NCERT Unit-wise Complete Syllabus Covered for Pre-Medical Exams | Covered with All Shortcut Tricks, Tips, Lecture Notes and All Types of Important Questions

CLASS 12

Unit 1: Ray optics

Chapter 1: Reflection at plane mirror

1. Real and virtual object
2. Characteristics properties of an image
3. Field of view
4. Concepts on minimum size of mirror
5. Number of images formed by two parallel mirror
6. Number of images formed by two inclined mirror
7. Deviation at single and multiple reflections
8. Angular velocity of reflected ray
9. Relative motion in plane mirror

Chapter 2 : Reflection at Spherical surface

1. Basic introduction
2. Important rays to draw the ray diagram on aspherical mirror
3. Relation between focus and radius of curvature
4. Mirror formula and magnification
5. U-V graphs for a concave and convex mirror
6. Concepts of Double mirror
7. shifting of principle axis in double mirror

8. Combination of concave and plane mirror such that final image is formed on object itself.
9. Combination of concave and concave mirror such that final image is formed on object itself

10. Combination of concave and convex mirror such that final image is formed on object itself
11. Image diameter of sun and moon by using concave mirror
12. Area of image when object is kept perpendicular to principle axis
13. Axial magnification
14. Axial magnification for short linear object
15. Relative motion in spherical mirror

Chapter 3 : Refraction at plane surface

1. Basic properties
2. Snell's law
3. Real and apparent depth concept
4. Air bubble in glass slab
5. Bird and fish problem
6. Shifting in glass slab
7. Problems based on shifting in glass slab
8. Thick mirror
9. Lateral displacement in glass slab

Chapter 4. Total Internal Reflection

1. Critical angle and basic definition
2. TIR in multiple medium
3. Optical fibre

4. Condition for no emergence in optical fibre
5. Area of visible region

Chapter 5: Prism

1. Deviation in Prism
2. Dependence of deviation on angle of incidence
3. Condition for minimum deviation
4. Problems based on minimum deviation
5. TIR in Prism
6. Condition for no emergence in prism
7. Silvering of Prism
8. Cauchy's relation
9. Deviation in Thin prism
10. Dispersion in thin prism
11. Combination of two prism of opposite actions
12. Dispersion without deviation
13. Deviation without dispersion

Chapter 6 : Refraction at spherical surface

1. Object and image distance relation for spherical refracting surface
2. problem based on single refracting surface
3. problem based on multiple refracting surface
4. problem based on converging rays (virtual object)

Chapter 7: Lenses

1. Basic introduction

2. Lens maker formula for focal length of lens

3.effect of surrounding medium on focal length of lens

4.Power of Lens

5.Focal length and Power of combination of lens

6. Lens equation and Magnification

7.Object and image distance relation for Lenses when surrounding mediums are different

8.Focal length of Lens and its combination when surrounding mediums are different

9. Silvering of Lens

10. Lens displacement method

Chapter -8: Optical Instruments

1. Human eye
2. Simple and compound microscope
3. Astronomical and terrestrial telescope

Unit 2 : Wave Optics

Chapter 1: Huygens's theory

1. Wave front
2. Huygens principle
3. Reflection and refraction from Huygens principle

Chapter 2: Interference

1. Resultant intensity and amplitude
2. YDSE experiment
3. Variation of intensity with position
4. Optical pathlength
5. YDSE in liquid
6. YDSE when thin transparent sheet is introduced
7. YDSE when white light is introduced
8. Thin film interference

Chapter 3: Diffraction

1. Basic concepts
2. Fresnel and Fraunhofer diffraction
3. Fraunhofer diffraction by single slit
4. Variation of intensity in diffraction
5. Fresnel distance and validity of ray optics
6. Resolving power of optical instrument

Chapter 4: Scattering and Polarisation

1. Rayleigh's law of scattering
2. Colour of sky
3. Polarised and unpolarised light
4. Law of Malus
5. Polarisation by reflection (Brewster's law)
6. Polarisation by scattering

