

SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar-388120

B.Sc. (Semester - 2)

Subject: Physics

Course: US02CPHY21

Mechanics-II, Basic Electronics and LASER

(Four Credit Course –4 Hours per week)

(Effective from June-2018)

UNIT: 1 Vector algebra

Introduction to scalar and vector, Surface area as a vector, Scalar triple product, Reciprocal vectors, Vector triple product, Gradient of a scalar point function, Divergence of a vector, Equation of continuity, Curl of a vector point function, Irrotational and solenoidal vectors, Gauss Theorem, Greens Theorem, Stokes Theorem

UNIT: 2 Special theory of relativity

Introduction, Frame of reference, Galilean transformation equation, Michelson Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Explanation of negative results, Time dilation, Variation of mass with velocity, Equivalence of mass and energy

UNIT: 3 Basic Electronics

DC power supply: Use of diodes in rectifiers, Half wave rectifier, Full wave rectifier, Definition of ripple factor and rectification efficiency

Filters: Definition of filter, How to get better DC, Shunt capacitor filter, Series inductor filter

Diodes: Types of diodes, Signal diodes, Power diodes, Zener diode (Zener effect, Avalanche effect & Voltage regulation), Varactor diodes, Light emitting diodes

Transistor: Introduction, Junction Transistor structure, Relations between different currents in a Transistor, DC Alpha, Three configurations, CE configuration(Input and output characteristics only)

UNIT: 4 LASER

Introduction & Properties of LASER, Stimulated absorption, Spontaneous emission and Stimulated emission, Relation between Einstein's A and B coefficients, Population Inversion, Pumping, Main component of LASER, ND:YAG LASER, CO₂ LASER, Application of LASER: in material processing, Holography (Concept of recording , Reconstruction of the image and applications), Other applications

Reference Book:

1. Introduction to Classical Mechanics
R.G.Takwale & P.S.Puranik
Tata McGraw-Hill Publishing Company Ltd., New Delhi
2. Engineering Physics
R.K.Gaur and S.L.Gupta
Dhanpat Rai Publications Ltd., New Delhi
3. Basic Electronics and Linear Circuits (2nd Edition)
N.N.Bhargava, D.C. Kulshreshtha and S.C. Gupta
Tata McGraw-Hill Ltd., New Delhi
4. Engineering Physics
K.Rajagopal,
PHI Learning Private Ltd. New Delhi