

SWAMI RAMANAND TEERTH MARATHWADA

UNIVERSITY, NANDED

B. Sc. Ist Year

(Revised Syllabus Effective from June 2013)



Salient Features of Revised B. Sc. Physics Syllabi

As per the considerations of examination reform the syllabi of B. Sc. Physics is revised and effectively implemented from June, 2013 academic year. The Syllabi is framed as per the guidelines given in the UGC curriculum. The numbers of objectives are taken in to consideration while reforming the syllabi.

The main objective is to create skilled minds and therefore understanding of theoretical and mathematical knowledge essential for finding solutions of various interacting physical phenomenon, the full paper on mathematical methods is included. It helps in general to improve scientific attitude to solve the research oriented problems, problems of interacting systems.

The professional Education of the students begins while enrolling their names in the B. Sc. Classes. The Board of study thought authentically that some sort of Job oriented syllabi is to be included and accordingly, some principles of cooling and liquefaction of gasses, some part of thermodynamics, theoretical physics, AC current, part of industrial electronics, digital electronics, communication system, TV, Lasers, detectors, nuclear energy, solar energy and various aspects of physics related to the industries and research field has been covered. The lab work also includes theory based practical to develop the skill and create interest of the students in the subject physics.

Curriculum Designing Committee	
Dr. G. N. Shinde Dean, Faculty of Science SRTMU Nanded	Principal, Indira Gandhi College CIDCO, Nanded
Dr. L. S. Ravangave (Chairman BOS)	Shri Sant Gadge Maharaj Mahavidyalaya, Loha, Dist. Nanded
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Dr. Gore Krashnakant Umajirao	Neataji Subhash Chandra Bose College, Nanded
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Dr. Choudhari Milind Madhukarrao	Maharashtra College Nilanga
Dr. Jadhav Kamlakar M.	Professor & Former Head Dept. of Physics Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
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B. Sc. I Physics Revised Syllabus Effective from June 2013

Course Title	SEM	Periods	Marks	
			Ext.	Int.
SEM –I PHY 111: <i>Mechanics and Properties of Matter Theory (Paper-I)</i>	I	45	40	10
SEM-I PHY121: PHY 112: <i>Mathematical Methods in Physics Theory (Paper-II)</i>	I	45	40	10
SEM –II PHY 121: <i>Heat and Thermodynamics Theory (Paper-III)</i>	II	45	40	10
SEM-II PHY 122: PHY 122: <i>Electricity and Magnetism Theory (Paper-IV)</i>	II	45	40	10
PHY 103: <i>Practical Course (Paper-V)</i>	Annual Pattern		100	

PHY 111: *Mechanics and Properties of Matter*

SEM-I

Paper-I

Periods: 45

Marks: 40 Ext. + 10 Internal

Units–I: Gravitation

(10 Periods)

Newton's law of Gravitation, Kepler's laws of Planetary Motion, Newton's deduction from Kepler's laws, Gravitational Field, Gravitational Intensity, Gravitational Potential, Gravitational Potential energy, Potential and field Intensity due to uniform Solid Sphere at a point (Point inside and outside), Problems.

Unit–II: Surface Tension

(10 Periods)

Definition of Surface Tension, Curvature pressure and Surface Tension, Difference of pressure on two sides of liquid surface, Expression for Excess Pressure inside a Spherical Drop and spherical Soap Bubble, Surface Tension by Jaeger's Method, Surface Tension by Ferguson Method.

Unit- III: Viscosity

(10 Periods)

Introduction, Coefficient of Viscosity, Streamline flow, critical velocity, Bernoulli's theorem, (Kinetic energy, Potential energy, Pressure energy) Poiseuille's equation for the flow of liquid through a tube, Determination of coefficient viscosity by Poiseuille's Method, Searle's Viscometer, Variation of viscosity with Temperature Problems.

Unit- IV: Elasticity

(15 Periods)

Definition of three types of Elastic stress and Strains, Deformation of cube (Bulk Modulus), Modulus of Rigidity and Young's modulus, Relation connecting elastic constants, Twisting couple on a cylinder or a (wire), Tensional pendulum, Maxwell's needle.

