HIM ACADEMY
COACHING INSTITUTE
Since-1993
तमसो मा ज्योतिर्गमय

Class
12
HP Board

Chapterwise Previous Years' Questions

Score More

PHYSICS

www.himacademy.org

HIM ACADEMY
HAMIRPUR (HP)
98160 21400

1 CHAPTER

Electric Charges and Fields

1 Mark Questions.

Q.1 The unit of intensity of electric field is :

(A) NC^{-1} (B) JC^{-1}

(C) Vm (D) Nm^{-1}

[HP Board 2020] **[1]**

Q.2 Electric field intensity due to an electric dipole at a point at distance '*r*' from its centre varies as :

(A) r (B) r^2 (C) r^3 (D) r^{-3}

[HP Board 2020] **[1]**

Q.3 What are the units of $K = \frac{1}{4\pi \in_0}$

(A) $C^2N^{-1}m^{-2}$ (B) Nm^2c^{-2}

(C) Nm^2c^2 (D) none of these

[HP Board 2020] **[1]**

Q.4 Number of electrons forming 1 Coulomb Charge is equal to

(A) 6.25 (B) 6.25×10^{-18}

(C) 6.25×10^{18} (D) 6.25×10^{-19}

[HP Board 2019] **[1]**

Q.5 Define electric field at a point.

[HP Board 2019, 2012] **[1]**

Q.6 The Dimensional formula of permittivity (ε_0) of free space is:

(A) $M^{-1}L^{-3}T^4A^2$ (B) $M^{-1}L^{-2}T^2A$

(C) $M^{-1}L^{-2}T^{-2}A$ (D) $M^{-1}L^{-2}A^{-2}$

[HP Board 2018] **[1]**

Q.7 The unit of permittivity (ε_0) of free space is:

(A) CN^2m^{-1} (B) Nm^2C^{-2}

(C) $C^2N^2m^{-2}$ (D) $C^2N^{-1}m^{-2}$

[HP Board 2018, 2016] **[1]**

Q.8 What is the value of permittivity (ε_0)of free space in S.I. system:

(A) $8.85\times10^{-12}\ N^{-1}\ m^{-2}\ c^2$ (B) $8\times10^{-11}\ N^{-1}\ m^{-2}c^2$

(C) $8.8\times10^{-10}\ N^{-1}\ m^{-2}\ c^2$ (D) $8.8\times10^{-9}\ N^{-1}\ m^{-2}c^2$

[HP Board 2018] **[1]**

Q.9 When a body becomes negatively charged, its mass

(A) decreases (B) increases

(C) remains the same (D) none of these

[HP Board 2018, 2016] **[1]**

Q.10 What is the dimensional formula of Electric field intensity?

(A) $[MLT^{-3}A^{-1}]$ (B) $[M^2LT^{-3}A^{-1}]$

(C) $[ML^2T^{-2}A^1]$ (D) $[ML^2T^{-3}A^{-1}]$

[HP Board 2017] **[1]**

Q.11 When a body becomes positively charged, its mass

(A) decreases (B) increases

(C) remains the same (D) none of these

[HP Board 2016] **[1]**

Q.12 No. of electrons forming 1 coulomb of charge is equal to

(A) 6.25 (B) 6.25×10^{-18}

(C) 6.25×10^{18} (D) 6.25×10^{-19}

[HP Board 2018, 2016] **[1]**

2 Marks Questions.

Q.13 Why two electric lines of force never intersect each other ? *[HP Board 2020]* **[2]**

Q.14 Calculates Coulomb's force between two α-particles separated by a distance of 3.2×10^{-15} m.

[HP Board 2018, 2011, 2010] **[2]**

Q.15 Explain what is meant by quantization of electric charge? *[HP Board 2018]* **[2]**

Q.16 Explain the law of conservation of charge by giving one example. [*HP Board 2018*] **[2]**

Q.17 Calculate the Coulomb's force between two protons separated by a distance of 20 cm.

[*HP Board 2018*] **[2]**

Q.18 What is the importance of Coulomb's law in vector form? [*HP Board 2018, 2013*] **[2]**

Q.19 Define Electric dipole moment. Give its SI units and direction. [*HP Board 2017*] **[1,1]**

Q.20 Explain what is meant by quantization of charge and conservation of charge ? [*HP Board 2009, 2015*] **[2]**

Q.21 What are polar and non-polar molecules? Give examples. [*HP Board 2017*] **[1, 1]**

Q.22 Find the Coulomb's force between two protons placed at 8×10^{-14} m distance. [*HP Board 2017*] **[2]**

Q.23 Explain why Coulomb's law of electrostatics is not a universal law. [*HP Board 2017*] **[2]**

Q.24 Name two basic properties of electric charge.

[*HP Board 2016,2013*] **[2]**

Q.25 State and explain Coulomb's law. Define coulomb.

[*HP Board 2016*] **[2]**

Q.26 Can a body have a charge of 0.8×10^{-19} coulomb? Justify your answer by comment.

[*HP Board 2016*] **[2]**

Q.27 Is Coulomb's law in electrostatics applicable in all situations? State and discuss two situations in which it is applicable. [*HP Board 2014*] **[2]**

Q.28 State and prove Gauss's theorem in electrostatics and by using it deduce an expression for the electric field at a point due to a line charge.

[*HP Board 2014, 2015*] **[2]**

Q.29 Explain quantisation of charge.

Deduce Coulomb's law from Gauss's theorem.

[*HP Board 2013*] **[2]**

Q.30 What do you mean by quantization of charge ? Define 1 coulomb of charge. **[1+1]**

Or

Is Coulomb's Law in electrostatics applicable in all situations ? [*HP Board 2012*] **[2]**

Explain quantisation of charge.

3 Marks Questions.

Q.31 State Gauss's Theorem is electrostatics. Deduce Coulomb's law from it. [*HP Board 2020*] **[4]**

Q.32 Derive an expression for field intensity at any point on axial line of dipole. [*HP Board 2019*] **[3]**

Q.33 Derive an expression for electric field intensity at any point on equatorial line of dipole.

[*HP Board 2019*] **[3]**

Q.34 Derive an expression for torque acting on an electric dipole in a uniform two dimensional electric field.

[*HP Board 2019*] **[3]**

Q.35 ***a)*** Apply Gauss's theorem to find an expression for the electric field intensity at a point due to a point charge.

b) Deduce Coulomb's law from Gauss's theorem.

[*HP Board 2018*] **[2+2]**

Q.36 State Gauss's theorem. Using it derive an expression for electric field intensity at a point due to an infinite plane sheet of charge. [*HP Board 2018*] **[1+3]**

Q.37 Define Gauss's theorem. Using it derive an expression for electric field intensity at a point due to an infinitely long straight uniformly charged wire.

[*HP Board 2018*] **[1+3]**

Q.38 ***a)*** Define electric dipole and axial line.

b) Derive an expression for electric field intensity at a point on the axial line of an electric dipole.

[*HP Board 2017*] **[1+3]**

Q.39 ***a)*** State Coulomb's law and Gauss's law.

[*HP Board 2017*] **[1, 1, 2]**

b) Deduce Coulomb's law from Gauss's law.

[*HP Board 2017*]

Q.40 What is Electric dipole? Derive an expression for z

Electric field due to an electric dipole on axial line.

[*HP Board 2014,2016*] **[1+3]**

Q.41 Derive an expression for Electric field intensity on the axial line of an Electric dipole. [*HP Board 2015*] **[3]**

Q.42 Write vector form of force acting between two charges q_1 and q_2 having $\vec{r}_1$ and $\vec{r}_2$ as their position vectors respectively. [*HP Board 2011*] **[3]**

Q.43 Derive an expression for electric field intensity at any point on equatorial line of dipole.

[*HP Board 2010, 2011*] **[3]**

Q.44 Using Gauss's theorem derive an expression for electric field intensity at a point due to uniformly cha rged spherical shell. [*HP Board 2010*] **[4]**

Q.45 State Gauss's theorem in electrostatics. How will you prove it for spherically symmetric surface?

[*HP Board 2009*] **[4]**

4 Marks Questions.

Q.46 Derive an expression for electric field intensity at a point on the axial line of the electric dipole.

[*HP Board 2020*] **[4]**

Q.47 Define electric dipole moment, derive an expression for the electric field intensity at a point on the equatorial line of the electric dipole. [*HP Board 2020*] **[4]**

Q.48 State Gauss's theorem in electrostatics. How will you prove it for spherically symmetric surface ?

[*HP Board 2019*] **[4]**

Q.49 State and Prove Gauss's theorem. Deduce coulomb's law using Gauss's theorem. [*HP Board 2016*] **[2+2]**

Q.50 Define electric field intensity at a point. Derive an expression for Electric field intensity on equatorial line of an electric dipole. [*HP Board 2015*] **[1, 3]**

Q.51 Obtain an expression for the electric field due to an electric dipole at a point on the line passing through the centre of the dipole and perpendicular to the dipole axis.

