VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester I

Subject: Physics (PHY-1001)

Paper – I

[2 credit course- 2 hours per week]

Unit – I **Duration: 15 hrs**

(A) MECHANICS:

Moment of inertia and its physical significance-radius of gyration (3.1), expression for the moment of inertia (3.2), torque (3.3), general theorems on moment of inertia (a) the principle or theorem of perpendicular axes (i) for a plane laminar body (b) the principle or theorem of parallel axes (i) case of a plane laminar body (3.4)

[*Elements of properties of matter by D. S. Mathur, S Chand & co.*]

(B) THERMODYNAMICS

The absorption of heat by solids and liquids (18.8), a closer look at heat and work (18.9), the first law of thermodynamics (18.10), some special cases of first law of thermodynamics (18.11), heat transfer mechanisms (18.12)

[*Fundamentals of Physics by Resnick, Halliday & Walker, 8th ed*]

Unit – II **Duration: 15 hrs**

PROPERTIES OF MATTER (ELASTICITY)

[Introduction, load, Stress and strain, Hooke's law] (Revision) (8.1 to 8.3)

Three types of elasticity (8.8), equivalence of a shear to a compression and an extension at right angles to each other (except corollary) (8.9), deformation of a cube-bulk modulus (8.12), modulus of rigidity (8.13), Young's modulus (8.14), relation connecting elastic constants (8.15), Poisson's ratio (8.16), Relations for K and η in terms of Poisson's ratio (8.17), limiting value of σ (8.18), Twisting couple of a cylinder (8.22), Torsional pendulum (8.26), determination of the coefficient of rigidity η for a wire or rod (a) horizontal twisting apparatus for a rod (8.27).

[*Elements of properties of matter by D S Mathur, S Chand & co.*]

Note: Illustrative problems on all the relevant topics should be covered.

Reference books:

1. University physics by Sears & Zimansky.
2. University physics by Freedman
3. Berkeley physics course volume I.
4. Mechanics by D. S. Mathur
5. Mechanics by J. C. Upadhyay
6. Heat & thermodynamics by Zeemansky
7. Heat & thermodynamics by Brij Lal & Subrahmanyam

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester I

Subject: Physics (PHY-1002)

Paper – II

[2 credit course- 2 hours per week]

Unit – I **Duration: 15 hrs**

(A) VECTORS

Triple product of vectors (1.22), scalar triple product (1.23), vector triple product (1.24), evaluation of vector triple product (1.25), scalar and vector fields (1.33), partial derivatives – gradient (1.34), the operator ∇ (1.35), magnitude and direction of $\nabla\emptyset$ (1.36), divergence and curl (1.37), applications of divergence and curl (1.38), some useful results (1.39), the Laplacian operator (1.40)

[*Mechanics by D S Mathur, 2nd ed*]

(B) ELECTROSTATICS

Gauss' theorem in electrostatics (2.9), Poisson's and Laplace's equations for an electric field (2.3),

Meaning of potential (3.1), vector form (3.2)(a), electric dipole (3.4)

Capacity (4.1), energy stored in the field of a charged condenser (4.4)

[*Fundamentals of magnetism & electricity by D. N. Vasudeva*]

Unit – II **Duration: 15 hrs**

GEOMETRICAL OPTICS

Deviation produced by a thin lens (2.5), equivalent focal length of two lenses separated by a finite distance (2.6), Power of a lens (2.7), Cardinal points of an optical system (2.8), principal foci & focal planes (2.9), principal points & principal planes (2.10)

Dispersion by a prism (3.13), refraction through a prism (3.14), angular & chromatic dispersions (3.16)

[*A textbook of Optics by Brij Lal and N. Subrahmanyam, reprint 2002*]

Note: Illustrative problems on all the relevant topics should be covered.

Reference books:

1. Vector analysis by Murray Spigel
2. Berkeley physics course volume I
3. Introduction to Electrodynamics by D J Griffiths
4. Electricity & magnetism by Sehgal, Chopra & Sehgal
5. Electromagnetism by Grant & Philips
6. Electricity & magnetism by Rangwala & Mahajan
7. Fundamentals of optics by Jenkins & White
8. Optics by A. K. Ghatak

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester II

Subject: Physics (PHY-2001)

Paper – I

[2 credit course- 2 hours per week]

Unit – I **Duration: 15 hrs**

(A) OSCILLATIONS AND WAVES

Equation of simple harmonic waves (4.11), Differential equation of wave motion (4.12), particle velocity wave velocity (4.13), energy of progressive waves (4.15)

Laws of transverse vibrations in a string (7.3), verification of the laws of transverse vibrations of the string (7.4), Melde's experiment (7.5)

[*Waves and oscillations by Brij Lal and Subrahmanyam*]

(B) MODERN PHYSICS

What is light (2.4), X-rays (2.5), X-ray diffraction (2.6), Compton effect (2.7)

[*Concepts of Modern Physics by A Beiser*]

Unit – II **Duration: 15 hrs**

PROPERTIES OF MATTER

Bending of beams (8.29), the cantilever (8.30), depression of a beam supported at the ends (8.33), determination of Y by bending of a beam (8.34), determination of elastic constants by Searle's method (8.36)

[*Elements of Properties of Matter by D S Mathur, 11th ed*]

Note: Illustrative problems on all the relevant topics should be covered.

