

XII- PHYSICS
VOLUME I AND II (E/M)
IMPORTANT AND CREATIVE
SHORT ANSWER QUESTIONS
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PREPARED BY

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UNIT -1

1. What is meant by quantisation of charges?
2. Write down Coulomb's law in vector form and mention what each term represents.
3. What are the differences between Coulomb force and gravitational force?
4. Write a short note on superposition principle.
5. Define 'electric field'.
6. What is meant by 'electric field lines'?
7. The electric field lines never intersect. Justify.
8. Define 'electric dipole'. Give the expression for the magnitude of its electric dipole moment and the direction.
9. Write the general definition of electric dipole moment for a collection of point charge.
10. Define 'electrostatic potential'.
11. What is an equipotential surface?
12. What are the properties of an equipotential surface?
13. Give the relation between electric field and electric potential.

14. Define 'electrostatic potential energy'.
15. Define 'electric flux'.
16. What is meant by electrostatic energy density?
17. Write a short note on 'electrostatic shielding'.
18. What is polarisation?
19. What is dielectric strength?
20. Define 'capacitance'. Give its unit.
21. What is corona discharge?
22. Difference between polar and non polar molecule
23. What is micro wave oven
24. Define torque in electric field
25. Define Dielectric
26. Application capacitor
27. What is charge

UNIT -2

1. Why current is a scalar?
2. Define current density.
3. Distinguish between drift velocity and mobility.
4. State microscopic form of Ohm's law.
5. State macroscopic form of Ohm's law.
6. What are ohmic and non ohmic devices?
7. Define electrical resistivity.
8. Define temperature coefficient of resistance.
9. Write a short note on superconductors?
10. What is electric power and electric energy?
11. Derive the expression for power $P=VI$ in electrical circuit.
12. Write down the various forms of expression for power in electrical circuit.
13. State Kirchhoff's current rule.
14. State Kirchhoff's voltage rule.
15. State the principle of potentiometer.
16. What do you mean by internal resistance of a cell?
17. State Joule's law of heating.
18. What is Seebeck effect?
19. What is Thomson effect?
20. What is Peltier effect?
21. State the applications of Seebeck effect
22. What is Electric cell
23. What is Battery
24. Define thermoelectric effect
25. Explain Cell series and parallel connection
26. Define 1 Kwh
27. What is Resistance
28. State Ohm's law

UNIT -3

1. What is magnetic field?
2. Define magnetic flux.
3. Define magnetic dipole moment.
4. State Coulomb's inverse law.
5. What is magnetic susceptibility?
6. State Biot-Savart's law.
7. What is magnetic permeability?
8. State Ampere's circuital law.
9. Compare dia, para and ferro-magnetism.
10. What is meant by hysteresis?
11. Define magnetic declination and inclination.
12. What is resonance condition in cyclotron?
13. Define ampere.
14. State Fleming's left hand rule.
15. Is an ammeter connected in series or parallel in a circuit? Why?
16. Explain the concept of velocity selector.
17. Why is the path of a charged particle not a circle when its velocity is not perpendicular to the magnetic field?
18. Give the properties of dia / para / ferromagnetic materials.
19. What happens to the domains in a ferromagnetic material in the presence of external magnetic field?
20. How is a galvanometer converted into (i) an ammeter and (ii) a voltmeter?
21. Define 1 ampere
22. State tangent law
23. The current sensitivity of a galvanometer can be increased by ?
24. Define sensitivity of Galvanometer
25. What is current sensitivity of Galvanometer
26. What is voltage sensitivity of Galvanometer
27. Types of magnets
28. Uses of magnets
29. What is solenoid

UNIT -4

1. What is meant by electromagnetic induction?
2. State Faraday's laws of electromagnetic induction.
3. State Lenz's law.
4. State Fleming's right hand rule.
5. How is Eddy current produced? How do they flow in a conductor?
6. Mention the ways of producing induced emf.
7. What for an inductor is used? Give some examples.
8. What do you mean by self-induction?
9. How will you define the unit of inductance?
10. What do you understand by selfinductance of a coil? Give its physical significance.
11. What is meant by mutual induction?
12. Give the principle of AC generator.
13. List out the advantages of stationary armature-rotating field system of AC generator.
14. What are step-up and step-down transformers?
15. Define average value of an alternating current.
16. How will you define RMS value of an alternating current?
17. What are phasors?

