

Physics Syllabus for 1st & 2nd year / A - Level

Instructions:

The objective of “Champion of Subject” is to test the conceptual abilities of the students and candidates regarding the subject.

- This is the comprehensive syllabus for the “Champion of Subject”.
- Candidates are advised to thoroughly go through and study the syllabus
- The test will comprise of 120 MCQs.
- The time allowed for the test will be 120 min.
- MCQs will cover part or all the syllabus mentioned below.
- Munzill reserved the right to conduct an online or physical test.

Chapter 1: Measurements

1.1: Physical Quantities

- Physical Quantities
- Problem on Physical Quantities

1.2: International System of Units

- International Systems of Base Units
- Supplementary units

1.3: Scientific Notation

1.4: Errors and Uncertainties

- Errors and Uncertainty in Measurement

1.5: Rounding off Numbers

- Rounding Off the numbers
- Introduction to Significant Figures

1.6: Precision and Accuracy

- Precision and Accuracy
- Problem on Precision and Accuracy

1.7: Indicating Uncertainty

- Assessment of Total Uncertainty in the Final result

1.8: Dimensions

- Dimensions of Physical Quantities

Chapter 2: Vectors and Equilibrium

2.1: Vectors

- Vector and its Representation

2.2: Cartesian Coordinate System or Rectangular Coordinate System

- Rectangular Coordinate system

2.3: Addition of Vectors

- Addition of Forces
- Commutative Property of Addition of Vectors
- Vectors Subtraction

2.4: Multiplication of a Vector by a Number

- Multiplication of Vector by a scalar

2.5: Resolution of a Vector

- Rectangular Components of a Vector
- Determination of a Vector from its Rectangular Components

2.6: Addition of Vectors by Rectangular Components

- Vector Addition by Rectangular Components
- Steps of vector Addition by Rectangular Components

2.7: Products of Vectors

- Scalar or Dot product
- Characteristics of the Scalar Product
- Vector or Cross Product
- Characteristics of Cross Product

2.8: Torque or Moment of Force

- Introduction to Torque or Moment of a Force

2.9: Equilibrium

2.10: Concurrent Forces

- Equilibrium of Bodies Under the Action of Coplanar Forces

2.11: Conditions of Equilibrium

- Conditions for Equilibrium

Chapter 3: Motion and Force

3.1: Vector Nature of Displacement

- Difference between Distance and Displacement

3.2: Velocity

- Introduction to velocity
- Problem on Introduction to Velocity

3.3: Acceleration

- Introduction to Acceleration
- Average Acceleration and Retardation
- Problem on Introduction to Acceleration

3.4: Graphical Analysis of Motion

3.5: Equations of Uniformly Accelerated Motion

Review of Equations of Uniformly Accelerated Motion

3.6: Newton's Laws of Motion

- First Law of Newton
- Second Law of Newton
- Third Law of Newton

3.7: Linear Momentum

- Advanced Momentum
- Momentum and Newton's Second Law of motion
- Impulse
- Law of Conservation of Momentum

3.8: Elastic and Inelastic Collision

- Elastic and Inelastic Collisions
- Elastic Collision in one Dimension
- More on Elastic Collision in one Dimension
- Some Cases of Elastic Collision

3.9: Momentum and Explosive Forces

3.10: Projectile Motion

- Features of Projectile

Chapter 4: Work and Energy

4.1: Work

- Work Done by a Constant Forces
- Work Done By a Variable Forces

4.2: Work done in Gravitational Field

4.3: Power

- Introduction to Power
- Power and velocity

4.4: Energy

- Potential Energy

4.5: Implication of Energy Losses in Practical Devices and Efficiency

- The implication of Energy Losses in Practical Devices and Efficiency
- Ideal Machine

4.6: Absolute Potential Energy

- Absolute Potential Energy

4.7: Escape Velocity

4.8: Inter Conversion of Potential Energy and Kinetic Energy

4.9: Conservation of Energy

- Advance law of Conservation of Energy

4.10: Sources of Energy

- Energy from Non-Renewable Sources
- Energy from Tides
- Energy from Waves
- Solar Energy
- Energy from Biomass
- Geothermal Energy

