B–21–X

Roll No.

Total No. of Questions : **26**] [Total No. of Printed Pages : **4**

XIIARJKUT23
9121–X
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

SECTION–A

1 each

1. Why are resistances connected in series and in parallel ?
2. Why can a d.c. ammeter not read an a.c. ?
3. Why are electromagnetic waves called so ?
4. What is the effect of decrease in wavelength of incident light on the velocity of photoelectrons ?
5. What type of charge carriers are there in a *p*-type semiconductor ?

SECTION–B

2 each

6. What is maximum value of angle of dip ? At what places does it occur ?

Or

Why do two parallel conductors carrying current exert force on each other ?

7. State and explain Fleming's right hand rule.

8. What does an electromagnetic wave consist of ? On what factors does its velocity in vacuum depend ?

9. If amplitude of two coherent sources producing interference is in the ratio of 1 : 2, find ratio of I_{max} to I_{min}.

10. (a) What is Demodulation ?

    (b) Draw a labelled block diagram for demodulation of amplitude modulated wave.

SECTION–C 3 each

11. Explain how you will compare the e.m.f.'s of two cells by a potentiometer ?

12. Find an expression for the electric field at any point outside a uniformly charged thin spherical shell.

Or

Explain, what is meant by quantization of charge ?

13. A wire has a resistance of 10.5 Ω at 21°C and 16.4 Ω at 147°C. Find the value of co-efficient of resistance.

14. Using Biot-Savart's law, calculate the magnetic field at the centre of a circular coil.

15. Obtain an expression for torque acting on a rectangular current loop, when placed inclined at an angle 'θ' with the direction of magnetic field 'B'.

16. A ray of light is incident on the surface of glass plate of refractive index 1.5 at the polarising angle. What is the angle of refraction ?

17. Write the postulates of Bohr's modal of hydrogen atom.

18. Define binding energy of a nucleus. Draw a curve between mass number and binding energy per Nucleon.

19. What is Photoelectric effect ? Derive the Einstein's equation.

20. Distinguish between an intrinsic semiconductor and *p*-type semiconductor. Why is *p*-type semiconductor crystal neutral ?

21. How is Junction diode formed ? Discuss the working of a function diode as full wave rectifier. https://www.jkboseonline.com

22. Explain the sky wave propagation of radio waves.

SECTION–D

4

23. Ram is using yellow light in a single slit diffraction experiment with slit of width 0.6 mm. The teacher replaces yellow light by X-rays. Now he is not able to observe diffraction pattern. He feels sad. Again the teacher replaces X-rays by yellow light and the diffraction pattern appears again. The teacher now explains the facts :

Questions :

(a) Which value is displayed by the teacher ?

(b) Give the necessary conditions for diffraction.

SECTION–E

5 each

24. (a) What is an electric dipole and electric dipole moment ?

(b) Derive an expression for electric potential at a point due to an electric dipole. Also discuss the special cases.

Or

(a) Define capacitance of a capacitor. Give its S.I. unit.

(b) Prove that the total electrostatic energy stored in a parallel plate capacitor is $\frac{1}{2}cv^2$.

25. With the help of a labelled diagram, explain the construction and working of an a.c. generator. Find an expression for e.m.f. produced by the generator.

Or

Derive an expression for impedance and phase angle for series LCR a.c. circuit. How does impedance differ from ohmic resistance ?

26. Stating the assumptions made and convention of signs used, derive the lens maker's formula in case of a double convex lens.

Or

Define fringe width. Derive an expression for fringe width in Young's double slit experiment of interference of light.

B–21–Y

Roll No.

Total No. of Questions : **26**] [Total No. of Printed Pages : **4**

XIIARJKUT23
9121–Y
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

SECTION–A

1 each

1. Why are connecting wires made of copper ?
2. What is the basic cause of induced e.m.f. ?
3. Which part of electromagnetic spectrum has largest penetrating power ?
4. What determines the strength of photoelectric current ?
5. Why are semiconductors doped ?

SECTION–B

2 each

6. What are magnetic lines of force ? Why *two* such lines do not cross each other ?

Or

Why should an ammeter have as low a resistance as possible ? Explain.

7. What is self-induction ? Give its S.I. unit.

8. Can an electromagnetic wave be deflected by magnetic or electric field ? Explain.

9. If amplitude of two coherent sources producing interference is in the ratio of 1 : 2, find ratio of I_{max} to I_{min}.

10. (a) Define amplitude modulation.

(b) Write any *two* factors which justify the need for modulating a signal.

SECTION–C

3 each

11. Derive the principle of Wheatstone bridge using Kirchhoff's law.

12. Find an expression for the electric field at a point due to a line charge using Gauss's theorem.

Or

Explain conservation of charge giving two examples.

13. A wire has a resistance of 10.5 Ω at 21°C and 16.4 Ω at 147°C. Find the value of co-efficient of resistance.

14. Using Biot-Savart's law, calculate the magnetic field at the centre of a circular coil.

15. Obtain an expression for torque acting on a rectangular current loop, when placed inclined at an angle 'θ' with the direction of magnetic field 'B'.

16. A ray of light is incident on the surface of glass plate of refractive index 1.5 at the polarising angle. What is the angle of refraction ?

17. Write the postulates of Bohr's modal of hydrogen atom.

18. Define binding energy of a nucleus. Draw a curve between mass number and binding energy per Nucleon.

19. What is Photoelectric effect ? Derive the Einstein's equation.

20. Distinguish between an intrinsic semiconductor and *p*-type semiconductor. Why is *p*-type semiconductor crystal neutral ?

21. How is Junction diode formed ? Discuss the working of a function diode as full wave rectifier. https://www.jkboseonline.com

22. Explain the sky wave propagation of radio waves.

SECTION–D

4

23. Ram is using yellow light in a single slit diffraction experiment with slit of width 0.6 mm. The teacher replaces yellow light by X-rays. Now he is not able to observe diffraction pattern. He feels sad. Again the teacher replaces X-rays by yellow light and the diffraction pattern appears again. The teacher now explains the facts :

Questions :

(a) Which value is displayed by the teacher ?

(b) Give the necessary conditions for diffraction.

SECTION–E

5 each

24. (a) What is an electric dipole and electric dipole moment ?

(b) Derive an expression for electric potential at a point due to an electric dipole. Also discuss the special cases.

Or

(a) Define capacitance of a capacitor. Give its S.I. unit.

(b) Prove that the total electrostatic energy stored in a parallel plate capacitor is $\frac{1}{2}cv^2$.

25. With the help of a labelled diagram, explain the construction and working of an a.c. generator. Find an expression for e.m.f. produced by the generator.

Or

Derive an expression for impedance and phase angle for series LCR a.c. circuit. How does impedance differ from ohmic resistance ?

26. Stating the assumptions made and convention of signs used, derive the lens maker's formula in case of a double convex lens.

Or

Define fringe width. Derive an expression for fringe width in Young's double slit experiment of interference of light.

B–21–Z

Roll No.

Total No. of Questions : 26] [Total No. of Printed Pages : 4

XIIARJKUT23
9121-Z
PHYSICS

Time : 3 Hours] [Maximum Marks : 70

SECTION–A 1 each

1. Why is constantan or manganin used for making standard resistors ?
2. From where does the electric energy come in a generator ?
3. Which part of electromagnetic spectrum is used in operating a RADAR ?
4. What is the effect of intensity of incident light on photo-electric current ?
5. Which type of doping creates a hole ?

SECTION–B 2 each

6. What is probable cause of earth's magnetism ?

Or

Why is soft iron core used in a moving coil galvanometer ?

SECTION–E

5 each

24. (a) What is an electric dipole and electric dipole moment ?

(b) Derive an expression for electric potential at a point due to a. electric dipole. Also discuss the special cases.

Or

(a) Define capacitance of a capacitor. Give its S.I. unit.

(b) Prove that the total electrostatic energy stored in a parallel plate capacitor is $\frac{1}{2}cv^2$.

25. With the help of a labelled diagram, explain the construction and working of an a.c. generator. Find an expression for e.m.f. produced by the generator.

Or

Derive an expression for impedance and phase angle for series LCR a.c. circuit. How does impedance differ from ohmic resistance ?

26. Stating the assumptions made and convention of signs used, derive the lens maker's formula in case of a double convex lens.

Or

Define fringe width. Derive an expression for fringe width in Young's double slit experiment of interference of light.

7. What is mutual induction ? Give its S.I. unit.

8. How are infrared waves produced ? Why are these called heat waves ?

9. If amplitude of two coherent sources producing interference is in the ratio of 1 : 2, find the ratio of I_{max} to I_{min}.

10. What is Communication ? Name *three* basic units of communication.

SECTION–C

3 each

11. State and explain Kirchhoff's laws for electrical circuit.

12. Find an expression for the electric field at a point due to an infinite sheet of charge.

Or

State Coulomb's law of force in electrostatics. Also define one Coulomb of charge.