18. Define electric resonance.
19. What do you mean by resonant frequency?
20. How will you define Q-factor?
21. What is meant by wattless current?
22. Give any one definition of power factor.
23. What are LC oscillations
24. Difference between Electrical and mechanical system
25. An inductor blocks AC but it allows DC .why? and How
26. What are poly Ac generator
27. A spherical stone and a spherical metallic ball of same size and mass are dropped from the same height. Which one, a stone or a metal ball, will reach the Earth's surface first? Justify your answer. Assume that there is no air friction
28. A straight conducting wire is dropped horizontally from a certain height with its length along east – west direction. Will an emf be induced in it? Justify your answer.
29. Write the importance of Electromagnetic Induction
30. A cylindrical bar magnet is kept along the axis of a circular solenoid. If the magnet is rotated about its axis, find out whether an electric current is induced in the coil

UNIT -5

1. What is displacement current?
2. What are electromagnetic waves?
3. Write down the integral form of modified Ampere's circuital law.
4. Write notes on Gauss' law in magnetism.
5. Give two uses each of (i) IR radiation, (ii) Microwaves and (iii) UV radiation.
6. What are Fraunhofer lines? How are they useful in the identification of elements present in the Sun?
7. Write notes on Ampere-Maxwell law.
8. Why are e.m. waves non-mechanical?

UNIT -6

1. What is angle of deviation due to reflection?
2. Derive the relation between f and R for a spherical mirror.
3. What are the Cartesian sign conventions for spherical mirrors?
4. What is optical path? Obtain the equation for optical path.
5. State Snell's law/law of refraction.
6. What is angle of deviation due to refraction?
7. What is principle of reversibility?
8. What is relative refractive index?
9. Obtain the equation for apparent depth.
10. Why do stars twinkle?
11. What are critical angle and total internal reflection?
12. Obtain the equation for critical angle.
13. Explain the reason for the glittering of diamond.
14. What are mirage and looming?
15. Write a short note on the prisms making use of total internal reflections.
16. What is Snell's window?
17. How does an endoscope work?
18. What are primary focus and secondary focus of a lens?
19. What are the sign conventions followed for lenses?
20. Arrive at lens equation from lens maker's formula
21. Obtain the equation for lateral magnification of thin lens.
22. What is power of a lens?

23. Derive the equation for effective focal length for lenses in contact.
24. What is angle of minimum deviation?
25. What is dispersion?
26. How are rainbows formed?
27. What is Rayleigh's scattering?
28. Why does sky appear blue?
29. What is the reason for reddish appearance of sky during sunset and sunrise?
30. Why do clouds appear white?
31. Prove that for the same incident light when a reflecting surface is tilted by an angle θ , the reflected light will be tilted by an angle 2θ .
32. What is the height of the mirror needed for a person to see his/her image fully on the mirror?
33. Define speed of light

UNIT -7

1. What are the salient features of corpuscular theory of light?
2. What are the important points of wave theory of light?
3. What is the significance of electromagnetic wave theory of light?
4. Write a short note on quantum theory of light.
5. Define wavefront.
6. What are the shapes of wavefront for (a) source at infinite, (b) point source and (c) line source?
7. State Huygens' principle.
8. What is interference of light?
9. What is phase of a wave?
10. Obtain the relation between phase difference and path difference.
11. What are coherent sources?
12. How does wavefront division provide coherent sources?
13. What is intensity (or) amplitude division?
14. How do source and images behave as coherent sources?
15. What is bandwidth of interference pattern?
16. What is diffraction?
17. Differentiate between Fresnel and Fraunhofer diffraction.
18. Discuss the special cases on first minimum in Fraunhofer diffraction.
19. What is Fresnel's distance? Obtain the equation for Fresnel's distance.
20. Mention the differences between interference and diffraction.
21. What is a diffraction grating?
22. What is resolution?
23. What is Rayleigh's criterion?
24. What is the difference between resolution and magnification?
25. What is polarisation?
26. Differentiate between polarised and unpolarised light
27. Discuss polarisation by selective absorption.
28. What are polariser and analyser?
29. What are plane polarised, unpolarised and partially polarised light?
30. State and obtain Malus' law.
31. List the uses of polaroids.

32. State Brewster's law.
33. What is angle of polarisation and obtain the equation for angle of polarisation.
34. Discuss about pile of plates.
35. What is double refraction?
36. Mention the types of optically active crystals with example.
37. Discuss about Nicol prism.
38. How is polarisation of light obtained by scattering of light?
39. What are near point and normal focusing?
40. Why is oil immersed objective preferred in a microscope?