UNIT 3: Current electricity

1. Electric current
2. Current density
3. Conduction of current in metal

4. Ohm's law
5. Temperature dependence of resistance or resistivity of conductor, insulator and semiconductor
6. Stretching of wire
7. Grouping of resistance
8. Point potential method for equivalent resistance
9. Current divider law
10. Voltage divider law
11. Kirchoff's law
12. Single loop multiple battery
13. Multiple loop multiple battery
14. Nodal analysis method
15. Wheatstone bridge and its extension
16. Horizontal and vertical symmetry
17. 3-D circuit
18. Measuring instruments (galvanometer, ammeter and voltmeter)
19. Cell and its internal resistance
20. Grouping of cell
21. Meter bridge
22. Potentiometer
23. Electric power
24. Combination of bulb
25. Series and parallel combination of bulbs

Unit 4: Capacitor

1. Capacitance of parallel plate capacitor
2. Potential energy and heat dissipation when connected with battery
3. Potential energy and heat dissipation when two capacitors are connected

4. Potential difference, potential energy and energy density when different charged plates are brought close together
5. Series and parallel combination.
6. Charge divider law
7. Kirchhoff's law in capacitors
8. Single loop multiple battery
9. Multiple loop multiple battery
10. Junction law
11. Point potential method
12. Plate potential method
13. Dielectric in capacitor
14. Series, parallel and mixed grouping of dielectric
15. Effect of insertion of dielectric on capacitance, field, potential, potential energy and energy density
16. Capacitance of spherical capacitor
17. Force between plates of capacitors when battery is connected or disconnected
18. C-R circuit

UNIT 5: Magnetic effect of current and Magnetism

Chapter 1: Magnetic field

1. Biot-savart's law
2. Magnetic field due to straight wire
3. Magnetic field due to circular current carrying wire
4. Problem based on straight wire and circular wire
5. Field at the centre of polygon
6. Zero resultant theorem
7. Ampere's law
8. Magnetic field due to hollow cylindrical wire
9. Magnetic field due to solid cylindrical wire

10. Magnetic field due to annular wire
11. Magnetic field due to infinite current carrying sheet
12. Solenoid
13. Toroid

Chapter 2 : Motion of charged particle in magnetic field

1. Force on charged particle in magnetic field
2. Circular motion of charge in magnetic field
3. Motion of charge on helical path
4. Motion of charge particle in electric and magnetic field (Lorentz force)
5. Cyclotron
6. Force on current carrying wire
7. Force on straight and curved wire
8. Force between two parallel current carrying conductor
9. Standard cases for force on current carrying conductor
10. Magnetic field due to charges in motion
11. Force between two moving charges
12. Magnetic dipole moment of revolving charge
13. Magnetic dipole moment, Torque and Potential energy of current carrying conductor
14. Work done in rotating magnetic dipole in magnetic field
15. Moving coil galvanometer

Chapter 3: Bar Magnet

1. Pole strength and magnetic moment
2. Cutting of bar magnet

3. Coulomb's law in magnetism
4. Magnetic field due to bar magnet and its behaviour in external magnetic field

Chapter4: Earth magnetism and Tangent law

1. Earth's magnetic field
2. Elements of Earth's magnetic field
3. Magnetic maps
4. Neutral points Earth's magnetic field
5. Tangent law
6. Tangent galvanometer

Chapter 5: Magnetometer and different magnetic materials

1. Deflection magnetometer
2. Vibration magnetometer an its uses
3. Magnetic material and their types

4. Curie law
5. Comparative study of magnetic materials
6. Hysteresis (B-H curve)

Unit 6: EMI and Alternating current(A.C)

Chapter 1: EMI

1. Magnetic flux
2. Faraday's law
3. Relative motion of coil and bar magnet
4. Self induction
5. Mutual induction

6. Motional EMI due to translatory motion
7. Magnetic force and power dissipation in motion of conductor
8. Motion of conducting rod in earth magnetic field
9. Motional EMI due to rotational motion
10. Periodic EMI
11. Ac generator/Dynamo
12. Eddy current
13. Transformer
14. Growth and decay of current in a large circuit
15. Behaviour of inductor
16. LC oscillation
17. Comparison of LC circuit and Spring mass system