[*HP Board 2014*] **[1, 3]**

Q.52 What is meant by potential energy of an electric dipole, when placed in an external electric field? Show that the potential energy 'U' of an electric dipole of dipole moment $\vec{p}$ in a uniform field $\vec{E}$ is given by $U = -\vec{p} \cdot \vec{E}$

[*HP Board 2014*] **[1, 3]**

Q.53 Draw labelled diagram showing an electric dipole making an angle 'θ' with uniform electric field $\vec{E}$. Derive an expression for the torque experienced by an electric dipole placed in uniform electric field. Also discuss the cases, when torque experienced is maximum and minimum. [*HP Board 2013*] **[1, 3]**

2 CHAPTER Electrostatic Potential and Capacitance

1 Mark Questions.

Q.1 Define electrostatic potential. *[HP Board 2019]* **[1]**

Q.2 What is the dimensional formula of electric capacitance?
(A) $[M^{-1}L^{-2}T^{4}A^{2}]$ (B) $[M^{-1}L^{-2}T^{4}A^{-2}]$
(C) $[M^{-1}L^{-2}T^{-4}A^{2}]$ (D) $[M^{1}L^{-2}T^{-4}A^{-2}]$
[HP Board 2017] **[1]**

Q.3 What is the dimensional formula of electric potential ?
(A) $[M^{2}L^{2}T^{-3}A^{-1}]$ (B) $[ML^{2}T^{-3}A^{-1}]$
(C) $[ML^{2}T^{-2}A^{1}]$ (D) $[ML^{-2}T^{-3}A^{-1}]$
[HP Board 2017] **[1]**

2 Marks Questions.

Q.4 Show that no work is done in moving a charge over an equipotential surface. *[HP Board 2020]* **[2]**

Q.5 Establish a relation between electric field and potential gradient. *[HP Board 2020]* **[2]**

Q.6 What are Equipotential surface? Show that no work is done in moving a test charge on equipotential surface. *[HP Board 2016]* **[2]**

Q.7 Show that Electric field is Negative gradient of electric potential. *[HP Board 2016]* **[2]**

Q.8 What is the principle of parallel plate capacitor? Find the capacitance of parallel plate capacitor with conducting slab between its plates.
[HP Board 2016] **[2]**

Q.9 No two equipotential surfaces intersect each other. Why ? *[HP Board 2013]* **[2]**

Q.10 Derive an expression for energy stored in a parallel plate capacitor *C*, charged to a potential difference *V*.
[HP Board 2009, 2010] **[2]**

3 Marks Questions.

Q.11 Derive an expression for electric potential due to a point charge. *[HP Board 2019]* **[3]**

Q.12 ***a)*** Write any two uses of Van De Graff's generator.
b) Discuss construction and working of Van De Graff's generator.
[HP Board 2012, 2013, 2017] **[1½, 1½]**

Q.13 Define Electrical capacitance. Derive an expression for Electrical capacitance of Parallel plate capacitor.
[HP Board 2015, 2013] **[3]**

Q.14 Establish a relation between Electric field intensity and Potential gradient. *[HP Board 2015, 2009]* **[3]**

Q.15 What do you understand by polarisation of a dielectric? Establish the relation $K = 1 + \chi_e$.
[HP Board 2011] **[3]**

4 Marks Questions.

Q.16 Describe briefly the principle, construction and working of Van-*de*-Graaff generator. How is the leakage of charge minimised from the generator?
[HP Board 2014] **[3, 1]**

Q.17 Define capacitance of a capacitor. Derive an expression for the capacitance of a parallel plate capacitor.
[HP Board 2013] **[1, 3]**

Q.18 Define electric potential at a point. Derive an expression for the potential at a point due to a point charge.
[HP Board 2013] **[1, 3]**

Q.19 Deduce the effect of introducing a dielectric slab in between the plates of a parallel plate capacitor. Find the capacitance of the capacitor. *[HP Board 2011]* **[4]**

Q.20 Define capacitance of a capacitor. Give its S.I. unit. Derive an expression for electrostatic energy stored in a charged capacitor. *[HP Board 2012]* **[1+1+2]**

3 CHAPTER Current Electricity

1 Mark Questions.

Q.1 If a wire of resistivity 'ρ' is stretched to doubles its length, then its new resistivity will be :
(A) half (B) double
(C) four times (D) not change
[HP Board 2020] **[1]**

Q.2 Kilowatt-hour is the unit of
(A) Current (B) Voltage
(C) Electric Power (D) Electric energy
[HP Board 2020] **[1]**

Q.3 Dimensional formula for electrical resistance is :
(A) $[M^{-1}L^{3}T^{-3}A^{-2}]$ (B) $[ML^{-3}T^{3}A^{2}]$
(C) $[ML^{3}T^{-2}A^{-2}]$ (D) $[ML^{2}T^{-3}A^{-2}]$
[HP Board 2020] **[1]**

Q.4 Kirchhoff's I and II Laws are based on conservation of:
(A) Energy and charge (B) Mass and Energy
(C) Mass and charge (D) Charge and Energy
[HP Board 2018] **[1]**

Q.5 Dimension of electrical resistance is
(A) $[ML^{2}T^{-3}A^{-2}]$ (B) $[ML^{2}T^{-3}A^{-1}]$
(C) $[ML^{3}T^{-3}A^{-2}]$ (D) $ML^{2}T^{-3}A^{-1}]$
[HP Board 2018] **[1]**

Q.6 A Carbon resistance is having a coding: Green, orange, black, gold. The resistance of the resistor is
(A) $53\times10^{0} \pm 5\%\Omega$ (B) $53\times10^{0} \pm 10\%\ \Omega$
(C) $53\times10^{1} \pm 5\%\Omega$ (D) $53\times10^{0}\pm10\%\ \Omega$
[HP Board 2017] **[1]**

Q.7 Resistivity of a conducting wire
(A) varies with its length
(B) varies with its mass
(C) varies with its cross-section
(D) is independent of its dimensions
[HP Board 2017] **[1]**

Q.8 If a wire of resistance is stretched to double of its length, then new resistance will be
(A) $R/2$ (B) R (C) $2R$ (D) $4R$.
[HP Board 2017] **[1]**

2 Marks Questions.

Q.9 State and explain Kirchhoff's laws in electricity.
[HP Board 2019] **[2]**

Q.10 Define internal resistance of a cell. Prove that $r = \left(\frac{E}{V} - 1\right)R$, where R is the external resistance used.
[HP Board 2018] **[2]**

Q.11 A resistor has coloured bands of yellow, red and blue colours respectively. Find the value of Resistance.
[HP Board 2016] **[2]**

Q.12 What is Voltmeter? Why it is always connected in parallel to the circuit? *[HP Board 2017]* **[1, 1]**

Q.13 A wire has resistance 90Ω and it is cut into three pieces having equal lengths. If these are now connected in parallel, find the resistance of the combination.
[HP Board 2016, 2013] **[2]**

Q.14 The sequence of bands marked on a carbon resistor are white, blue, orange and silver. What will be the resistance ? *[HP Board 2013]* **[2]**

Q.15 How will you represent a resistance of 3700+10% ohm by colour code ? *[HP Board 2013]* **[2]**

Q.16 Establish the relation between current and drift velocity.
[HP Board 2012] **[2]**

3 Marks Questions.

Q.17 Derive an expression for internal resistance of a cell.
[HP Board 2020] **[3]**

Q.18 State and explain Kirchhoff's laws in electricity.
[HP Board 2020] **[3]**

Q.19 State Ohm's law. On what factors the resistance of a conductors depends ? *[HP Board 2020]* **[3]**

Q.20 Define the drift velocity and drive an expression for it.
[HP Board 2020] **[3]**

Q.21 Derive the relation between current and drift velocity.
[HP Board 2020] **[3]**

Q.22 A wire having resistance R ohm is stretched to double its length. What is the new resistance ?
[HP Board 2020] **[3]**

Q.23 Using Kirchhoff's laws prove the principle of Wheatstone's bridge. [*HP Board 2020*] **[3]**

Q.24 What is drift velocity of electrons and relaxation time of free electrons in a metallic conductor carrying a current ? Establish a relation between them.
[*HP Board 2019*] **[3]**

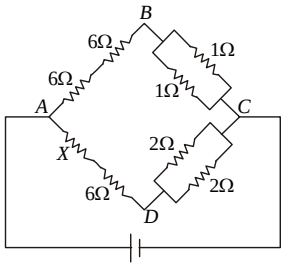
Q.25 Define drift velocity and derive the expression for it in a conductor in terms of relaxation time.
[*HP Board 2019*] **[3]**

Q.26 A series combination of three resistors take current 2A from a 24V supply. If the resistors are in the ratio 1:2:3 find the value of the unknown resistors.
[*HP Board 2019*] **[3]**

Q.27 Define resistivity of a material and discuss the factors on which it depends. What is the unit of resistivity?
[*HP Board 2018*] **[3]**

Q.28 What is the principle of potentiometer? How it is used to measure the internal resistance of a cell?
[*HP Board 2018*] **[3]**

Q.29 In the given circuit, calculate the value of X so that potential difference between B and D is zero.



[*HP Board 2018, 2016*] **[3]**

Q.30 What is the principle of Potentiometer? How is it used to compare the *e.m.f.* of two cells
[*HP Board 2018*] **[3]**

Q.31 Find the effective resistance of three resistors having resistances R_1, R_2, R_3 when connected in the parallel.
[*HP Board 2018*] **[3]**

Q.32 What is the principle of Potentiometer? How it is used to compare the *e.m.f.*'s of two primary cells?
[*HP Board 2013, 2016,2017*] **[3]**

Q.33 Define Electrical energy and Electrical power. Derive a relation between them. [*HP Board 2017*] **[3]**

Q.34 What is the principle of meter Bridge? How is it used to find the unknown resistance?
[*HP Board 2017*] **[3]**

Q.35 Define Resistance. Discuss the effect of temperature on it. [*HP Board 2017*] **[3]**

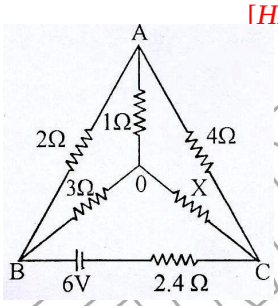
Q.36 Define internal resistance of a cell. Using potentiometer determine the internal resistance of a cell.
[*HP Board 2012, 2015,2017*] **[3]**

Q.37 Discuss grouping of Resistor in series and parallel.
[*HP Board 2016*] **[3]**

Q.38 What is internal resistance of a cell? Establish a relationship between *e.m.f.*, Terminal Potential difference and '*r*'. [*HP Board 2016*] **[3]**

Q.39 What are the points of differences between *e.m.f.* and Potential difference? [*HP Board 2016*] **[3]**

Q.40 Find the value of unknown resistance X in the following circuit, if no current flows through the section AO. Also calculate the current drawn by the circuit from the battery of emf 6V and negligible internal resistance.
[*HP Board 2016*] **[3]**



Q.41 Find the effective *e.m.f.* of the cells when connected in series. [*HP Board 2016*] **[3]**

Q.42 What is Wheatstone bridge? Deduce the condition for which Wheatstone bridge is balanced.
[*HP Board 2015*] **[3]**

Q.43 How many electrons pass through a wire in 2 minutes, if the current passing through the wire is 300 mA?
[*HP Board 2015*] **[3]**

Q.44 State Kirchhoff's laws of Electricity.
[*HP Board 2015*] **[3]**

Q.45 Describe the principle and construction of a potentiometer. Why do we prefer a potentiometer with longer bridge wire? [*HP Board 2014*] **[2,1]**

Q.46 What do you understand by Electric resistance of a conductor? Prove that resistance of a conductor is

$R = \dfrac{ml}{ne^2\tau A}$, where '$\tau$' is average relaxation time.
[*HP Board 2014*] **[3]**

Q.47 State and explain Wheatstone bridge principle.
[*HP Board 2014*] **[3]**

Or

State Ohm's law and define resistance. Give the units and dimensional formula of resistance.
[*HP Board 2014*] **[3]**

