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Important questions for public exam 2024-25

XII-PHYSICS

Important Detail :

Unit –1 Electrostatics

- 1) Derive an expression for electrostatic potential due to an electric dipole.
- 2) Obtain the expression for electric field due to an infinitely long charged wire.
- 3) Obtain the expression for electric field due to a charged infinite plane sheet.
- 4) Explain in detail the effect of a dielectric placed in a parallel plate capacitor.
- 5) Derive an expression for resultant capacitance when capacitors are connected in series and parallel.
- 6) Explain in detail the construction and working of a Van de Graaff generator.

Unit –2 Current Electricity

- 7) Explain the equivalent resistance of a series and parallel resistor network.
- 8) Obtain the condition for bridge balance in wheatstone's bridge.
- 9) Describe the microscopic model of current and obtain microscopic form of Ohm's law.
- 10) How the emf of two cells are compared using potentiometer?
- 11) Explain the determination of the internal resistance of a cell using potentiometer.

Unit –3 Magnetism & magnetic effects of electric current

- 12) Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.
- 13) Discuss the working of cyclotron in detail.
- 14) Derive the expression for the force between two parallel current carrying conductor.
- 15) Derive the expression for the force on a current carrying conductor in a magnetic field.
- 16) Explain about working of moving coil galvanometer.

Unit –4 Electromagnetic induction

- 17) Show that the mutual inductance between a pair of coils same $M_{12} = M_{21}$.
- 18) Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle.
- 19) Explain the construction and working of transformer.
- 20) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

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Unit – 5 Electromagnetic Waves

- 21) Write down the Maxwell equations in integral form.
- 22) Explain the types of emission spectrum.
- 23) Explain the types absorption spectrum.

Unit – 6 Ray Optics

- 24) Derive the mirror equation and the equation for lateral magnification.
- 25) Describe the Fizeau's method to determine the speed of light.
- 26) Derive the equation for refraction at single spherical surface.
- 27) Obtain lens maker's formula and mention its significance.
- 28) What is dispersion? Obtain the equation for dispersive power of a medium.

Unit – 7 Wave Optics

- 29) Prove law of reflection using Huygens' principle.
- 30) Prove law of refraction using Huygens' principle.
- 31) Obtain the equation for resultant intensity due to interference of light.
- 32) Obtain the equation for path difference and bandwidth in Young's double slit experiment.
- 33) Discuss the diffraction at single slit and obtain the condition for nth minimum.
- 34) Explain about compound microscope and obtain the equation for the magnification.

Unit – 8 Dual nature of radiation & matter

- 35) What do you mean by electron emission? Explain briefly various methods of electron emission.
- 36) Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons.
- 37) List out the laws of photoelectric effect.
- 38) Give the construction and working of photo emissive cell.
- 39) Briefly explain the principle and working of electron microscope.
- 40) How do we obtain characteristics X – ray spectra?

Unit – 9 Atomic and Nuclear physics

- 41) Explain the J.J. Thomson experiment to determine the specific charge of electron.
- 42) Discuss the Millikan's oil drop experiment to determine the charge of an electron.
- 43) Explain the variation of average binding energy with the mass number using graph and discuss about its feature.
- 44) Obtain the law of radioactivity.
- 45) Derive the expression for radius and energy of 'n'th orbit using bohr theory

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Unit – 10 Electronics & Communication

- 46) Draw the circuit diagram of a half wave, full wave rectifier and explain its working.
- 47) Describe the function of a transistor as an amplifier with the neat circuit diagram.
Sketch the input and output waveforms.
- 48) Explain the working principle of a solar cell. Mention its application.
- 49) State and prove de Morgan's first and second theorem.
- 50) Explain the amplitude modulations with necessary diagrams.

Important 3marks :

Unit –1 Electrostatics

- 1) Derive an expression for the torque experienced by a dipole due to a uniform electric field.
- 2) Obtain an expression for potential energy due to a collection of three point charges which are separated by finite distances.
- 3) Obtain the expression for the capacitance for a parallel plate capacitor.
- 4) Obtain the expression for energy stored in a parallel plate capacitor.
- 5) Derive an expression for electrostatic potential due to a point charge.

