

V S A Q

SECTION - A

1.
 - (i) What is dispersion? Which colour gets relatively more dispersed?
 - (ii) What is Myopia? How can it be corrected?
 - (iii) What is hypermetropia? How can it be corrected?
 - (iv) What is optical density and how is it different from mass density?
 - (v) Define 'power' of a convex lens. What is its unit?
 - (vi) Define focal length and radius of curvature of a concave lens.
 - (vii) Draw a neat labelled diagram of a simple microscope.
 - (viii) The focal length of a concave lens is 30 cm. Where should an object be placed so that its image is $\frac{1}{10}$ of its size?

2.
 - (i) Define magnetic inclination or angle of dip.
 - (ii) Define magnetic declination.
 - (iii) Define Magnetic susceptibility. Mention its unit.
 - (iv) What happens to compass needles at the Earth's pole?
 - (v) What are units of magnetic moment, magnetic induction and magnetic field?
 - (vi) Magnetic lines form continuous closed loops. Why?
 - (vii) What is the magnetic moment associated with a solenoid?
 - (viii) Classify the following materials with regard to magnetism.
Manganese, Cobalt, Nickel, Bismuth, Oxygen, Copper

3.
 - (i) Distinguish between ammeter and voltmeter.
 - (ii) How do you convert a moving coil galvanometer into an ammeter?
 - (iii) How do you convert a moving coil galvanometer into a voltmeter?
 - (iv) What is the principle of a moving coil galvanometer?
 - (v) What is the smallest value of current that can be measured with a moving coil galvanometer?
 - (vi) What is the importance of Oersted's experiment?
 - (vii) State Ampere's law and Biot-Savart law.
 - (viii) A circular coil of radius r having N turns carries a current i . What is its magnetic moment?
 - (ix) What is the force on a conductor of length L carrying a current i placed in a magnetic field of induction B ? When does it become maximum?
 - (x) What is the force on a charged particle of charge q moving with a velocity v in a uniform magnetic field of induction B ? When does it become maximum?

4.
 - (i) What is transformer ratio?
 - (ii) What is the phenomenon involved in the working of a transformer?
 - (iii) What type of transformer is used in a 6V bed lamp?
 - (iv) Write the expression for the reactance of (i) an inductor (ii) a capacitor.
 - (v) Define power factor. On which factor does power factor depend.
 - (vi) What is the phase difference between AC emf and current in the following
Pure resistor, pure inductor and pure capacitor
 - (vii) A transformer converts 200 V ac into 2000 V ac. Calculate the number of turns in the secondary if the primary has 10 turns.

5.
 - (i) Give two uses of infrared rays.
 - (ii) Microwaves are used in Radars. Why?
 - (iii) What is the average wavelength of X-rays?
 - (iv) What are applications of microwaves?
 - (v) If the wavelength of electromagnetic radiation is doubled, what happens to the energy of photon?

6.
 - (i) What are cathode rays?
 - (ii) What is work function?
 - (iii) Give example of photosensitive substances. Why are they called so?

7.
 - (i) What is photoelectric effect?
 - (ii) Write down Einstein's photoelectric equation.
 - (iii) Write down deBroglie's relation and explain the terms there in.
 - (iv) State Heisenberg's Uncertainty Principle.
 - (v) An electron, an α -particle, and a proton have the same kinetic energy. Which of these particles has the shortest de Broglie wavelength?

8.
 - (i) Draw the circuit symbols for p-n-p transistors.
 - (ii) Define amplifier and amplification factor.
 - (iii) Which gates are called universal gates?
 - (iv) What is Zener voltage (V_z) and how will a Zener diode be connected in circuits generally?
 - (v) What is an n-type semiconductor? What are the majority and minority charge carriers in it?
 - (vi) What are intrinsic and extrinsic semi-conductors?
 - (vii) What is a p-type semiconductor? What are the majority and minority charge carriers in it?
 - (viii) What is a p-n junction diode? Define depletion layer.
 - (ix) How is a battery connected to a junction diode in (i) forward and (ii) reverse bias?
 - (x) In which bias can a Zener diode be used as voltage regulator?
 - (xi) Write the expressions for the efficiency of a full wave rectifier and a half wave rectifier.
 - (xii) What is the maximum percentage of rectification in half wave and full wave rectifiers?