Q.48 Define relaxation time of an electron in a conductor. Explain, how it varies with increase in the temperature of a conductor. State the relationship between resistivity and relaxation time. [*HP Board 2014*] **[3]**

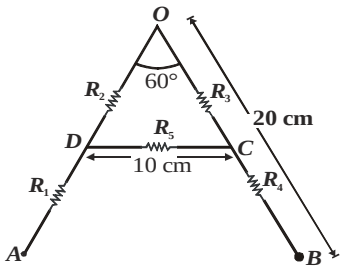
Q.49 What is a voltmeter ? How can a galvanometer be converted into a voltmeter? [*HP Board 2013*] **[3]**

Q.50 State and prove Wheatstone bridge principle by using Kirchhoff's laws. [*HP Board 2013*] **[3]**

Q.51 What is a meter bridge? How can you find unknown resistance by it ? [*HP Board 2011*] **[3]**

Q.52 Define resistivity of a material and discuss the factors on which it depends. What is unit of resistivity ? [*HP Board 2011*] **[3]**

Q.53 A letter 'A' consists of a uniform wire of resistance of one ohm per cm. The sides of the letter are each 20 cm long and cross-piece in the middle is 10 cm long, while the apex angle is 60°. Find the resistance of the letter between two ends of the legs. [*HP Board 2010*] **[3]**



4 Marks Questions.

Q.54 Find the equivalent resistance of three resistors R_1, R_2 and R_3 when they are connected. [*HP Board 2015*] **[4]**

Q.55 Define the term drift velocity and derive an expression for it. Also establish the relation between current and drift velocity. [*HP Board 2015*] **[4]**

4 CHAPTER

Moving Charges and Magnetism

1 Mark Questions.

Q.1 A cyclotron is used to accelerate

(A) Electron (B) Neutron

(C) Positive ions (D) None of these

[*HP Board 2020*] **[1]**

Q.2 To convert a galvanometer in to a voltmeter

(A) a high resistance is connected in parallel

(B) a low resistance is connected in series

(C) a low resistance is connected in parallel

(D) a high resistance is connected in series

[*HP Board 2019*]

Q.3 What is the magnitude of force experienced by a stationary charge when placed in an uniform magnetic field

(A) $F = qvB\sin\theta$ (B) $F = q\ v\ B$

(C) F = zero (D) none of these

[*HP Board 2017, 2016*] **[1]**

Q.4 Two long parallel conductors carrying current in opposite direction

(A) attract each other

(B) repel each other

(C) neither attract nor repel each other

(D) None of these [*HP Board 2017*] **[1]**

Q.5 A charged particle enters in a magnetic field with some velocity parallel to the magnetic field. The nature of path following by the charged particle will be

(A) helical (B) circular

(C) straight line (D) parabolic

[*HP Board 2017*] **[1]**

Q.6 Two long parallel conductors carrying current in the same direction

(A) attract each other (B) repel each other

(C) neither attract nor repel (D) none of these

[*HP Board 2016*] **[1]**

Q.7 A transformer is a device which gives only

(A) DC-Voltage (B) AC-Voltage

(C) AC and DC voltage (D) None of these

[*HP Board 2016*] **[1]**

Q.8 Tesla is a unit of

(A) Electric field (B) Electric flux

(C) Magnetic induction (D) Magnetic moment

[*HP Board 2016*] **[1]**

Q.9 Resistance of an ideal ammeter is

(A) infinite (B) Zero (C) 1Ω (D) 10Ω

[*HP Board 2016*] **[1]**

2 Marks Questions.

Q.10 Find the force acting on a current carrying conductor placed in an uniform magnetic field.

[*HP Board 2019*] **[2]**

Q.11 State and prove Ampere's circuital law.

[*HP Board 2019*] **[2]**

Q.12 Calculate the value of resistance needed to convert a galvanometer of resistance 200 Ω, which gives full scale deflection for a current of 5 mA, into a voltmeter of range 25 volt. [*HP Board 2018, 2016*] **[2]**

Q.13 A galvanometer coil has a resistance of 30 ohm and the meter shows full scale deflection for a current of 2mA. Calculate the value of the resistance required to convert it into an ammeter of range 0 to 1A.

[*HP Board 2018*] **[2]**

Q.14 A galvanometer of resistance 15Ω gives full scale deflection for a current of 2 mA. Calculate shunt resistance required to convert it into an ammeter of range (0-5)A. [*HP Board 2018*] **[2]**

Q.15 Find the force acting on a current carrying conductor placed in an uniform magnetic field.

[*HP Board 2010,2011*] **[2]**

Q.16 With the help of a schematic diagram, explain how a galvanometer can be converted into ammeter?

[*HP Board 2011*] **[2]**

Q.17 What is an ammeter? Why it is always connected in series in the circuit? [*HP Board 2017*] **[2]**

Q.18 How will you convert a moving coil galvanometer into an ammeter and voltmeter? [*HP Board 2017*] **[2]**

3 Marks Questions.

Q.19 How can we convert a galvanometer into voltmeter ?

[*HP Board 2020*] **[3]**

Q.20 State and prove Ampere's Circuital Law.

[*HP Board 2020*] **[3]**

Q.21 Using Biot Savart's law, find expressions for the magnetic field at the centre of the circular coil carrying current I. [*HP Board 2020*] **[3]**

Q.22 Derive an expression for torque acting on current carrying loop placed in the uniform magnetic field.

[*HP Board 2019*] **[3]**

Q.23 What is Cyclotron? Explain its working.

[*HP Board 2015*] **[3]**

Q.24 How does an atom act as a magnetic dipole? Derive an expression for dipole moment of an atom. What is Bohr magneton? [*HP Board 2014*] **[3]**

Q.25 Derive the expression for the maximum force experienced by a straight conductor of length 'l', carrying current '*I*' and kept in a uniform magnetic field '$\vec{B}$'. [*HP Board 2014*] **[3]**

Q.26 State Biot-Savort law. Use it to obtain an expression for magnetic field at the centre of a current carrying circular loop. [*HP Board 2014*] **[3]**

Q.27 Calculate the force between two parallel conductors carrying currents in the opposite direction. [*HP Board 2018*] **[3]**

Q.28 Calculate the force between two parallel conductors carrying currents in the same direction. [*HP Board 2018*] **[3]**

Q.29 State Ampere's circuital law. By usings it derive an expression for magnetic field intensity at a point due to a straight current carrying conductor. [*HP Board 2018*] **[1+2]**

Q.30 Derive the expression for the force on a charge '*q*' moving with velocity '*v*' in a magnetic field *B*. Discuss the cases when the force is maximum and minimum. [*HP Board 2013*] **[2, 1]**

Q.31 Derive an expression for magnetic field at a centre of a circular coil carrying current. [*HP Board 2013*] **[3]**

Q.32 Obtain an expression for the force between two long straight parallel current carrying conductors. What is the direction of force ? [*HP Board 2009*] **[3]**

4 Marks Questions.

Q.33 Derive an expression for magnetic force experienced by a current carrying conductor placed in a uniform magnetic field. [*HP Board 2017*] **[4]**

Q.34 What is moving coil Galvanometer? Explain its principle, construction and theory. [*HP Board 2015*] **[4]**

Q.35 Find the magnetic field at a point on the axis of a circular coil carrying current. [*HP Board 2011*] **[4]**

Q.36 State Ampere's circuital law. By using it, derive an expression for magnetic field intensity produced at a point due to current flowing through an infinite long straight conductor. [*HP Board 2015*] **[4]**

Q.37 With the help of labelled diagram, give the principle and theory of cyclotron. Why it is not suitable for accelerating neutrons? [*HP Board 2014*] **[4]**

5 CHAPTER Magnetism and Matter

1 Mark Questions.

Q.1 Which of the following has highest wavelength ?
(A) X-rays (B) u.v. rays
(C) microwaves (D) γ-rays
[*HP Board 2020*] **[1]**

Q.2 A bar magnet is kept in uniform magnetic field. It experiences :
(A) a torque but not a force
(B) a force but not a torque
(C) both a force and a torque
(D) neither a force nor a torque [*HP Board 2020*] **[1]**

Q.3 At magnetic poles, the angle of dip is :
(A) 45° (B) 30°
(C) 90° (D) Zero
[*HP Board 2020*] **[1]**

Q.4 Angle of dip is 90° at
(A) poles (B) equator
(C) both (a) (b) (D) none of these
[*HP Board 2019*]

Q.5 .....Law for magnetism establishes that monopoles do not exist. [*HP Board 2019*] **[1]**

2 Marks Questions.

Q.6 What is the cause of earth magnetism?
[*HP Board 2018, 2010*] **[2]**

Q.7 Why is diamagnetism independent of temperature?
[*HP Board 2018*] **[2]**

Q.8 Why steel is used for making permanent magnet?
[*HP Board 2018, 2016*] **[2]**

Q.9 What are paramagnetic substances ? Write any two properties of paramagnetic substances.
[*HP Board 2013*] **[1,1]**

Q.10 What are ferromagnetic substances? Write any two properties of ferromagnetic substances.
[*HP Board 2013*] **[1,1]**

Q.11 What are diamagnetic substances ? Write any two properties of the diamagnetic substances.
[*HP Board 2013*] **[2]**

Q.12 Give any four properties of paramagnetic substances.
[*HP Board 2012*] **[2]**

3 Marks Questions.

Q.13 How can we convert a galvanometer into ammeter ?
[*HP Board 2020*] **[3]**

Q.14 What are paramagnetic substances ? Write its two properties. [*HP Board 2020*] **[3]**

Q.15 Define magnetic elements of earth.
[*HP Board 2020*] **[3]**

Q.16 Explain domain theory of ferromagnetic substances.
[*HP Board 2020*] **[3]**

Q.17 What are ferromagnetic substances ? Explain ferromagnetism on the basis of electron theory.
[*HP Board 2019*] **[3]**

Q.18 What are ferromagnetic substances ? Explain ferromagnetism on the basis of electron theory.
[*HP Board 2019*] **[3]**

Q.19 Derive an expression for potential energy of a bar magnet, when placed in uniform magnetic field.
[*HP Board 2008, 2009*] **[3]**

Q.20 What are magnetic elements at a place? Define them.
[*HP Board 2015*] **[3]**

Q.21 Differentiate between dia, para and ferromagnetic materials. [*HP Board 2014, 2015*] **[3]**

Q.22 What are the magnetic elements of earth at a place ? Define them. [*HP Board 2012*] **[3]**

Q.23 ***a)*** Define Para-magnetic materials. Give examples.
b) Define Ferro-magnetic materials. Give examples.
c) Explain domain theory to explain ferromagnetism.
[*HP Board 2017*] **[1, 1, 2]**

Q.24 ***a)*** DefineMagnetic declination (*O*).
b) Define Magnetic inclination (Dip).
c) Derive an expression for torque experienced by a magnetic dipole (Bar Magnet) when placed in uniform magnetic field.
[*HP Board 2015, 2017*] **[1, 1, 2]**

6 CHAPTER Electromagnetic Induction

1 Mark Questions.

Q.1 A transformer works on [*HP Board 2020*] **[1]**

(A) d.c. only (B) a.c. only

(C) both a.c. and d.c. (D) none of these

Q.2 Eddy currents are produced in

(A) inductor furnance (B) electromagnetic brakes

(C) speedometer (D) all of these

[*HP Board 2019*]

Q.3 Define self induction. [*HP Board 2019*] **[1]**

Q.4 A transformer is a device which gives only:

(A) DC-voltage (B) AC-voltage

(C) AC and DC voltage (D) None of these

[*HP Board 2018, 2016*] **[1]**

Q.5 Why spark is produced in the switch off a fan when it is put off ? [*HP Board 2010*] **[1]**

2 Marks Questions.

Q.6 Define mutual inductance. Write its SI unit.

