

SARDAR PATEL UNIVERSITY
Subject
: Physics:
Second Semester
Course No. FSPH-201
(Effective from June – 2010)
Classical Mechanics & Relativity
(Two Credit Course – 2 Hours per week)

UNIT: 1 Vector algebra

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

UNIT: 2 Mechanics of a particle

Introduction to mechanics, Mechanics of a particle, Equation of motion of a particle, Motion under constant force (Atwood's machine), Motion under force which depends on time only, Motion of a charged particle in electromagnetic field, Motion in a constant electric field, Motion in a constant magnetic field (Derivation of cyclotron frequency), Motion in a crossed fields (Derivation of drift velocity)

UNIT: 3 Simple harmonic motion

Acceleration due to gravity, The simple pendulum, Drawbacks of a simple pendulum, Compound pendulum, Interchangeability of centers of suspension and oscillation, Centre of percussion, Other points, collinear with C.G. about which the time period is the same, Conditions for maximum and minimum time periods, Bar pendulum, Kater's reversible pendulum

UNIT: 4 Special theory of relativity

Frame of reference, Inertial frame of reference, Galilean transformation equation, Luminiferous Ether, Michelson Morley experiment, Einstein's special theory of relativity, Lorentz transformation, Lorentz-Fitzgerald contraction, Time dilation, Mass-Energy equivalence, Energy Momentum relation

Reference Books:

1. Introduction to Classical Mechanics
R. G. Takwale & P. S. Puranik
Tata McGraw-Hill Publishing Company Ltd., New Delhi
2. Elements of properties of matter
D. S. Matur, S. Chand & Co., New Delhi
3. Atomic and Nuclear Physics
N. Subrahmanyam and Brijlal
Revised by Jivan Seshan, S.Chand & Company Ltd, New Delhi

SARDAR PATEL UNIVERSITY
Subject
: Physics:
Second Semester
Course No. FSPH-202
(Effective from June – 2010)
Electronics, Nuclear and Modern Physics
(Two Credit Course – 2 Hours per week)

UNIT: 1 Electronics – 1

V-I characteristics of a PN junction diode

DC power supply: Use of diodes in rectifiers, Half wave rectifier, Full wave rectifier, Ripple factor and rectification efficiency, Performance of half wave rectifier, Performance of full wave rectifier

Filters: How to get better DC, Shunt capacitor filter, Series inductor filter, Choke - input LC filter, The CLC or PI filter

UNIT: 2 Electronics - 2

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

Transistor: Introduction to Transistor structure, The working of a transistor Relation between currents in a transistor, DC alpha, Transistor amplifying action, Transistor configurations, Transistor characteristics, Common-Emitter configuration, current relations, relation between alpha and beta, Input and output CE characteristics, Basic CE amplifier circuit, DC load line

UNIT: 3 Nuclear Structure and Nuclear Transformations

Nuclear Transformations: Radioactive decay, Half-life, Radiometric dating

Nuclear Structure: Nuclear composition Atomic masses, nuclear electrons,
Some nuclear properties : spin and magnetic moment, Nuclear magnetic resonance, applications of NMR, **Stable nuclei** : nuclear decay, **Binding energy** : binding energy per nucleon, The strong interaction, Liquid drop model

UNIT: 4 Modern Physics

Introduction to Black body radiation, Wien's Law, Rayleigh-Jeans Law, Planck's Law of Radiation & Special Cases of Planck's Law, Compton effect De Broglie's hypothesis, Davisson and Germer Experiment, Heisenberg's Uncertainty principle, Bohr atom model and its limitations, Wilson-Sommerfeld relativistic atom model, Vector Atom model and associated quantum numbers

Reference Books:

1. Basic Electronics and Linear Circuits
N. N. Bhargava, D.C. Kulshreshtha and S.C. Gupta
Tata McGraw-Hill Ltd., New Delhi
2. Concepts of Modern Physics,
Arthur Baiser, Tata McGraw Hill, New Delhi
3. Atomic Physics
J. B. Rajam, S. Chand & Company Ltd., (7th Edition)

SARDAR PATEL UNIVERSITY
Subject
: Physics (Practicals):
Second Semester
Course No. FSPH-203
(Effective from June – 2010)
(Two Credit Course – 4 Hours per week)

1. γ by bending of beam
2. Bar pendulum
3. Flywheel
4. Resolving power of grating
5. Newton's ring
6. λ by spectral line by diffraction photograph
7. Half wave rectifier with filters(L, C, LC, π)
8. Full wave rectifier with filters(L, C, LC, π)
9. Zener diode as voltage regulator
10. CE transistor characteristics(Input, Output & Transfer)
11. Measurement of self inductance
12. Measurement of capacitance
13. Study of probability distribution for two option system (coins)
14. Vibration magnetometer
15. Simulation of radioactive decay

Note: To provide flexibility, up to the maximum of 20% of total experiments can be replaced/ added to the list by the Board of Studies.