AIMS – Basic Engg Science

Course Name: Ground Level
This is the pre-requisite for analytical instrument specialist training
Duration: 5 working days

A) Applied Maths

1. Periodic functions Time and frequency Base Harmonics and transients
2. Curve fitting and numerical techniques
3. Statistical methods of analysis Methods of central tendency deviations

B) States and Properties of Matter

1. Solids Liquids Gasses and Plasma
2. Inherent and Acquired parameters
3. Definitions and parametric units and relationship
4. Dimensional Analysis

C) Mechanical Parameters of Solids, Liquids and Gasses

1. Stress Strain and Elastic Modulus
2. Pressure, Absolute, Gage, Differential references
3. Axial and Shear forces, Viscosity, Surface Tension
4. Linear, angular and oscillating motions

D) Work, Power and Energy

1. Concept of Work and Energy
2. Conservation of mass and energy and inter- conversions
3. Basics of Thermal, Chemical and Light energy and their measures

E) Fluids in Motion

1. Bernoulli's Principle
2. Reynolds number and compressibility

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F) Thermodynamic Principles

1. Laws of Thermodynamics and Implications
2. Gas Equations
3. Principles of Heat & Mass Transfer
4. Concepts of Enthalpy, Entropy and Thermodynamic Cycles

G) Wave Motion and Acoustics

1. Simple Harmonic Motion
2. Transverse and Longitudinal Wave Motion
3. Measurement of Sound and Oscillatory Motion

H) Electromagnetics

1. Magnetism & Electrostatics Principles
2. Electromagnetics

I) Material Science

1. Resistance, Conductors, Insulators
2. Semiconductors and Junction- Diffusion and drift
3. Metal –Metal Junctions, Siebeck, Peltier and Thomson effects
4. Piezoelectricity, photo electricity, Hall effect, Zeeman, Crompton effects
5. Accoustic, Optical and Electromagnetic Properties of Matter

J) Wave Particle Mechanics and Nuclear Radiation

1. Basics of Quantum Physics
2. Basics of Nuclear Particle Dynamics
3. Atomic and Molecular Spectra
4. Optical, Acoustic and Electromagnetic Properties of Matter
5. Reflection, Refraction, Interference, Diffraction and Scattering

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K) Physical Chemistry

1. Basic Chemical Processes
2. Plant Chemistry – Molecules and Ions
3. Concepts of pH- Acids, bases salts, esters and colloids
4. Dissolution Concentrations & Diffusion- Humidity
5. Oxidation Reduction, Stoichiometry, Heat of Reaction
6. Electrochemistry
7. Emission & Absorption Spectra and scattering and guiding laws
8. Electrochemical, Flame Ion, Thermal Conductivity detectors

L) Electronics

1. Electrical Principles DC, AC, Voltage Current and Power
2. Devices and functions- Diodes, Transistors, Microelectronics
3. Impedance, admittance and hybrid circuit matrix Thevenin Norton Theorem
4. Frequency response and filters
5. Electro acoustics and electro optics
6. Micro Controllers and Signal conversion, ADC DAQ
7. RF and Microwave Circuits

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