VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5006)

Paper – VI

[2 credit course- 2 hours per week]

Unit – I **Mechanics** **Duration: 15 hrs**

Waves and Oscillations:

The free vibrations of physical systems

3. The decay of free vibrations, the effects of very large damping

Forced vibrations and resonance

4. Undamped oscillator with harmonic forcing, complex exponential method for forced oscillation, forced oscillation with damping, effect of varying the resistive term, transient phenomena

Text Book: Vibrations and waves by A P French, CBS publishers & distributors pvt ltd. (The M. I. T. introductory Physics series)

Mechanics:

Conservation principles (1.2), Mechanics of a particle (1.3), Mechanics of a system of particles (1.4), Constraint motion, constraints and degrees of freedom (1.5), Generalized Coordinates (1.6), generalized notations (1.7), Limitations of Newton's laws (1.8)

Deduction of Lagrange's equation by differential method-D' Alembert's principle (2.5), Deduction of Hamilton's principle from D' Alembert's principle (2.7.1), Deduction of Newton's second law of motion from Hamilton's principle (2.7.2)

Text Book: Classical Mechanics by Gupta, Kumar and Sharma,
Pragati Prakashan (26^{th} edition 2012)

Unit – II **Mathematical methods** **Duration: 15 hrs**

Scalar and vector fields (1.15), important vector relationships (1.19), Orthogonal Curvilinear Coordinates (1.20), starting from Cartesian coordinates to find the values of $d\ i\ \vec{v}$ and $\nabla^2 S$ in terms of circular coordinates and spherical coordinates (1.21), the vector integration, (a) Line integration, (b) surface integration, (c) Volume integration (1.22), Gauss divergence theorem (1.23), Stoke's theorem (1.24), Green's theorem (1.25), Gauss's formula of electrostatics from Gauss' divergence theorem (1.26), Green's theorem in plane (1.27)

Text book: Mathematical Physics by Rajput, Pragati prakashan (17^{th} edition)

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

REFRENCE BOOKS:

1. University physics by Sears & Zimansky, Pearson
2. University physics by Freedman, Pearson
3. Berkeley physics course volume I, Tata McGraw-Hill Education
4. Classical Mechanics by J. C. Upadhyay, Himalaya publishing house
5. Classical Mechanics by Takwale and Puranik, Tata McGraw-Hill Education
6. Mathematical Methods in Physical Sciences by M Boas, Wiley eastern

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5007)

Paper – VII

[2 credit course- 2 hours per week]

Unit – I **Electromagnetism** **Duration: 15 hrs**

Dielectrics:

The polarization density ρ (5.1), polarization charge density (5.2), the relation $\vec{D} = \in_o \vec{E} + \vec{P}$ (5.3), Gauss's law in the presence of a dielectric; Boundary conditions on D and E (5.4)

Faraday's law of electromagnetic induction:

The law (9.1), motional emf (9.3), mutual inductance (9.4), self-inductance (9.5)

Text book: Electricity and magnetism by Mahajan and Rangwala,
Tata McGraw-Hill publishing company ltd. (26^{th} reprint)

Plasma:

Quasi-neutrality in plasma (12.1), plasma as a conducting fluid-fluid magneto-hydrodynamics (12.3), magnetic confinement-Pinch effect (12.4)

Text book: Electromagnetism by B B Laud, New Age International

Unit – II **Optics** **Duration: 15 hrs**

Fiber optics:

Introduction (27.1), total internal reflection (27.3), the optical fiber (27.4), why glass fibers? (27.5), the numerical aperture (27.7), attenuation in optical fibers (27.8)

Text book: Optics by Ajoy Ghatak, Tata-McGraw-Hill publishing company ltd. (4^{th} edition)

Inetrferometry:

Haidinger's fringes (8.29), Michelson interferometer (8.32), types of fringes (8.33), applications of Michelson interferometer (8.35), determination of wavelength of monochromatic light (8.36), determination of difference in wavelength between two neighboring spectral lines (8.37), determination of the refractive index of gases (8.39), Fabry-Perot interferometer (8.45)

Text book: A text book of Optics by Subrahmanyam and Brij Lal, S Chand & Company Ltd, (22^{nd} edition)

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

REFRENCE BOOKS:

1. Introduction to Electrodynamics by D J Griffiths, PHI Learning
2. Electricity & magnetism by Sehgal, Chopra & Sehgal, S Chand & Sons
3. Electromagnetism by Grant & Philips**,** John Wiley & Sons Inc
4. Fundamental of magnetism & Electricity by D N Vasudeva, S Chand & Co
5. Fundamentals of optics by Jenkins & White, Tata McGraw Hill Education

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5008)

Paper – VIII

[2 credit course- 2 hours per week]

Unit – I **Atomic physics** **Duration: 15 hrs**

Atomic structure:

The nuclear atom (4.1), electron orbits (4.2), atomic spectra (4.3), the Bohr atom (4.4), energy levels and spectra (4.5)

Hydrogen atom:

Schrodinger's equation for hydrogen atom (6.1), separation of variables (6.2), quantum numbers (6.3), principal quantum number (6.4), orbital quantum number (6.5), magnetic quantum number (6.6), electron probability density (6.7), radiative transitions (6.8), selection rules (6.9)

Text book: Concepts of modern physics by A Beiser

Tata-McGraw Hill publishing company ltd. (6^{th} edition)

Unit – II **Nuclear physics and cosmic rays** **Duration: 15 hrs**

Detectors of Nuclear Radiation:

Introduction (29.1), interaction between energetic particle and matter (29.2), ionization chamber (29.3), solid state detectors (29.4), proportional counter (29.5), Geiger-Muller counter (29.6), the Wilson Cloud chamber (29.7), Diffusion Cloud chamber (29.8), bubble chamber (29.9), spark chamber (29.10), nuclear emulsion (29.11), the scintillation counter (29.12), Cerenkov counter (29.13)

Particle Accelerators:

Introduction (30.1), Van De Graff generator (30.2), the linear accelerator (30.3), Cyclotron (30.4), Synchrocyclotron (30.6), Betatron (30.7)

Cosmic Rays:

Discovery of cosmic rays (37.1), latitude effect (37.2), the east west effect (37.3), Altitude effect (37.4), primary cosmic rays (37.5), secondary cosmic rays (37.6), cosmic rays showers (37.7), discovery of positron (37.8), the meson (37.9), Van allan belt (37.10), origin of cosmic rays (37.11)

Text book: Modern physics by R Murugeshan, S Chand & Company Ltd. (15^{th} edition)

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

REFRENCE BOOKS:

1. Atomic & nuclear physics by J B Rajam, S Chand & Co.
2. Atomic & nuclear physics by Brij Lal & Subrahmanyam, S Chand publisher
3. Modern physics by K Crane, Wiley
4. Introduction to Modern Physics by Richtmyer, Kennard, Cooper, McGraw Hill

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5009)

Paper – IX

[2 credit course- 2 hours per week]

Unit – I **Statistical Mechanics** **Duration: 15 hrs**

Macroscopic and microscopic states:

Macroscopic states (4.1), microscopic states (4.2), phase space (4.3), μ space (4.4), γ space (4.5), postulates of equal apriory probability (4.6), ergodic hypothesis (4.7), density distribution in phase space (4.8), Liouville's theorem (4.9), principle of conservation of density in phase and principle of extension in phase (4.10), condition of statistical equilibrium (4.11)

Statistical Ensemble:

Micro canonical ensemble (5.1), canonical ensemble (5.2), alternative method for the derivation of canonical distribution (5.3), mean value and fluctuation (5.4), grand canonical ensemble (5.5), the alternative method for the derivation of grand canonical ensemble distribution (5.6), fluctuations in the number of particles of a system in a grand canonical ensemble (5.7)

Text book: Statistical Mechanics by B B Laud, New Age International

Unit – II **Relativity** **Duration: 15 hrs**

Galilean transformation (10.1), Electromagnetism and Galilean transformation (10.2), Michelson- Morley's experiment (10.3), the interferometer (10.4), The experiment (10.5), The postulate of special theory of relativity (10.6), Lorentz transformation (10.7), velocity transformation (10.8), length contraction (10.9), time dilation (10.10), simultaneity, Mass in relativity, Mass and energy (10.11)

Text book: Classical Mechanics by G Arul Dhas, PHI of India pvt ltd.

