

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester III

Subject: Physics (PHY-3003)

Paper – III

[2 credit course- 2 hours per week]

Unit – I

MECHANICS

Duration: 15 hrs

[Some definitions & preliminary relations (4.3)] (Revision)

Charged particle in a uniform & constant electric field (4.4), Charged particle in an alternating electric field (4.5), charged particle in a uniform & constant magnetic field (4.6), the cyclotron (4.7), magnetic focusing (4.8), charged particle in a combined electric & magnetic field (4.9)

[*Mechanics by D S Mathur, S Chand & co*]

Unit – II

THERMODYNAMICS

Duration: 15 hrs

Thermodynamic variables (6.1), extensive & intensive variables (6.2), Maxwell's thermodynamic variables (6.3), applications of Maxwell's thermodynamic relations (6.4), thermodynamic potentials (6.5), significance of thermodynamic potentials (6.6), relation of thermodynamic potentials with their variables (6.7), relations between C_p , C_v & μ (6.8), the TdS equations (6.9), Clapeyron's equation using Maxwell's thermodynamic relations (6.10)

[*Heat & thermodynamics by Brij Lal & Subrahmanium*]

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 J. C. Upadhyay
5. Mechanics by Satya Prakash & Agarwal
6. Heat & thermodynamics by Zeemansky

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester III

Subject: Physics (PHY-3004)

Paper – IV

[2 credit course- 2 hours per week]

Unit – I

MODERN PHYSICS

Duration: 15 hrs

De Broglie waves (3.1), waves of what (3.2), describing a wave (3.3), phase & group velocities (3.4), particle diffraction (3.5), particle in a box (3.6), uncertainty principle 1 (3.7), uncertainty principle 2 (3.8), applying the uncertainty principle (3.9)

[*Concepts of modern physics by A Beiser*]

Unit – II

OPTICS

Duration: 15 hrs

Plane transmission grating (9.33), theory of plane transmission grating (9.34), oblique incidence (9.36)

Introduction (10.1), polarization of transverse waves (10.2), plane of polarization (10.3), polarization by reflection (10.4), Brewster's law (10.6), polarization by refraction (10.8), Malus' law (10.9), Optical activity (10.31), specific rotation (10.34), Laurent's half shade polarimeter (10.35)

[*A text book optics by Brij Lal & Subramanyam*]

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

Reference books:

1. Modern physics by J B Rajam
2. Modern physics by Murugesahan
3. Atomic & nuclear physics by Brij Lal & Subramanyam
4. Fundamentals of optics by Jenkins & White
5. Optics by A K Ghatak

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester III

Subject: Physics (PHY-3005)

Paper – V

[2 credit course- 2 hours per week]

Unit – I

ELECTROMAGNETISM

Duration: 15 hrs

AC through inductance, capacitance and resistance in series, or the LCR series circuit (22.11), series resonant circuit (22.13), parallel or branched ac circuit (22.14)

AC bridge (22.23), measurement of an inductance (22.24), measurement of capacity de Sauty's method (22.25), Schering bridge for measuring capacitance (22.26), measurement of frequency of an AC supply (22.27)

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

Unit – II

ELECTRONICS

Duration: 15 hrs

Thevenin's theorem (1.5), Norton's theorem (1.6)

Voltage-divider bias (8.1), accurate VDB analysis (8.2), VDB load line & Q point (8.3), other types of bias (8.5)

Basic ideas (13.1), drain curves (13.2), the trans-conductance curve (13.3), biasing in the ohmic region (13.4), biasing in the active region (13.5), trans-conductance (13.6)

[*Electronic principles by Malvino, TMH*]

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

Reference books:

1. Electromagnetism by Grant & Philips
2. Electricity & magnetism by Rangwala & Mahajan
3. Electricity & magnetism by Sehgal, Chopra & Sehgal
4. Microelectronics by Millman & Grabel
5. Integrated electronics by Millman & Halkias
6. Electronics: Fundamentals & applications by Allen Mottershead
7. Basic electronics by B L Theraja

List of experiments Semester III

GROUP A	
1.	Moment of inertia by torsional pendulum (disc & irregular body)
2.	Moment of inertia by bifilar suspension
3.	Flat spiral spring (determination of η)
4.	"Y" by the method of elevation
5.	Stefan's fourth power law
6.	Study of Simple Harmonic Motion
GROUP B	
1.	Optical lever
2.	Brewster's law
3.	"h" by photocell
4.	Diffraction grating (normal incidence)
5.	Cauchy's constants
6.	Resolving power of telescope
GROUP C	
1.	Thevenin's theorem
2.	Figure of merit of a ballistic galvanometer
3.	Energy band gap of a semiconductor diode
4.	Low resistance by Carey-Foster's bridge
5.	Transistor characteristics in CE configuration
6.	"L" by Maxwell's bridge

