SIR CV RAMAN COACHING CENTRE -2025-IDAAPADI,SALEM

XLL PHYSICS ALL UNITS - IMPORTANT QUESTIONS -2025

2 -MARK ,3 -MARK AND 5- MARK [ALL UNITS]

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Unit -1

ELECTROSTATICS

Short answer questions

1. What are the differences between Coulomb force and gravitational force?
2. Write a short note on superposition principle
3. The electric field lines never intersect. Justify.
4. Define 'electric dipole'.
5. Define 'electrostatic potential"
6. Give the relation between electric field and electric potential
7. Define 'electric flux
8. What is meant by electrostatic energy density?
9. Define 'capacitance'. Give its unit
10. What is corona discharge?
11. Discuss the basic properties of electric charges.
12. Explain in detail Coulomb's law and its various aspects
13. **Difference between polar and non polar molecule [inside]**

Long answer questions

1. Explain in detail the construction and working of a Van de Graaff generator.
2. Derive the expression for resultant capacitance, when capacitors are connected in series and in parallel
3. Obtain the expression for capacitance for a parallel plate capacitor.
4. Obtain the expression for energy stored in the parallel plate capacitor.
5. Obtain the expression for electric field due to an uniformly charged spherical shell
6. Obtain the expression for electric field due to an charged infinite plane sheet
7. Obtain the expression for electric field due to an infinitely long charged wire
8. Derive an expression for electrostatic potential due to an electric dipole.
9. Derive an expression for electrostatic potential due to a point charge.
10. Derive an expression for the torque experienced by a dipole due to a uniform electric field
11. Calculate the electric field due to a dipole on its axial line and equatorial plane.

Unit – 2

CURRENT ELECTRICITY

Short answer questions

1.Why current is a scalar?
2.Define current density
3.Distinguish between drift velocity and mobility.
4. Define electrical resistivity
5. Define temperature coefficient of resistance.
6. Write a short note on superconductors?
7. What do you mean by internal resistance of a cell?
8. State Joule's law of heating.
9. What is Seebeck effect?
10. What is Thomson effect?
11.What is Peltier effect?
12. State the applications of Seebeck effect

Long answer questions

1. Describe the microscopic model of current and obtain microscopic form of Ohm's law.
2. Obtain the macroscopic form of Ohm's nlaw from its microscopic form and discuss its limitation.
3. Explain the equivalent resistance of a series and parallel resistor network.
4. Explain the determination of the internal resistance of a cell using voltmeter
5. State and explain Kirchhoff 's rules.
6. Obtain the condition for bridge balance in Wheatstone's bridge.
7. Explain the determination of unknown resistance using meter bridge.
8. How the emf of two cells are compared using potentiometer?
9**. Explain the equivalent cell of a series and parallel cell network [inside]**

Unit – 3

MAGNETISM AND MAGNETIC EFFECTS OF ELECTRIC CURRENT

Short answer questions

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. 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. Give the properties of dia / para / ferromagnetic materials
18. How is a galvanometer converted into (i) an ammeter and (ii) a voltmeter
19.**State tangent law [inside]**

Long answer questions

1. Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current using Biot-Savart law.
2.Obtain a relation for the magnetic field at a point along the axis of a circular coil carrying current using Biot-Savart law.
3. Compute the torque experienced by a magnetic needle in a uniform magnetic field.
4 Calculate the magnetic field at a point on the axial line of a bar magnet.
5. Obtain the magnetic field at a point on the equatorial line of a bar magnet.
6. Find the magnetic field due to a long straight conductor using Ampere's circuital law.
7.Discuss the working of cyclotron in detail.
8. What is tangent law? Discuss in detail.
9. Derive the expression for the torque on a current-carrying coil in a magnetic field.
10. Discuss the conversion of galvanometer into an ammeter and also a voltmeter
11. Derive the expression for the force between two parallel, current-carrying conductors.
12. Give an account of magnetic Lorentz force
13. Compare the properties of soft and hard ferromagnetic materials.
14. Derive the expression for the force on a current-carrying conductor in a magnetic field.

Unit – 4

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

Short answer questions

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. Define average value of an alternating current.
9. How will you define RMS value of an alternating current?
10. What are phasors?

11. Define electric resonance.
12. What do you mean by resonant frequency?
13. How will you define Q-factor?
14. What is meant by wattles current?
15. Give any one definition of power factor.
16. What are LC oscillations?