13. A wire has a resistance of 10.5 Ω at 21°C and 16.4 Ω at 147°C. Find the value of co-efficient of resistance.

14. Using Biot-Savart's law, calculate the magnetic field at the centre of a circular coil.

15. Obtain an expression for torque acting on a rectangular current loop, when placed inclined at an angle 'θ' with the direction of magnetic field 'B'.

16. A ray of light is incident on the surface of glass plate of refractive index 1.5 at the polarising angle. What is the angle of refraction ?

17. Write the postulates of Bohr's modal of hydrogen atom.

18. Define binding energy of a nucleus. Draw a curve between mass number and binding energy per Nucleon.

19. What is Photoelectric effect ? Derive the Einstein's equation.

20. Distinguish between an intri. semiconductor and *p*-type semiconductor. Why is *p*-type semiconductor crystal neutral ?

21. How is Junction diode formed ? Discuss the working of a function diode as full wave rectifier.

22. Explain the sky wave propagation of rad' waves.

SECTION–D

4

23. Ram is using yellow light in a single slit diffraction experiment with slit of width 0.6 mm. The teacher replaces yellow light by X-rays. Now he is not able to observe diffraction pattern. He feels sad. Again the teacher replaces X-rays by yellow light and the diffraction pattern appears again. The teacher now explains the facts :

Questions :

(a) Which value is displayed by the teacher ?

(b) Give the necessary conditions for diffraction.

A–1–A

Roll No.....

Total No. of Questions : **26]**

[Total No. of Printed Pages : **4**

12th SZARJD22
6001–A
PHYSICS

Time : 2.30 Hours] **[Maximum Marks : 70**

Note :– Attempt all questions.

Section–A

1 each

1. Charge resides only on the outer surface of a charged conductor. (True/False)

2. What is the condition of balanced position of Wheatstone bridge ?

3. Ozone layer is present in the stratosphere region of atmosphere. (True/False)

4. Define threshold frequency.

5. P-type semiconductor is electrically neutral. (True/False)

Section–B

2 each

6. Find the electrostatic potential energy of an electric dipole having magnitude of each charge as 3×10^{-6} coulomb, separated by a distance of 2×10^{-7} metre.

Or

Three capacitors of capacitance 1μF, 2μF and 3μF are connected in series. Find the total capacitance of combination.

7. Mention two points of difference between step up and step down transformer.

8. Give *four* properties of electromagnetic waves.

9. Find the magnifying power and length of astronomical telescope of objective and eye piece of focal length 144 cm and 6 cm respectively.

10. Why ground waves are not suitable for high frequency ?

Section–C

3 each

11. Derive relation between Current and Drift velocity.

Or

Find the resistivity of wire of length 2 m. diameter 0.01 m and resistance 50 mΩ.

12. A battery of e.m.f. 10 V and internal resistance 3 Ω is connected to a resistor so that a current of 0.5 A flows in the circuit. Find the resistance of resistor and terminal voltage of battery, in a closed circuit.

13. A solenoid is 2 m long and 3 cm in diameter, has 5 layers of winding of 1000 turns, each carries a current of 5 A. Find magnetic induction at its centre along its axis and also at the ends.

14. State and explain Faraday's laws of electromagnetic induction.

15. Magnetic field through a coil of 200 turns and area of cross-section 0.04 m^2 changes from 0.1 wb/m^2 to 0.04 wb/m^2 in 0.02 second. Find the induced e.m.f. and induced current, if resistance of coil is 10 ohm.

16. Define Scattering of light. Why sky appears blue ?

17. Derive Einstein's photoelectric equations.

18. Write down the postulates of Bohr's model of hydrogen atom.

19. Define nuclear fission. Explain with the help of an example.

20. Distinguish between *p*- and *n*-type extrinsic semiconductor.

21. Give the truth table, logic symbol and Boolean expression of OR gate.

22. Draw the block diagram of data transmission and data reception.

Section–D

23. Owais was very happy to receive a car on his birthday from his father. Then Owais and his friend Basit went for a long drive at night. Basit suggested Owais to get the tubes of his headlight replaced with high power tubes, as the headlight according to him were weak. Owais did so and again went for long drive with his friend to check the new headlights. As they were enjoying the drive, suddenly a scooter coming from opposite side struck their car. Luckily nobody was hurt but the vehicles got badly damaged. Basit slapped the scooterist but the scooterist said that the headlights of the car made him blind and he could not see anything. Owais's father became very angry with Owais and told him that he should have installed special cover on the headlights to reduce the glare. Now, answer the following : 4

(a) What is the special cover reducing the glare called ? Mention its two other applications.

(b) What is your opinion about Owais and Basit's behaviour ?

(c) What do you think about the reaction of Owais's father ?

(d) Name and state the law that relates refractive index of the material cover with the angle at which reflected light and refracted light are perpendicular to each other.

Section–E

5 each

24. State Gauss' law. Derive an expression for the electric field due to an infinite line of charge.

Or

Give the principle, construction and working of Van de Graff's generator.

25. State Biot Savart's law. Derive an expression for the magnetic field at the centre of circular coil carrying current.

Or

What are diamagnetic, paramagnetic and ferromagnetic substances ? Give their properties.

26. State Huygens' principle. Derive laws of reflection or refraction from it.

Or

What is Lens Maker's formula ? Derive an expression for Lens Maker's formula for a convex lens.

A–1–B

Roll No.....

Total No. of Questions : 26] [Total No. of Printed Pages : 4

12th SZARJD22
6001–B
PHYSICS

Time : 2.30 Hours] **[Maximum Marks : 70**

Note :– Attempt all questions.

Section–A 1 each

1. Capacitance of a spherical conductor of radius (r) is $c = 4\pi\epsilon_0 r$. (True/False)
2. A wire of resistivity (s) is stretched to double its length. What will be its new resistivity ?
3. In an electromagnetic wave, the phase difference between electric field and magnetic field is zero. (True/False)
4. Define threshold wavelength.
5. n-type semiconductor is electrically neutral. (True/False)

Section–B 2 each

6. How much charge and energy is stored in a 12PF capacitor connected to a 50 V battery ?

Or

If force between two equal charges separated by a distance of 2 m in free space is equal to weight of 20 kg child. Find the magnitude of charges. Take $g = 10$ m/s^2.

7. Define inductive reactance and capacitive reactance in mathematical form.

8. Define electromagnetic wave. Write the expression for velocity of electromagnetic wave in terms of permitivity of free space (ϵ_0) and permeability of free space (μ_0).

9. Calculate the speed of light in a medium whose critical angle is 45°.

10. Why sky waves are not used for transmission of T.V. signals ?

Section–C 3 each

11 State and explain Kirchhoff's law.

Or

How many electrons pass through a wire in 2 minutes, if current of 300 mA passes through it.

12. A wire of resistance 5 ohm is stretched to double its original length. Find the new resistance.

13. A solenoid is 2 m long and 3 cm in diameter, has 5 layers of winding of 1000 turns, each carries a current of 5 A. Find magnetic induction at its centre along its axis and also at the ends.

14. State and explain Faraday's laws of electromagnetic induction.

15. Magnetic field through a coil of 200 turns and area of cross-section 0.04 m^2 changes from 0.1 wb/m^2 to 0.04 wb/m^2 in 0.02 second. Find the induced e.m.f. and induced current, if resistance of coil is 10 ohm.

16. Define Scattering of light. Why sky appears blue ?

17. Derive Einstein's photoelectric equations.

18. Write down the postulates of Bohr's model of hydrogen atom.

19. Define nuclear fission. Explain with the help of an example.

20. Distinguish between *p*- and *n*-type extrinsic semiconductor.

21. Give the truth table, logic symbol and Boolean expression of OR gate. https://www.jkboseonline.com

22. Draw the block diagram of data transmission and data reception.

Section–D

4

23. Owais was very happy to receive a car on his birthday from his father. Then Owais and his friend Basit went for a long drive at night. Basit suggested Owais to get the tubes of his headlight replaced with high power tubes, as the headlight according to him were weak. Owais did so and again went for long drive with his friend to check the new headlights. As they were enjoying the drive, suddenly a scooter coming from opposite side struck their car. Luckily nobody was hurt but the vehicles got badly damaged. Basit slapped the scooterist but the scooterist said that the headlights of the car made him blind and he could not see anything. Owais's father became very angry with Owais and told him that he should have installed special cover on the headlights to reduce the glare. Now, answer the following :

    (a) What is the special cover reducing the glare called ? Mention its two other applications.

(b) What is your opinion about Owais and Basit's behaviour ?

(c) What do you think about the reaction of Owais's father ?

(d) Name and state the law that relates refractive index of the material cover with the angle at which reflected light and refracted light are perpendicular to each other.

Section–E

5 each

24. State Gauss' law. Derive an expression for the electric field due to an infinite line of charge.

Or

Give the principle, construction and working of Van de Graff's generator.

