



Shree H. N. Shukla College of Science

(Affiliated to Saurashtra university)

Nr. Lalpari Lake, B/h Marketing Yard, Rajkot-360 003

Ph. No. : 9099063150, 97277 53360

P-101 : Physics Theory

(In force from June-2016)

(Mechanics & Semiconductor Electronics)

60 hour 70 Marks

UNIT 1: (12 hour : 14 Mark)

Vectors algebra and calculus: Vectors and Scalars, Addition of Vectors, Resolution of Vectors, Scalar and Vector Products, Differential Calculus as Rate Measurer, Differential Calculus as Maxima and Minima, Integral Calculus, Numerical Examples.

Basic electronics and Linear circuits: Electronic components, Basic idea of Passive components (Resistors, Capacitors, Inductors) and Active components, Source of Electric Power, Batteries, Concept of Voltage Sources, Ideal Voltage Source, Practical Voltage Source, Concept of Current Sources, Practical Current Source, Conversion of Voltage Source into Current Source and vice versa, RC circuits analysis and time constant.(Capacitor charging and discharging). Numerical Examples.

UNIT 2: (12 hour: 14 Mark)

Semiconductors Physics: Semiconductor materials, Energy Bands in solids-metals insulators and semiconductor, Intrinsic Semiconductor, Crystal Structure of Intrinsic semiconductor, Charge Carriers in Intrinsic semiconductor, Conduction in Intrinsic semiconductor, Extrinsic semiconductors, N-type Semiconductor, P-type Semiconductor, Effect of temperature on conductivity of Intrinsic and Extrinsic Semiconductor, PN junction, Formation of PN junction, PN junction with Forward and Reverse biasing, Reverse Breakdown, V-I Characteristic of a PN junction diode, The ideal diode, Static and Dynamics Resistance of a diode. Zener Diode, Zener Breakdown, V-I Characteristic of a Zener diode, Numerical Examples.



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Reference books for unit 1,2 :

1. Concept of physics By H C Verma part 1 Publisher: Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics
By H D Young Publisher: PEARSON
3. Basic electronics and linear circuits By N N Bhargava, D C Kushreshtha,
S C Gupta Publisher: Technical Teachers Training Institute Chandigarh.
4. Elements of Electronics By Bagde & Singh Pub: S.chand

UNIT 3: (12 hour : 14 Mark)

Laws of Motion & Dynamics of System of Particles: Frames of reference, Newton's Laws of motion, Kinetic Energy, Work and Work-Energy theorem, Calculation of Work Done, Conservative and Non-Conservative force (only definition), Potential Energy and Conservation of Energy, Definition of Center of Mass, Center of Mass of Two Particles and several group of Particles, Linear Momentum and its Conservation Principle, Rocket Propulsion, Collisions, Inelastic Collisions, Elastic Collisions (one dimension and two dimension explanation), Numerical Examples.

UNIT 4: (12 hour : 14 Mark)

Rotational Mechanics: Angular velocity and Angular Acceleration, Torque of a Force about the Axis of Rotation, Moment of Inertia and $\tau = I\alpha$, Moment of Inertia of rectangular Bar, Moment of Inertia of Solid Cylinder, Angular Momentum, Conservation of angular momentum, Kinetic Energy of a Rigid body, Two Theorems on Moment of Inertia. Numerical Examples.

Gravitation: Newton's Law of Gravitation, Gravitation Potential Energy, Gravitation potential, Gravitational field, Calculation of Gravitational Potential and Field due to a Point Mass, Kepler's Laws, Motion of Planets and Satellite in circular orbit. Geosynchronous orbits, Weightlessness, Escape velocity, Numerical Examples.

UNIT 5: (12 hour : 14 Mark)

Elasticity: Elasticity, Stress and Strain, Hooke's law, Relation between Longitudinal Stress and Strain(stress-strain diagram), Modulus of Rigidity, Poisson's Ratio, Determination of Modulus of Rigidity by Searles method.



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Oscillations: Simple Harmonic Motion, Equation for SHM and its Solutions, Terms associated with SHM like (Time Period, Frequency, Amplitude, and Phase), SHM as a Projection of Circular Motion, Energy conservation in simple harmonic motion, Kinetic and Potential Energy, Damped Oscillations, Forced Oscillation and Resonance. Numerical Examples.

Reference books for unit 3,4,5:

1. Concept of physics By H C Verma part 1 Publisher: Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics By H D Young Publisher: PEARSON

Other Reference books:

1. Mechanics Berkeley Physics course Vol 1
2. Lectures on physics, R.P.Feynman, Vol-1
3. Physics – Resnick and Halliday
4. Principles of electronics By V.K.Mehta Publisher: S.Chand
5. Electronic Device And Circuits By Allen Mottershead Pub: PHI



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LIST OF EXPERIMENTS

B.Sc. Semester-I

1. To Study of errors in observation Using Vernier Caliper, Micrometer Screw
2. To determine 'g' and radius of gyration using Bar Pendulum,
3. To determine the Moment of Inertia of rectangular body & prove law of perpendicular axis by Bifilar Suspension.
4. To determine the Moment of Inertia & Modulus of rigidity by Torsional pendulum.
5. To determine the Young's Modulus of long wire by Searl's method.
6. To determine the Poisson's ratio of rubber tube.
7. To study of Charging and Discharging of Capacitor and RC time constant.
8. To determine Low resistance by Projection method.
9. To study of Tangent galvanometer (Constant of T.G. & Verification of Ohm's law, to find reduction factor of TG)
10. To determine Low resistance by Potentiometer.
11. To study Semiconductor Diode Characteristics.
12. To study Zener diode Characteristics

Reference Books:

1. B.Sc. Practical physics By C.L.Arora Pub: S.chand.
2. A text book of Practical Physics By Indu Prakash & Ramkrishna
Pub: Kitab Mahal, New Delhi.
3. Practical Physics By S.L.Gupta and V. Kumar
Pub: Pragati Prakashan, Meerut.
4. B.Saraf et al-Physics through experiments Vol. I & II.