Reference books:

1. Oscillations & waves by H. J. Pain
2. Oscillations & waves by Brij Lal & Subrahmanyam
3. Oscillations & waves by Bajaj
4. Mechanics by Saty Prakash & Agarwal
5. Atomic & nuclear physics by J. B. Rajam
6. Atomic & nuclear physics by Brij Lal & Subrahmanyam
7. Modern physics by K. Crane
8. Modern physics by Murugeshan
9. Introduction to Modern Physics by Richtmyer, Kennard, Cooper

Veer Narmad South Gujarat University
Syllabus for B. Sc. Semester II
Subject: Physics (PHY-2002)
Paper – II
[2 credit course- 2 hours per week]

Unit – I **Duration: 15 hrs**

(A) MAGNETISM

Law of force between two magnetic poles (7.2), magnetic field-lines and tubes of forces (7.3, 7.4), behavior of a magnetic substance in a magnetic field permeability induction (7.5), magnetic flux and flux density (7.5(a)), magnet in a magnetic field (7.6)

[*Fundamentals of magnetism & electricity by D. N. Vasudeva*]

(B) ELECTRONICS

Full-wave rectifier (17.8), filters (17.9), series inductor filter (17.10), shunt capacitor (17.11), LC filter (17.13), the CLC or Pi filter (17.14)

[*Basic electronics by B L Theraja*]

Unit – II **Duration: 15 hrs**

(A) DIGITAL ELECTRONICS

Binary to decimal conversion (4.2), decimal to binary conversion (4.3), octal numbers (4.4), hexadecimal numbers (4.5)

[*Digital principles & applications by A P Malvino & Leach, Mc-graw hill int edition*]

(B) OPTICS

Fresnel's biprism (8.8), interference in thin films (8.15), interference due to reflected light (thin film) (8.16), fringes produced by a wedge-shaped thin film (8.21), Newton's rings (for reflected light only) (8.23), determination of the wavelength light using Newton's rings (8.24)

[*A textbook of Optics: Brij Lal and Subrahmanyam, 22nd ed*]

Note: Illustrative problems on all the relevant topics should be covered.

Reference books:

1. Introduction to Electrodynamics by D J Griffiths
2. Electromagnetism by Grant & Philips
3. Electricity & magnetism by Rangwala & Mahajan
4. Electricity & magnetism by Sehgal, Chopra & Sehgal

List of experiments

Semester – I

	Group A
1	Error analysis
2	To verify the parallel axes theorem of moment of inertia
3	To verify the perpendicular axes theorem of moment of inertia
4	Modulus of rigidity of a wire using torsional pendulum
5	Modulus of rigidity of a rod by Searle's apparatus
6	Thermal conductivity of a bad conductor by Lee's method

	Group B
1	Low resistance by Wheatstone's bridge method of projection
2	Study of decay of current in RC circuit
3	Cardinal points of a lens system placed in air
4	Determination of refractive index of liquid using lens system
5	Dispersive power of the material of a prism using spectrometer
6	Resistivity of the material of a conductor using Ohm's law

Note:

1. The duration of each experiment is of 2 hours. Two such experiments are to be performed by each student per week.
2. In the external exam, a student will have to perform two experiments, each experiment of 2 hours duration.
3. It is recommended that there should not be more than 20 students per batch in the external exam.

List of experiments

Semester – II

	Group A
1	Force constant (k) of a spring
2	Speed of transverse waves on a stretched wire of various linear densities using Sonometer
3	Elastic constants (Y, η, K & σ) by Searle's method
4	Melde's experiment
5	"Y" by cantilever
6	"Y" by bending of a beam supported at two ends & loaded in the middle

	Group B
1	Study of magnetic field due to Solenoid
2	Impedance of an LCR ac series network
3	Wattage of a lamp
4	Newton's rings experiment
5	Study of rectifiers
6	Zener diode as a voltage regulator

Note:

1. The duration of each experiment is of 2 hours. Two such experiments are to be performed by each student per week.
2. In the external exam, a student will have to perform two experiments, each experiment of 2 hours duration.
3. It is recommended that there will not be more than 20 students per batch in the external exam.