25. State Biot Savart's law. Derive an expression for the magnetic field at the centre of circular coil carrying current.

Or

What are diamagnetic, paramagnetic and ferromagnetic substances ? Give their properties.

26. State Huygens' principle. Derive laws of reflection or refraction from it.

Or

What is Lens Maker's formula ? Derive an expression for Lens Maker's formula for a convex lens.

A–1–C

Roll No.....

Total No. of Questions : **26**] [Total No. of Printed Pages : **4**

12th SZARJD22
6001–C
PHYSICS

Time : 2.30 Hours] **[Maximum Marks : 70**

Note :– Attempt all questions.

Section–A 1 each

1. The dielectric constant of a metal is infinite. (True/False)
2. What is the condition for the Wheatstone bridge to be most sensitive ?
3. All electromagnetic waves are transverse in nature. (True/False)
4. Define work function.
5. Intrinsic semiconductors are electrically neutral. (True/False)

Section–B 2 each

6. Three capacitors of capacitance 1 μF, 2 μF and 3 μF are connected in parallel. Find the total capacitance of combination.

Or

The electrostatic force on a small sphere of charge 0.4 μc due to another small sphere of charge –0.8 μc in air is 0.2 N. Calculate distance between the two spheres.

7. Define mean value and root mean square value of alternating current.

8. Define electromagnetic wave. Write the expression for velocity of electromagnetic wave in terms of amplitude of electric field (E_0) and amplitude of magnetic field (B_0).

9. Calculate speed of light in a medium for angle of polarization of 60°.

10. Why are short waves used for long distance transmission ?

Section–C

3 each

11. State and explain principle of potentiometer.

Or

A 220 volt-100 watt bulb is connected to 110 volt source. Calculate the power consumed by the bulb.

12. A wire of resistance 5 ohm is stretched by double its original length. Find the new resistance.

13. A solenoid is 2 m long and 3 cm in diameter, has 5 layers of winding of 1000 turns, each carries a current of 5 A. Find magnetic induction at its centre along its axis and also at the ends.

14. State and explain Faraday's laws of electromagnetic induction.

15. Magnetic field through a coil of 200 turns and area of cross-section 0.04 m^2 changes from 0.1 wb/m^2 to 0.04 wb/m^2 in 0.02 second. Find the induced e.m.f. and induced current, if resistance of coil is 10 ohm.

16. Define Scattering of light. Why sky appears blue ?

17. Derive Einstein's photoelectric equations.

18. Write down the postulates of Bohr's model of hydrogen atom.

19. Define nuclear fission. Explain with the help of an example.

20. Distinguish between *p*- and *n*-type extrinsic semiconductor.

21. Give the truth table, logic symbol and Boolean expression of OR gate. https://www.jkboseonline.com

22. Draw the block diagram of data transmission and data reception.

Section–D

23. Owais was very happy to receive a car on his birthday from his father. Then Owais and his friend Basit went for a long drive at night. Basit suggested Owais to get the tubes of his headlight replaced with high power tubes, as the headlight according to him were weak. Owais did so and again went for long drive with his friend to check the new headlights. As they were enjoying the drive, suddenly a scooter coming from opposite side struck their car. Luckily nobody was hurt but the vehicles got badly damaged. Basit slapped the scooterist but the scooterist said that the headlights of the car made him blind and he could not see anything. Owais's father became very angry with Owais and told him that he should have installed special cover on the headlights to reduce the glare. Now, answer the following : 4

(a) What is the special cover reducing the glare called ? Mention its two other applications.

(b) What is your opinion about Owais and Basit's behaviour ?

(c) What do you think about the reaction of Owais's father ?

(d) Name and state the law that relates refractive index of the material cover with the angle at which reflected light and refracted light are perpendicular to each other.

Section–E 5 each

24. State Gauss' law. Derive an expression for the electric field due to an infinite line of charge.

Or

Give the principle, construction and working of Van de Graff's generator.

25. State Biot Savart's law. Derive an expression for the magnetic field at the centre of circular coil carrying current.

Or

What are diamagnetic, paramagnetic and ferromagnetic substances ? Give their properties.

26. State Huygens' principle. Derive laws of reflection or refraction from it.

Or

What is Lens Maker's formula ? Derive an expression for Lens Maker's formula for a convex lens.

1901-Z

PHYSICS

Maximum Marks—70 **Time Allowed—3 Hours**

(Fifteen Minutes Extra to read the Question Paper)

(Long Answer Type Questions)

1. **State and explain Coulomb's law in vector form. Hence define unit charge.**

Or

Show that electric potential can be represented as line integral of electric field. **5**

2. **Find the force between two Parallel conductors carrying current in Same and Opposite direction and hence define one ampere.**

Or

What is Ampere circuit law? Derive an expression for magnetic field due to a current in a toroid. 5

3. **State and explain Faraday's laws of Electromagnetic induction.**

Or

What is a Transformer? Explain its theory and discuss its main uses. 5

4. **What do you mean by total internal reflection and critical angle? Derive a relation between the refractive index and critical angle. What are the conditions for producing total internal reflection?**

Or

With the help of ray diagram, explain the formation of image in compound microscope. Derive an expression for its magnifying power. 5

(Short Answer Type Questions)

5. How is a Potentiometer used to compare e.m.f. of two cells? 3

6. State Ohm's law and deduce it from the knowledge of drift velocity. 3

7. **Three capacitors of capacitance 2PF, 3PF and 4PF are connected in parallel. What is the charge on each capacitor of the combination is connected to 100 volt supply?** 3

8. What is meant by Electric resonance? Where is it used?

9. **What does an Electromagnetic wave convert of? On what factors does its velocity in vacuum depend?** 3

10. **Distinguish between Interference and Diffraction.** 3

11. **Show that in case of a prism $A + D = i + e$ where symbols have their usual meanings.** 3

12. **State difference between Nuclear fusion and Fission. Also give an example of each.**

(Very Short Answer Type Questions)

13. The following very short answer type questions of two marks, each may be answered in a few words or few sentences or as may be required.

(a) State two properties of Paramagnetic substance. 2

(b) Distinguish between Constructive and Destructive interference. 2

(c) What is Threshold frequency and Stopping potential?

(d) What is the Ionization energy of H-atom? 2

(e) Draw the circuit diagram of a pnp transistor as an amplifier.

(f) How can NOR gate be made? Write its Boolean expression. 2

(g) What is Amplitude modulation?

(h) What is Sky-wave? Where it is used?

(Objective Type Questions)

4 (i) Which alloys are used for making standard resistance coils? 1

(ii) What is the magnitude of Force acting on a stationary charge? 1

(iii) The speed of light in a medium is independent of the nature of source, why? 1

(iv) What is the velocity of a Photon? 1

(v) How many electron volt make one joule? 1

Choose the correct answer :

(vi) The density of nucleus is of the order of

A. $10^3 kg/m^3$

B. $10^{10} kg/m^3$

C. $10^{15} kg/m^3$

D. $10^{17} kg/m^3$. 1

(vii) The impurity atoms with which pure silicon should be dropped to make P-type semiconductor

A. Phosphorus

B. Antimony

C. Boron

D. Arsenic.

5101-X
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

Section–A

1 each

1. In homes electrical devices are connected in parallel. Why ?
2. Is photoelectric emission possible at all frequencies ?
3. What is the value of one atomic mass unit (amu) in terms of energy ?
4. The energy gap of silicon is 1.1 eV. What does it mean ?
5. Under what conditions a transistor works as an open switch ?

Section–B

2 each

6. What do you understand by eddy currents ? How can they be minimised ?

Or

Distinguish between reactance and impedance of an a.c. circuit.

7. The near point of a person is at 40 cm from the eye. Find the power of the lens he should use while reading at 25 cm.

8. Define half life of a radioactive substance and derive an expression for it.

9. Why is NAND gate known as universal gate ?

10. Why are TV signals not transmitted using sky waves ?

Section–C 3 each

11. Show that the electric field at any point is equal to the negative of the potential gradient at that point.

12. How many electrons pass through a wire in 2 minutes, if the current passing through the wire is 0.3 ampere ?

Or

What is the drift velocity of electrons in a copper conductor having cross-sectional area of 5×10^{-6} m^2 if the current is 10 A ? Assume that there are 8×10^{28} electrons/m^3.

13. What is Wheatstone Bridge ? Apply Kirchhoff's laws to Wheatstone bridge to derive the condition for balancing the bridge.

14. Derive an expression for magnetic field at a point well inside a solenoid carrying current.

15. State and explain Faraday's law of electromagnetic induction.

16. Calculate the impedance of series LCR circuit.

17. Give two uses of each of the following :

(a) Gamma rays

(b) Infrared rays

(c) Ultraviolet rays

18. What are Polaroids ? Mention some of their practical uses.

19. (a) What is the momentum of electron if its de-Broglie wavelength is 2Å ?

