

B.Sc. PHYSICS SYLLABUS
COURSR STRUCTURE

PHYSICS

Semester	THEORY/ PRACTICAL	TITLE	WORKLOAD HRS/WEEK	CREDITS
FIRST	Theory – I	Mechanics	4	
	Practical – I	Mechanics Practicals	3	
SECOND	Theory – II	Waves and Oscillations	4	
	Practical – II	Waves and Oscillation Practicals	3	
THIRD	Theory – III	Thermal Physics	4	
	Practical – III	Thermal Physics Practicals	3	
FOURTH	Theory – IV	Optics	4	
	Practical – IV	Optics Practicals	3	
FIFTH	Theory – V	Electromagnetic Theory	3	
	Practical – V	Electromagnetic Theory Practicals	3	
	Theory – VI	Atomic Physics	3	
	Practical – VI	Atomic Physics Practicals	3	
SIXTH	Theory – VII	Basic Electronics	3	
	Practical – VII	Basic Electronics Practicals	3	
	Theory – VIII	Modern Physics	3	
	Practical – VIII	Modern Physics Practicals	3	

B.Sc. (Physics) Semester I-Theory Syllabus
Paper – I :: Mechanics

48 hrs
(4 hrs / week)

Unit – I

1. Vector Analysis (12)

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems- simple applications.

Unit – II

2. Mechanics of Particles (12)

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section,

3. Mechanics of rigid bodies (12)

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope,

Unit – IV

4. Central forces (12)

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

5. Special theory of relativity (12)

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

NOTE: Problems should be solved at the end of every chapter of all units.

Textbooks

1. Berkeley Physics Course. Vol.1, **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata-McGraw hill Company Edition 2008*.
2. **Fundamentals of Physics**. Halliday/Resnick/Walker *Wiley India Edition 2007*.
3. **First Year Physics** - *Telugu Academy*.
4. **Introduction to Physics for Scientists and Engineers**. F.J. Ruche. *McGraw Hill*.

Reference Books

1. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company Edition, 2008*.
2. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005*.
3. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *Pearson Education Eleventh Edition*.
4. **An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. *The McGraw Hill Companies*.
5. **Mechanics**. Hans & Puri. *TMH Publications*.
6. **Engineering Physics**. R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications*.
7. R P Feynman, RB Lighton and M Sands - The Feynman Lectures in Physics, Vol.-1, BI Publications,
8. J.C. Upadhyay - Mechanics.
9. P.K. Srivastava - Mechanics, New Age International.

FIRST SEMISTER PRACTICALS

36 hrs
(3 hrs / week)

Practical Paper – I :: Mechanics

1. Study of a compound pendulum determination of 'g' and 'k'.
2. Y' by uniform Bending
3. Y by Non-uniform Bending.
4. Moment of Inertia of a fly wheel.
5. Measurement of errors –simple Pendulum.
6. 'Rigidity moduli by torsion Pendulum.
7. Determine surface tension of a liquid through capillary rise method.
8. Determination of Surface Tension of a liquid by different methods.
9. Determine of Viscosity of a fluid.
10. Calculation of slope and intercept of a $Y = mX + C$ by theoretical method

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastava

B.Sc. (Physics) Semester II-Theory Syllabus
Paper – II :: Waves and Oscillations

48 hrs
(4 hrs / week)

Unit – I

1. Fundamentals of vibrations(12)

Simple harmonic oscillator, and solution of the differential equation– Physical characteristics of SHM, torsion pendulum, - measurements of rigidity modulus , compound pendulum, measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures

Unit – II

2. Damped and forced oscillations (12)

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance. Coupled Oscillators.

Unit – III

3. Vibrating Strings (12)

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones, energy transport, transverse impedance

Unit – IV

4. Vibrations of bars(12)

Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the mid point iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

NOTE: Problems should be solved at the end of every chapter of all units.

SECOND SEMISTER PRACTICALS

36 hrs
(3 hrs / week)

Practical Paper – II :: Waves and Oscillations

1. Study of damping of an oscillating disc in Air and Water logarithmic decrement.
2. Study of Oscillations under Bifilar suspension.
3. Study of oscillations of a mass under different combination of springs.
4. Verification of Laws of a stretched string (Three Laws).
5. Determination of frequency of a Bar-Melde's experiment.
6. Observation of Lissajous figures from CRO.
7. Volume Resonator –determination of frequency of a tuning fork.
8. Velocity of Transverse wave along a stretched string.
9. Study of damping of a bar pendulum
10. Study of coupled oscillator.

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

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