UNIT -8

1. Why do metals have a large number of free electrons?
2. Define work function of a metal. Give its unit.
3. What is photoelectric effect?
4. How does photocurrent vary with the intensity of the incident light?
5. Give the definition of intensity of light according to quantum concept and its unit.
6. How will you define threshold frequency?
7. What is a photo cell? Mention the different types of photocells.
8. Write the expression for the de Broglie wavelength associated with a charged particle of charge q and mass m , when it is accelerated through a potential V .
9. State de Broglie hypothesis.
10. Why we do not see the wave properties of a baseball?
11. A proton and an electron have same kinetic energy. Which one has greater de Broglie wavelength? Justify.
12. Write the relationship of de Broglie wavelength λ associated with a particle of mass m in terms of its kinetic energy K .
13. An electron and an alpha particle have same kinetic energy. How are the de Broglie wavelengths associated with them related?
14. Define stopping potential.
15. What is surface barrier?
16. Mention the two features of x-ray spectra, not explained by classical electromagnetic theory.
17. What is Bremsstrahlung?
18. Applications X rays
19. What is X rays
20. Define 1 eV

UNIT -9

1. What are cathode rays?.
2. Write the properties of cathode rays.
3. Give the results of Rutherford alpha scattering experiment.
4. Write down the postulates of Bohr atom model.
5. What is meant by excitation energy.
6. Define the ionization energy and ionization potential.
7. Write down the draw backs of Bohr atom model.
8. What is distance of closest approach?
9. Define impact parameter.
10. Write a general notation of nucleus of element X. What does each term denote?
11. What is isotope? Give an example.
12. What is isotone? Give an example.
13. What is isobar? Give an example.
14. Define atomic mass unit u .

15. Show that nuclear density is almost constant for nuclei with $Z > 10$.
16. What is mass defect?
17. What is binding energy of a nucleus? Give its expression.
18. Calculate the energy equivalent of 1 atomic mass unit.
19. Give the physical meaning of binding energy per nucleon.
20. What is meant by radioactivity?
21. Give the symbolic representation of alpha decay, beta decay and gamma emission.
22. In alpha decay, why the unstable nucleus emits ${}_2\text{He}^4$ nucleus? Why it does not emit four separate nucleons?
23. What is mean life of a radia active nucleus? Give the expression.
24. What is half-life of a radia active nucleus? Give the expression.
25. What is meant by activity or decay rate? Give its unit.
26. Define curie.
27. What are the constituent particles of neutron and proton?
28. A very interesting application of alpha decay is in smoke detectors which prevent us from any hazardous fire.
29. What is nucleus

UNIT -10

1. Define forbidden energy gap.
2. Why is temperature co-efficient of resistance negative for semiconductor?
3. What do you mean by doping?
4. Distinguish between intrinsic and extrinsic semiconductors.
5. A diode is called as a unidirectional device. Explain.
6. What do you mean by leakage current in a diode?
7. Draw the input and output waveforms of a full wave rectifier.
8. Distinguish between avalanche breakdown and Zener breakdown.
9. Give the Barkhausen conditions for sustained oscillations.
10. Explain the current flow in a NPN transistor.
11. What are logic gates?
12. Explain the need for a feedback circuit in a transistor oscillator.
13. Write a short note on diffusion current across p-n junction.
14. What is meant by biasing? Mention its types.
15. Why can't we interchange the emitter and collector even though they are made up of the same type of semiconductor material?
16. Why are NOR and NAND gates called universal gates?
17. Define barrier potential.
18. What is rectification?
19. List the applications of light emitting diode.
20. Give the principle of solar cells.
21. What is an integrated circuit?
22. What is modulation?
23. Define bandwidth of transmission system.
24. What do you mean by skip distance?
25. Give applications of RADAR.
26. What is mobile communication?
27. Explain centre frequency or resting frequency in frequency modulation.
28. What does RADAR stand for?
29. Fiber optic communication is gaining popularity among the various transmission media -justify.
30. What is ideal diode

UNIT -11

1. Distinguish between Nanoscience and Nanotechnology.
2. What is the difference between Nano materials and Bulk materials?
3. Give any two examples for “Nano” in nature.
4. Mention any two advantages and disadvantages of Robotics.
5. Why steel is preferred in making Robots?
6. What are black holes?
7. What are sub atomic particles?

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