Bending of Beam, Bending Moment, Cantilever (Weight of the beam is ineffective, Weight of the beam is effective), Depression of a Beam supported at the ends and loaded at the centre, Determination of Y by bending of beam Problems.

Books Recommended:

1. Elements of Properties of Matter –D.S.Mathur, Shamlal Charitable trust, New Delhi.
2. General Properties of Matter – J. C. Upadhyaya, Ram Prasad & Sons, Agra.
3. Concept in Physics (Text Book for B. Sc. Ist Year) – Dr. K. U. Gore. Nirmal Pub. Nanded
4. Text Book of Physics - Dr. C. J. Kadam. Vaishnavi's Pub. Latur.

PHY 112: *Mathematical Methods In Physics.*
SEM-I **Paper-II**
Periods: 45 **Marks: 40 Ext. +10 Internal**

Unit-I: Vector Analysis

(15 Periods)

Vector triple product, Scalar triple product, Vector identity, Scalar and vector field , Gradient of a scalar field , Divergence of a vector field and Curl of a vector field and their Physical interpretation , Laplacian Operator (∇^2), Line integral, Surface integral, Volume integral, Gauss's divergence theorem, Stoke's theorem, Green's theorem (Statements only).

Unit II: Complex variables

(10 Periods)

Introduction, Definition, complex algebra (Addition, Subtraction, Multiplication, Division, conjugate complex number), Argand diagram, Graphical representation of Sum, Difference, product and Quotient of complex number, Extraction of Roots, Properties of moduli ,arguments and geometry of complex numbers, , Rectangular, polar and exponential form of complex numbers, Problems.

Unit -III: Partial Differentiation

(7 Periods)

Definition of Partial Differentiation, total Differentiation , Chain rule, Order of Differentiation, Change of variables from Cartesian to Polar Co-ordinates, Implicit, Condition for maxima and minima (without proof), Problems

Unit IV: Fourier Series (Book 9, 10)

(13 Periods)

Definition, Evaluation of the coefficients of Fourier series, Cosine series, Sine series, Dirichlet's Conditions, Graphical representations of even and odd functions, Physical applications of Fourier series analysis, Square wave, Half wave Rectifier, Problems.

Books Recommended:

1. Vector Analysis - Murray R. Spiegel
2. Mathematical Physics - B.S. Rajput
3. Mathematical Physics- B.D. Gupta (Vikas publishing House)
4. Methods of Mathematical Physics by Laud Talbout and Gambhir
5. Mathematical methods in Physical Sciences- Masy and Bias.
6. **Mathematics For Engineers and Physists** Pipe

PHY 121: Kinetic Theory , Heat and Thermodynamics
SEM –II **Paper-III**
Periods: 45 Marks: **40 Ext. + 10 Internal**

Unit–I: Kinetic Theory

(8 Periods)

Mean free path, Transport Phenomena, Viscosity of Gases, Thermal Conductivity of Gases, Diffusion, Inter relation between three transport coefficients.

Unit –II : Heat of Gas

(15 Periods)

Andrew's Experiment on CO₂, Amagat's Experiment, Behavior of Gases at high pressure, Porous Plug Experiment, Vander wall's Equation of State, Critical Constants, Corresponding states, Coefficients of Vander wall's Equation, Boyles temperature, Temperature of Inversion Relation between Boyles temperature and Temperature of Inversion, Reduced Equation of State, properties of matter near critical point.

Unit–III: Thermodynamics

(15 Periods)

First Law of Thermodynamics, Relation connecting P, V and T in an Adiabatic Process, Second Law of Thermodynamics (Kelvin and Clausius statements), Carnot's cycle, Carnot's heat Engine , Carnot's Theorem, Entropy , Entropy of Irreversible processes, entropy of reversible process Third Law of Thermodynamics.