Unit –2 Current Electricity

- 6) Explain the determination of the internal resistance of a cell using voltmeter.
- 7) State kirchhoff's current rule and voltage rule.

Unit –3 Magnetism & magnetic effects of electric current

- 8) Find the magnetic field due to a long straight conductor using Ampere's circuital law.
- 9) Discuss the conversion of a galvanometer into an Ammeter and voltmeter.
- 10) Give an account of magnetic Lorentz force.
- 11) Give the properties of dia / para / ferro magnetic materials.

Unit –4 Electromagnetic induction

- 12) Obtain an expression for motional emf from Lorentz force.
- 13) How will you induce an emf by changing the area enclosed by the coil?
- 14) Mention the various energy losses in a transformer.
- 15) Prove that total energy is conserved during LC oscillations.
- 16) List the advantages and disadvantages of AC over DC.

Unit – 5 Electromagnetic Waves

- 17) Write a short notes on i) micro waves ii) X – Rays iii) Radio waves iv) visible spectrum
- 18) Write down the properties of electromagnetic waves.

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Unit – 6 Ray Optics

- 19) Obtain the equation for lateral displacement of light passing through a glass slab.
- 20) Derive the relation between f and R for a spherical mirror.
- 21) Obtain the equation for apparent depth.
- 22) What is optical path? obtain the equation for optical path.
- 23) What is total internal reflection? Give the conditions for total internal reflection.

Unit – 7 Wave Optics

- 24) Differentiate between Fresnel and Fraunhofer diffraction.
- 25) What is Fresnel's distance? Obtain the equation for Fresnel's distance.
- 26) State and prove Brewster's law.
- 27) List the uses of polaroids.

Unit – 8 Dual nature of radiation & matter

- 28) Derive an expression for de Broglie wavelength of electrons.
- 29) List out the characteristics of photons.
- 30) Give the applications of photocell.

Unit – 9 Atomic and Nuclear physics

- 31) Discuss the spectral series of hydrogen atom.
- 32) Discuss the alpha decay, Gamma emission process with example.

Unit – 10 Electronics & Communication

- 33) Transistor functions as a switch. Explain.
- 34) Explain how the zener diode act as a voltage regulator?
- 35) Distinguish between avalanche breakdown and Zener breakdown.

Important Short answer :

Unit –1 Electrostatics

- 1) What are the differences between Coulomb force and gravitational force.
- 2) Define electric field.
- 3) The electric field lines never intersect .Justify.
- 4) Define electric dipole .Give the expression for the magnitude of its electric dipole moment and the direction.
- 5) Define electrostatic potential.
- 6) What is equipotential surface?
- 7) What are the properties of an equipotential surface?
- 8) Define electric flux. Give its unit.
- 9) What is electric polarisation?
- 10) What is dielectric strength?
- 11) Define capacitance of a capacitor.
- 12) What is corona discharge or action at points .

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Unit –2 Current Electricity

- 13) Why current is a scalar?
- 14) Define current density.
- 15) Distinguish between drift velocity and mobility.
- 16) What are Ohmic and non ohmic materials?
- 17) Define electrical resistivity.
- 18) Define temperature coefficient of resistance.
- 19) State Kirchoff's first rule (current rule / Junction rule).
- 20) State Kirchoff's second rule.(Voltage rule / Loop rule).
- 21) Explain the principle of potentiometer.
- 22) What do you mean by internal resistance of a cell?
- 23) State Joule's law of heating.
- 24) What is seebeck effect?
- 25) What is peltier effect?
- 26) What is Thomson effect?
- 27) State the applications of Seebeck effect.

Unit –3 Magnetism & magnetic effects of electric current

- 28) What is meant by electromagnetic induction?
- 29) Define magnetic dipole moment.
- 30) State Coulomb's inverse law.
- 31) State Biot savart's law.
- 32) State Ampere's circuital law.
- 33) What is meant by hysteresis?
- 34) What is resonance condition in cyclotron?
- 35) Define ampere.
- 36) State Fleming's left hand rule.
- 37) Is an ammeter connected in series or parallel in a circuit why ?
- 38) Give the properties of dia / para / ferro magnetic materials.