Long answer questions

1.Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$).
2. How will you induce an emf by changing the area enclosed by the coil?
3. Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle.
4,Elaborate the standard construction details of AC generator.
5. Explain the working of a single-phase AC generator with necessary diagram.
6. How are the three different emfs generated in a three-phase AC generator? Show the graphical ,representation of these three emfs.
7. Explain the construction and working of transformer
8. Mention the various energy losses in a transformer
9. Find out the phase relationship between voltage and current in a pure inductive circuit.
10. Derive an expression for phase angle between the applied voltage and current in a series RLC circuit
11. Obtain an expression for average power of AC over a cycle. Discuss its special cases.
12. Prove that the total energy is conserved during LC oscillations

Unit -5

ELECTROMAGNETIC WAVES

Short answer questions

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

Long answer questions

1. Write down Maxwell equations in integral form.
2. Write short notes on (a) microwave (b) X-ray (c) radio waves (d) visible spectrum
3.Discuss the Hertz experiment.

4.Explain the importance of Maxwell's correction.
5.Write down the properties of electromagnetic waves.
6.Explain the types of emission spectrum.
7. Explain the types of absorption spectrum.

Unit - 6

RAY OPTICS

Short answer questions

1.Derive the relation between f and R for a spherical mirror
2. What is optical path? Obtain the equation for optical path
3. State Snell's law/law of refraction
4. Obtain the equation for apparent depth
5. Why do stars twinkle?
6. What are critical angle and total internal reflection?
7. Obtain the equation for critical angle.
8.. Explain the reason for the glittering of diamond
9. How does an endoscope work?
10. Derive the equation for effective focal length for lenses in contact
11. How are rainbows formed?
12.. What is Rayleigh's scattering?
13. Why does sky appear blue?
14.. What is the reason for reddish appearance of sky during sunset and sunrise?
15.Why do clouds appear white
16. What is dispersion?

Long answer questions

1.Derive the mirror equation and the equation for lateral magnification.
2.Describe the Fizeau's method to determine the speed of light
3 Derive the equation for acceptance angle and numerical aperture of optical fibre
4.Obtain lens maker's formula and mention its significance.
5.What is dispersion? Obtain the equation for dispersive power of a medium.

Unit – 7

WAVE OPTICS

Short answer questions

1. State Huygens' principle.
2. What is interference of light
3.Obtain the relation between phase difference and path difference.
4.What are coherent sources
5.Differentiate between Fresnel and Fraunhofer diffraction.
6.What is Fresnel's distance? Obtain the equation for Fresnel's distance.

7.Mention the differences between interference and diffraction.
8. What is the difference between resolution and magnification
9. Differentiate between polarised and unpolarised light
10. State and obtain Malus' law.
11. List the uses of polaroids
12. State Brewster's law
13 Discuss about pile of plates.
14 Mention the types of optically active crystals with example.
15. Discuss about Nicol prism
16. What are near point and normal focusing?
17. Why is oil immersed objective preferred in a microscope? What is myopia? What is its remedy?
18. What is hypermetropia? What is its remedy?
19. What is astigmatism? What is its remedy?
20. What is presbyopia?

Long answer questions

1.Prove law of reflection using Huygens' principle.
2.Obtain the equation for resultant intensity due to interference of light.
3.Explain the Young's double slit experimental setup and obtain the equation for path difference.
4. Obtain the equation for bandwidth in Young's double slit experiment.
5. Explain about compound microscope and obtain the equation for the magnification.
6. Explain the experimental determination of refractive index of the material of the prism using spectrometer.

Unit -8

DUAL NATURE OF RADIATION AND MATTER

Short answer questions

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 will you define threshold frequency?
5. What is a photo cell? Mention the different types of photocells
6. 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*.
7. State de Broglie hypothesis.
8. Why we do not see the wave properties of a baseball?
9. A proton and an electron have same kinetic energy. Which one has greater de Broglie wavelength? Justify.
10. An electron and an alpha particle have same kinetic energy. How are the de Broglie wavelengths associated with them related?
11. Define stopping potential.

12. What is surface barrier?
13. Mention the two features of x-ray spectra, not explained by classical electromagnetic theory.
14 What is Bremsstralung?