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

REFRENCE BOOKS:

1. Statistical mechanics by R K Pathariya, Butterworth-Heinemann
2. Statistical mechanics by K Huang, Wiley
3. Fundamentals of statistical and thermal physics by F reif, McGraw Hill
4. Introduction to special relativity by R Resnik, Wiley
5. Concepts of Modern physics by A Beiser, Tata McGraw Hill
6. Modern physics by K Krane, Wiley India pvt ltd.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5010)

Paper – X

[2 credit course- 2 hours per week]

Unit – I **Instruments** **Duration: 15 hrs**

Electron microscope (4.5)
Discovery (5.1), properties of positive rays (5.2), positive rays analysis-Thomson's parabola method (5.3), Aston's mass spectrograph (5.4), Bainbridge mass spectrograph (5.4), Dempster's mass spectrograph (5.6), mass defect and packing fraction (5.7)
Constant deviation spectrograph (24.2), (ultraviolet spectroscopy) introduction (24.5), quartz spectrograph for near UV region (24.6)
Text book: Modern physics by R Murugeshan, S Chand & Company Ltd. (15^{th} edition)

Unit – II **Digital Electronics** **Duration: 15 hrs**

Logic Gates:
Logic gates (15.4), basic gates (15.4.1), other logic gates (15.4.2), Boolean Algebra (15.5), symbols in Boolean Algebra (15.5.1), Boolean laws (15.5.2), De Morgan's laws (15.5.3), circuits using only NAND/NOR gates (15.6), realization of logic gates using NAND gates (15.6.1), realization of logic gates using NOR gates (15.6.2), implementation of logic circuit from truth table (15.7), sum-of-product method (15.7.1), product -of- sum method (15.7.2), Karnaugh map (15.8), Karnaugh map construction (15.8.1), simplification using Karnaugh map (15.8.2), don't care conditions (15.8.3), arithmetic circuits (15.9), half-adder (15.9.1), full-adder (15.9.2), binary adders (15.9.3), half-subtracter (15.9.4), full- subtracter (15.9.5), half-adder/ subtracter (15.9.6), 2's complement adder/ subtracter (15.9.7)
Text book: A text book of Electronics by S Chattopadhyay,
New central book agency, Kolkata

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

REFRENCE BOOKS:

1. Instrumentation by Rangan, Sarma & Mani, Tata McGraw Hill
2. Instrumentation by B Jones
3. Digital electronics by Gothman, PHI publication
4. Microelectronics by Millman & Grabel, McGraw Hill
5. Integrated electronics by Millman & Halkias, McGraw Hill
6. Digital principles & applications by Malvino & Leach, Tata McGraw Hill
7. Digital computer electronics by Malvino, Tata McGraw Hill
8. Digital electronics, principles & applications by Tokheim, Tata McGraw Hill

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester V

Subject: Physics (PHY-5011)

Paper –XI

[2 credit course- 2 hours per week]

Unit – I **Numerical analysis** **Duration: 15 hrs**

Errors in Numerical calculations:

Errors and their computations (1.1), a general error formula (1.4), errors in a series approximation (1.5)

Solutions of algebraic equations:

Introduction (2.1), the bisection method (2.2), the method of false position (2.3), the iteration method (2.4), Newton-Raphson method (2.5)

Interpolation:

Introduction (3.1), errors in polynomial interpolation (3.2), finite differences (3.3), forward differences (3.3.1), backward differences (3.3.2), central differences (3.3.3), symbolic relations and separation of symbols (3.3.4), detection of errors by use of difference tables (3.4), differences of a polynomial (3.5), Newton's formula for interpolation (3.6) , divided differences and their properties (3.10), Newton's general interpolation formula (3.10.1), interpolation by iteration (3.10.2), inverse interpolation (3.11)

Text book: Introductory Methods of Numerical Analysis by S S Sastry
PHI publications (4^{th} Edition)

Unit – II **Material Science** **Duration: 15 hrs**

Electrical Properties of Materials:

Introduction (6:I), classical free electron theory of metals (6:II), drawbacks of classical theory (6:III), relaxation time, collision time and mean free path (6:IV)

Magnetic Properties of Materials:

Introduction (9:I), Magnetic permeability (9:II), magnetization (9:III), diamagnetism (9:IX), paramagnetism (9:XI), Weiss theory of paramagnetism (9:XII), Ferromagnetism (9:XIX), the domain model (9:XXVII)