Unit –4 Electromagnetic induction

- 39) State Faraday's laws of electromagnetic induction.
- 40) State Lenz's law.
- 41) State Fleming's right hand rule.
- 42) Mention the ways of producing induced emf.
- 43) What do you mean by self induction?
- 44) What is meant by mutual induction?
- 45) Give the principle of AC generator.
- 46) Define average value of an alternating current.
- 47) How will you define RMS value of an alternating current?
- 48) How will you define Q- factor?
- 49) Define power factor.
- 50) What is meant by Wattless current?

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Unit – 5 Electromagnetic Waves

- 51) What is displacement current?
- 52) What are electromagnetic waves?
- 53) Give two uses of i) IR radiation ii) UV radiation iii) micro waves.
- 54) What are Fraunhofer lines ? How are they useful in identification of elements present in sun?
- 55) Why are e.m waves non-mechanical?

Unit – 6 Ray Optics

- 1) State Snell's law / law of refraction.
- 2) Why do stars twinkle?
- 3) What are critical angle and total internal reflection?
- 4) What are primary focus and secondary focus of a lens?
- 5) What is power of lens?
- 6) What is angle of minimum deviation?
- 7) What is dispersion?
- 8) How are rainbows are formed?
- 9) What is Rayleigh's scattering?
- 10) Why does sky appear blue?
- 11) What is the reason for reddish appearance of sky during sunset and sunrise?
- 12) Why do clouds appear white?

Unit – 7 Wave Optics

- 13) Define wavefront.
- 14) State Huygen's principle.
- 15) What is the interference of light?
- 16) What are coherent sources ?
- 17) What is diffraction?
- 18) Mention the difference between interference and diffraction.
- 19) What is polarisation?
- 20) State Brewster's law.
- 21) What are the advantages and disadvantages of are reflecting telescope?
- 22) What is a myopia? What is its remedy?
- 23) What is hypermetropia? What is its remedy?
- 24) What is astigmatism? What its remedy?
- 25) What is presbyopia?

Unit – 8 Dual nature of radiation & matter

- 26) Define work function of a metal. Give its unit.
- 27) What is photoelectric effect?
- 28) How will you define threshold frequency?
- 29) What is photo cell? Mention the different types of photocells?
- 30) State de Broglie hypothesis.

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- 31) A proton and electron have same kinetic energy . Which one has greater de Broglie wavelength. Justify.
- 32) Define stopping potential.
- 33) What is surface barrier?

Unit – 9 Atomic and Nuclear physics

- 34) What is meant by excitation energy?
- 35) Define the ionization energy and ionization potential.
- 36) What is distance of closest approach?
- 37) Define impact parameter.
- 38) What is isotope? Give an example.
- 39) What is isotone? Give an example.
- 40) What is isobar? Give an example.
- 41) Define atomic mass unit u.
- 42) What is mass defect?
- 43) Calculate the energy equivalent of 1 atomic mass unit.
- 44) What is meant by radioactivity?
- 45) What is mean life of a radio active nucleus ? Give an expression.
- 46) What is half life of a radio active nucleus ? Give an expression.
- 47) What is meant by activity or decay rate ? Give its unit.
- 48) Define curie.
- 49) What are the constituent particles of neutron and proton?

Unit – 10 Electronics & Communication

- 50) What do you mean by doping?
- 51) Distinguish between intrinsic and extrinsic semiconductors.
- 52) A diode is called as a unidirectional device. Explain.
- 53) What are logic gates?
- 54) What is meant by biasing ? Mention its types.
- 55) Why can't we interchange the emitter and collector even though they are made up of same type of semiconductor material?
- 56) Why are NOR and NAND gates called universal gates?
- 57) Define barrier potential.
- 58) List the application of light emitting diode.
- 59) What is modulation?
- 60) What do you mean by skip distance?

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