(b) The maximum kinetic energy of a photoelectron is 5 eV. What is its stopping potential ?

20. Discuss the energy level diagram in case of hydrogen atom.

21. Draw V-I characteristics of a *p–n* junction diode in (a) forward bias (b) reverse bias.

22. Explain surface wave and sky wave propagation of radio waves.

Section–D

23. Sona and Mona are friends both studying in 12th class. Sona is a 'arts' student and Mona is a 'science' student. Both of them go to market to purchase sunglasses. Sona feels that any coloured glasses with fancy look are good enough. Mona tells her to look for UV protection glasses, polaroid glass and photosensitive glasses.

Read the above passage and answer the following questions :

(a) What are UV protection glasses, polaroid glasses and photosensitive glasses ?

(b) What values are displayed by Mona ?

Section–E

5 each

24. What is an electric dipole ? Deduce an expression for torque on an electric dipole placed in a uniform field. Hence define dipole moment.

Or

State Gauss theorem. Derive an expression for electric field intensity at a point due to an infinite plane sheet of charge density.

25. Give the principle, construction and working of a moving coil galvanometer.

Or

Using Ampere's law, derive an expression for magnetic field at a point due to a long straight current carrying conductor.

26. State Huygen's principle. Verify Snell's law of refraction using it.

Or

Describe an astronomical telescope. Derive an expression for its magnifying power when final image is formed at infinity.

5101-Z
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

Section–A

1 each

1. For what basic purpose the cells are connected in series and in parallel.
2. Is there any difference between light wave and matter waves ?
3. In which region of electromagnetic spectrum does the Lyman series of hydrogen atom lie ?
4. How does the junction width change, when a p–n junction is forward biased ?
5. Can two p–n junction diodes placed back to back work as p–n–p transistor ? Give reason to justify your answer.

Section–B

2 each

6. Explain Self-Induction. Define co-efficient of self-induction.

Or

What is importance of power factor in an a.c. circuit ?

7. An object is placed 10 cm in front of a concave mirror of radius of curvature 15 cm. Find the nature, position and magnification of the image.

8. Draw a curve between mass number and average binding energy.
9. Explain how AND gate is realised.
10. What is communication system ? Name its major components.

Section–C 3 each

11. Define electrical capacitance of a conductor. On what factors does it depend ? Give its unit.
12. In a potentiometer, a cell of e.m.f. 1.25 V gives a balance point at 35.0 cm length of the wire. If the cell is replaced by another cell and the balance point shift to 63.0 cm, what is the emf of the second cell ?

Or

Three identical cells each of e.m.f. 2 V and unknown internal resistance are connected in parallel. This combination is connected to a 5 ohm resistor. If the terminal voltage across the cell is 1.5 volt. What is the internal resistance of each cell ?

13. How will you use potentiometer for comparing the e.m.f's of two given cells ?
14. Derive an expression for magnetic field at a point well inside a solenoid carrying current.
15. State and explain Faraday's law of electromagnetic induction.
16. Calculate the impedance of series LCR circuit.
17. Give two uses of each of the following :
    (a) Gamma rays
    (b) Infrared rays
    (c) Ultraviolet rays

B–1–A

Roll No.....

Total No. of Questions : **21**] [Total No. of Printed Pages : **4**

XIISZRJDF20
1101–A
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

(Long Answer Type Questions) 5 each

1. Using Gauss's law derive an expression for electric field due to uniformly charged thin spherical shell at a point outside the shell.

Or

What is parallel plate capacitor ? Derive an expression for the energy stored in a capacitor.

2. Give the principle, construction and working of a moving coil galvanometer.

Or

Discuss the properties of dia, para and ferromagnetic materials.

3. What is meant by total internal reflection ? State its conditions.

Or

Define fringe width. Derive expression for fringe width in interference pattern.

4. Define Rectification. How can a p-n junction diode be used as a full wave rectifier ?

Or

Draw an OR gate using two diodes, explain its working and write its truth table.

(Short Answer Type Questions) 3 each

5. Calculate the potential energy in case of dipole having magnitude of each charge as 3×10^{-6} C. The charges are separated at a distance of 2000 Å.

6. Distinguish between resistance and resistivity.

7. Explain the limitations of cyclotron.

8. State and explain Faraday's laws of electromagnetic induction.

9. Write any *six* characteristics of electromagnetic waves.

10. For a given medium, the polarising angle is 45°. What will be the critical angle of the medium ?

11. State postulates of Bohr's theory of Hydrogen atom.

12. What is space wave propagation ? Give *two* examples of communication system which use space wave mode.

(Very Short Answer Type Questions) 2 each

13. Briefly explain the principle of Potentiometer.

14. Why is the core of a transformer laminated ?

15. A capacitor behaves as perfect conductor for high frequency a.c. Explain why ?

16. Find the power of a convex lens of focal length 20 cm.

17. Why does sky look blue ?

18. Give *two* points of difference between nuclear fission and nuclear fusion.

19. State laws of photoelectric emission.

20. What is Modulation ?

(Objective Type Questions) 1 each

21. (a) Do as directed :

(i) The copper strips in a slide wire bridge are thick because ..... . (Fill in the blank)

(ii) The advantage of placing the prism in minimum deviation position is to obtain pure spectrum. *(True/False)*

(iii) The momentum of a photon is 'P', the wave length is ..... . (Fill in the blank)

(iv) Mass defect is difference between ..... . (Fill in the blank)

(v) The resistance and depletion layer in p-n junction diode decreases during forward bias. (True/False)

(b) Choose the correct/most appropriate answer :

(vi) 1 kWh is equal to :

(A) 3.6×10^5 J (B) 3.6×10^{-6} J

(C) 3.6×10^6 J (D) 36000 J

(vii) Resonant frequency of LCR-resonant circuit is :

(A) $2\pi\sqrt{LC}$ (B) $2\pi/\sqrt{LC}$

(C) $\frac{1}{2\pi}\sqrt{LC}$ (D) $\frac{1}{2\pi\sqrt{LC}}$

(viii) The tip of a needle does not give a sharp image on a screen. This is due to :

(A) Polarization (B) Interference

(C) Diffraction (D) Refraction

(ix) An electron of mass 'm' and charge 'e' is moving from rest through a potential difference 'V' in vacuum. Its final velocity is :

(A) $\sqrt{\frac{2eV}{m}}$ (B) $\sqrt{\frac{eV}{m}}$

(C) $\sqrt{\frac{eV}{2m}}$ (D) $\frac{eV}{m}$

(x) A hole in a p-type semiconductor is :

(A) an excess electron

(B) a missing electron

(C) a missing atom

(D) a positive ion

B–1–B

Roll No.....

Total No. of Questions : 21] [Total No. of Printed Pages : 4

XIISZRJDF20
1101-B
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

(Long Answer Type Questions) **5 each**

1. Using Gauss's law derive an expression for electric field due to uniformly charged thin spherical shell at a point outside the shell.

Or

What is parallel plate capacitor ? Derive an expression for the energy stored in a capacitor.

2. Give the principle, construction and working of a moving coil galvanometer.

Or

Discuss the properties of dia, para and ferromagnetic materials.

3. What is meant by total internal reflection ? State its conditions.

Or

Define fringe width. Derive expression for fringe width in interference pattern.

4. Define Rectification. How can a p-n junction diode be used as a full wave rectifier ?

Or

Draw an OR gate using two diodes, explain its working and write its truth table.

(Short Answer Type Questions) 3 each

5. Calculate the potential energy in case of dipole having magnitude of each charge as 3×10^{-6} C. The charges are separated at a distance of 2000 Å.
6. Distinguish between resistance and resistivity.
7. Explain the limitations of cyclotron.
8. State and explain Faraday's laws of electromagnetic induction.
9. Write any *six* characteristics of electromagnetic waves.
10. For a given medium, the polarising angle is 45°. What will be the critical angle of the medium ?
11. State postulates of Bohr's theory of Hydrogen atom.
12. What is space wave propagation ? Give *two* examples of communication system which use space wave mode.

(Very Short Answer Type Questions) 2 each

13. Briefly explain the principle of Potentiometer.
14. Why is the core of a transformer laminated ?
15. Why an inductor is an easy path for d.c. and resistive path for a.c. ?

