resonance, Transforms and properties: Laplace, Fourier, Z-transform, Discrete-time Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform, Electrical Circuit Analysis using Laplace & Fourier Transforms, Properties of networks in terms of poles and zeroes, Transfer function, resonant circuits, Two-port networks.

3. Analog Electronics:

Characteristics of Diode, BJT, JFET AND MOSFET, Diode circuits. Transistors at low and high frequencies, Amplifiers, single and multi-stage. Feedback amplifiers, Operational amplifiers characteristics and circuit configuration. Instrumentation amplifiers, V to I and I to V converters. Op Amp based active filters. Oscillators and signal generators.

4. Digital Electronics:

Combinational logic circuits, minimization of Boolean functions, IC families, TTL, MOS and CMOS, Arithmetic circuits, comparator, Schmitt trigger, Timer and multi vibrator, sequential circuits, flip Flops, registers, counters, multiplexers, ADC and DAC, S/H circuit, Basic number system, Microprocessor applications, memory and input output interfacing. Microcontrollers.

5. Signals, System and Communication:

Time division and frequency division multiplexing, Amplitude modulation, Frequency modulation, Pulse modulation, Sampling, Quantization and Coding, Digital pass band methods, Digital Modulation: ASK, PSK, FSK, QPSK, Information theory basics, Shannon's theory, entropy and convolution coding, Noise.

6. Electrical and Electronic measurements:

Bridges and potentiometers, measurement of R, L, C, voltage, current, power, power factor and energy, extensive of instrument ranges, digital voltmeters and multi-meters, time, phase and frequency measurement, CRO.

7. Transducers, mechanical measurement and Industrial Instrumentation:

Resistive, inductive, capacitive and piezoelectric transducers and their signal conditioning, measurement of displacement, velocity, acceleration, force torque, vibration, Measurement of pressure, flow, temperature, liquid level and pH, conductivity, viscosity and humidity.

8. Control system and process control:

Feedback principles, block diagram representation and reduction technique, time response, steady state error, Routh and Nyquist criteria, Bode plot, Root loci, time delay systems, phase and gain margins, state space representation of systems, mechanical, hydraulic and pneumatic system components, synchro pair, servo motor, stepper motor, P, PI, PID controllers.

9. Analytical, optical and biomedical Instrumentation:

Gas chromatography, mass spectrometers, optical sources and detectors, basics of fibre optics, fibre optic sensors, biomedical instruments, EEG, ECG and EMG, clinical measurements, Ultrasonic transducers and ultrasonography, principles of computer assisted tomography.