

SAURASHTRA UNIVERSITY

RAJKOT, 360005.

Syllabus for the Subject of PHYSICS

under the Faculty of SCIENCE



Accredited Grade A by NAAC

B.Sc.-Sem: 1&2 (Physics)

In force from June - 2016.

SAURASHTRA UNIVERSITY

At: RAJKOT, State: Gujarat, Pin: 360005.

B.Sc. Semester -1

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.

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.

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

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.

Instruments List

- Practical 1: Vernier Caliper, Micrometer Screw, A wooden piece.
- Practical 2: Bar Pendulum, Spirit level, Stop-watch, Telescope, Meter Scale.
- Practical 3: Bifilar Suspension Apparatus, A rectangular wooden piece (lamina), stand with meter scale, stop-watch.
- Practical 4: Torsion pendulum, Right Circular Cylinder(Regular Body), Irregular Body(Rings of different radii), Spirit Level, Micrometer screw, Vernier Callipers, Stop-watch, Weight Box, Long thin wire.
- Practical 5: Searle's Apparatus for Young Modulus, Stop-Watch, telescope, Meter Scale, Vernier Caliper, Micrometer Screw, Two identical wire.
- Practical 6: Rubber Tube with metal sleeves and rubber stoppers, Metal Stand to hold rubber tube, Graduated tube, Hanger with Slotted Weight, Meter Scale, Measuring Cylinder, Thread
- Practical 7: R-C Circuit with Transformer OR Step Down Transformer of 25 V with Variable adjustment , Capacitance ($C = 10\mu\text{F}$) and Resistance (300Ω) of different values, A.C MilliAmmeter, A.C Voltmeter.
- Practical 8: Wheastone's Bridge Wooden Apparatus, Resistance Box, Low resistance, Battery (0-10 Volt), Sensitive Galvanometer, Jockey, Key, four way key, Rheostat.
- Practical 9: Tangent galvanometer, Battery, Resistance Box, Reversing Key, Rheostat, Voltmeter, Plug key.
- Practical 10: Potentiometer Apparatus, Rheostat, Two Way Key, Plug Key, Resistance Box, Low resistance, Battery (0-10 Volt), Sensitive Galvanometer, Jockey, Key.
- Practical 11: Semiconductor Diode, Battery(0 -100 V) , Milliammeter (0-500 ma), Voltmeter(0-3V), Microammeter(0-100 μA), Or Diode Characteristic Circuit Board With Meters.
- Practical 12: Zener Diode Characteristic Circuit Board with meters Or Zener

PAPER STYLE For Semester -1and 2

1. B. Sc. Physics Syllabus for Semester 1 & 2 consists of 5 units:
2. All units carry 14 marks
3. 70 Marks for theory and 30 marks for Internal Examinations.
4. Total 5 questions one question from each unit.
5. Each question of 14 mark
6. Time duration: $2\frac{1}{2}$ Hours

Question:1 from Unit 1 : Mark 14

Question:2 from Unit 2 : Mark 14

Question:3 from Unit 3 : Mark 14

Question:4 from Unit 4 : Mark 14

Question:5 from Unit 5: Mark 14

Each Question divide in a,b,c and d sub question as shown below

(a) Shorts questions 4 [4 Marks]

(One word, one line, explanation, definition, true or false, fill up the blanks, etc.)

(b) Answer any 1 numerical out of 2 [2 Marks]

(c) Answer any1 out of 2 [3Marks], one question should be numerical

(d) Answer any1 out of 2 [5 Marks]