16. Find the power of a concave lens of focal length 20 cm.

17. Why sun looks red at sunrise/sunset ?

18. Define nuclear fission with an example.

19. Define threshold frequency and work function.

20. Define Demodulation.

(Objective Type Questions) 1 each

21. (a) Do as directed :

(i) The copper strips in a slide wire bridge are thick because ..... . (Fill in the blank)

(ii) We can increase the range of a telescope by increasing the diameter of the obje ve. (True/False)

(iii) A graph between de-Broglie wavelength and momentum of photon is ..... . (Fill in the blank)

(iv) Average binding energy of stable nucleus is ..... MeV/nucleon. (Fill in the blank)

(v) The resistance and length of depletion layer in p-n diode increase during reverse bias. (True/False)

(b) Choose t' correct/most appropriate answer :

(vi) A power of 100 W is being supplied across a potential difference of 200 V. Current flowing is :

(A) 0.5 A (B) 1 A

(C) 2 A (D) 0.05 A

(vii) The average value of A.C. over a complete cycle is :

(A) I_0 (B) $\frac{2I_0}{\pi}$

(C) Zero (D) $\frac{I_0}{\sqrt{2}}$

(viii) The phase difference between any two points on the same wave front is :

(A) 2π (B) π

(C) Zero (D) $\pi/2$

(ix) de-Broglie wavelength of a body of mass 'm' and kinetic energy 'E' is :

(A) $\lambda = \frac{\sqrt{2mE}}{h}$ (B) $\frac{h}{\sqrt{2mE}} = \lambda$

(C) $\lambda = \frac{h}{2mE}$ (D) $\lambda = \frac{h}{mE}$

(x) Boron is added as an impurity to silicon, the resulting material is :

(A) n-type semiconductor

(B) p-type semiconductor

(C) Intrinsic semiconductor

(D) None of these

XIIARKDN20

2001-C

PHYSICS

Section-A

(Very-Very Short Answer Type Questions)

1. A wire of resistivity 'p' is stretched to twice its length. What will be its new resistivity ?

2. What is the magnetic force exerted by a magnetic field on a stationary charge ?

3. At very high frequency a capacitor be haves as a pure conductor. Why ?

4. If the intensity of incident radiation on a metal is doubled, what happens to the kinetic energy of electrons emitted ?

5. How does the conductivity of a semiconductor change with rise of temperature ?

Section-B

(Very Short Answer Type Questions)

6. State and explain Biot-Savart law for magnetic field due to a current element.

Or

Define magnetic declination and magnetic dip.

7. The reading of hot wire ammeter in a.c. circuit is 10A. What is rms value of current and peak value of current ?

8. Distinguish step-up and step-down transformers.

9. What is Polarisation? What type of waves can be polarised?

10. Sky waves are not used in transmitting TV signals. Why?

Section-C

(Short Answer Type Questions)

11. A point charge of 2 μC is at the centre of a cubic Gaussian surface of 9 cm edge. What is the net electric flux through the surface and through one face of the cube ?

12. With the help of circuit diagram explain how you will compare e.m.fs of two primary cells using potentiometer.

Or

Using Kirchhoff's laws, derive the condition for balance of a Wheatstone bridge circuit.

13. Calculate resistivity of the material of a wire 2.0 m long. 0.6 mm diameter and having resistance of 3.0 ohm.

14. Using phasor-diagram solution of series LCR circuit, derive an expression for impedance.

15. Give two uses of each of the following:

(i) Microwave (ii) Infrared waves (iii) X-rays

16. What is phenomenon of total internal reflection ? Give the conditions for its occurrence.

17. Show that the de-Broglie wavelength of electron of energy 'E' is given by relation:

$$\lambda = \frac{h}{\sqrt{2mE}}$$

18. Show that in Bohr's hydrogen atom $r \propto n^2$, where 'r' is the radius and 'n' is the principal quantum number.

19. Define mass defect and obtain an expression for binding energy per nucleon.

20. With the help of a circuit diagram explain the voltage regulating action of Zener diode.

21. Give logic symbol. Boolean expression and truth-table of an AND gate.

22. What is amplitude modulation ? Discuss its advantages.

Section-D

(Value Based Questions)

23. Ravi was very much fascinated towards astronomy that he decided

to make a telescope. He carefully studied about the construction of telescope and prepared his own model and presented his ideas in a science seminar and got first prize.

Questions :

(a) What qualities do Ravi possess ?

(b) What kind of telescope he might have made and draw ray diagram for the same ?

Section-E

(Long Answer Type Questions)

24. State and explain Coulomb's Law in vector form. Hence define unit charge.

Or

What is parallel plate capacitor ? Derive an expression for its capacitance, where dielectric slab is introduced between its plates.

25. Discuss the principle, construction and working of a moving coil galvanometer.

Or

What are dia- para- and ferro-magnetic materials. Discuss their important properties.

26. Discuss the phenomenon of refraction through a prism and prove that for a prism:

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

Or

Define fringe width. Derive an expression for fringe width in interference pattern.

B–1–X

Roll No.....

Total No. of Questions : **21**] [Total No. of Printed Pages : **4**

XIIRSZJF19
22001–X
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

(Long Answer Type Questions) 5 each

1. State Gauss's law. Derive an expression for electric field due to an infinite plane sheet of charge.

Or

Give the principle, construction and working of Van de Graff's generator.

2. State Biot Savart's law. Derive an expression for the magnetic field at the centre of circular coil carrying current.

Or

Give the principle, construction and working of moving coil galvanometer.

3. Derive an expression for the impedance and phase angle of an LCR-series circuit. Hence write the condition for impedance to be maximum and minimum.

Or

Give the principle, construction and working of a transformer.

4. Define fringe width. Derive an expression for fringe width in case of Young's double slit experiment of interference of light.

Or

What is lens maker's formula ? Derive lens maker's formula for a convex lens.

(Short Answer Type Questions) 3 each

5. What is the capacity of a parallel plate capacitor, whose area of plates is $1{\cdot}13 \times 10^9$ m^2 and separation between them is 0·7 cm ? Also, find the energy stored in the capacitor for a potential of 200 volt.

6. State and explain Kirchhoff's laws.

7. A wire of 5 ohm is stretched to double its original length. Calculate its new resistance.

8. State and explain Faraday's laws of electromagnetic induction.

9. State and explain Brewster's law of polarization of light.

10. Calculate angle of minimum deviation for an equilateral triangular prism of refractive index $\sqrt{3}$.

11. Define half life period of a radioactive substance. Derive an expression for it.

12. What is a Zener diode ? How is Zener diode used as a voltage regulator ?

(Very Short Answer Type Questions) 2 each

13. A galvanometer of resistance 30 ohm shows a full scale deflection for a current of 2 mA. Calculate the value of resistance required to convert it into a voltmeter of range 0-5 volt.

14. Write *four* properties of electromagnetic waves.

15. What is total internal reflection ? Write *two* conditions for total internal reflection of light. https://www.jkboseonline.com

16. Define threshold frequency and stopping potential.

17. What is the momentum and energy of a photon of frequency $1{\cdot}5 \times 10^{13}$ Hz ? Take $h = 6{\cdot}6 \times 10^{-34}$ Js and $c = 3 \times 10^{8}$ m/s.

18. Write *four* properties of α-rays.

19. Give the truth table and logic symbol of NOR gate.

20. Why sky waves are not used for transmission of TV signals ?

(Objective Type Questions) 1 each

21. Do as directed :

(i) What is the condition for Wheatstone bridge to be most sensitive and balanced ?

(ii) Write the dimensional formula of magnetic field.

(iii) Electromagnetic waves are produced by accelerated charge.

(True/False)

(iv) What is myopia ? Which lens is used to correct myopia ?

(v) The nuclear radius depends upon the mass number as $A^{1/3}$, while as nuclear density is independent of mass number.

(True/False)

(vi) The conductivity of an intrinsic semiconductor depends upon temperature only.

(True/False)

(vii) *n*-type semiconductor is obtained by adding ..... impurity to pure semiconductor.

(A) Trivalent (B) Tetravalent

(C) Pentavalent (D) All of these

(viii) Define ground wave propagation.

(ix) The radio waves received after reflection from ionosphere are :

(A) Ground waves (B) Sky waves

(C) Space waves (D) Surface waves

(x) Modulation is essential feature of a :

(A) Transmitter (B) Receiver

(C) Medium (D) None of these

XIIRSZJF19—22001-X

B-1-X

E–1–X

Roll No.....

Total No. of Questions : **21]**

[Total No. of Printed Pages : **4**

12th BAKDM19
22701–X
PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

(Long Answer Type Questions) 5 each

1. Two long straight parallel wires carrying currents I_1 and I_2 in the same direction. Find an expression for force per unit length between them. Depict the pattern of magnetic field lines. Use the expression to define S.I. unit of current.

Or

Derive an expression for the force acting on a current carrying conductor placed in a uniform magnetic field. Also mention the cases when the force is minimum and maximum.

2. State and explain Lenz's law. Show that Lenz's law is in accordance with the law of conservation of energy.

Or

Derive an expression for Average power in LCR circuit connected to an A.C. supply. Hence define power factor.

3. With the help of a ray diagram illustrate the formation of final image of an object in a compound microscope. Derive an expression for its magnifying power. How can it be increased ?

Or

State Huygen's principle. Hence derive laws of refraction from it.