Superconductivity:

A survey of superconductivity (8:II), an account of the mechanism of superconductors (8:III), effects of magnetic field (8:IV), ac resistivity (8:V), critical current (8:VI), flux exclusion: the Meissner effect (8:VII), thermal properties (8:VIII), penetration depth (8:XII), type – I and type – II superconductors (8:XIII), potential applications of superconductivity (8:XXIV)

Text book: Solid state physics by S O Pillai,
New age international publishers (Revised 6^{th} edition)

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

REFRENCE BOOKS:

1. Numerical analysis by Tim Sauer, Pearson
2. Numerical analysis by G Shanker Rao & Shanker G Rao, New age international
3. Introduction to Numerical Analysis by Devi Prasad, Narosa publication
4. Solid state physics by Ali Omer, Pearson
5. Solid state physics by A J Dekker, Mcmillan
6. Introduction to Solid state physics by C Kittal, Wiley

List of experiments

Semester- V

	Group A
1	Resonance pendulum
2	Study of coupled oscillator
3	Y by Koenig's method
4	Coefficient of viscosity η by log decrement
5	Y, η a n σ for the material of a flat spiral spring
6	To study damping of a bar pendulum (log decrement)
	Group B
1	Fabry Perot etalon
2	Wavelength of a monochromatic light using Fresnel's biprism
3	Cardinal points of lens system by Searle's Goniometer
4	Resolving power of prism
5	Refractive index of a liquid by total internal reflection
6	Babinate's compensator
	Group C
1	Activation energy of semiconductor
2	Absorption spectrum of iodine molecule
3	Characteristics of photocell
4	To estimate temperature of a sodium flame
5	Characteristics of a solar cell (To determine field factor and voltage factor)
6	$\frac{e}{k}$ by power transistor (CB configuration)
	Group D
1	Series resonance
2	Constant of B. G. using solenoid
3	Owen's bridge
4	TCR of platinum using Carey-foster's bridge
5	Self inductance by Carey-foster's method
6	Comparison capacitance by the method of mixture

	Group E
1	To study two-stage RC coupled amplifier
2	Use of OP AMP as an adder/subtractor
3	To determine CMRR of an OP AMP
4	Study of NOR/NAND gate as a universal gate
5	Temperature to frequency converter using IC 555
6	To study voltage gain, input impedance, output impedance and power gain of an emitter follower.
	Group F
1	Study of statistical distribution from the given data (Most probable value, average value and rms value)
2	Interpolation (Newton's method)
3	Numerical differentiation
4	Lagrangian interpolation formula
5	Inverse interpolation
6	Method of iteration

Note:

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester VI

Subject: Physics (PHY-6006)

Paper – VI

[2 credit course- 2 hours per week]

Unit – I **Mechanics** **Duration: 15 hrs**

Rotating frames and relative coordinate systems:

Inertial vs non inertial systems (5.1), Translation motion (5.2), rotating coordinate systems (5.3), Foucault pendulum (5.5)

Text book: Classical Mechanics by Gupta, Kumar and Sharma, Pragati Prakashan (26th edition 2012)

The motion of rigid body:

Angular momentum (8.2), kinetic energy (8.3), inertia tensor (8.4), principal axes (8.5), Euler's angle (8.6), Euler's equation of motion (8.10), force-free motion of a symmetrical top (8.11)

Text book: Classical mechanics by G Aruldhas, PHI publications

Unit – II **Mathematical methods** **Duration: 15 hrs**

Fourier series and integrals:

Definitions, Evaluations of coefficients of Fourier series, Cosine and Sine series (7.1), Dirichlet's theorem (7.2), Extension of the interval (7.4)

Complex Variables:

Definition of complex numbers (4.1), equality of complex numbers (4.2), complex algebra (4.3), conjugate complex numbers (4.4), graphical representation of complex numbers (4.5), Geometrical representation of the sum, difference, product and quotient of complex numbers, solved problems on complex numbers (4.6), Functions of complex variable (4.7), Analytical functions, Cauahy – Rienmann condition (4.8)

Text book: Mathematical physics by B S Rajput, Pragati prakashan (17th edition)

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

REFRENCE BOOKS:

1. University physics by Sears & Zimansky, Pearson
2. University physics by Freedman, Pearson
3. Berkeley physics course volume I, Tata McGraw-Hill Education
4. Classical Mechanics by J. C. Upadhyay, Himalaya publishing house
5. Classical Mechanics by Takwale and Puranik, Tata McGraw-Hill Education
6. Mathematical Methods in Physical Sciences by M Boas, Wiley eastern

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester VI

Subject: Physics (PHY-6007)

Paper – VII

[2 credit course- 2 hours per week]

Unit – I **Electromagnetism** **Duration: 15 hrs**

Magnetism:

Three types of magnetic substances (11.1), magnetization M (11.2), the equation $B = \mu_0 M + \mu_0 H$ (11.3), the bohr magneton (11.4), hysteresis, the $B - H$curve (11.5)

Maxwell's equations:

The displacement current (12.1), Maxwell's equations (12.2), Poynting vector (12.3), the wave equation (12.4), plane electromagnetic waves (12.5), energy considerations (12.6)

Text book: Electricity and magnetism by Mahajan and Rangwala,
Tata-McGraw-Hill publishing company ltd. (26^{th} reprint)

Unit – II **Optics** **Duration: 15 hrs**

Coherence:

Introduction (17.1), the line width (17.2), the spatial coherence (17.3), Michelson-Steller interferometer (17.4)

Lasers:

Introduction (26.1), spontaneous and stimulated emission (26.1.1), main components of the laser (26.1.2), understanding optical amplification: the EDFA (26.1.3), the Ruby laser (26.3), spiking in Ruby laser (26.3.1), the He-Ne laser (26.4), Einstein coefficients and optical amplification (26.6)

Holography:

Introduction (21.1), theory (21.2), requirements (21.3), some applications (21.4)

Text book: Optics by Ajoy Ghatak,
Tata-McGraw Hill publishing company ltd. (4^{th} edition)

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

REFRENCE BOOKS:

1. Introduction to Electrodynamics by D J Griffiths, PHI Learning
2. Electricity & magnetism by Sehgal, Chopra & Sehgal, S Chand & Sons
3. Electromagnetism by Grant & Philips**,** John Wiley & Sons Inc
4. Fundamental of magnetism & Electricity by D N Vasudeva, S Chand & Co
5. Fundamentals of optics by Jenkins & White, Tata McGraw Hill Education
6. A text book of Optics by Subrahmanyam & Brij Lal

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester VI
Subject: Physics (PHY-6008)
Paper – VIII
[2 credit course- 2 hours per week]

Unit – I **Atomic physics** **Duration: 15 hrs**

Atomic structure:
The vector atom model (6.12), quantum numbers associated with vector atom model (6.13), coupling schemes (6.14), the Pauli exclusion principle (6.15), the periodic classification of elements (6.16), some examples of electron configurations with their modern symbolic representations (6.17), magnetic dipole moment due to orbital motion of the electron (6.18), magnetic dipole moment due to spin (6.19), the Stern-Gerlach experiment (6.20), spin-orbit coupling (6.21), optical spectra (6.22), Zeeman effect (6.23), Larmor's theorem (6.24), quantum mechanical explanation of normal Zeeman effect (6.25), anomalous Zeeman effect (6.26), Paschen-Back effect (6.27), Stark effect (6.28)
Text book: Modern physics by R Murugeshan, S Chand & Company ltd. (15^{th} edition)

Unit – II **Radioactivity** **Duration: 15 hrs**

Alpha Decay:
Determination of e/m of Alpha particle (31.7), determination of charge of an alpha particle (31.8), velocity of an alpha particle (31.9), range of an alpha particle (31.10), experimental measurement of range of alpha particle (31.11), alpha particle disintegration energy (31.12), alpha particle spectra (31.13), theory of alpha decay (31.14), Gamow's theory of alpha decay (31.15)
Beta Decay:
The nature of Beta particle (31.16), determination of e/m of beta particle (31.17), Kauffmann's experiment (31.18), Bucherer's experiment (31.19), increase of beta particle mass with velocity (31.20), beta ray spectra, magnetic spectrograph (31.21), origin of line and continuous spectra, the Neutrino theory of beta decay (31.22)
Gamma Ray:
Introduction (31.23), determination of wavelength of gamma rays (31.24), origin of gamma rays (31.25), internal conversion (31.27)
Elementary Particles:

Introduction (38.1), particle and anti particles (38.2), Anti matter (38.3), fundamental interactions (38.4), elementary particle quantum numbers (38.5), conservation laws and symmetry (38.6), the quark model (38.7)
Text book: Modern physics by R Murugeshan, S Chand & Company ltd. (15^{th} edition)

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

REFRENCE BOOKS:

1. Atomic & nuclear physics by J B Rajam, S Chand & Co.
2. Atomic & nuclear physics by Brij Lal & Subrahmanyam, S Chand publisher
3. Modern physics by K Crane, Wiley
4. Introduction to Modern Physics by Richtmyer, Kennard, Cooper, McGraw Hill
5. Nuclear physics by S B Patel, New age international
6. An introduction to nuclear physics by H Enge, Addition-Wesley publication co
7. Nuclear physics by Kaplan, Addition-Wesley publication co

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester VI

Subject: Physics (PHY-6009)

Paper – IX

[2 credit course- 2 hours per week]

Unit – I **Statistical Mechanics** **Duration: 15 hrs**

Some applications of Statistical Mechanics:

Thermodynamics (6.3), Statistical interpretation of the basic thermodynamical variables (6.4), physical interpretation of α (6.5), chemical potential in the equilibrium state (6.6), thermodynamic functions in terms of grand partition function (6.7), ideal gas (6.8), Gibb's paradox (6.9), the equipartition theorem (6.10), the statistics of Para magnetism and Curies law (6.11), (classical approach) thermal disorder in crystal lattice (6.12)

MB/BE/FD statistics:

Symmetry of wave functions (8.1), the Boltzmann limit of Boson and Fermion gases (8.2), evaluation of partition function (8.3)

Text book: Statistical Mechanics by B B Laud, New age International

Unit – II **Relativity** **Duration: 15 hrs**

Relativistic Lagrangian of a particle (10.12), Relativistic Hamiltonian of a particle (10.13), Space-time diagram (10.14), Geometrical interpretation of Lorentz transformation (10.15), Principle of Covariance (10.16), Four vectors in Mechanics (10.17), Position four-Vectors, Four-Velocity, Momentum Four-Vector, Four-Force, Four-Acceleration, Charge current Four-Vector (10.18), Invariance of Maxwell's equations, Maxwell's equations, Vector and Scalar potentials, Gauge transformations, Four-Vector potentials.

Text book: Classical Mechanics by G Aruldhas, PHI of India pvt ltd.

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

REFRENCE BOOKS:

7. Statistical mechanics by R K Pathariya, Butterworth-Heinemann
8. Statistical mechanics by K Huang, Wiley
9. Fundamentals of statistical and thermal physics by F reif, McGraw Hill
10. Introduction to special relativity by R Resnik, Wiley
11. Concepts of Modern physics by A Beiser, Tata McGraw Hill
1. Modern physics by K Krane, Wiley India pvt ltd.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester VI

Subject: Physics (PHY-6010)

Paper – X

[2 credit course- 2 hours per week]

Unit – I **Instruments & measurement** **Duration: 15 hrs**

Exhaust pumps and their characteristics (15.1), rotary oil pumps (15.2), molecular pump (15.3), diffusion pump (15.4), other methods of producing low pressures (15.5), pressure gauges (15.7)

Text book: Mechanics by D S Mathur, S Chand & co. (2nd edition)

Unit – II **Digital Electronics** **Duration: 15 hrs**

Combinational circuits (15.10), multiplexer (15.10.1), demultiplexer (15.10.2), encoders (15.10.3), decoders (15.10.4), digital comparator (15.10.5), flip-flop (15.11), RS flip-flop (15.11.1), clocked SR flip-flop (15.11.2), D flip-flop (15.11.3), edge-triggered D flip-flop (15.11.4), edge-triggered JK flip-flop (15.11.5), the master-slave JK flip-flop (15.11.6), T flip-flop (15.11.7), D flip-flop using JK flip-flop (15.11.8), preset and clear function in a flip-flop (15.11.9), sequential logic circuits (15.12), registers (15.12.1), counters (15.12.2), synchronous counters (15.12.3), A/D and D/A converters (15.13), sampling and quantization (15.13.1), digital-to-analog converter (DAC) (15.13.2), analog-to-digital converter (ADC) (15.13.3)