[*HP Board 2020*] **[2]**

Q.7 What is transformer ? On what principle it works ?

[*HP Board 2020*] **[2]**

Q.8 Why laminated iron core is used in transformers ?

[*HP Board 2020*] **[2]**

Q.9 State Faraday's laws of electromagnetic induction.

[*HP Board 2019*] **[2]**

Q.10 Explain self inductance of a coil and give its unit.

[*HP Board 2019*] **[2]**

Q.11 Why transformer cannot be used to step up d.c. voltage?

[*HP Board 2018*] **[2]**

Q.12 Define Eddy currents. Explain dampening of oscillating metallic plates due to eddy currents.

[*HP Board 2017*] **[2]**

Q.13 What is self inductance? Define coefficient of self induction. Give its SI unit. [*HP Board 2013,2016*] **[2]**

Q.14 Show that Lenz's law is a direct consequence of law of conservation of energy. [*HP Board 2014*] **[2]**

Q.15 What are eddy currents ? How can they be minimised?

[*HP Board 2009*] **[2]**

Q.16 What are eddy currents? How are they produced ?

[*HP Board 2013*] **[2]**

3 Marks Questions.

Q.17 Give any two applications of eddy currents.

[*HP Board 2019*] **[3]**

Q.18 State and explain the Faraday's laws of Electromagnetic Induction. [*HP Board 2015*] **[3]**

Q.19 What is electromagnetic induction? State Faraday's laws of electromagnetic induction. [*HP Board 2014*] **[3]**

Or

Deduce an expression for self-inductance of a long solenoid of 'N' turns. **[3]**

Q.20 Define Self-inductance. Write down the expression for self-inductance of a long solenoid.

[*HP Board 2015*] **[3]**

Q.21 What is Lenz' law ? Show that it is in accordance with the law conservation of energy.

[*HP Board 2015, 2016, 2017*] **[3]**

4 Marks Questions.

Q.22 ***a)*** State Faraday's law of electromagnetic induction.

b) What are the various energy losses in transformer?

c) Define power factor in an a.c. circuit.

[*HP Board 2018*] **[1½+1½+1]**

Q.23 Describe the principle and theory of a transformer. Why the efficiency of a transformer is always less than unity?

[*HP Board 2018*] **[3]**

7 CHAPTER

Alternating Current

1 Mark Questions.

Q.1 When a.c. flows through inductor, then current
(A) is in phase with voltage
(B) lags behind voltage by $\pi/2$
(C) leads the voltage by $\pi/2$
(D) none of these
[*HP Board 2020*] **[1]**

Q.2 Phase difference between voltage and current in a.c. circuits having resistor only is :
(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$
(C) π (D) Zero
[*HP Board 2020*] **[1]**

Q.3 kWh is equal to:
(A) 36×10^3 J (B) 36×10^5 J
(C) 36×10^{-5} J (D) 36×10^{-3} J
[*HP Board 2018*] **[1]**

Q.4 Resonance occur in a series *L.C.R.* circuit when:
(A) $X_L = X_C$ (B) $X_L > X_C$
(C) $X_L < X_C$ (D) None of these
[*HP Board 2018*] **[1]**

Q.5 Capacitor blocks d.c. why? [*HP Board 2018*] **[1]**

Q.6 The r.m.s. value of a.c. is 220 V. Nearly the peak value of a.c. is
(A) 220 V (B) 311 V
(C) 211 V (D) 50 V
[*HP Board 2017*] **[1]**

Q.7 What is the frequency of house hold supply of a.c. in India?
(A) zero (B) 60 Hz
(C) 50 Hz (D) None of these
[*HP Board 2017*] **[1]**

Q.8 Direct current cannot flow through
(A) inductor (B) capacitor
(C) resistor (D) semi-conductor
[*HP Board 2017*] **[1]**

Q.9 Energy dissipated in LCR circuit is
(A) L only (B) C only
(C) R only (D) All of these
[*HP Board 2016*] **[1]**

Q.10 The average power dissipated in pure capacitor in a.c. circuit is
(A) $\frac{1}{2}CV^2$ (B) CV^2
(C) $2CV^2$ (D) Zero.
[*HP Board 2016*] **[1]**

2 Marks Questions.

Q.11 What do you mean by impedance of *LCR* series circuit? Derive an expression for it. What is the condition for resonance. [*HP Board 2018*] **[2]**

Q.12 Why a.c. is more dangerous than d.c. ? Explain. [*HP Board 2018*] **[2]**

Q.13 A capacitor blocks d.c. but allows a.c. to pass through it. Explain, why ? [*HP Board 2018*] **[2]**

Q.14 Show that the phase difference between voltage and current in an a.c. circuit having pure inductor is 90°. [*HP Board 2017*] **[2]**

Q.15 What is inductive reactance 'X_L' in an a.c. circuit? What is its value for d.c.? [*HP Board 2014*] **[2]**

Or

Prove mathematically that the average value of alternating current over one complete cycle is zero.

Q.16 Explain wattless current. [*HP Board 2014*] **[2]**

3 Marks Questions.

Q.17 Define mean value and root mean square value of alternating current. Derive an expression for root mean square value of alternating current.
[*HP Board 2019*] **[3]**

Q.18 Show that the phase difference between voltage and current in an a.c. circuit having pure capacitor is 90°. [*HP Board 2017*] **[3]**

Q.19 Derive an expression for energy stored in an inductor. [*HP Board 2017*] **[3]**

Q.20 Show that there is no phase difference between voltage and current in an a.c. circuit having pure resistor. [*HP Board 2017*] **[3]**

Q.21 Define impedance and derive an expression for it in *LCR* series circuit. What will be impedance of LCR-circuit at resonance? [*HP Board 2015*] **[3]**

Q.22 What is meant by average value of a.c.? Derive an expression for it. [*HP Board 2015*] **[3]**

Q.23 Derive the relation for average power of an a.c. circuit. [*HP Board 2013,2014*] **[3]**

Or

Obtain condition for the resonance of *LCR*-circuit and show that resonance frequency is $\frac{1}{2\pi\sqrt{LC}}$.

Q.24 Describe the principle, construction and theory of stepup transformer. [*HP Board 2014*] **[3]**

Or

What is an AC generator ? Discuss its principle, construction and working. **[3]**

4 Marks Questions.

Q.25 What do you mean by Average value of a.c. ? Derive its expression. [*HP Board 2020*] **[4]**

Q.26 Derive an expression for impedance of an a.c. circuit containing *LCR* in series. What is meant by resonance ? [*HP Board 2020*] **[4]**

Q.27 What do you mean by root mean square value of a.c.? Derive an expression for r.m.s. value of a.c. [*HP Board 2020*] **[4]**

Q.28 Derive an expression for the power of an *LCR* a.c. circuit (without different cases). [*HP Board 2019*] **[4]**

Q.29 Describe the principle construction and working of transformer with the help of diagram. Why is its core laminated ? [*HP Board 2019*] **[4]**

Q.30 Derive an expression for average power in *LCR* series circuit connected to a.c. supply hence define power factor. [*HP Board 2016,2017*] **[4]**

Q.31 What do you mean by average value of a.c.? Derive an expression. Why average value is calculated for half cycle of a.c.? [*HP Board 2016*] **[4]**

Q.32 What do you mean by r.m.s. value of a.c.? Derive an expression for r.m.s. value of a.c. [*HP Board 2016*] **[4]**

Q.33 Describe the principle, construction and working of a Transformer. Why is its core laminated? [*HP Board 2013,2015*] **[4]**

Q.34 Explain the principle and working of a transformer. How is it useful for long distance transmission of electrical energy ? [*HP Board 2012*] **[4]**

Q.35 Define mean value and root mean square value of alternating current. Derive an expression for root mean square value of alternating current. [*HP Board 2009, 2010, 2011*] **[3]**

Q.36 A series circuit contains *L*, *C* and *R* as circuit elements. Discuss current-voltage relation when a.c. is passed through such circuit and hence find the expression for the impedance of the circuit and resonant frequency of the circuit. [*HP Board 2009, 2011*] **[4]**

Or

With the help of a phase diagram obtain a relation for impedance in an *a.c. LCR* series circuit. What is meant by resonance of this circuit? [*HP Board 2009, 2010*] **[4]**

Q.37 Explain the principle, and working of a transformer. What are the various energy losses in transformer ? [*HP Board 2009*] **[4]**

8 CHAPTER — Electromagnetic Waves

1 Mark Questions.

Q.1 The ratio of speed of *X*-rays to γ-rays in vacuum is :

(A) greater than 1 (B) less than 1

(C) 1 (D) none of these

[*HP Board 2020*] **[1]**

Q.2 The e.m. waves used in telecommunication system are :

(A) ultraviolet rays (B) micro-waves

(C) visible light (D) infra-red rays

[*HP Board 2020*] **[1]**

Q.3 According to Maxwell's hypothesis, a changing electric field gives rise to:

(A) an *e.m.f.* (B) electric current

(C) magnetic field (D) pressure gradient

[*HP Board 2019*] **[1]**

Q.4 Electromagnetic waves are transverse in nature is evident by:

(A) Polarization (B) Interference

(C) Reflection (D) Diffraction

[*HP Board 2019*] **[1]**

Q.5 Which of the following has minimum wavelength

(A) X-rays (B) Ultraviolet rays

(C) γ-rays (D) None of these

[*HP Board 2019*] **[1]**

Q.6 What is the cause of greens house effect?

