Paper: MJ-PH (TH) – 405 (4 Credits)

UNIT 1 Astrophysics

Light and its porpeerties (1.1), the Earth's atmosphere and the electromagnetic rdaition (1.2), optical telescopes (1.3), radio telescopes (1.4), the hubble space telescope (HST) (1.5), astronomical spectrograph (1.6), photographic photometry (1.7), photoelectric photometry (1.8), spectrophotometry (1.9), detectors and image processing (1.10).

UNIT 2 Quantum Mechanics

Quantum mechanics (5.1), wave equation (5.2), Schrodinger's equation: time dependent form (5.3), linearity and superposition (5.4), expectation values (5.5), operators (5.6), Schrodinger's equation: steady-state form (5.7), particle in box (5.8), finite potential (5.9), tunnel effect (5.10), harmonic oscillator (5.11).

UNIT 3 Free Energy and Chemical Thermodynamics

Free energy as available work (5.1), free energy as a force towards equilibrium (5.2), phase transformations of pure substances (5.3), phase transformations of mixtures (5.4), dilute solutions (5.5), chemical equilibrium (5.6).

UNIT 4 Radioactivity

Introduction (3.1), laws of disintegration (3.2), activity and its units (3.2.1), half-life (3.2.2), average life (3.2.3), radioactive series (3.3), law of successive disintegration (3.4), radioactive equilibrium (3.4.1), alpha emission (3.5), properties of alpha particles (3.5.1), alpha spectrum (3.5.2), range of alpha-particles (3.5.3), Geiger-Nuttal law (3.5.4), beta decay (3.6), conditions for spontaneous emission of β^--particles (3.6.1), conditions for spontaneous emission of β^+-particles (3.6.2), gamma decay (3.7.1).

Reference books:

1. An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chatto-padhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nd Ed.
2. Concepts of Modern Physics by A. Beiser, 6th Ed., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2003
3. Introduction to Thermal Physics by Daniel V. Schroeder, 2nd Ed., Oxford University Press, 2021.
4. Introduction to Nuclear and Particle Physics by Mittal, Verma and Gupta, 3rd Ed., PHI Learning Pvt. Ltd.

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