4. On the basis of energy bands distinguish between metals, insulators and semiconductors.

Or

Give logic symbol, truth-table, Boolean expression and realisation of an OR gate.

(Short Answer Type Questions) 3 each

5. Express Coulomb's law in vector form.

6. Derive an expression for energy stored in a capacitor.

7. State and explain Kirchhoff's laws.

8. A potential difference of 6V is applied across a conductor of resistance 3Ω. Calculate the number of electrons flowing through it in one second. (Given charge on electron $e = 1{\cdot}6 \times 10^{-19}$C)

9. Give *six* uses of electromagnetic waves.

10. Define mass defect and binding energy. Sketch the graph between B.E. per nucleon and mass number.

11. Explain space wave propagation.

12. The angle of minimum deviation for a prism of $\pi/3$ is $\pi/6$. Calculate the refractive index of material of the prism.

(Very Short Answer Type Questions) 2 each

13. What are Polar and Non-polar dielectric ?

14. Mention *two* applications of optical fibres.

15. What is the cause of blue colour of the sky ?

16. Explain the action of diode as half-wave rectifier.

17. How can a galvanometer be converted into a voltmeter ? Explain.

18. Derive Einstein's Photoelectric equation.

19. Calculate the frequency associated with a photon of energy $3{\cdot}3 \times 10^{-20}$ J (Given $h = 6{\cdot}6 \times 10^{-34}$ Js)

20. What do you understand by nuclear fission

(Objective Type Questions) 1 each

21. (i) An Ammeter is always connected in parallel of an electric circuit. (True/False)

(ii) Bulk of power in AM wave is carried by _____ (Fill in the blank)

(iii) Define Self-induction.

(iv) Write frequency range of microwaves.

(v) The Balanced condition for Wheatstone bridge is :

$$\frac{P}{Q} = \text{.....}$$ (Fill in the blank)

Choose the correct/most appropriate answer :

(vi) Electric energy E is equal to :

(A) $E = VIT$ (B) $E = \frac{V}{I}$

(C) $E = VI$ (D) None of these

(vii) Average power of an A.C. circuit is :

(A) EvIv sin ϕ (B) EvIv cos ϕ

(C) EvIv (D) None of these

(viii) Two coherent sources have wavelength λA and λB then :

(A) $\lambda A = \lambda B$ (B) $\lambda A > \lambda B$

(C) $\lambda A < \lambda B$ (D) None of these

(ix) Which of the following phenomena confirms the transverse nature of light ?

(A) Interference (B) Diffraction

(C) Polarisation (D) None of these

(x) In which region of e.m. spectrum does Lyman series of H-atom lies ?

(A) Ultraviolet (B) Infrared

(C) Visible (D) X-rays

D-1-X

12th RKDO18

20301-X

PHYSICS

(Long Answer Type Questions)

1. Explain, theory and working of a cyclotron. Give its limitations.

Or

Define magnetic dipole moment. Derive an expression for magnetic field intensity at a point an axial line of a bar magnet.

2. Derive an expression for average power of an a.c. circuit containing L, C and R. Hence define power factor.

Or

What do you understand by self-induction? Derive an expression for coefficient of self-inductance of solenoid

3. Describe an Astronomical telescope and derive an expression for its magnifying power in normal adjustment.

Or

Using Young's double slit experiment derive an expression for fringe width.

4. Give the logic symbol, truth table and Boolean expression for AND gate. How is it realised in practice ? https://www.jkboseonline.com

Or

What is a Transistor ? How can we uses as an amplifier (Common! Emitter configuration)?

(Short Answer Type Questions)

5. Two equal charges are separated by a distance of 2 m in free space Calculate the magnitude of charges so that force between them is equal to weight of a 20 kg child.

6. Derive an expression for energy stored in a capacitor.

7. Give any six properties of e. m. waves. is

8. What is total internal reflection ? Give the conditions for this phenomenon.

9. Discuss the effect of temperature on resistance of conductors.

10. State and explain Kirchhoff's loop law of electrical circuit.

11. What is nuclear fusion ? Give one representive reaction.

12. Explain sky wave propagation.

(Very Short Answer Type Questions)

13. What do you mean by conservation of electric charge ?

14. Why ammeters are connected in series in electric circuits.

15. A concave lens of focal length 30 cm and a convex lens of focal length 20 cm are placed in combination Calculate the focal length on combination. https://www.jkboseonline.com

16. State laws of photoelectric emission

17. Derive an expression for de-Broglic wavelength 'λ' of an election when accelerated through a potential differee of 'V' volts.

18. Define wave front and name its various types.

19. Give any four properties of β-particles.

20. What is Rectifier ? Draw circuit diagram of full-wave rectifier.

(Objective Type Questions)

21. Do as directed :

(i) The resistance of a conductor depends upon its length and area of cross-section.(True/False)

(ii) The dimensional formula for magnetic field strength is .....

(iii) State Lenz's law.

(iv) What is Radioactive Decay Constant ?

(v) Define amplitude modulation.

Choose the correct/most appropriate answer :

(vi) Transformer works on principle of:

(a) Conservation of charge (b) Mutual induction (c) Rectification (d) None of these

(vii) The phase difference between current and voltage in an a.c. circuit having capacitor only is :

(a) 0° (b)90° (c) 180°` (d) 45°

(viii) The phenomenon of polarisation of light indicates that:

(a) Light is not a wave (b) Light is a longitudinal. Wave.

(c) Light is transverse wave (d) Light travels with a speed of 3×10^8 ms^{-1}

(ix) A person standing in front of a mirror, finds his image larger than himself. This implies that the mirror is :

(a) Convex (b)Parabolic (c) Plane (d)Concave

(x) UHF range can propagate by means of:

(a) Ground wave (b) Sky wave (c) Surface waves (d) Space waves

D-18-A

HSEIIRKON17

15318-A

PHYSICS

(Long Answer Type Questions)

1. Derive an expression for the torque experienced by an electric dipole placed in a uniform electric field. What is the net force acting on this electric dipole?

Or

Define capacitance of a capacitor. Give its S.I. Unit. Derive an expression for the electrostatic energy stored in a charged capacitor.

2. What are dia, para and feromagnetic materials ? Discuss their important properties.

Or

Describe the principle, construction and working of moving coil galvanometer.

3. Derive an expression for average Power in LCR series circuit connected to A. C. Supply. Hence define Povher factor.

Or

Give the principle, construction, theory and working of A. c. generator

4. State Huygen's principle and prove the laws of reflection on its basis.

Or

With the help of a ray diagram, explain the working of a compound microscope. Derive an expression for its maghifying power.

(Short Answer Type Questions)

5. What is meant by equipotential surface ? Give two properties of equipotential surface.

6. Establish the relation between drift velocity of electrons and electric current.

7. A 220 V-100 Watt bulb is connected to 100 V source. Calculate the power consumed by the bulb.

8. How will you convert galvanometer into Voheter?

9. Write characteristics of electromagnetic waves,

10. State and explain Brewster's law of Polarization.

11. Calculate the speed of light in a medium whose critical angle is 30°.

12. Explain with the help of a circuit diagram how a zener diode can be used as a voltage regulator.

(Very Short Answer type Questions)

13. Find the capacitive reactance of 1 o μf capacitor when it is a part of a circuit whose frequency is 100 Hz. https://www.jkboseonline.com

14. Define modulation. What are the elements of basic communication system?

15. Why does sun look blue ? Explain

16. Why the sky waves are not d in the transmission of TV Signal ?

17. Explain the term stopping potential and threshold frequency.

18. Explain mass defect.

19. Define half-life and average life of a radioactive substance.

20. Give Boolean expression and truth table of NOR gate.

(Objective Type Questions)

21. (i) What is demodulation ?

(ii) Define Isotones.

(iii) At what temperature would an intrinsic semiconductor behaves like a perfect insulator?

(iv) The deviation through a glass prism is minimum when .....

(v) De-Broglie waves are associated with a moving particle irrespective of .....

Choose the correct one:

(vi) Conductivity of a superconductor is :

(a) Infinite (b) Very large (c) Very small (d) Zero

(vii) law is a consequence of the law of conservation of:

(a) Charge (b) Mass (c) Momentum (d) Energy

(viii) The magnitude of Saturation of Phon-electric current depends upon :

(a) Frequency (b) Intensity (e) Work function (d) Stopping potential

(ix) The radius of copper nucleus is of the order of:

(a) 10^{-16}m (b) 10^{-14}m (c) 10^{-12}m (d) 10^{-9}m

(x) An oscillator is nothing but amplifier with:

(a) Positive feed back (b) Negative feed

(c) No feed back (d) Large gain

E-19-X

XIIRKN16

11019-X

PHYSICS

(Long Answer Type Questions)

1. Explain the principle and working vale de Graff generator,

Or

Suite Gauss's theorem in electrostatics. Derive an expression for the electric field due to uniformly charged spherical shell at a point outside the shell

2. What is a magnetic dipole ? Obtain expression for the strength of magnetic field at a distance from its centre on axial line.