Long answer questions

1.What do you mean by electron emission? Explain briefly various methods of electron emission.
2. Briefly discuss the observations of Hertz, Hallwachs and Lenard.
3. Explain the effect of potential difference on photoelectric current.
4. Explain how frequency of incident light varies with stopping potential.
5. List out the laws of photoelectric effect Obtain Einstein's photoelectric equation with necessary explanation.
6. Explain experimentally observed facts of photoelectric effect with the help of Einstein's explanation.
7**.** Give the construction and working of photo emissive cell.
8. Derive an expression for de Broglie wavelength of electrons.
9. Briefly explain the principle and working of electron microscope.
10 Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons.
11. List out the characteristics of photons.
12. Give the applications photocell.
13. How do we obtain characteristic x-ray spectra

Unit – 9

ATOMIC AND NUCLEAR PHYSICS

Short answer questions

1. What are cathode rays?.
2. Write the properties of cathode rays.
3.Write down the postulates of Bohr atom model.
4. What is meant by excitation energy.
5. Define the ionization energy and ionization potential
6.What is distance of closest approach?
7.Define impact parameter
8. What is Isotope and isotone? Give an example.
9.What is isobar? Give an example.
10. Define atomic mass unit *u*.
11. Show that nuclear density is almost constant for nuclei with $Z > 10$.
12. What is mass defect?
13. What is binding energy of a nucleus? Give its expression.
14. Calculate the energy equivalent of 1 atomic mass unit.
15. Give the physical meaning of binding energy per nucleon.
16. What is meant by radioactivity?
17.Give the symbolic representation of alpha decay, beta decay and gamma emission
18,What is mean life of a radia active nucleus? Give the expression.

19.. What is half-life of a radia active nucleus? Give the expression.
20. What is meant by activity or decay ,rate? Give its unit.
21. Define curie.
22. What are the constituent particles of neutron and proton?

23. In alpha decay, why the unstable nucleus emits $^{4}_{2}He$ nucleus? Why it does not emit four separate nucleons?

Long answer questions

1.Explain the J.J. Thomson experiment to determine the specific charge of electron.
2. Discuss the Millikan's oil drop experiment to determine the charge of an electron.
3. Derive the energy expression for an eletron is the hydrogen atom using Bohr atom model.
4. Discuss the spectral series of hydrogen atom.
5. Explain the variation of average binding energy with the mass number using graph and discuss about its features
6. Obtain the law of radioactivity
7.Explain the idea of carbon dating
8. Describe the working of nuclear reactor with a block diagram
9.Explain alpha decay ,beta decay ,gamma decay

Unit – 10

ELECTRONICS AND COMMUNICATION

Short answer questions

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 waveformsof 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. Why are NOR and NAND gates calleduniversal gates?
13. Define barrier potential.
14 What is rectification?
15. List the applications of light emittingdiode.
16. Give the principle of solar cells.
17. What is an integrated circuit?
18. What is modulation?
19. Define bandwidth of transmission system.

20. What do you mean by skip distance?
21. Give applications of RADAR.
22 What is mobile communication?
23 Explain centre frequency or resting frequency in frequency modulation.
24. What does RADAR stand for?
25 Fiber optic communication is gaining popularity among the various transmission media –justify

Long answer questions

1. Draw the circuit diagram of a half wave rectifier and explain its working.
2.Explain the construction and working of a full wave rectifier.
3. What is an LED? Give the principle of its operation with a diagram.
4. Write a note on photo diode.
5. Sketch the static characteristics of a common emitter transistor and bring out the essential features of input and output characteristics.
6. Transistor functions as a switch. Explain.
7. Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output wave forms.
8. Give circuit symbol, logical operation, truth table, and Boolean expression of
i) AND gate ii) OR gate iii) NOT gate iv) NAND gate v) NOR gate and vi) EX-OR gate.
9 State and prove De Morgan's first and second theorem.
10. Explain the ampitude modulation with necessary diagrams.
11. Explain the basic elements of communication system with the necessary block diagram.
12 Explain the ground wave propagation and space wave propagation ofelectromagnetic waves through space.
13. List out the advantages and limitations of frequency modulation.
14. What is meant by satellite communication? Give its applications
15..Explain the working principle of a solar cell. Mention its applications.

Unit -11

RECENT DEVELOPMENTS IN PHYSICS

Short answer questions

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?

Long answer questions

1. Discuss the applications of Nanomaterials in various fields.
2. What are the possible harmful effects of usage of Nanoparticles? Why?
3. Discuss the functions of key components in Robots?
4. Elaborate any two types of Robots with relevant examples.
5. Comment on the recent advancement in medical diagnosis and therapy.

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