(A) Infra red rays (B) U.V. rays

(C) X-ray (D) Radiowaves

[*HP Board 2016, 2018*] **[1]**

Q.7 Electromagnetic waves are produced by :

(A) Static charge

(B) Chargeless particles

(C) Accelerating charge

(D) None of these [*HP Board 2016, 2018*] **[1]**

Q.8 Define electromagnetic waves. What is the source of electromagnetic wave? [*HP Board 2018*] **[1]**

Q.9 Write an expression for speed of e.m. waves in free space: [*HP Board 2018*] **[1]**

(A) $C = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ (B) $C = \frac{E_0 N_0}{B_0}$

(C) $C = \frac{E \epsilon_0}{B}$ (D) All of these

Q.10 Which of the following e.m. waves has the highest wavelength?

(A) X-rays (B) Microwaves

(C) Infra-red waves (D) Ultra-violet rays

[*HP Board 2017*] **[1]**

Q.11 The value of velocity of light in vacuum is

(A) $\sqrt{\frac{\mu_0}{\epsilon_0}}$ (B) $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$

(C) $\sqrt{\mu_0 \epsilon_0}$ (D) $\sqrt{\frac{\epsilon_0}{\mu_0}}$

[*HP Board 2016*] **[1]**

Q.12 What is electromagnetic spectrum? Give two uses of infra red rays. [*HP Board 2018*] **[1]**

Q.13 What are microwaves? Write one application of microwaves. [*HP Board 2018*] **[1]**

Q.14 What are X-Rays? Give their one use.

Q.15 What are electromagnetic waves? Give their two properties. [*HP Board 2018*] **[1]**

Q.16 What is electromagnetic spectrum ?

[*HP Board 2009, 2010, 2011*] **[1]**

2 Marks Questions.

Q.17 Prove that e.m. waves are transverse in nature.

[*HP Board 2020*] **[2]**

Q.18 Arrange the following radiations in the descending order of wavelength : γ-rays, infra-red rays, red light, yellow light, radio-waves, UV rays. [*HP Board 2020*] **[2]**

Or

Give two uses of U.V. rays ? [*HP Board 2020*] **[2]**

Q.19 Write one use of each : [*HP Board 2020*] **[2]**

i) infra-red rays ***ii)*** X-rays

Q.20 Electro-magnetic waves of frequency 5×10^{14} Hz are passed through a liquid. The wavelength of waves in liquid is measured to be 4.5×10^{-7} m. Calculate the velocity of electromagnetic waves in vacuume.

[*HP Board 2019*] **[2]**

Q.21 A radar transmitter generates waves, whose frequency is 3×10^9 Hz. What is the wave length of the wave ?

[*HP Board 2019*] **[2]**

Q.22 Write four uses of ultraviolet rays.

[*HP Board 2019*] **[2]**

Q.23 Give four properties of em wave. [*HP Board 2016*] **[2]**

Q.24 Give four uses of X-rays? [*HP Board 2015,2016*] **[2]**

Q.25 What is electromagnetic spectrum? Give two uses of Infra red rays. [*HP Board 2016*] **[2]**

Q.26 What are microwaves? Give their one use. [*HP Board 2016*] **[2]**

Q.27 Give four uses of *x*-rays. [*HP Board 2015*] **[2]**

Or

Give four uses of infrared radiations. [*HP Board 2015*] **[2]**

Q.28 Define Electromagnetic Spectrum. Name the main parts of Electromagnetic Spectrum. [*HP Board 2013,2015*] **[1,1]**

3 Marks Questions.

Q.29 How *X*-rays are produced? Give three uses of *X*-rays. [*HP Board 2017*] **[3]**

Q.30 Show that Electromagnetic waves are transverse in nature. [*HP Board 2009, 2015*] **[3]**

Q.32 What are Electromagnetic waves? Write four properties of e.m. waves. [*HP Board 2013,2015*] **[3]**

Q.33 Prove that electromagnetic waves are transverse in nature. [*HP Board 2013*] **[3]**

Q.34 State and explain Maxwell's modification to Ampere's circuital law. [*HP Board 2012*] **[3]**

9 CHAPTER Ray Optics and Optical Instruments

1 Mark Questions.

Q.1 The critical angle of light passing from glass to air is minimum for :

(A) red (B) green

(C) yellow (D) violet

[*HP Board 2020*] **[1]**

Q.2 The focal length of plane mirror is :

(A) Zero (B) + 1

(C) – 1 (D) infinity

[*HP Board 2020*] **[1]**

Q.3 The velocity of light in vacuum can be changed by changing :

(A) Frequency (B) Amplitude

(C) Wavelength (D) None of these

[*HP Board 2020*] **[1]**

Q.4 An object is placed in front of a concave mirror of radius of curvature 40 cm at a distance of 10 cm. Find the position and nature of image formed. [*HP Board 2020*] **[1]**

Q.5 The blue colour of the sky is due to the phenomenon of

(A) reflection (B) refraction

(C) scattering (D) dispersion

[*HP Board 2019*] **[1]**

Q.6 Glittering of diamond is due to

(A) Total internal reflection

(B) Dispersion

(C) Diffraction

(D) None of these [*H.P. Board 2019*] **[1]**

Q.7 Phenomenon of mirage is observed in desert due to

(A) diffraction of light

(B) reflection of light

(C) total internal reflection of light

(D) interference of light. [*HP Board 2019*] **[1]**

Q.8 What is the focal length of a plane mirror?

(A) zero (B) infinity

(C) zero to infinity (D) None of these

[*HP Board 2018*] **[1]**

Q.9 To get nine images of a single object one should have two plane mirror at an angle of:

(A) 40° (B) 36° (C) 90° (D) 120°

[*HP Board 2018*] **[1]**

Q.10 To get five images of a single object one should have two plane mirror at an angle of:

(A) 30° (B) 60° (C) 90° (D) 120°

[*HP Board 2018*] **[1]**

Q.11 To get three images of a single object one should have two plane mirror at an angle of

(A) 30° (B) 60° (C) 90° (D) 120°

[*HP Board 2017, 2016*] **[1]**

Q.12 When a wave enters in a medium what does not change?

(A) Wavelength (B) Amplitude

(C) Frequency (D) Speed

[*HP Board 2017, 2016*] **[1]**

Q.13 Pencil in a beaker filled with water seems to be broken or bent due to [*HP Board 2017, 2016*] **[1]**

(A) Reflection (B) Diffraction

(C) Total internal reflection (D) Refraction

Q.14 If angle between two plane mirrors is 60°, then number of images formed are

(A) 5 (B) 6

(C) infinite (D) None of these

[HP Board 2017] **[1]**

Q.15 The image formed by the objective of a compound microscope is

(A) Virtual and large (B) Virtual and diminished

(C) Real and diminished (D) Real and enlarged

[HP Board 2016] **[1]**

Q.16 Why sky appears blue in colour?

[HP Board 2018, 2016, 2015] **[1]**

Q.17 What is the cause of dispersion of light?

[HP Board 2018] **[1]**

Q.18 Why danger signals are red?

[HP Board 2018, 2016, 2012] **[1]**

Q.19 What is Dispersion of light? Explain its cause.

[HP Board 2015] **[1]**

2 Marks Questions.

Q.20 Derive lens formula in case of convex lens when image formed is real. *[HP Board 2020]* **[2]**

Q.21 Refractive index of glass is 1.5. Find the speed of light in glass and the critical angle for glass.

[HP Board 2020] **[2]**

Q.22 What is total internal reflection ? Under what conditions does it take place. *[HP Board 2020]* **[2]**

Q.23 What is the critical angle for the material of refractive index $\sqrt{2}$? *[HP Board 2020]* **[2]**

Q.24 Why does the sky appear blue?What will it look like on moon ? *[HP Board 2019]* **[2]**

Q.25 Show that in case of prism $A + \delta = i + e$, where the symbols have their usual meanings.

[HP Board 2015] **[2]**

Q.26 Why sun appears reddish at the time of sun set?

[HP Board 2013, 2015,2016] **[2]**

Q.27 Define Power of a Lens. What are its units?

[HP Board 2015, 2016] **[2]**

Q.28 Explain the formation of mirage. *[HP Board 2013]* **[2]**

Q.29 Discuss the principle and application of optical fibres.

[HP Board 2010] **[2]**

Q.30 What is Mirage? Discuss Mirage in brief.

[HP Board 2017] **[2]**

Q.31 Define Power of a lens Two lenses of power –15D and +5D are in contact each other. What is the focal length of this combination? *[HP Board 2017]* **[2]**

Q.32 An object is placed in front of a concave mirror of radius of curvature 40 cm at a distance of 10 cm. Find the position and nature of the image.

[HP Board 2017] **[2]**

Q.33 Discuss Sparkling of a Diamond.

[HP Board 2017] **[2]**

Q.34 What are optical fibres? Write its three applications.

[HP Board 2014] **[2]**

3 Marks Questions.

Q.35 Derive an expression for magnifying power of a simple microscope, when image formed is at least distance of distinct vision. *[HP Board 2020]* **[3]**

Q.36 Derive mirror formula for concave mirror when image formed is real. *[HP Board 2020]* **[3]**

Q.37 Prove that $-\frac{n_1}{u}+\frac{n_2}{v}=\frac{n_2-n_1}{R}$.

