

Teaching Plan for EVEN Semesters w.e.f. May 2024

Name: M Jani Baig

Designation: Associate Professor

B.Sc. VI Semester; Paper 6.2: Electronic Instrumentation & Sensors – Teaching Plan

May 2024

Paper: 6.2 – Unit: 01

08 hours

**Power supply:** AC power and its characteristics, Single phase and three phase, Need for DC power supply and its characteristics, line voltage and frequency, Rectifier bridge, Filters: Capacitor and inductor filters, L-section and  $\pi$ -section filters, ripple factor, electronic voltage regulators, stabilization factor, voltage regulation using ICs (78xx & 79xx). **Basic electrical measuring instruments:** Cathode ray oscilloscope- Block diagram, basic principle, electron beam, CRT features, signal display.

June 2024

Paper: 6.2 – Unit: 01 & 02

22 hours

Basic elements of digital storage oscilloscopes. Basic DC voltmeter for measuring potential difference, Extending Voltmeter range, AC voltmeter using rectifiers. Basic DC ammeter, requirement of a shunt, Extending of ammeter ranges. **Basic principle of standard AF signal generator:** Fixed frequency and variable frequency, AF sine and square wave generator, basic Wein-bridge network and oscillator configuration, Triangular and saw tooth wave generators, circuitry and waveforms. **Passive and active filters:** Fundamental theorem of filters, Proof of the theorem by considering asymmetrical T-network. Types of filters, Circuitry and Cut-off frequency and frequency response of Passive (RC) and Active (op-amp based) filters: Low pass, high pass and band pass.

July 2024

Paper: 6.2 – Unit: 03 & 04

22 hours

**Data Conversion and display Digital to Analog (D/A) and Analog to Digital (A/D) converters** – A/D converter with pre amplification and filtering. D/A converter - Variable resistor network, Ladder type (R-2R) D/A converter, Op-amp based D/A converter. (4 hours) **Digital display systems and Indicators** – Classification of displays, Light Emitting Diodes (LED) and Liquid Crystal Display (LCD) – Structure and working. **Data Transmission systems** – Advantages and disadvantages of digital transmission over analog transmission, Pulse amplitude modulation (PAM), Pulse time modulation (PTM) and Pulse width modulation (PWM)- General principles. Principle of Phase Sensitive Detection (PSD). **Transducers and sensors:** Definition and types of transducers. Basic characteristics of an electrical transducer, factors governing the selection of a transducer, Resistive transducer-potentiometer, Strain gauge and types (general description), Resistance thermometer – platinum resistance thermometer.

August 2024

Paper: 6.2 – Unit: 04

08 hours

Thermistor. Inductive Transducer-general principles, Linear Variable Differential Transducer (LVDT) – principle and construction, Capacitive Transducer, Piezo-electric transducer, Photoelectric transducer, Photovoltaic cell, photo diode and phototransistor – principle and working. (10 hours)

B.Sc. IV Semester; Paper 4.1: Thermal Physics and Electronics – Teaching Plan

May 2024

Paper: 4.1 – Unit: 03

04 hours

**Semiconductor devices:** Review of Intrinsic and Extrinsic semiconductors, p-n junction and its characteristics and Parameters, Diode approximations, Half-wave rectifier, Full-wave rectifier, Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator.

June 2024

Paper: 4.1 – Unit: 03

11 hours

**Junction Transistors:** Basics of Bipolar Junction Transistors (BJT), BJT operation, Common Base, Common Emitter and Common Collector Characteristics. Field Effect Transistor (FET) and its characteristics. Transistor as an Amplifier and Oscillator. **Electronics:** Integrated Circuits (Analog and Digital), Operational Amplifier, Ideal characteristics of Op-Amp, Inverting and Non-Inverting Configurations. Applications- Voltage Follower, Addition and Subtraction

July 2024

Paper: 4.1 – Unit: 04

11 hours

**Digital:** Switching and Logic Levels, Digital Waveform. Number Systems: Decimal Number System, Binary Number System, Hexadecimal Number System. Conversion of Decimal to Binary & Hexadecimal Number System. Conversion of Binary to Decimal & Hexadecimal number system. Conversion of Hexadecimal to Binary and Decimal number system.

August 2024

Paper: 4.1 – Unit: 04

04 hours

**Boolean Algebra Theorems:** De Morgan's theorem. Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, NAND Gate, NOR Gate, Algebraic Simplification, Implementation of NAND and NOR functions

  
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