SUBJECT: PHYSICS
CLASS: $12^{\text {th }}$

MAXIMUM MARKS: 70
TIME: 3 HRS
S. No

General Instructions Marks
There are total of four sections in the question paper. All questions are compulsory. Section- A contains 10 Very Very Short Answer Type Question of $1 \times 10=10$ marks 1 Mark each
Section-B contains 9 Very Short Answer Type Question of $2 \times 2 \times 9=18$ marks Marks each to be answered in 20 to 30 words.
Section-C contains 9 Short Answer Type Questions of 3 Marks $3 \times 9=27$ marks each to be answered in 50 to 70 words Section-D contains 3 Long Answer Type Questions of 5 Marks $5 \times 3=15$ marks each to be answered in 100 to 150 words.
2 Use log table, if necessary. Use of scientific calculator is not allowed

## SECTION A

Q.1.
(i) The magnitude of elementary charge is
(a) $2 \times 10^{-19} \mathrm{C}$
(b) $1.6 \times 10^{-19} \mathrm{C}$
(C) Zero
(d) infinity
(ii) The resistance of a wire is $R$ if the length of the wire is doubled, then its resistance will be
(a) $2 R$
(b) $4 R$
(c) $R$
(d) 0.25 R
(iii) Tesla is the unit of
(a) electric flux
(b) magnetic flux
(c) electric field
(d) magnetic field
(iv) The frequency of house hold supply of AC in India is
(a) 60 Hz
(b) 100 Hz
(c) 50 Hz
(d) 70 Hz
(v) The speed of electromagnetic waves is independent of
(a) wavelength
(b) frequency
(c) intensity
(d) medium, in which they travel

(vi) In the diffraction pattern due to the single slit of width ' $a$ ' with incident light of wavelength $\lambda$ with angle of diffraction $\theta$, the condition for the first minimum is
(a) $\lambda \operatorname{Sin} \theta=a$
(b) a $\operatorname{Cos} \theta=\lambda$
(c) $a \sin \theta=\lambda$
(d) $\lambda \operatorname{Cos} \theta=a$
(vii) The minimum energy required to remove an electron is called
(a) work function
(b) kinetic energy
(c) stopping potential
(d) potential energy
(viii) The momentum of a photon is p . The corresponding wavelength is
(a) $h / p$
(b) hp
(c) $h c / \lambda$
(d) $h c \bar{v}$
(ix) The source of energy of stars is
(a) chemical reaction
(b) nuclear fission
(c) nuclear fusion
(d) None of these
(x) In forward bias, the width of depletion layer in a p-n junction
(a) decreases
(b) remains unchanged
(c) increases
(d) first increases then decreases

## SECTION B

## Answer the following questions:

Q2. Calculate the Coulomb force between two $\alpha$-particles separated by a distance of $3.2 \times 10^{-15} \mathrm{~m}$.
Q3. The range of the wavelength of visible light is 390 nm . Calculate the corresponding frequency range. Given $\mathrm{c}=3 \times 10^{8} \mathrm{~m}$
Q4. What do you mean by the diffraction of light?
Q5. An electron is accelerated through a potential difference of 1000 volt. What is the velocity of the electron?
Q6. Draw binding energy curve and discuss its significance?
Q7. What are the drawbacks of Rutherford's atomic model?
Q8. What is meant by the term doping of an intrinsic semiconductor? How does it affect the conductivity of a semiconductor?
Q9. Draw a circuit diagram for $\mathrm{p}-\mathrm{n}$ junction in a forward bias. Sketch the voltage versus current graph for the same.

Q10. Differentiate between $P$-type and $N$-type semiconductor

## SECTION C

## Answer the following questions:

Q11. A sphere of radius 10 cm has an unknown charge. If the electric field, 10 cm from the center of the sphere is $2.0 \times 10^{4} \mathrm{~N} / \mathrm{C}$ and points radially inward, what is the net charge on the sphere?
Q12. No two electric lines of force can cross each other. Explain with diagram.
Q13. State Ohm's law and derive the relation $\mathrm{J}=\sigma \mathrm{E}$
Q14. With the help of Kirchhoff's rule, obtain the condition for balancing of a Wheatstone Bridge.
Q15. State Biot-Savart law. Derive an expression for the magnetic field at a point on the axis of a circular coil.
Q16. What is a.c. generator? State its principle and name the main components of a.c. generator
Q17. What are coherent sources? Why two independent sources cannot be coherent?
Q18. Derive relationship for magnifying power of a telescope in normal adjustment?
Q19. What is nuclear fission? Give an example to illustrate it. What is the importance of fission phenomenon?

## SECTION D

## Answer the following questions:

Q20. What are dia, para, and ferromagnetic materials? Discuss their important properties.
OR
Using Ampere's circuit law, derive an expression for magnetic field due to infinitely long straight conductor.
Q21. State and explain Faraday's laws of electromagnetic induction. Show that $E=-d \phi / d t$ OR

At a power plant, the water head is at a height of 100 m and water flow available is $300 \mathrm{~m}^{3} / \mathrm{s}$. If the efficiency is $60 \%$, find the electric power available from the plant.

Q22. What is optical fiber? Discuss how it is used to transmit light beam from one place to another without the loss in intensity of light? What are its other uses?

OR
State Huygens's principle. With the help of this principle derive the laws of refraction.