9.
 - (i) Define modulation. Why is it necessary?
 - (ii) Mention the basic methods of modulation.
 - (iii) What is 'World Wide Web' (WWW)?
 - (iv) Which type of communication is employed in Mobile Phones?
 - (v) Mention the frequency range of speech signals.
 - (vi) What is sky wave propagation?
 - (vii) What are the basic blocks of communication system?
 - (viii) Mention various parts of the ionosphere.

10.
 - (i) A bar magnet of length 0.1m and with a magnetic moment of 5 Am^2 is placed in a uniform magnetic field of intensity 0.4 T, with its axis making an angle of 60° with the field. What is the torque on the magnet?
 - (ii) The horizontal component of the earth's magnetic field at a certain place is $2.6 \times 10^{-5} \text{ T}$ and the angle of dip is 60° . What is the magnetic field of the earth at this location.
 - (iii) A coil of 20 turns has an area of 800 mm^2 and carries a current of 0.5 A. If it is placed in a magnetic field of intensity 0.3 T with its plane parallel to the field. What is the torque that it experiences?
 - (iv) The force between two magnetic poles separated by a distance d in air is F. At what distance between them does the force become doubled?

SAQ

SECTION - B

11. (i) Define critical angle. Explain total internal reflection using neat diagram.
(ii) Why does the setting sun appear red?
(iii) Explain the formation of a rainbow.
(iv) Explain the formation of a mirage.
(v) With a neat labelled diagram explain the formation of image in a simple microscope.
(vi) Define focal length of a concave mirror. Prove that the radius of curvature of a concave mirror is double its focal length.
12. (i) How do you determine the resolving power of your eye?
(ii) Explain Doppler effect in light. Distinguish between red shift and blue shift.
(iii) Discuss the intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids.
(iv) Derive the expression for the intensity at a point where interference of light occurs. Arrive at the conditions for maximum and zero intensity.
(v) Does the principle of conservation of energy hold for interference and diffraction phenomena? Explain briefly.
13. (i) State and explain Coulomb's law in electricity.
(ii) State Gauss' law in electrostatics and explain its importance.
(iii) Derive the equation for the couple acting on an electric dipole in a uniform electric field.
(iv) Define intensity of electric field at a point. Derive an expression for the intensity due to a point charge.
(v) Derive an expression for the intensity of the electric field at a point on the axial plane of an electric dipole.
(vi) Derive an expression for the intensity of the electric field at a point on the equatorial plane of an electric dipole.
14. (i) Derive the formula for equivalent capacitance when the capacitors are connected in series.
(ii) Derive the formula for equivalent capacitance when the capacitors are connected in parallel.
(iii) Derive an expression for the capacitance of a parallel plate capacitor.
(iv) Derive an expression for the electric potential due to a point charge.
(v) Derive an expression for the energy stored in a capacitor. What is the energy stored when the space between the plates is filled with a dielectric.
a) With charging battery disconnected b) With charging battery connected to the circuit.
15. (i) State and explain Biot-Savart law.
(ii) State and explain Ampere's law.
(iii) Find the magnetic induction due to a long current carrying conductor.
(iv) Derive an expression for the magnetic induction at the centre of a current carrying circular coil using Biot-Savart law.
(v) Derive an expression for the magnetic induction at a point on the axis of a current carrying circular coil using Biot-Savart law.
(vi) What are the basic components of a cyclotron? Mention its uses.

16. (i) Describe the ways in which Eddy currents are used to advantage.
(ii) Obtain an expression for the emf induced across a conductor which is moved in a uniform magnetic field which is perpendicular to the plane of motion.
(iii) Obtain an expression for the mutual inductance of two long coaxial solenoids.
(iv) Obtain an expression for the magnetic energy stored in a solenoid in terms of the magnetic field, area and length of the solenoid.
(v) Derive an expression for the axial field of a solenoid of radius R , containing n turns per unit length and carrying current i .
(vi) The force between two magnetic poles separated by a distance d in air is F . At what distance between them does the force become doubled?
(vii) Compare the properties of para, dia and ferro magnetic substances.
(viii) State the principle on which a transformer works. Describe the working of a transformer with necessary theory.
17. (i) What are the limitations of Bohr's theory of hydrogen atom?
(ii) Explain the different types of spectral series of Hydrogen atom.
(iii) The Lyman series of hydrogen spectrum lies in the ultraviolet region. Why?
(iv) Describe Rutherford atom model. What are the drawbacks of this model?
(v) Write a short note on de Broglie's explanation of Bohr's second postulate of quantization.
(vi) Write a short note on the discovery of neutron.
(vii) What are the properties of neutron?
(viii) What are nuclear forces? Write their properties.
(ix) Distinguish between nuclear fission and nuclear fusion.
18. (i) What is rectification? Explain the working of a full wave rectifier.
(ii) Describe how a semiconductor diode is used as a half wave rectifier.
(iii) Distinguish between Half wave rectifier and full wave rectifier.
(iv) Define NAND and NOR gates. Give their truth tables.
(v) Distinguish between Zener break down and avalanche break down.
(vi) What is Zener diode? Explain how it is used as a voltage regulator.
(vii) Describe a transistor and explain its working.