- Wind Power
- Nuclear Energy and Electrical Energy

Chapter 5: Rotational and Circular Motion

5.1: Angular Motion

- Angular Displacement
- More on Angular Displacement
- Angular Velocity
- Angular Acceleration

5.2: Relation Between Angular and Linear Displacements

- Relation Between Angular and Linear Velocities
- Equation of Angular Motion

5.3: Centripetal Force and Centripetal Acceleration

- Centripetal Forces
- More on Centripetal Forces
- Centripetal and Centrifugal Force
- Applications of Centripetal Force

5.4: Torque and Moment of Inertia

5.5: Angular Momentum and Torque

- Angular Momentum
- Law of Conservation of Angular Momentum

5.6: Kinetic Energy of Rotation

- Rotational Kinetic Energy

5.7: Rolling of Disc and Hoop down the Inclined Plane

- Rotational Kinetic Energy of a Disc and Hoop

5.8: The Artificial Satellites

5.9: The Orbital Velocity

5.10: The Geostationary Orbits

5.11: The Real and Apparent Weight

5.12: Weightlessness in Satellites and Gravity Free system

- weightlessness in Satellites and Gravity Free system

5.13: The Artificial Gravity

- Artificial Gravity
- Communication Satellites

Chapter 6: Fluid Dynamics

6.1: Viscous Drag and Stokes Law

6.2: Terminal velocity

- Advanced Terminal Velocity
- Terminal Velocity of Paratrooper

6.3: Fluid Flow

6.4: Equation of Continuity

6.5: Bernoulli's Equation

- Torricelli's Theorem
- Relation Between Speed and Pressure of the Fluid
- More on Relation Between Speed and Pressure of the Fluid
- Venturi Relation
- Blood Flow

Chapter 7: Oscillation

7.1: Oscillations

- Vibratory Motion

7.2: Terminology of Oscillatory Motion

- Instantaneous Displacement and Amplitude of Vibration
- Some other Parameters of Simple Harmonic Motion

7.3: Simple Harmonic Motion

7.4: Circular Motion and S.H.M

- Displacement
- Instantaneous Velocity

7.5: Simple Pendulum

- Simple Pendulum
- Energy conservation in SHM

7.6: Free and Forced Oscillations

7.7: Resonance

- Introduction to Resonance
- Advantages and Disadvantages of Resonance

7.8: Waveform of Simple Harmonic Motion

- Instantaneous Displacement and Amplitude of Vibration

7.9: Phase

7.10: Damped Oscillations

7.11: Sharpness of Resonance

Chapter 8: Waves

8.1: Periodic Waves

8.2: Progressive Waves

- Necessary Conditions for Wave motion

8.3: Classification of Progressive Waves

- Transverse periodic Waves
- Longitudinal Periodic Waves

8.4: Speed of Sound

- Speed of Sound in Air
- Laplace's Correction

8.5: Effects of Various Factors on Speed of Sound in Air

- Effects of Various Factors on Speed of Sound in Air

8.6: Superposition of Waves

- Principle of Superposition

8.7: Interference of Waves

- Interference

8.8: Beats

- Problem on Interference
- Beats

8.9: Reflection of Waves and Phase Change

- Reflection of waves
- Reflection of Sound Waves

8.10: Stationary Waves

8.11: Transverse Stationary Waves in a Stretched String

- Stationary waves in a Stretched String

8.12: Fundamental and Overtone Vibration

8.13: Resonance of Air Column and Organ Pipes

- Resonance of Air Column and Organ Pipes
- Stationary Waves in Air Columns

8.14: Doppler Effect

- Applications of Doppler Effect

8.15: Ultrasonic Waves

- Ultrasonic Waves
- Uses of Ultrasonic Waves

Chapter 9: Physical Optics

9.1: Nature of Light

9.2: WaveFront

9.3: Huygen's Principle

9.4: Coherent sources

9.5: Interference of Light

9.6: Young's Double slits Experiment

9.7: Interference in Thin Film

9.8: Michelson's Interferometer

9.9: Diffraction of Light

9.10: Fraunhofer Diffraction at a Single Slit

- Fraunhofer Diffraction

9.11: Diffraction Grating

9.12: The Diffraction of X-Rays by Crystal

9.13: Polarization of Light

- Polarization
- Production and Detection of Plane Polarized Light
- Polarization by Reflection
- Applications of Polarized Light
- Optical Rotation