Note:

1. The duration of each experiment is of 3 hours. Three experiments are to be performed by each student per week.
2. In the external exam, a student will have to perform three 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 IV

Subject: Physics (PHY-4003)

Paper – III

[2 credit course- 2 hours per week]

Unit – I

INSTRUMENTATION

Duration: 15 hrs

[Introduction (19.1), Monochromatic light (19.2), Polarized Wave Shapes (19.3)] Revision Reflection absorption and transmittance (19.5), radiometry and photometry (19.6), terms relating to photometry (19.7), laws of illumination (19.11), terms relating to radiometry (19.12), photometric/radiometric measurement systems (19.13), optical sources (19.14), optical detectors (19.15)

[*A course in Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanpat Rai & Co*]

Unit – II

SOLID STATE PHYSICS

Duration: 15 hrs

Introduction (1.1), the crystalline state (1.2), basic definitions (1.3), the fourteen bravais lattices & seven crystal systems (1.4), elements of symmetry (1.5), nomenclature of crystal directions & crystal planes, Millar indices (1.6), examples of simple crystal structures (1.7), inter-atomic forces (1.9), types of bonding (1.10)

[*Elementary solid state physics by M. Ali Omar, Perason education*]

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

Reference books:

1. Solid state physics by C Kittal
2. Solid state physics by Kachhawa

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester III

Subject: Physics (PHY-4004)

Paper – IV

[2 credit course- 2 hours per week]

Unit – I

MODERN PHYSICS

Duration: 15 hrs

Quantum mechanics (5.1), the wave equation (5.2), Schrodinger's equation: Time dependent form (5.3), linearity & superposition (5.4), expectation values (5.5), operators (5.6), Schrodinger's equation: Steady state form (5.7), particle in a box (5.8), finite potential well (5.9)

[*Concepts of modern physics by A Beiser*]

Unit – II

OPTICS

Duration: 15 hrs

Aberrations (3.1), spherical aberrations in a lens (3.5), reducing spherical aberrations (3.6), coma (3.7), aplanatic lens (3.8), astigmatism (3.9), curvature of the field (3.10), distortion (3.11), chromatic aberration (3.12), achromatic lenses (3.27), condition for achromatism of two thin lenses separated by finite lenses (3.28)

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

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2. Modern physics by Murugesahan
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5. Optics by A. K. Ghatak

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for B. Sc. Semester IV

Subject: Physics (PHY-4005)

Paper – V

[2 credit course- 2 hours per week]

Unit – I

ELECTROMAGNETISM

Duration: 15 hrs

Galvanometers (14.1), moving iron galvanometers (14.2), moving coil galvanometer (14.3), the sensitivity (14.4), ballistic galvanometer (14.8), moving coil ballistic galvanometer (14.9), damping (14.10), current and charge sensitivities (14.12), measurement of sensitivity of a galvanometer (14.13), uses of ballistic galvanometer (14.14)

[Fundamentals of magnetism and electricity by D N Vasudeva]

Unit – II

ELECTRONICS

Duration: 15 hrs

Base-biased amplifier (9.1), emitter-biased amplifier (9.2), small-signal operation (9.3), AC beta (9.4), AC resistance of the emitter diode (9.5), analyzing an amplifier (9.7) JFET amplifiers (13.7)

The depletion mode MOSFET (14.1), the enhancement mode MOSFET (14.2)

[Electronic principles by Malvino]

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6. Electronics: Fundamentals & applications by Allen Mottershead
7. Basic electronics by B L Theraja

List of experiments
Semester – IV

Group A	
1	Moment of inertia of a flywheel
2	Bar pendulum
3	Flat spiral spring (determination of “Y”)
4	Thermocouple
5	Study of resonator
6	Specific heat of liquid by Newton’s law of cooling
Group B	
1	Cylindrical obstacle (wavelength of light)
2	Spherical aberration
3	Polarimeter
4	Diffraction grating (minimum deviation)
5	Malus’ law
6	Rydberg’s constant
Group C	
1	FET characteristics
2	Mutual inductance by ballistic galvanometer
3	Norton’s theorem
4	k/e using transistor
5	De Sauty’s bridge (comparison of capacitances)
6	TCR of thermistor using post office box

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