SECTION - C

19. (i) Explain the formation of stationary waves in an air column enclosed in open pipe. Derive the equations of the frequencies of the harmonics produced.
- (ii) How are stationary waves formed in closed pipes? Explain the various mode of vibration and obtain relations for their frequencies.
- (iii) Explain the formation of stationary waves in stretched strings and hence deduce the laws of transverse waves in stretched strings.
- (iv) What is Doppler effect? Obtain an expression for the apparent frequency of sound heard when the source is in motion with respect to an observer at rest.
- (v) Draw a neat labelled diagram of a compound microscope and explain its working. Deduce an expression for its magnification.
20. (i) State Kirchoff's law for an electrical network. Using these laws deduce the conditions for balance in a Wheatstone bridge.
- (ii) State the working principle of potentiometer. Explain with the help of circuit diagram how the emf of two primary cells are compared by using the potentiometer.
- (iii) State the working principle of potentiometer. Explain with the help of circuit diagram how the potentiometer is used to determine the internal resistance of the given primary cell.
- (iv) Obtain an expression for the torque on a current carrying loop placed in a uniform magnetic field. Describe the construction and working of a moving coil galvanometer.
- (v) How can a galvanometer be converted to an ammeter? Why is the parallel resistance smaller than the galvanometer resistance?
- (vi) How can a galvanometer be converted to a voltmeter? Why is the series resistance greater than the galvanometer resistance?
21. (i) Explain the principle and working of a nuclear reactor with the help of a labelled diagram.
- (ii) What is radioactivity? State the law of radioactive decay. Show that radioactive decay is exponential in nature.
- (iii) Discuss Bohr's theory of the spectrum of hydrogen atom.
- (iv) State the basic postulates of Bohr's theory of atomic spectra. Hence obtain an expression for the radius of orbit and the energy of orbital electron in a hydrogen atom.
- (v) Explain the source of stellar energy. Explain the carbon-nitrogen cycle, proton-proton cycle occurring in stars.

GUESS PAPER - 1
SR. PHYSICS
AIMSTUTORIAL.IN

SECTION - A

I. Answer ALL questions :

[10 x 2 = 20]

1. What is dispersion? Which colour gets relatively more dispersed?
2. Define magnetic declination.
3. What is the principle of a moving coil galvanometer?
4. How do you convert a moving coil galvanometer into an ammeter?
5. What is transformer ratio?
6. Give two uses of infrared rays.
7. What are cathode rays.
8. What is Photoelectric effects.
9. Draw the circuit symbols for p-n-p and n-p-n transistors.
10. Define modulator ? Why is it necessary?

SECTION - B

II. Answer any SIX of the following Questions :

[6 x 4 = 24]

11. Define critical angle. Explain total internal reflection using a neat diagram.
12. How do you determine the resolving power of your eye?
13. State and explain Coulomb's law in electricity.
14. Derive the formula for equivalent capacitance when the capacitors are connected in series.
15. State and explain Biot-Savart Law.
16. Describe the ways in which Eddy currents are used to advantage.
17. What are the limitations of Bohr's theory of hydrogen atom?
18. What is rectification? Explain the working of a full wave rectifier.

SECTION - C

III. Answer any Two of the following Questions :

[2 x 8 = 16]

19. Explain the formation of stationary waves in an air column enclosed in open pipe. Derive the equations for the frequencies of the harmonics produced. An open organ pipe 85 cm long is sounded. If the velocity of sound is 340 m/s, what is the fundamental frequency of vibration of the air column?
20. State Kirchhoff's law for an electrical network. Using these laws deduce the condition for balance in a Wheatstone bridge. A wire of resistance $4R$ is bent in the form of a circle. What is the effective resistance between the ends of the diameter?
21. Explain the principle and working of a nuclear reactor with the help of a labelled diagram.