Or

Prove that two parallel conductors of infinite lengths, carrying currents in the same direction attract each other. Deduce the expression for the force per unit length experienced by each conductor.

3. Describe the principle, construction and working of a transformer.

Or

What is meant by r.m.s value of a.c.? Derive the relation for root mean square value of a.e.

4. Derive the Len's Maker's formula for a convex lens.

Or

Deduce the conditions of maxima and minima in Young's double slit experiment and find an expression for fringe width.

(Short Answer Type Questions)

5. Explain conservation of charge.

6. A wire of resistance 5 Ω is drawn out so that its length is increased to twice its original length. Calculate its new resistance.

7. Explain, how you will compare the e.m.f's of two cells of a potentiometer

8. How can a galvanometer be converted into ammeter ? Find its resistance.

9. Write down important properties of electromagnetic waves,

10. Show that in case of a prism. $A + \delta = i + e$ where symbols have their usual meanings.

11. For a given medium, the polarising angle is 60° What will be the critical angle for this medium? https://www.jkboseonline.com

12. What is junction transistor? Mention its two types. How are they represented ?

(Very Short Answer type Questions)

13. A 100 Hz a.c. is flowing in a 14 mH coil. Find reactance of the coil.

14. Draw a labelled diagram showing course of rays for a simple microscope

15. Why sky wave propagation of electromagnetie waves cannot be used for TV transmission ?

16. What is Modulation ? Define amplitude modulation.

17. Derive de-Broglie wave equation for material particles.

18 Define binding energy. Sketch the graph between binding energy per nuclear and mass number.

19. Define the term half-life of a radioactive substance and write its relation with decay constant.

20. What is a Hole? Which type of doping creates a hole?

(Objective Type Questions)

21. (i) The electromagnetic waves used in the telecommunication are:

(a) ultraviolet (b) infrared (c) visible (d) microwaves

(ii) The ratio of drift velocity to that of the thermal velocity of an electron in a conductor is of the order of:

(a) 10^{-6} (b) 10^{-8} (c) 10^{-5} (d) 10^{-10}

(iii) For the current in LCR-circuit to be maximum:

(a) $w^2 = LC$ (b) $w^2 = \frac{1}{LC}$

(c) $w = \frac{1}{LC}$ (d) $w = LC$

(iv) Define wavefront of light.

(V) One photon of light is capable of ejecting one electron only. (True/False)

(vi) The threshold frequency of photon for photoelectric emission from a metal of work function 0.1 eV is ..... (Fill in the blank)

(vii) Define mass defect.

(viii) When nuclear fission and fusion reactions occur, what decreases in both the cases?

(ix) Draw p-n junction with forward bias.

(x) Why doping is done?

HSETIRK014

1701 - X

PHYSICS

(Long Answer Type Questions)

1. Explain the principle of a Capacitor. Deduce an expression for the energy stored in a parallel plate capacitor.

Or

State Gauss's Theorem. Use it to derive an expression for electric field at a point near an infinitely long straight charged wire.

2. Describe the principle and construction of a moving coil galvanometer. Prove that current flowing in the coil is directly proportional to its deflection.

Or

Using Biot-Savart law, obtain an expression for the magnetic field at a point on the axis of circular current loop.

3. State and explain the phenomena of Self-induction. Hence define the Coeff. of Self induction

4. Define Impedance. Derive an expression for it in LCR circuit connected to a e. supply

5. State Huygen's principle. Deduce the laws of reflection on the basis of Huygen's principle.

Or

Derive an expression for the fringe width in Young's double slit experiment,

(Short Answer Type Questions)

6. Calculate the resistivity of the material of a wire of length 1.0 m, diameter 0.4 m and having a resistance of 2.0 in ohm.

7. Explain how resistance of a conductor varies with temperature.

8. What is Polarisation? With the help of a diagram explain plane of polarisation and plane of vibration.

9. For a given source of light, the angle of minimum deviation of a 60° prism is 40° What is its refractive index?

10. Derive the expression for the radius of the ground states orbit of hydrogen using Bohr's postulates.

10. Describe NOR gates.

11. Explain the formation of energy bands in solids.

12. Discuss Sky and Space wave propagation.

(Very Short Answer Type Questions)

13. The following very short answer type questions of two marks, each may be answered in a few words or few sentences or as may be required,

(a) Give the properties of electric line of forces.

(b) Define the term declination, dip and horizontal component

(c) Calculate the inductive reactance of a ImH coil for a frequency of 50 Hz.

(d) Give the wavelength and frequency of (0) Radio waves. (ii) Infrared waves.

(e) Give the characteristics of Binding energy curve.

(f) State the laws of Photoelectric effect.

(g) Derive an expression for the De-Brogue wavelength.

(h) Define Magnifying power and resolving power of a telescope.

(Objective Type Questions)

14. Choose the correct/most appropriate answer and write it in your Answer-book

(1) A charge of 5C is moved along on equipotential surface having a pot of 10 volts. The work done is https://www.jkboseonline.com

A. 50 J B. 2J C. 0.5 J D. Zero

(ii) Which of the following is a non-ohmic element?

A. Diode B. Corbonresistance C. Tungsten wire D. Copper wire

(iii) Define Tesla

(iv) On what principle is transformer based

(v) If power of a lens is 5 dioptre, its focal length will be.....

(vi) The density of the nucleus is of the order of .....

(vii) A P-type semiconductor is positively charged (True/False)

(viii) Dimension of $\frac{1}{\sqrt{\mu 0\, \epsilon 0}}$ is

A. LT^{-1}

B. LT^{-2}

C. $L^{-1}T^{-2}$

D. $L^{2}T^{-1}$

(ix) Modem is a device which performs

A. Modulation B. Rectification C. Dc-modulation D. Modulation and demodulation.

(x) Bulk of power in an AM wave is carried by.....

HSEIIRKO - 13

81017-P

PHYSICS

(Long Answer Type Questions)

1. Using Gauss's theorem derive an expression for electric field due to a uniformly charged spherical shell (i) at a point outside the shell (ii) at a point inside the shell.

Or

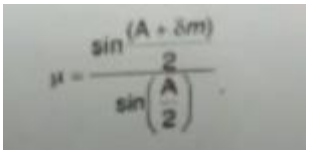
What is electric potential energy? Derive an expression for potential energy of a system of two point charges.

2. Calculate force per unit length between two long straight conductors carrying current in the same direction and hence define Ampere,

Or

Derive an expression for torque acting on a bar magnet held at an angle with the direction of uniform magnetic field.

3. Discuss the phenomenon of refraction through a prism and prove that for a prism



Or

What is Polarisation of light? Explain Brewster's law.

4. Eplain formation of energy bands in solids and define conduction band and valence band

OF

Explain the working of a NOT gate. Give its symbol and write its truth table and 32 nimiz expression

(Short Answer Type Questions)

5. A parallel plate capacitor having plate area of 10chicm each and are separated by 2.5 mm. The capacitor is charged to 200 V. Calculate energy stored in capacitor.

6. Deduce Wheatstone bridge principle using Kirchhoff's laws.

7. What are Eddy currents? How can they be 32inimized?

8. Give six properties of electromagnetic waves.

9. Write three points of difference between interference and diffraction pattern of light

10. Calculate the frequency and wavelength associated with a photon of energy 6.6×10^{-15} J (Given $h = 6.6 \times 10^{34}$ JS).

11. What is meant by half-life of a radioactive elehrtent? Derive an expression for it

12. Discuss briefly, how amplitude modulated wave is produced?

(Very Short Answer Type Questions)

13. What are the factors on which resistance of a conductor depends? Give corresponding relation.

14. How do magnetic field lines prefer to pass through a ferromagnetic substances than through air?

15. What is electric resonance?

16. Name various methods of producing induced e.m.f.

17 Give two applications of optical fibres.

18 Calculate the value of Rydberg's constant

19. The refractive index of glass is 1.5. Find the speed of light in glass.

20. Name the elements of Communication System.

(Objective Type Questions)

21. (A) Do as directed

(I) Alloys are used to make standard resistances and not pure conductors (True/False)

(ii) Potentiometer measures e.m.f. of a cell without drawing any current from the cell.

(True/False)

(iii) The S.l. unit of magnetic field strength is.....

(iv) The dimensional formula for co-efficient of self-inductance is.....

(v) Two coherent sources have wavelength of λ_A and λ_B. Then $\lambda_A = \lambda_B$ (True/False)

(B) Choose the correct/most appropriate answer:

(vi) The phenomenon responsible for blue colour of sky is:

(a) Dispersion (b) Polarisation (C) Scattering (d) Diffraction

(vii) If particles are moving with same velocity, then maximum de Broglie wavelength is for. https://www.jkboseonline.com

(a) Proton (b) Neutron (c) α-particle (d) β-particle

(viii) The penetrating power is maximum for:

(a) α -rays (b) β -rays (c) Protons (d) λ-rays

(ix) A semiconductor is cooled from T.K to TK Is resistance

(a) will increase (b) will decrease (c) will not change (d) will first decrease then increase

(x) If the reverse voltage in a diode is increased the width of depletion region.

