

Savitribai Phule Pune University

Department of Electronic and Instrumentation Science

Syllabus for M.Sc. Instrumentation Science Entrance Exam 2022

Physics (40 %)

Motion and Friction, Work, Energy and Power, Heat, Fundamental properties of wave, Angular Momentum, Newton's Laws, Specific Heat Capacity, Thermal Expansion, Gravitational Force, Energy, Conduction, Convection, Occurrence of Superconductivity, Critical magnetic field, Elastic and inelastic scattering, Diffraction, Fibre optics, LASER, Coulomb's law, Gauss law, Electric field, Electrostatic Potential, Statement of Poisson's equation, Polarization, Electric displacement, Electric susceptibility and dielectric constant, Electric field at an exterior and interior point of dielectric, Concepts of magnetic induction, magnetic flux and magnetic field, Relationship between B, H and M, Biot-Savart's law, Ampere's law for force between two current carrying loops, Ampere's circuital law, Equation of continuity, Magnetic susceptibility and permeability, Hysteresis loss, B-H curve. Faradays law of induction, Lenz's law, Simple Harmonic Motion, Waves, Inertia, Temperature, Thermal conduction, Geometric Optics, Wave Optics, Quantum Optics, Electromagnetism, Electromagnetic induction, Elasticity, Force, mass, Velocity, Density, Energy, Hall effect, Sound waves, Diamagnetism, Langevin theory of Diamagnetism, Application of diamagnetic material, Occurrence of Superconductivity, Critical magnetic field and Meissner effect, Paramagnetism, Langevin theory of Para magnetism, ferromagnetism, ferromagnetic domains, Hysteresis, Curie temperature, Ferromagnetism, Conventional and non-conventional sources of energy, Photovoltaic principle solar cells.

Electronics (40 %)

P-N junction diode, Applications of diode, Rectifiers, clippers, clampers, Zener diode voltage regulators. Construction, characteristics and configurations of BJT, biasing of BJT, BJT amplifiers Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET Feedback concepts, types of Feedback connection, Oscillators, Number System, Logic gates, Combinational Circuits, Sequential Circuits, Analog to Digital Converter, Digital to Analog Converter. Introduction to Microcontrollers, 8051 Microcontroller Architecture, Addressing modes and instruction set. Introduction, Elements of Communication Systems, Types of Modulation Ideal OP-AMP characteristics, frequency response of OP-AMP; Basic applications of op-amp, Summing amplifier, Integrator, Differentiator, etc. Basic thyristor family like SCR, IGBT, TRIAC, etc. Rectifiers: Single-phase and three-phase controlled & uncontrolled rectifiers, choppers, cycloconverters and inverters.

Computer architecture and C Programming (10 %)

Data Types, operators, identifiers and keywords, constants, types of operators, variable declaration, Input and Output, Control statement, conditional, case and switch statement, loop- statements, Function definition, Arrays Notation and declaration, multidimensional arrays, pointers, Declarations, Pointer arithmetic, Pre-processors, structures. CPU organisations – ALU & control circuit, Introduction to input devices, computer output: output fundamentals, hardcopy output devices, Computer system characterization & capabilities. Speed, Memory types

Instrumentation (10 %)

Definition, Classification, Static and Dynamic characteristics. Typical Sensors: Principle, Construction, Working and specifications of- Thermal Sensors, Optical Sensors, Mechanical and electromechanical transducers. Measurement principles: Measurement of physical parameters, measurement system block diagram, Measurement characteristics. Test and Measuring instruments: Working principle, specification and operating procedure for: Voltmeter, Ammeter, Multirange meter, Analog Multimeter, Electronic Voltmeter, True RMS Meter, DMM, DFM, CRO. Types of CRO. Signal Sources: Signal and function generators, Sweep generator.

General Aptitude Syllabus

Quantitative Aptitude (Number Systems, HCF and LCM, Ratio and Proportion, Percentage, Simple and Compound Interest, Time and Work, Time and Distance, Volume and Surface Area, Problems on Ages, Blood Relation, Boats and Streams, Problems on Trains, etc.) B. Verbal Ability