When refraction occurs from rarer medium to denser medium at convex spherical refractive surface. (n_1 & n_2 are refractive indices of two media)

[HP Board 2020] **[3]**

Q.38 What is total internal reflection ? What are the necessary conditions for it ? *[HP Board 2019]* **[3]**

Q.39 What is total internal reflection? What are its conditions? Establish relationship between critical angle and refractive index. *[HP Board 2013, 2014, 2015, 2016]* **[3]**

Q.40 Prove that for a concave mirror, the radius of curvature is twice the focal length. *[HP Board 2015]* **[3]**

4 Marks Questions.

Q.41 Derive the expression $-\frac{n_1}{u}+\frac{n_2}{v}=\frac{n_2-n_1}{R}$, when the refraction occurs from rarer to denser medium at convex spherical refracting surface ($n_1 < n_2$). (Where u, v, R, are object distance, image distance and radius of curvature of spherical surface respectively.) [*HP Board 2019*] **[4]**

Q.42 Prove that $\frac{n_1}{-u}+\frac{n_2}{v}=\frac{n_2-n_1}{R}$, when refraction occurs from rarer to denser medium at a concave spherical refracting surface. [*HP Board 2019*] **[4]**

Q.43 Why are danger signals red? Explain. [*HP Board 2019*] **[4]**

Q.44 Define magnifying power of an astronomical telescope. Derive an expression for magnifying power of an astronomical telescope. **[4]**

Or

What is meant by Dispersion of light? Prove that for a prism

$$\mu=\frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$$

[*HP Board 2018*] **[1+3]**

Q.45 Define magnifying power of a compound microscope. Derive an expression for magnifying power of a compound microscope when the image is formed at least distance of distinct vision. **[1+3]**

What is meant by Dispersion of light? Prove that for a prism $A + \delta + i + e$, where symbols have their usual meanings. [*HP Board 2018*] **[1+3]**

Q.46 Define Compound microscope. Using Ray diagram find an expression for its magnifying power. [*HP Board 2016,2017*] **[4]**

Q.47 Derive Lens maker's formula. Also state sign conventions used to derive lens maker's formula. [*HP Board 2017*] **[4]**

Q.48 Using new Cartesian sign conventions, derive

$\frac{-n_2}{u}+\frac{n_1}{v}=\frac{n_1-n_2}{R}$. When refraction occurs at convex spherical refracting surface and object lies in denser medium? [*HP Board 2016*] **[4]**

Q.49 Stating new Cartesian sign conventions, derive the relation

$-\frac{n_1}{u}+\frac{n_2}{v}=\frac{n_2-n_1}{R}$ when refraction takes from rarer medium to denser medium at a convex spherical surface, where letters have their usual meanings.

Or

a) What is Simple Microscope? Define its magnifying power.

b) Using ray diagram find an expression magnifying power of simple microscope for distinct vision. [*HP Board 2013, 2015, 2017*] **[2, 2]**

Q.50 With the help of a diagram, explain the working of a simple microscope and find expression for its magnifying power. [*HP Board 2015*] **[4]**

Q.51 What is Astronomical telescope? With the help of ray diagram, derive a relation for its magnifying power when image is formed at least distance of distinct vision. [*HP Board 2015*] **[4]**

Q.52 Derive Lens Maker's formula for a convex lens. [*HP Board 2012, 2014, 2015,2016*] **[4]**

Q.53 What is Compound Microscope? With the help of ray diagram, explain the working of compound microscope. Find an expression for its magnifying power. [*HP Board 2013,2015*] **[4]**

Q.54 Describe the construction and working of an astronomical telescope. Calculate its magnifying power, when the image is formed at the least distance of distinct vision. [*HP Board 2013*] **[4]**

Q.55 Derive lens formula for convex lens stating sign conventions [*HP Board 2011*] **[4]**

Q.56 Derive the relation between refractive index of medium and its critical angle. [*HP Board 2010*] **[4]**

Q.57 Discuss refraction from a rarer medium to denser medium at a convex spherical refracting surface, when image formed is virtual. [*HP Board 2009*] **[4]**

Or

Derive relation, $\frac{-1}{u}+\frac{n}{v}=\frac{n-1}{R}$,

Where $n=\frac{n_2}{n_1}$; In case of virtual image formation. **[4]**

Q.58 Stating sign conventions and assumptions, derive the expression for the lens maker's formula *i.e.*

$$\frac{1}{f}=(\mu-1)\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$$

where the letters have their usual meanings. [*HP Board 2013*] **[4]**

Q.59 Draw a labelled diagram for a compound microscope, when final image is formed at least distance of distinct vision. Define magnifying of compound microscope in this case and derive expression for it. [*HP Board 2014*] **[4]**

Q.60 A needle placed 45 cm from a lens forms an image on a screen placed 90 cm on the other side of the lens. Find its focal length. If the length of needle is 5 cm, what is the length of image? [*HP Board 2015*] **[4]**

10 CHAPTER

Wave Optics

1 Mark Questions.

Q.1 Can two independent source of light be coherent? Why? [*HP Board 2010*] **[1]**

Q.2 What are the two assumptions on which Huygen's principle is based? Explain Huygen's geometrical construction for wave fronts. [*HP Board 2018*] **[1]**

Q.3 Light waves can be polarised but sound waves cannot be polarised. Why? [*HP Board 2018*] **[1]**

Q.4 What is meant by Polarisation of light? Derive Brewster's law of polarisation of light. [*HP Board 2018*] **[1]**

Q.5 Show that in Young's double slit experiment for interference of light, the widths of bright and dark fringes are equal. [*HP Board 2018*] **[1]**

Q.6 Using Huygen's Principle prove the laws of refraction. [*HP Board 2018*] **[1]**

Q.7 Using Huygen's principle prove the laws of reflection. [*HP Board 2018, 2016, 2015*] **[1]**

2 Marks Questions.

Q.8 Coloured spectrum is seen through a muslin cloth. Why? [*HP Board 2020*] **[2]**

Q.9 Distinguish between interference and diffraction of light. [*HP Board 2018*] **[2]**

Q.10 What are the assumptions of Huygen's wave theory of light. [*HP Board 2012*] **[2]**

Q.11 Define wave front of light. State its relation with ray of light. [*HP Board 2014*] **[2]**

Q.12 Why should we have narrow sources to produce good interference fringes? [*HP Board 2014*] **[2]**

3 Marks Questions.

Q.13 What is Polaroid? Give its uses. [*HP Board 2013, 2014,2017*] **[3]**

Q.14 What are the conditions for sustained interference with good contrast? [*HP Board 2017*] **[3]**

Q.15 Show that in Young's double slit experiment for interference of light, the widths of bright and dark fringes are equal.

Or

[*HP Board 2011*] **[3]**

What is fringe width ? Derive an expression for fringe width in Young's double slit experiment. What will happen if the distance between the two slits becomes nearly zero ? [*HP Board 2009*] **[3]**

Q.16 What is the difference between interference and diffraction? [*HP Board 2017*] **[3]**

Q.17 What is fringe width? Derive an expression for fringe width in Young's double slit experiment. [*HP Board 2016*] **[3]**

Q.18 State and prove Brewster's law of Polarisation of light. [*HP Board 2015*] **[3]**

Q.19 State Huygen's principle and prove the laws of reflection on the basis of wave theory. [*HP Board 2013*] **[1, 2]**

4 Marks Questions.

Q.20 Explain diffraction of light at a single slit and derive an expression for the width of central maxima. [*HP Board 2020*] **[4]**

Q.21 Derive expressions for conditions of constructive and destructive interference in Young's double slit experiment. [*HP Board 2020*] **[4]**

Q.22 State Huygen's Principles and prove the laws of refraction on its basis. [*HP Board 2020*] **[4]**

Q.23 Define polarising angle. How is it related with the critical angle? [*HP Board 2013*] **[4]**

Q.24 ***a)*** State and explain Huygen's principle.

b) Using Huygen's principle, prove Snell's law of refraction. [*HP Board 2017*] **[4]**

Q.25 In Young's double slit experiment, prove that dark and bright fringes are equal in width. [*HP Board 2016*] **[4]**

Q.26 What do you mean by diffraction of light? Explain diffraction at a single slit and deduce an expression for width of central maxima. [*HP Board 2014*] **[4]**

Q.27 What do you mean by interference of light ? Deduce the conditions for constructive and destructive interference in Young's double slit experiment. [*HP Board 2012*] **[4]**

Q.28 Two independent light sources cannot act as coherent sources. Why? [*HP Board 2014,2015*] **[4]**

Q.29 ***a)*** What are coherent sources of light?

b) Show that the fringe width of dark fringe is equal to the width of bright fringe in Young's double slit experiment. [*HP Board 2017*] **[1, 3]**

11 CHAPTER

Dual Nature of Radiation and Matter

1 Mark Questions.

Q.1 The mass of photon at rest is :
(A) Zero (B) 1.6×10^{-35} kg
(C) 1 a.m.u. (D) 9×10^{-31} kg
[*HP Board 2020*] **[1]**

Q.2 One electron volt is equal to [*HP Board 2020*] **[1]**
(A) 10^{-13} J (B) 1.6×10^{-31} J
(C) 1.6×10^{-19} J (D) 6.25×10^{18} J

Q.3 The wavelength of matter waves is independent of :
(A) Mass (B) Velocity
(C) Momentum (D) Charge
[*HP Board 2020*] **[1]**

Q.4 The unit of Plank's constant is:
(A) Nm (B) eV
(C) Js^{-1} (D) Js
[*HP Board 2019*] **[1]**

Q.5 The minimum energy required to remove an electron is called :
(A) Work function (B) Kinetic energy
(C) Stopping potential (D) Potential energy
[*HP Board 2019*] **[1]**

Q.6 Define work function of a metal and give it's units. Discuss various types of electron emission.
[*HP Board 2018*] **[1]**

Q.7 Define Photoelectric effect. Derive Einstein's photoelectric equation. [*HP Board 2018*] **[1]**

Q.8 Derive an expression for *de*-Broglie wavelength of an electron moving under Potential difference of V volts.
[*HP Board 2018*] **[1]**

Q.9 Define threshold frequency. Explain the laws of Photoelectric emission. [*HP Board 2018*] **[1]**

Q.10 Derive *de*-Broglie's wave equation for material particles.
[*HP Board 2018, 2015*] **[1]**

2 Marks Questions.

Q.11 Derive Einstein's photoelectric equation.
[*HP Board 2020*] **[2]**

Q.12 What is photon ? Write its two properties.
[*HP Board 2020*] **[2]**

Q.13 State the laws of Photo-electric emission.
[*HP Board 2020*] **[2]**

Q.14 Write down Einstein's photoelectric equation. What is threshold frequency? [*HP Board 2015*] **[2]**

Q.15 What is photon? State its three properties.
[*HP Board 2014*] **[2]**

3 Marks Questions.

Q.16 Derive an expression for half-life of a radio-active substance. [*HP Board 2020*] **[3]**

Q.17 Calculate the momentum of a photon having frequency 5×10^{13} Hz. Given that $h = 6.6 \times 10^{-34}$ Js and $C = 3 \times 10^{8}$ ms^{-1}. [*HP Board 2013*] **[3]**