(a) increase (b) decrease (c) fluctuates (d) does not change

E-50

Roll No.....

Total No. of Questions : 30]

[Total No. of Printed Pages : 4

HSEIIKROXII
45017–C
PHYSICS

Time : 3 Hours + 15 Minutes extra to read the question paper]

[Maximum Marks : 70

(Long Answer Type Questions)

1. State and explain the principle of superposition in electrostatics.

Or

Explain why the capacitance of a parallel plate capacitor increases when dielectric slab is introduced between the plates. 5

2. State and explain Ampere's circuital law and find the magnetic field at the centre of toroid?

Or

Derive an expression for the force per unit length between two long straight parallel conductors carrying current in the same direction and hence define Ampere. 5

3. Give principle, construction and working of A C Generator.

Or

What is meant by Root Mean Square value of AC ? Derive an expression for r.m.s. value of A C

4 What is lens formula ? Derive the lens formula in case of a convex lens.

Or

Explain the term wave front Describe laws of reflection using Huygens wave theory

(Short Answer Type Questions)

5. Calculate the coulomb force between two positrons separated by a distance of 1.6×10^{-5} m.
6. Terminal potential difference is less than the e.m.f. of a cell. Explain, Why?
7. A resistor is of three coloured bands yellow, red and blue colours respectively on it. Find the value of resistance.
8. Explain self-inductance and mutual inductance. State their units in S.I. system.
9. What are the important applications of different parts of Electromagnetic Spectrum ?
10. What is total internal reflection? Under what conditions does it take place ?
11. How does angle of deviation vary with the angle of incidence in case of a Prism ? What is the angle of minimum deviation ?

12. Define electron volt and atomic mass unit. Calculate the energy equivalent to the mass of Proton. 3

(Very Short Answer Type Questions)

13. What is the importance of radial magnetic field in moving coil galvanometer ? 2

14. **What are coherent sources of light?** **2**

15. **Write down Einstein's photo-electric equation. What is threshold-frequency ?** 2

16. **Define the term Isotopes with example.** 2

17. Draw the logic symbol and truth table of a NAND gate. 2

18. Draw the symbol of NPN and PNP transistor. 2

19. Define the term communication and draw its block diagram. 2

20. Why sky waves are not used for transmission of T.V. signals? 2

(Objective Type Questions)

21. The temperature of inversion for a thermocouple is constant..... (True/False) 1

22. The force acting on a charge moving through a uniform magnetic field is minimum when ..... (Fill in the blank) 1

23. The advantage of placing the prism in minimum deviation position is to obtain pure spectrum .....
(True/False) 1

24. 1 Million electron volt is :

(a) 1.6×10^{-19} J (b) 1.6×10^{-16} J

(c) 1.6×10^{-13} J (d) 1.6×10^{-11} J 1

(Tick the correct) 1

25 An electron of mass m and charge e is moving from rest through a potential difference V in vacuum. Its final velocity .....

(Fill in the blanks) 1

26. A free electron is stable/unstable .....

(Fill in the blanks) 1

27. Which of the following logic gates is an universal logic gate ?

(a) OR (b) AND

(c) NOT (d) NAND

(Tick the correct) 1

28. Forbidden energy gap of a semi-conductor is of the order of :

(a) 0.1 eV (b) 1 eV

(c) 10 eV (d) None of these 1

29. The concentration of impurities in a transistor is :

(a) heart for emitter region

(b) largest for emitter region

(c) least for box region

(d) equal for both the region 1

30. Bulk of power in an AM wave is carried by .....

(Fill in the blanks) 1

G - 52

HSE2KROXI

9317 – A

PHYSICS

(Long Answer Type Questions)

1. What is Electric Potential? Derive an expression for electric potential at a distance from a charge 'q'.

Or

What is Parallel Plate Capacitor ? Obtain an expression for the capacitance of a parallel plate capacitor when a conducting slab is inserted between its plates.

2. State Ampere's Circuital Law. Find the magnetic field at a point well inside the solenoid carrying current.

Or

What is Magnetic Dipole? Derive an expression for the magnetic field intensity at a point on the equitorial line of a bar magnet

3. Derive lens-makers formula for a thin convex lens.

Or

State Huygen's Principle. Prove the laws of refraction on the basis of wave theory.

3. Derive lens-makers formula for a thin convex lens.

Or

State Huygen's Principle. Prove the laws of refraction on the basis of wave theory.

4. Define total internal reflection. State its conditions. How do optical fibres transmit light without absorption ?

Or

Derive the conditions for constructive and destructive interference.

(Short Answer Type Questions)

State and prove Superposition Principle.

Define Electric Power and Electric Energy. Give their units.

What are Diamagnetic Substances? Give properties of diamagnetic substances.

Define resistance, reactance and impedance of a LCR circuit.

What is Einstein's explanation of photoelectric effect?

0. State the postulates of Bohr's model of atom.

1. Distinguish between conductors, semiconductors and insulators on the basis of energy band diagrams. https://www.jkboseonline.com

2. Mention differences between amplitude and frequency modulation

(Very Short Answer Type Questions)

3. How does the resistivity of a conductor vary with temperature?!

4. Define Magnetic Flux. What are Positive and Negative Flux?

5. Give the uses of X-rays.

6. What are Polaroids? Give their two uses.

7. State Malus law and Brewster's law.

18. The half-life period of a radioactive substance is 30 days. What is the time taken for $^{3}/_{4}$th of the original mass to disintegrate?

19. Give Boolean Expression and truth table of NOR gate.

20. What is Sky Wave Propagation?

(Objective Type Questions)

21. (i) Define Relaxation Time.

(ii) Who discovered superconductivity and when?

(iii) Name the physical quantity which is set up in a coil when change in magnetic flux takes place through it.

(iv) What is S.I. unit of mutual inductance?

(V) Weber is the unit of which physical quantity?!

Choose correct answer:

(vi) Speed of electromagnetic wave is same:

(a) for all wavelengths (b) for all frequencies

(c) in all media (d) for all intensities

(vii) The phenomenon of photoelectricalfect was first explained by

(a) Bohr (b) Plank (c) Hallwacks (d) Einstein

(viii) Magnetic field does not cause deflection in

(a) γ rays (b) β-rays (c) β + rays (d) α rays

(xi) In NPN transistor. the maximum current passes through

(a) Collector (b) Emitter (c) Base (d) Same in all

An oscillator is nothing but an amplifier with

(a) Positive feedback (b) Large gain (c) No feedback (d) Negative feedback

Roll No.....

Total No. of Questions—6] [Total No. of Printed Pages—2

KXIIRO8

3036

PHYSICS

PAPER—B

Maximum Marks—48

Time Allowed—2¼ Hours

PART—II

2. (a) Derive lens maker's formula for a thin convex lens.

Or

Describe an astronomical telescope. Derive an expression for its magnifying power when final image is at least distance of distinct vision. 5

(b) In a certain spectrum produced by a glass prism of dispersive power 0.031, it was found that $\mu_r = 1.645$ and $\mu_b = 1.665$. What is the refractive index of yellow colour ? 3

3. (a) Explain the concept of resolving power. Briefly discuss the resolving power of a microscope and a telescope.

Or

Deduce the conditions of maxima and minima in Young's double slit experiment and find an expression for fringe width. 5

(b) Show by drawing a graph that how binding energy per nucleon varies with mass number. 3

4. (a) What is Photoelectric effect ? Establish Einstein's photoelectric relation. Explain the Laws of Photoelectric emission on the basis of this relation.

P. T. O

Or

Describe de Broglie concept of matter waves and obtain an expression for the momentum and wavelength of the particle. 5

(b) Explain one similarity and one dissimilarity between Nuclear fission and Nuclear fusion. 3

5. (a) How are energy bands formed in solids ? Explain the behaviour of conductors, insulators and semiconductors on the basis of band theory.

Or

Explain, how p-n junction can be used as half-wave rectifier and fullwave rectifier. 5

(b) Two metals X and Y have work functions 2 eV and 5 eV respectively. Which metal will emit electrons when incident light of wavelength 400 nm falls on it and why ? 3

6. (a) Explain the use of n-p-n transistor as an amplifier in common emitter configuration. Find its current gain and voltage gain.

Or

What do you understand by Logic gate ? Give truth table and logic symbol for NAND and NOR gate. 5

(b) Mention some of the merits of digital Communication. 3

7. (a) What is a Satellite Communication ? Give its merits and demerits.

Or

Briefly discuss different types of two wire line systems. 5

(b) Explain sky wave propagation. 3