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GUESS PAPER - 2
SR. PHYSICS
AIMSTUTORIAL.IN

SECTION - A

I. Answer ALL questions :

[10 x 2 = 20]

1. What is Myopia? How can it be corrected?
2. What happens to compass needles at the Earth's pole?
3. The force between two magnetic poles separated by a distance d in air is F . At what distance between them does the force become doubled?
4. How do you convert a moving coil galvanometer into a voltmeter?
5. What is the phenomenon involved in the working of a transformer?
6. How are micro waves produced?
7. What is work function?
8. Write down Einstein's photoelectric equation.
9. How is a battery connected to a junction diode in (i) forward and (ii) reverse bias?
10. Mention the frequency range of speech signals.

SECTION - B

II. Answer any SIX of the following Questions :

[6 x 4 = 24]

11. Explain the formation of a rainbow.
12. Derive the expression for the intensity at a point where interference of light occurs. Arrive at the conditions for maximum and zero intensity.
13. Derive the equation for the couple acting on an electric dipole in a uniform electric field.
14. Derive the formula for equivalent capacitance when the capacitors are connected in parallel.
15. State and explain Ampere's law.
16. State the principle on which a transformer works. Describe the working of a transformer with necessary theory.
17. Explain the different types of spectral series of Hydrogen atom.
18. Describe how a semiconductor diode is used as a half wave rectifier.

SECTION - C

III. Answer any Two of the following Questions :

[2 x 8 = 16]

19. How are stationary waves formed in closed pipes? Explain the various modes of vibration and obtain relations for their frequencies.
20. State the working principle of potentiometer. Explain with the help of circuit diagram how the potentiometer is used to determine the internal resistance of the given primary cell.

A potentiometer wire is 5 m long and a potential difference of 6V is maintained between its ends. Find the emf of a cell which balances against a length of 180 cm of the potentiometer wire.

21. What is radioactivity? State the law of radioactive decay. Show that radioactive decay is exponential in nature.

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GUESS PAPER - 3
AIMSTUTORIAL.IN
SR. PHYSICS

SECTION - A

I. Answer ALL questions :

[10 x 2 = 20]

1. Define 'power' of a convex lens. What is its unit?
2. Define magnetic inclination or angle of dip.
3. Distinguish between ammeter and voltmeter.
4. What is the phase difference between AC emf and current in the following. Pure resistor, pure inductor and pure capacitor.
5. State Lenz's law.
6. If the wavelength of electromagnetic radiation is doubled, what happens to the energy of photon?
7. Write down deBroglie's relation and explain the terms there in.
8. State Heisenberg's Uncertainty Principle.
9. What is Zener voltage (V_z) and how will a Zener diode be connected in circuits generally?
10. What is 'World Wide Web' (WWW)?

SECTION - B

II. Answer any SIX of the following Questions :

[6 x 4 = 24]

11. Why does the setting sun appear red?
12. Explain Doppler effect in light. Distinguish between red shift and blue shift.
13. State Gauss' law in electrostatics and explain its importance.
14. Three capacitors each of capacitance $9\mu\text{F}$ are connected in series.
 - a) What is the total capacitance of the combination
 - b) What is the potential difference across each capacitor if the combination is connected to a 120V supply?
15. Derive an expression for the magnetic induction at the centre of a current carrying circular coil using Biot-Savart law.
16. Obtain an expression for the emf induced across a conductor which is moved in a uniform magnetic field which is perpendicular to the plane of motion.
17. Explain the different types of spectral series of hydrogen atom.
18. Define NAND and NOR gates. Give their truth tables.

SECTION - C

III. Answer any Two of the following Questions :

[2 x 8 = 16]

- 19.a) What is Doppler effect? Obtain an expression for the apparent frequency of sound heard when the source is in motion with respect to an observer at rest.
 - b) A rocket is moving at a speed of 200 ms^{-1} towards a stationary target. While moving, it emits a wave of frequency 1000 Hz. Some of the sound reaching the target gets reflected back to the rocket as an echo. Calculate the frequency of the sound as detected by the target.
- 20.a) State the working principle of potentiometer. Explain with the help of circuit diagram how the emf of two primary cells are compared by using the potentiometer.
 - b) In a potentiometer arrangement, a cell of emf 1.25V gives a balance point at 35.0 cm length of the wire, If the cell is replaced by another cell and the balance point shifts to 63.0 cm., what is the emf of the second cell?
21. State the basic postulates of Bohr's theory of atomic spectra. Hence obtain an expression for the radius of orbit and the energy of orbital electron in a hydrogen atom.

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