Unit–IV: Thermodynamic Relations

(8 Periods)

Maxwell's Thermodynamical Relations, T- ds equations, Clausius-Clapeyron latent heat equations, Internal energy, Helmholtz' function, Enthalpy, Gibb's function

Books Recommended:

1. Heat and Thermodynamics – Brij Lal, N.Subrahmanyam, Sultan Chand & Company Ltd.
2. Heat and Thermodynamics – D.S.Mathur, Sultan Chand & Sons, New Delhi
3. Thermodynamics and Statistical Physics – S.L.Kakani
4. Text Book of Heat and Thermodynamics- D. S. Mathur
5. Thermodynamics, Kinetic Theory, and Statistical Thermodynamics – Sears and Salinger, Narosa Publishing House, New Delhi.

PHY 122: Electricity and Magnetism
SEM - II *Paper-IV*

Periods: 45

Marks: 40 Ext. + 10 Internal

Unit-I: Alternating Currents And AC Bridges **(13 Periods)**

AC through LCR circuit, (series resonance and Parallel Resonance circuits) Complex numbers and Their Applications in solving AC Circuit Problems, Complex Impedance and Resistance, Power in AC circuit Power Factor, Choke, Transformer Principle, with current and voltage ratios; Efficiency of transformer Types of Transformers: step down and Step up, Power loss In Transformer, AC bridge, Owns Bridge.

Unit- II: Electromagnetic Induction **(10 Periods)**

Definition, Faradays Law of Electromagnetic Induction, Self induction, self induction of a Solenoid, Mutual induction, Mutual Induction of a pair of coil, Work done in Establishing Current in an Inductance, Mutual inductance of a Co axial Solenoids, Problems.

Unit- III: Magnetization **(12 Periods)**

Introduction, Magnetic Induction, Intensity of magnetization, Permeability, Susceptibility, Relation between Permeability and Susceptibility, Hysteresis curve, I-H curve By magnetometer Method, Moving coil type Ballistic Galvanometer, logarithmic decrement, damping correction,

Unit- IV: Magnetostatics : **(10Periods)**

Definition of Magnetic Field, Lorentz Force, Force on a Current Carrying Conductor, Magnetic Dipole Moment, Biot And Savert Law, and Its Applications to straight conductor, Circular coil, Amperes Circuital Law and its Curl.

Books Recommended:

1. Vector Analysis - Murray R. Spigel
2. Foundations of Electromagnetic theory- Reitz,Milford,Christey
3. Fundadamental Physics P. B. Patil. Helambe, Mahajan ,
3. Introduction to Electrodynamics – D.G. Griffith
5. Electricity and Magnetism - Brij Lal, Subramanyan (Ratan Prakashan Mandir,Twentieth revised and enlarged edition 1997)
6. Electricity and Magnetism – Khare, Shrivastav (Twentieth revised 1997)
8. Electricity and Electronics – D.C.Tayal (Himalaya Publishing House, Mumbai)

9. Electricity and Magnetism – Vasudev (S. Chand and CO.)

10 Concept in Physics (Text Book for B. Sc. Ist Year Paper II) -S. S. Nalwad & Dr. K. U. Gore.

PHY 103: Practical Course Paper: V

Periods: 80

Marks: 100

List of the Experiments

1. Y- by Spiral spring.
2. η - by Spiral spring.
3. η - by Static torsion.
4. η - by Maxwell's needle.
5. Y- by bending loaded at the middle.
6. Viscosity of given liquid by Poiseuille's method.
7. Surface Tension of liquid by Jaeger's method.
8. Determination of Viscosity of given liquid by Searle's Viscometer.
9. Calibration of capillary tube
10. Thermal conductivity by Searle's method
11. Refractive index of material of a prism by Spectrometer (Focusing by Schuster's method).
12. Small resistance by Carry Fosters Bridge.
13. Field along the axis of Circular coil (Determination of radius of the coil)
14. Ballistic galvanometer (Figure of merit)
15. C1/C2 by Desotyes method.
16. Determination self inductance using Maxwell's Bridge
17. Helmotz Resonator
19. Determination of Angle of Prism
- 20 Calibration of Spectrometer

Note: The students can have their own choice to perform any two experiments in place of any two experiment in the list above available in their laboratory.

Each student appearing for examination must produce a journal showing that he has completed not less than **12** experiments during the year.