Chapter 10: Thermodynamics

10.1: Thermal Equilibrium

10.2: Heat and Work

10.3: Equivalence of Heat and Work

10.4: Internal Energy

10.5: Thermodynamic System

10.6: First Law of Thermodynamics

- First Law of Thermodynamics
- Isobaric Process
- Isothermal Process
- Adiabatic Process

10.7: Molar Specific Heat of a Gas

- Constant Volume Molar Specific heat of a Gas (C_v)
- Constant Pressure Molar Specific heat of a Gas (C_p)

10.8: Reversible and Irreversible Processes

10.9: Heat Engine

10.10: Second Law of Thermodynamics

10.11: Carnot Cycle

- Coefficient of Performance

10.12: Entropy

Chapter 11: Electrostatics

11.1: Coulomb's Law

11.2: Fields of Force

- Fields of Force
- More on Fields of Force

11.3: Electric Field Lines

11.4: Applications of Electrostatics

11.5: Electric Flux

11.6: Electric Flux Through a Surface Enclosing a Charge

11.7: Gauss's Law

11.8: Applications of Gauss's Law

- The intensity of Field Inside a Hollow Charged Sphere
- Electric Intensity Due to an Infinite Sheet of Charge
- Electric Intensity Between Two Oppositely Charged Parallel Plates
- Problem-Electric Intensity Between Two Oppositely Charged Parallel Pl

11.9: Electric Potential

- Electric Potential
- Electric Field as Potential Gradient
- Electric Potential at a Point due to a Point Charge
- More on Electric Potential at a Point due to a Point Charge
- More on Electric Potential at a Point due to a Point Charge
- Problem-Electric Potential at a Point due to a Point Charge

11.10: Electron Volt

11.11: Electric and Gravitational Forces (A Comparison)

11.12: Charge on an Electron by Millikan's Method

11.13: Capacitor

11.14: Capacitance of a Parallel Plate Capacitor

11.15: Electric Polarization of Dielectrics

11.16: Energy Stored in a Capacitor

- Energy Stored in a Capacitor
- More on Energy Stored in a Capacitor

11.17: Charging and Discharging a Capacitor

- Charging and Discharging a Capacitor
- More on Charging and Discharging a Capacitor

Chapter 12: Current Electricity

12.1: Electric Current

12.2: Source of Current

12.3: Effects of Current

12.4: Ohm' law

12.5: Resistivity and its Dependence Upon Temperature

12.6: Colour Code for Carbon Resistances

- Rheostat
- More on Rheostat
- Thermistors

12.7: Electrical Power and Power Dissipation in Resistors

12.8: Electromotive Force (EMF) and Potential Difference

- Relation Between Electromotive Force and Potential Difference and Int
- Maximum Power Output

12.9: Kirchhoff's Rules

- Kirchhoff's First Rules
- Kirchhoff's Second Rule

12.10: Wheatstone Bridge

12.11: Potentiometer

Chapter 13: Electromagnetism

13.1: Magnetic Field Due to Current in a Long Straight Wire

- Magnetic Field Due to Current in a Long Straight Wire

13.2: Force on a Current-Carrying Conductor in a Uniform Magnetic Field

- Force on a Current-Carrying Conductor in a Uniform B Field
- More on Force on a Current-Carrying Conductor in a Uniform B Field

13.3: Magnetic Flux and Flux Density

13.4: Ampere's Law and Determination of Flux Density B

- Ampere's Law and Determination of Flux Density B
- More on Ampere's Law and Determination of Flux Density B
- Field Due to a Current-Carrying Solenoid

13.5: Force on a Moving Charge in a Magnetic Field

- Force on a Moving Charge in a Magnetic Field
- More on Force on a Moving Charge in a Magnetic Field

13.6: Motion of Charged Particle in an E and B Field

- The motion of Charged Particle in an Electric and Magnetic Field

13.7: Determination of e/m of an Electron

- Determination of e/m of an Electron
- More on Determination of e/m of an Electron

13.8: Cathode Ray Oscilloscope

- Cathode Ray Oscilloscope
- Uses of CRO

13.9: Torque on a Current-Carrying Coil

- Torque on a Current-Carrying Coil in a Magnetic Field
- More on Torque on a Current-Carrying Coil in a Magnetic Field

13.10: Galvanometer

- Galvanometer
- Ammeter
- Voltmeter
- Ohmmeter

13.11: AVO meter-Multimeter

- AVO Meter - Multimeter

Chapter 14: Electromagnetic Induction

14.1: Induced EMF and Induced Current

- Induced EMF and Induced Current
- More on Induced EMF and Induced Current

14.2: Motional EMF

- Motional EMF
- More on Motional EMF

14.3: Faraday's Law and Induced EMF

14.4: Lenz's Law and Direction of Induced EMF

14.5: Mutual Induction

- Mutual Induction
- More on Mutual Induction

14.6: Self Induction

14.7: Energy Stored in an Inductor

14.8: Alternating Current Generator

- Alternating Current Generator
- More on Alternating Current Generator

14.9: D.C. Generator

14.10: Back Motor Effect in Generator

14.11: D.C. Motor

14.12: Back EMF Effect in Motors

14.13: Transformer

Chapter 15: Alternating Current

15.1: Alternating Current

- Alternating Current
- Phase of A.C.
- Vector Representation of an Alternating Current

15.2: A.C. Circuits

15.3: A.C. Through a Resistor

15.4: A.C. Through a Capacitor

- A.C. Through a Capacitor
- The reactance of Capacitive Circuit

15.5: A.C. Through an Inductor

15.6: Impedance

15.7: R-C and R-L Series Circuits

15.8: Power in A.C. Circuits

- Power in A.C. Circuits

15.9: Series Resonance Circuit

15.10: Parallel Resonance Circuit

15.11: Three Phase A.C. Supply

- Three Phase A.C. Supply

15.12: Principle of Metal Detectors

- Principle of Metal Detectors

15.13: Choke**15.14: Electromagnetic Waves****15.15: Principle of Generation, Transmission and Reception of Electromagnetic Waves**

- Principle of Generation of e.m Waves
- Principle of Transmission and Reception

15.16: Modulation

Chapter 16: Physics of Solids

16.1: Classification of Solids

- Crystalline and Amorphous or Glassy Solids
- Polymeric Solids and Crystal Lattice

16.2: Mechanical Properties of Solids

- Deformation in Solids
- Stress and Strain
- Elastic Constants
- Elastic Limit and Yield Strength
- Strain Energy in Deformed Materials

16.3: Electrical Properties of Solids

- Electrical Properties of Solids
- Energy Band Theory
- Insulators and Conductors
- Semiconductors
- Intrinsic Semiconductors
- Extrinsic Semiconductors
- Conduction by Electrons and Holes in Semiconductors

16.4: Superconductors**16.5: Magnetic Properties of Solids**

- Magnetic Properties of Solids
- Atomic Origin of Magnetism

- Paramagnetic Material
- Diamagnetic Material
- Origin of Ferromagnetism
- Hysteresis Loop

Chapter 17: Electronics

17.1: Brief Review of p-n Junction and its Characteristics

- Forward Biased p-n Junction
- Reverse Biased p-n Junction

17.2: Rectification

- Rectification
- Half Wave Rectification
- Full Wave Rectification

17.3: Specially Designed p-n Junction

- Light Emitting Diode
- Photo Diode
- Photo-Voltaic Cell

17.4: Transistors

- Transistors
- Problem- Transistors
- Current Flow in a n-p-n Transistor

17.5: Transistor as an Amplifier

- Transistor as an Amplifier

17.6: Transistor as a Switch

- Transistor as a Switch

17.7: Operational Amplifier

- Operational Amplifier
- Characteristics of op-amp

17.8: OP-AMP as Inverting Amplifier

- OP-AMP as Inverting Amplifier
- 17.9: OP-AMP as Non-Inverting Amplifier
- OP-AMP as Non-Inverting Amplifier

17.10: OP-AMP as a Comparator

- OP-AMP as a Comparator

17.11: Comparator as a Night Switch

- Comparator as a Night Switch

17.12: Digital Systems

17.13: Fundamental Logic Gates

- Fundamental Logic Gates
- OR Gate
- AND Gate
- NOT Gate

17.14: Other Logic Gates

- Other Logic Gates
- NOR Gate
- NAND Gate
- Exclusive OR Gate(XOR)
- Exclusive - NOR Gate (XNOR)

17.15: Applications of Gates in Control Systems

- Control Systems Using Logic Gates

Chapter 18: Dawn of Modern Physics

18.1: Relative Motion

- Relative Motion

18.2: Frames of Reference

- Frames of Reference
- Inertial Reference Frame

18.3: Special Theory of Relativity

- Special Theory of Relativity

- More on Special Theory of Relativity
- Time Dilation
- Length Contraction
- Mass Variation
- Mass energy relation
- NAVSTAR Navigation System

18.4: Black Body Radiation

- Black Body Radiation
- Planck's Assumption
- The Photon

18.5: Interaction of Electromagnetic Radiation With Matter

- Interaction of Electromagnetic Radiation With Matter
- Photoelectric Effect
- Photocell
- Compton Effect
- Pair Production

18.6: Annihilation of Matter

- Annihilation of Matter

18.7: Wave Nature of Particles

- Wave Nature of Particles
- Davisson and Germer Experiment
- Wave-Particle Duality
- Uses of Wave Nature of Particles
- Electron Microscope

18.8: Uncertainty Principle

- Uncertainty Principle

Chapter 19: Atomic Spectra

19.1: Atomic Spectra

- Atomic Spectra

19.2: Bohr's Model of the Hydrogen Atom

- Bohr's Model of the Hydrogen Atom
- De-Broglie's Interpretation of Bohr's Orbits
- Quantized Radii
- Quantized Energies
- Hydrogen Emission Spectrum

19.3: Inner Shell Transitions and Characteristic X-Rays

- Inner Shell Transitions and Characteristic X-Rays
- Production of X-Rays
- The Continuous X-Ray Spectrum
- Properties of X-Rays
- Uses of X-Ray
- CAT - Scanner
- Biological Effects of X-Rays

19.4: Uncertainty Within the Atom

19.5: Laser

- Laser
- Spontaneous and Stimulated Emission
- Population Inversion and Laser Action
- Ruby Laser
- Helium-Neon Laser
- Uses of laser in medicine and industry

Chapter 20: Nuclear Physics

20.1: Atomic Nucleus

- Atomic Nucleus

20.2: Isotopes

- Isotopes and Isobars
- Mass Spectrograph

10.3: Mass Defect and Binding Energy

- Mass Defect and Binding Energy

20.4: Radioactivity

- Radioactivity
- Alpha Emission
- Beta Emission
- Gamma Emission

20.5: Half-Life

- Half-Life

20.6: Interaction of Radiation With Matter

- Interaction of Radiation With Matter
- Interaction of Alpha Particles With Matter
- Interaction of Gamma Rays With Matter
- Interaction of Neutrons With Matter
- Comparison between Alpha, Beta and Gamma Radiation

20.7: Radiation Detectors

- Comparison between Alpha, Beta and Gamma Radiation
- Radiation Detectors
- Wilson Cloud Chamber
- Geiger-Muller Counter
- Solid-State Detector

20.8: Nuclear Reactions

- Nuclear Reactions

20.9: Nuclear Fission

- Nuclear Fission
- Fission Chain Reaction
- Nuclear Reactor
- Liquid Metal Fast Breeder Reactor (LMFBR)

20.10: Fusion Reaction

- Fusion Reaction
- Fusion and Stellar Energy

20.11: Radiation Exposure

- Radiation exposure

20.12: Biological Effects of Radiation

- Biological effects of radiation
- Biological effects of radiation-problem

20.13: Biological and Medical Uses of Radiation

- Protection from radiation
- Biological and medical uses of radiation
- Treatment of Cancer
- Polymerisation, Sterilization and food preservation
- Radiation Methods in Archaeology

20.14: Basic Forces of Nature

- Basic forces of nature

20.15: Building Blocks of Matter

- Building Blocks of Matter