Chapter 2: Alternating current(A.C)

1. Equation of alternating current, voltage and Graphs
2. Phasor diagram and initial phase
3. Measurement of alternating quantities
4. Average power consumption in A.C
5. R,L and C circuit
6. RL,RC and LC circuit
7. Series RLC circuit

8. Choke coil
9. Parallel RLC circuit
10. Parallel LC circuit

Unit 7: Electrostatics

Chapter 1: Coulomb's law

1. Charges

2. Coulombs law and its definition
3. Dielectric constant
4. Resultant force on charge
5. Zero resultant theorem and equilibrium of charged particle
6. S.H.M. of charged particle
7. Thread charge system
8. Redistribution of charge

Chapter 2: Electric field

1. Electric field and electric field intensity
2. Graph of electric field
3. Problem based on calculation of net electric field due to point charge
4. Electric field due to charged ring
5. Electric field at the centre of circular arc
6. Electric field due to thin rod

Chapter 3: Gauss theorem

1. Electric flux
2. Gauss theorem
3. Closed surface in uniform field
4. Application of gauss theorem
5. Field due to thin rod
6. Field due to conducting sphere
7. Solid non-conducting sphere
8. Solid sphere with cavity
9. Electrostatic induction in conductor
10. Cavity in conductor
11. Field due to conducting and non conducting sheet

Chapter:4 electric potential

1. Electric potential energy

2. Electric potential due to point charge
3. Work energy concept in arrangement and rearrangement of system
4. Problems based on mechanical energy conservation
5. Problems based on potential due to system of charges
6. Potential due to charged ring
7. Problems based on work, energy theorem and mechanical energy conservation in charged ring
8. Potential due to conducting sphere
9. Problems based on concentric spherical shells
10. Earthing of spherical shell
11. Connection of two spherical shell
12. Potential due to non-conducting sphere
13. Problems based on work energy and mechanical energy conservation in non-conducting sphere
14. Relation between field and potential
15. Calculation of field from potential
16. Calculation of potential difference and work done in uniform field and field
17. Equipotential surface and its application
18. Electric dipole
19. Problems based on electric dipole moment
20. Field and potential due to electric dipole
21. Torque and potential energy in uniform field
22. Problems based on mechanical energy conservation of dipole
23. Problems based on SHM of dipole
24. Work done in rotating dipole against field
25. Dipole in non uniform field

Unit 8: Modern Physics

Chapter 1 : Atom

1. Rutherford's model
2. Bohr's model
3. Recoil of atom

Chapter 2: Dual nature of radiation and matter

1. Photo electric effect and its definition
2. Einstein photoelectric equation
3. Graph of Photo electric current versus anode potential
4. Effect of intensity on I-V graph
5. Effect of energy on I-V graph
6. Photon theory
7. Change in momentum, force and radiation pressure
8. De-Broglie hypothesis
9. Problems based on de-Broglie hypothesis

Chapter 3: Nuclei

1. Introduction and nuclear density
2. Binding energy
3. Binding energy per nucleon graph and its application
4. Conservation laws in nuclear reaction
5. Q value of a Nuclear reaction
6. Radioactivity
7. Types of radioactivity
8. Laws of radioactive disintegration
9. Average life
10. Carbon dating technique
11. Age of rock
12. Problems based on radioactivity

Unit 9: Semiconductor

1. Energy band diagram
2. Types of semiconductor
3. P N Junction diode and depletion region
4. Electric conduction in semiconductor
5. Biasing of P N Junction
6. Application of PN Junction
7. Half wave and full-wave rectifier
8. Transistor
9. Working of transistor
10. Transistor action in active mode
11. Transistor as an amplifier
12. Problems based on amplifier
13. Logic gates

Unit 10: Electromagnetic wave

1. Introduction
2. **To Be Updated Soon**