Q.18 An electron and a photon have same wave length. Which one has greater kinetic energy ?
[*HP Board 2012*] **[3]**

Or

What is photoelectric effect ? Explain the effect of increase of (*i*) frequency (*ii*) intensity of incident radiation on photoelectric current. [*HP Board 2012*] **[3]**

Q.19 What is photoelectric effect ? Derive Einstein's photoelectric equation. Explain two laws of photoelectric effect on the basis of this relation. Explain the effect of increase in frequency of incident light on the velocity of photoelectrons ejected.
[*HP Board 2009, 2010, 2011*] **[3]**

Q.20 Calculate the *de*-Broglie wavelength of an electron.
[*HP Board 2008, 2009*] **[3]**

Q.21 Give the value of speed and rest mass of a photon. Determine the wavelength of a photon of energy 10^{10} eV. Given $h = 6.625 \times 10^{-34}$ Js.
[*HP Board 2016,2017*] **[1, 2]**

Q.22 Derive *de*-Broglie wavelength of an electron moving under potential difference of V volt.
[*HP Board 2013, 2015, 2016*] **[3]**

Q.23 What is photoelectric effect? State the laws of Photoelectric emission.
[*HP Board 2013, 2015,2016*] **[1+2]**

Q.24 A Photon and electron have got same de Broglie wavelength. Which has greater total energy? Explain.
[*HP Board 2015,2016*] **[3]**

Q.25 Verify Laws of photoelectric effect, after deriving Einstein's photoelectric equation. [*HP Board 2016*] **[3]**

12 CHAPTER — Atoms

2 Mark Questions.

Q.1 What are the limitations of Bohr's atomic model? [*HP Board 2015*] **[2]**

Q.2 What is Rutherford's model of an atom? What are its drawbacks? [*HP Board 2015*] **[2]**

Q.3 State postulates of Bohr's theory of hydrogen atom. [*HP Board 2015*] **[2]**

13 CHAPTER — Nuclei

1 Mark Questions.

Q.1 Atom bomb works on the principle of :

(A) Nuclear fission (B) Nuclear fusion
(C) β-decay (D) α-decay

[*HP Board 2020*] **[1]**

Q.2 Hydrogen bomb is based on the principle of :

(A) Nuclear fission (B) β-decay
(C) Nuclear fusion (D) None of these

[*HP Board 2020*] **[1]**

Q.3 The energy equivalent to 1 a.m.u. is :

(A) 1.6×10^{-19} J (B) 6.02×10^{23} J
(C) 9.31 MeV (D) 931 MeV

[*HP Board 2020*] **[1]**

Q.4 For the given reaction, the particle X is:

$${}_6C^{11} \rightarrow {}_5B^{11} + \beta^+ + X$$

(A) neutron (B) antineutrino
(C) neutrino (D) proton

[*HP Board 2018*] **[1]**

Q.5 In reaction ${}_4Be^9 + {}_2He^4 \rightarrow {}_6C^x + {}_0n^1$ calculate the value of '*x*'.

(A) 16 (B) 12
(C) 10 (D) 14

[*HP Board 2018*] **[1]**

Q.6 ${}_7N^{14}$ is bombarded with ${}_2He^4$. The resulting nucleus is ${}_8O^{17}$ with the emission of:

(A) Neutrino (B) Antineutrino
(C) Proton (D) Neutron

[*HP Board 2018*] **[1]**

Q.7 An atom bomb works on the principle of

(A) Alpha-decay (B) Beta-decay
(C) Nuclear fission (D) Nuclear fusion

[*HP Board 2017*] **[1]**

Q.8 The penetrating power is maximum for

(A) α-rays (B) β-rays
(C) γ-rays (D) None of these

[*HP Board 2017*] **[1]**

Q.9 A nucleus of ${}_{11}Na^{23}$ contains

(A) 12 electrons (B) 12 protons
(C) 12 neutrons (D) 11 neutrons

[*HP Board 2017*] **[1]**

Q.10 When ${}_3Li^7$ is bombarded by protons are the resultant nuclei are ${}_4Be^8$, the emitted particles are

(A) α-particle (B) β-particle
(C) γ-photon (D) neutron

[*HP Board 2016*] **[1]**

Q.11 In nuclear transformation

$${}_aX^b + {}_0n^1 \longrightarrow {}_3Li^7 + {}_2He^4$$

which one is the nucleus of element *X*

(A) ${}_5B^{10}$ (B) ${}_5B^9$
(C) ${}_4Be^{11}$ (D) ${}_6C^{12}$

[*HP Board 2016*] **[1]**

Q.12 A deutron is bombarded on ${}_8O^{16}$ nucleus then α-particle is emitted, the product nucleus is

(A) ${}_7N^{14}$ (B) ${}_5B^{10}$ (C) ${}_2Be^9$ (D) ${}_7N^{13}$

[*HP Board 2016*] **[1]**

Q.13 What is Mass defect, binding energy and binding energy per nucleon? [*HP Board 2018*] **[1]**

Q.14 Define nuclear forces. Give their properties.

[*HP Board 2018*] **[1]**

2 Marks Questions.

Q.15 State the laws of radioactive decay. If N_0 is the number of radioactive nuclei in the sample at some initial time. Find out the relation to determine the number of undecayed nuclei *N* present at a subsequent time. Draw a plot of *N* as a function of time. [*HP Board 2019*] **[2]**

Q.16 State the laws of Radioactive decay.

[*HP Board 2015*] **[2]**

Q.17 Define Binding energy. Sketch the graph between binding energy per nucleon and mass number.

[*HP Board 2015*] **[2]**

Q.18 What fraction of tritium will remain after 25 years? Given: half life of Tritium is 12.5 years.

[*HP Board 2015*] **[2]**

Q.19 State the laws of radioactive decay and hence derive the relation $N = N_0 e^{-\lambda t}$, where the letters have their usual meanings. [*HP Board 2009, 2011*] **[2]**

Or

State the laws of radioactive decay. If N_0 is the number of radioactive nuclei in the sample at some initial time. Find out the relation to determine the number of undecayed nuclei N present at a subsequent time. Draw a plot of N as a function of time.

Q.20 Define half life of radioactive substance. Derive an expression for it. [*HP Board 2015*] **[2]**

3 Marks Questions.

Q.21 State the laws of radio-active decay.

[*HP Board 2020*] **[3]**

Q.22 Define binding energy per nucleon. Draw a curve between mass number and binding energy per nucleon. Also explain the curve. [*HP Board 2020*] **[3]**

Q.23 What is nuclear fission and fusion?

[*HP Board 2014*] **[3]**

Q.24 How does binding energy per nucleon vary with mass number? What is its significance?

[*HP Board 2014*] **[3]**

Q.25 What are Nuclear forces? Give their four properties.

[*HP Board 2016*] **[3]**

Q.26 What is Decay Law? Show that $N = N_0 e^{-\lambda t}$, where symbols have their usual meanings.

[*HP Board 2017*] **[3]**

Q.27 Define Nuclear size and Nuclear density. Show that nuclear density is the same all nuclei. [*HP Board 2018*] **[3]**

Q.28 What is Mass defect, binding energy and binding energy per nucleon? [*HP Board 2016*] **[3]**

Q.29 State the laws of radioactive decay. Show that radioactive decay is exponential in nature.

[*HP Board 2013, 2014*] **[3]**

Q.30 Show that the density of the nuclei of all the atoms is same. [*HP Board 2013*] **[3]**

Q.31 Define half life and decay constant of a radioactive substance. Derive relation between them.

[*HP Board 2011*] **[3]**

Q.32 Find the binding energy per nucleon of $_3Li^7$ nucleus. Given, mass of proton = 1.007829 a.m.u., Mass of a neutron = 1.00866 a.m.u., and mass of $_3Li^7$ = 7.01599 a.m.u. [*HP Board 2010*] **[3]**

Q.33 Define atomic mass unit (u). Find its energy equivalent in MeV. [*HP Board 2009*] **[3]**

Q.34 Define bindings energy per nucleon. Discuss the main features of the graph between mass number and binding energy per nucleon. [*HP Board 2017*] **[3]**

14 CHAPTER
Semiconductor Electronics : Materials, Devices and Simple Circuits

1 Mark Questions.

Q.1 When a *p-n* junction diode is reverse biased, then,
(A) high current flows
(B) the depletion region is increased
(C) the height of potential barrier is reduced
(D) the depletion region is reduced
[*HP Board 2020*] **[1]**

Q.2 Depletion layer in P-N junction diode consists of :
(A) electrons (B) immobile ions
(C) holes (D) both (A) and (C)
[*HP Board 2020*] **[1]**

Q.3 Boron is added as an impurity to silicon, the resulting material is : [*HP Board 2020*] **[1]**
(A) *n*-type semiconductor
(B) *p*-type semiconductor
(C) intrinsic semiconductor
(D) none of these

Q.4 N-type semiconductor is obtained by doping intrinsic germanium with [*HP Board 2016*] **[1]**
(A) Phosphorous (B) Aluminium
(C) Boron (D) Gold

Q.5 Boron is added as impurity to silicon, the resultant semiconductor is [*HP Board 2016*] **[1]**
(A) *n*-type semiconductor (B) *p*-type semiconductor
(C) *n*-type conductor (D) none of these

Q.6 Which of the following logic gate is an universal logic gate?
(A) OR (B) AND
(C) NOT (D) NAND
[*HP Board 2016, 2018*] **[1]**

Q.7 At absolute zero, Ge behaves as:
(A) Conductor (B) Insulator
(C) Semiconductor (D) Super conductor
[*HP Board 2018*] **[1]**

Q.8 Which of the following logic gate is an universal logic gate? [*HP Board 2018*] **[1]**
(A) OR (B) AND
(C) NOT (D) NOR

Q.9 A *p*-type semiconductor is
(A) Neutral (B) Negatively charged
(C) Positively charged (D) None of these
[*HP Board 2017*] **[1]**

Q.10 Which of the following logic gate is an universal logic gate ?
(A) OR (B) AND
(C) NOT (D) NAND
[*HP Board 2017*] **[1]**

Q.11 What is the difference between P-type and N-type semi-conductor? [*HP Board 2018*] **[1]**

Q.12 In a transistor base is made very thin. Why? [*HP Board 2018*] **[1]**

Q.13 What is rectification? How can a diode be used as half wave rectifier. [*HP Board 2018*] **[1]**

Q.14 Write the truth table for OR gate. [*HP Board 2011*] **[1]**

Q.15 Write truth table of an AND gate.
[*HP Board 2009, 2011*] **[1]**

2 Marks Questions.

Q.16 Give the Boolean expression, symbolic diagram and truth table of 'NOT' Gate. [*HP Board 2020*] **[2]**

Q.17 Distinguish between forward biasing and reverse biasing of junction diode. [*HP Board 2020*] **[2]**

Q.18 Distinguish between intrinsic semi-conductors and extrinsic semiconductors. [*HP Board 2018*] **[2]**

Q.19 On the basis of energy band diagram, distinguish between metal, insulator and semiconductor.

