



NMAT Physics

Suggested Study Plan

❖ Mechanics

Week 1

Suggested Time Plan: 8 hrs

Describing Motion with Graphical Analysis

- Scalars and Vectors
- Definition of Kinematics Terms: Speed, Velocity, Acceleration
- Interpreting Motion Graphs: position-time, velocity-time graphs
- acceleration-time graphs

Motion with Constant Acceleration

- Equations of Motion
- Applications of equations to Vertical Motion and Free Fall
- Applications of equations to Horizontal Motion

Projectile Motion

- Projectile Definition
- Projectile Motion Trajectory
- Horizontal and Vertical Velocity or Projectiles

Forces and Newton's Laws of Motion

- Weight and Normal Force
- Friction
- Free Body Diagrams.
- Newton's First Law (Law of Inertia)
- Newton's Second Law (Law of Acceleration)
- Newton's Third Law (Law of Interaction)
- Newton's Law of Gravitation
- Momentum and Impulse
- Law of Momentum Conservation

Week 2

Suggested Time Plan: 6 hrs

Circular and Rotational Motion.

- Uniform Circular Motion
- Centripetal vs Centrifugal Force
- Centripetal Acceleration.
- Torque
- Moment of Inertia
- Angular Velocity and Angular Momentum

Work, Energy, and Power

- Work
- Kinetic Energy
- Gravitational Potential Energy
- Hooke's Law
- Conservation of Energy
- Power and Power Rating

Fluids

- Fluids and Fluid Pressure
- Pascal's Principle
- Buoyant Force and Archimedes' Principle
- Bernoulli's Principle

❖ Thermodynamics (Week 3)

Suggested Time Plan: 4 hrs

Heat

- Temperature vs Heat
- Heat Transfer and Thermal Equilibrium
- Latent Heat and Phase Change
- Heat Transfer Equation
- Factors Affecting Rate of Heat Transfer
- Thermal Expansion
- Mechanical Equivalent of Heat

Thermodynamic Systems and Gases

- Thermodynamic Systems
- Laws of Thermodynamics
- Thermodynamic Processes
- Heat Engines and the Carnot Cycle
- Gas Variables
- Gas Laws: Boyle's Law, Charles' Law, Avogadro's Law, Ideal Gas Law

❖ **Electricity and Magnetism (Week 3)**

Suggested Time Plan: 4 hrs

Electricity and Magnetism

- Electric Charges and Electrostatic Force (Coulomb's Law)
- Circuit Components
- Circuit Variables: Electric Current, Voltage, Resistance, Power
- Ohm's Law
- Series vs Parallel Circuits
- Capacitors
- Magnetic Field, Magnetic Force, and Flux Lines.
- Electromagnetic Induction

❖ **Vibrations, Waves, and Optics (Week 4)**

Suggested Time Plan: 8 hrs

Wave Basics and Wave Properties

- Wave variables: frequency (f), period (T), wavelength (λ), and velocity (v)
- Law of Reflection
- Key Terms: Normal, Angle of Incidence, Angle of Reflection, Total Internal Reflection, Critical Angle

Refraction, Dispersion, and Diffraction

- Why Light Refracts
- Refractive Index
- Snell's Law
- Dispersion
- Diffraction and Young's Double-Slit Experiment
- Interference
- Diffraction Grating

Images, Lenses, and Mirrors

- Real and Virtual Images
- Law of Reflection
- Image Formed in a Plane Mirror
- Converging vs Diverging Lenses/Mirrors
- Concave vs Convex Lenses/Mirrors
- Ray Diagrams
- Lens/Mirror Equation
- How the Eye Forms Images
- Myopia and Hyperopia

Light and Sound

- Theories of Light
- Light as an Electromagnetic Wave
- Polarized Light
- Electromagnetic Spectrum
- Visible Light and Perception of Color.
- Prisms
- Absorption and Reflection
- Sound Waves
- Sound Variables: Pitch, Intensity, Frequency, Amplitude
- Doppler Effect

❖ **Modern Physics (Week 5)**

Suggested Time Plan: 2 hrs

Modern Physics

- Quantum and Relativistic Mechanics
- Theory of Special Relativity and General Relativity
- Principles of Quantum Mechanics
- Nucleons and Isotopes
- Radioactive elements and Half-life
- Radioactive decay
- Nuclear fission and Nuclear fusion

❖ **Take Physics Practice Tests and Mock Exam (Week 5)**