Text Book: A text book of Electronics by S Chattopadhyay,
New central book agency, Kolkata

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

REFRENCE BOOKS:

9. Instrumentation by Rangan, Sarma & Mani, Tata McGraw Hill
10. Instrumentation by B Jones
11. Digital electronics by Gothman, PHI publication
12. Microelectronics by Millman & Grabel, McGraw Hill
13. Integrated electronics by Millman & Halkias, McGraw Hill
14. Digital principles & applications by Malvino & Leach, Tata McGraw Hill
15. Digital computer electronics by Malvino, Tata McGraw Hill
1. Digital electronics, principles & applications by Tokheim, Tata McGraw Hill

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester VI

Subject: Physics (PHY-6011)

Paper –XI

[2 credit course- 2 hours per week]

Unit – I **Astrophysics & Cosmology** **Duration: 15 hrs**

Cosmology:

The expansion of the universe (16.1), the cosmic microwave background radiation (16.2), dark matter (16.3), cosmology and general relativity (16.4), the big bang cosmology (16.5), the formation of nuclei and atoms (16.6), echoes of big bang (16.7), the future of universe (16.8)

Text Book: Modern physics by Kenneth Krane, John Wiley & sons, (2^{nd} edition)

Unit – II **Programming in C** **Duration: 15 hrs**

Introduction to computer, Numeric constants,

(i) constants, (ii) scalar variables, (iii) declaring variable names, (iv) defining constant Arithmetic Expressions,

(i) Arithmetic operators and modes of expressions, (ii) Integer expression, (iii) Floating point expression, (iv) Operator precedence in expression, (v) Assignment statements, (vi) Defining variables

(vii) Arithmetic conversion, (viii) assignment expression, (ix) Increment decrement statement, (x) multiple assignments

Input output statements, Conditional statements, Loops

(i) the *while* loop, (ii) the *for* loop, (iii) the *do while* loop

Some simple programs in 'C'

Text book: (1) Computer Programming in C by V Rajaraman, Prentice-Hall of India, New Delhi, (2) Programming in C by Balagurusamy

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

REFRENCE BOOKS:

1. Computer fundamentals & C programming by Balagurusamy, Tata McGraw Hill Education
2. Schaum's outline series, theory and problems with C by Byron S Gottfried, McGraw Hill publications
3. Programming in ANSI C by Balagurusamy, Tata McGraw Hill Education
4. Programming with C by Venugopal and Sudeep, Tata McGraw hill

List of experiments

Semester- VI

	Group A
1	Determination of “g” using Kater’s pendulum
2	To determine young’s modulus “Y” by method of vibration
3	Thermal conductivity of a rubber tube
4	To determine angle of contact and surface tension using Quink’s method
5	To study compound pendulum by the method of coincidence
6	To study oscillations of a mass in the case of combination of two springs
	Group B
1	To determine the cardinal points of a lens system using turn table
2	Resolving power of grating
3	To verify Hartmann’s formula using spectrometer
4	To study diffraction at a straight edge
5	Edser-Butler plate
6	Refractive index of liquid using Newton’s rings
	Group C
1	$\frac{e}{m}$ of electron by Thomson’s method
2	Stefan’s constant
3	Absorption coefficient of liquid using photocell
4	To determine neutral temperature and constants of the thermocouple
5	To determine electronic charge “e” using photo-emissive cell
6	LDR characteristics
	Group D
1	Hysteresis curve
2	Anderson’s bridge
3	Parallel resonance
4	Mutual inductance by Carey-foster’s method
5	High resistance by leakage
6	Absolute value of capacitance using B G

	Group E
1	Hartley's oscillator
2	Colpit's oscillator
3	Characteristics of UJT
4	Integrator/differentiator using OP AMPLIFIER
5	Negative feedback amplifier
6	Study of half-adder/subtractor and full adder/subtractor
	Group F
	Development of algorithm, flowchart and program for the following problems:
1	Arranging words in alphabetical order
2	Picking the largest and smallest of a set of number
3	Solving quadratic equations
4	Multiplications of two square matrices
5	Solving equations by Newton-Raphson's method
6	Integration-Simpson's rule/trapezoidal method
7	Conversion of Fahrenheit to Celsius
8	Average of a set of numbers

Note:

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