Q.20 Give : [*HP Board 2017*] **[½, ½, 1, 1]**
a) Logic symbol ***b)*** Boolean expression
c) Truth table ***d)*** Electronic circuit of "OR" gate.

Q.21 What is Rectifier ? On what principle it works. [*HP Board 2017*] **[2]**

Q.22 What is doping? What happens to the conductivity with increase of temperature? [*HP Board 2016*] **[2]**

Q.23 What is Logic Gate? Convert decimal number into binary number. [*HP Board 2016*] **[2]**

Q.24 What is the difference between *p*-type and *n*-type semi-conductor? [*HP Board 2016*] **[2]**

Q.25 Give logic symbol, Boolean expression and truth table of 'OR' gate. [*HP Board 2015*] **[2]**

Q.26 Give logic symbol, Boolean expression and truth table of an 'AND' gate. [*HP Board 2015*] **[2]**

Q.27 Distinguish between Intrinsic and Extrinsic semiconductors. [*HP Board 2015*] **[2]**

Q.28 Give the symbol and Boolean expression of AND gate. [*HP Board 2009*] **[2]**

Q.29 Write Truth table, Logic symbol and Boolean expression of 'NOR' gate. [*HP Board 2015, 2013*] **[2]**

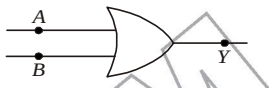
Q.30 What is intrinsic semiconductor? How does conductivity of an intrinsic semiconductor vary with rise in temperature and why? [*HP Board 2014*] **[2]**

Q.31 What is logic gate? Give truth table, logic symbol and Boolean expression of NAND Gate.[*HP Board 2014*] **[2]**

Q.32 Discuss the formation of *p-n* junction. [*HP Board 2014*] **[2]**

Q.33 Give the logic symbol, Boolean expression and truth table of NAND logic gate. [*HP Board 2013*] **[2]**

Q.34 Give Boolean expression and truth table of the logic gate shown in figure [*HP Board 2013*] **[2]**



Q.35 What do you mean by doping ? Which type of doping creates a hole ? [*HP Board 2012*] **[2]**

3 Marks Questions.

Q.36 Discuss the working of *n-p-n* transistor as common-emitter amplifier. [*HP Board 2020*] **[3]**

Q.37 Discuss the working of P-N junction diode as a full wave rectifier. [*HP Board 2020*] **[3]**

Q.38 Explain through a diagram, working of transistor as an oscillator. [*HP Board 2020*] **[3]**

Q.39 What is the principle of rectifier ? Explain with the help of circuit diagram, the use of junction diode as a full wave rectifier. [*HP Board 2019*] **[3]**

Q.40 Drawing a labelled circuit diagram, explain the working of common emitter amplifier using *n-p-n* transistor. What is the phase relationship between input and output signals? [*HP Board 2019*] **[3]**

Q.41 Drawing a labelled circuit diagram, explain the working of common emitter amplifier using *n-p-n* transistor. What is the phase relationship between input and output signals? [*HP Board 2009*] **[3]**

Q.42 What is Oscillator? With the help of diagram explain the working of transistor as an oscillator in CE mode. [*HP Board 2016*] **[3]**

Q.43 Using the concept of electron current and hole current derive an expression for conductivity of semiconductor. [*HP Board 2009*] **[3]**

Q.44 ***a)*** Draw a labelled circuit diagram of a transistor operating as a switch.

b) In a transistor emitter-base junction is always forward biased while the collector base junction is reverse biased. Why? [*HP Board 2014*] **[2½, 1½]**

Q.45 What is transistor ? Explain the action of *p-n-p* transistor. [*HP Board 2013*] **[3]**

Q.46 Drawing a labelled circuit diagram, explain the working principle of a common emitter amplifier using *p-n-p* transistor. [*HP Board 2013*] **[3]**

Q.47 Differentiate metals, semiconductors and insulators on the basis of energy band theory. [*HP Board 2012*] **[3]**

Q.48 What is the principle of rectifier ? Explain with the help of a circuit diagram, the use of junction diode as a full wave rectifier. [*HP Board 2011*] **[3]**

Or

With the help of a circuit diagram, explain the working principle of a full wave rectifier. Draw the input and output waveforms.

Q.49 What is rectification? How can a diode be used as half rectifier? [*HP Board 2016*] **[3]**

Q.50 Give the working of *p-n-p* transistor. [*HP Board 2015*] **[3]**

4 Marks Questions.

Q.51 Give a labelled diagram of *p-n-p* transistor as a common emitter amplifier and explain its working. [*HP Board 2010, 2011*] **[4]**

Q.52 What is an Amplifier? With the help of circuit diagram, explain the function of *p-n-p* transistor as an amplifier. [*HP Board 2015*] **[4]**

Q.53 How is Junction diode formed? Discuss the working of junction diode as a full wave rectifier. [*HP Board 2015*] **[4]**

Q.54 What is a Rectifier? Explain the working of a full-wave rectifier giving a neat circuit diagram as well as the input and output waveforms. [*HP Board 2014*] **[4]**

15 CHAPTER

Communication Systems

1 Mark Questions.

Q.1 In earth's atmosphere, Ozone layer lies in :

(A) Troposphere (B) Stratosphere

(C) Mesosphere (D) Ionosphere

[*HP Board 2020*] **[1]**

Q.2 Modem is a device which performs

(A) modulation

(B) demodulation

(C) rectification

(D) both modulation and demodulation

[*HP Board 2020*] **[1]**

Q.3 The function of MODEM is to convert:

(A) analog signal into digital signal

(B) digital signal into analog signal

(C) analog signal into digital and vice-versa

(D) none of these [*HP Board 2018*] **[1]**

Q.4 What is modulation? Explain the need of modulation. [*HP Board 2018*] **[1]**

Q.5 Modem is a device which performs:

(A) Modulation

(B) Demodulation

(C) Rectification

(D) Modulation and demodulation

[*HP Board 2017*] **[1]**

Q.6 The radio waves which are received after reflection in ionosphere are called

(A) ground waves (B) sky waves

(C) space waves (D) surface waves

[*HP Board 2016*] **[1]**

Q.7 Modulation

(A) reduces the bandwidth use

(B) allows practicable antennas

(C) helps in long distance transfer of messages

(D) amplifies the bandwidth [*HP Board 2016*] **[1]**

Q.8 Major limitation of Amplitude modulation is

(A) noisy output

(B) high cost

(C) medium efficiency

(D) average audio response [*HP Board 2016*] **[1]**

Q.9 The portion of atmosphere closest to the ground is

(*a*) troposphere (*b*) stratosphere (*c*) mesosphere

[*HP Board 2013*] **[1]**

Q.10 What is frequency modulation ? Give advantages of frequency modulation. [*HP Board 2011*] **[1]**

Q.11 What is ground wave ? [*HP Board 2011*] **[1]**

2 Marks Questions.

Q.12 Write Boolean expression, truth table and symbolic diagram of "OR" Gate. [*HP Board 2020*] **[2]**

Q.13 What is modulation ? What are its types ? [*HP Board 2019*] **[2]**

Q.14 Define the following:

(*a*) Attenuation **(*b*)** Amplification

[*HP Board 2017*] **[2]**

Q.15 Write a short note on Sky wave propagation. [*HP Board 2017*] **[2]**

Q.16 Define the following:

(*a*) Modulation **(*b*)** De-modulation

[*HP Board 2017*] **[2]**

Q.17 How microwaves are produced? Give any three uses of Microwaves. [*HP Board 2017*] **[2]**

Q.18 Write a short note on Space wave propagation. [*HP Board 2017*] **[2]**

Q.19 Define the following:

(*a*) Transducer **(*b*)** Transponder.

[*HP Board 2017*] **[1, 1]**

Q.20 Write a short note on Sky wave propagation. [*HP Board 2015*] **[2]**

Q.21 What is ground wave propagation? Why is it limited upto 1500 kHz? [*HP Board 2015*] **[2]**

Q.22 Write a short note on ground wave propagation. [*HP Board 2011*] **[2]**

Q.23 Define signal; also give the classification of signals. [*HP Board 2010*] **[2]**

Q.24 What is amplitude modulation ? [*HP Board 2009, 2011*] **[2]**

3 Marks Questions.

Q.25 A T.V. Tower has height '*h*'. Derive an expression for the maximum distance upto which the signal can be received from the antenna. [*HP Board 2020*] **[3]**

Q.26 Discuss the ground wave and space wave propagation. [*HP Board 2020*] **[3]**

Q.27 Distinguish between analog and digital communi-cation. [*HP Board 2020*] **[3]**

Q.28 Deduce an expression for the distance at which T.V. signals can directly be received from a T.V. tower of height *h*. [*HP Board 2018*] **[3]**

Q.29 What do you mean by ground wave, sky wave and space wave propagation. [*HP Board 2016*] **[3]**

Q.30 What is modulation? Why is it needed? [*HP Board 2014*] **[3]**

Q.31 Discuss various types of wave propagation. [*HP Board 2014*] **[3]**

Q.32 Derive an expression for maximum distance up to which the TV signals can be received on the earth's surface. [*HP Board 2014*] **[3]**

Q.33 What is modulation? Distinguish between frequency modulation and amplitude modulation. [*HP Board 2013*] **[3]**

Q.34 Explain the following terms : [*HP Board 2013*] **[3]**

(*a*) Ground wave **(*b*)** Space wave

(*c*) Sky wave

Q.35 Calculate the distance upto which the TV signals can be received directly from the transmitting antenna of height *h*. [*HP Board 2011*] **[3]**

4 Marks Questions.

Q.36 What is space communication ? Explain with diagram the concepts and methods of space and sky wave propagation. [*HP Board 2009,2010, 2011, 2011*] **[4]**

Q.37 ***a)*** What is Modulation? Why is it needed?

b) Explain Amplitude modulation.

[*HP Board 2015*] **[2+2=4]**