0944 -DIPLOMA IN INFORMATION TECHNOLOGY & ENGINEERING
SEMESTER -I
094413 - APPLIED PHYSICS – I

RATIONALE

Applied physics includes the study of a large number of diverse topics all related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

DETAILED CONTENTS
1. Units and Dimensions

1.1 Physical quantities
1.2 Fundamental and derived units
1.3 Systems of units (FPS, CGS, MKS and SI units)
1.4 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain)
1.5 Principle of homogeneity
1.6 Dimensional equations and their applications, conversion from one unit to another unit for density, force, pressure, work, power, energy, velocity, acceleration
1.7 Limitations of dimensional analysis

2. Force and Motion

2.1 Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors
2.2 Force, resolution and composition of forces – resultant, parallelogram law of forces
2.3 Equilibrium of forces, Lami's theorem
2.4 Newton's Laws of motion – concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion conversion of momentum, impulse and impulsive forces, simple numerical problems based on third law.
2.5 Projectile, horizontal and oblique projections and equation of trajectory
2.6 Derivation of time of flight, maximum height and horizontal range
2.7 Circular motion
2.8 Relation between linear and angular velocity and linear acceleration and angular acceleration
2.9 Centripetal force (derivation) and centrifugal force
2.10 Banking of roads

3. Work, Power and Energy

3.1 Work: definitions and its SI units
3.2 Work done in moving an object on horizontal and inclined plane (incorporating

frictional forces)

3.3 Power: definitions and its SI units, calculation of power in simple cases

3.4 Energy: Definitions and its SI units: Types: Kinetic energy and Potential energy, with examples and their derivation

3.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another

4. Properties of Matter

4.1 Elasticity, definition of stress and strain

4.2 Different types of modulus of elasticity

4.3 Explanation of stress – strain diagram

4.4 Pressure – its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon's pressure, manometers and barometer gauges

4.5 Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension

4.6 Fluid motion, stream line and turbulent flow, Reynolds number

4.7 Viscosity and coefficient of viscosity; derivation of terminal velocity; effect of temperature on viscosity

5. Waves and vibrations

5.1 Generation of waves by vibrating particles

5.2 Wave motion with examples

5.3 Types of wave motion, transverse and longitudinal wave motion with examples

5.4 Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$)

5.5 Sound and Light waves

5.6 Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M.

5.7 Vibration of cantilever and beam, determination of time period of a cantilever

5.8 Free, forced and resonant vibrations with examples

6. Rotational Motion

6.1 Definitions of torque, moment of inertia, radius of gyration

6.2 Derivation of rotational kinetic energy and angular momentum

6.3 Conservation of angular momentum (qualitative)

6.4 Theorems of parallel and perpendicular axes

7. Gravitation and satellites

7.1 Kepler's law of planetary motion

7.2 Newton's law of gravitation

7.3 Escape velocity (derivation)

7.4 Satellites, Geo-stationary satellite

8. Temperature and its measurement

8.1 Principles of measurement of temperature and different scales of temperature

8.2 Difference between heat and temperature on the basis of K.E. of molecules

8.3 Bimetallic and Platinum resistance thermometer: their merits and demerits

8.4 Pyrometers – Disappearing filament optical pyrometer

9. Transfer of Heat

9.1 Modes of transfer of heat (conduction, convection and radiation with examples)

9.2 Coefficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method)

9.3 Properties of heat radiation

9.4 Stefan's law, Kirchhoff's law, Wien's law, Planck's black body radiation law

9.5 Prevost's theory of heat exchange

LIST OF PRACTICALS

1. To find the thickness of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier caliper
3. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer
4. To find the surface tension of a liquid by capillary rise method
5. To determine and verify the time period of cantilever by drawing graph between load (w) and depression (D)
6. To determine the atmospheric pressure at a place using Fortin's Barometer
7. To determine the coefficient of linear expansion of a metal rod
8. To find the coefficient of thermal conductivity of copper using Searle's conductivity apparatus
9. To find the coefficient of thermal conductivity of bakelite sheet (bad conductor) by Lee's Disc Method

RECOMMENDED BOOKS

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
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4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi