B–8–X

Roll No. .....

Total No. of Questions : 22] [Total No. of Printed Pages : 8

12th ARF(SZ)JKUT2024-25
308–X
PHYSICS

Time : 3 Hours] [Maximum Marks : 70

SECTION–A

1 each

1. Choose the correct/most appropriate answer :

(i) In case of insulators as the temperature decreases, resistivity :

(A) Increases

(B) Decreases

(C) Remains constant

(D) Becomes zero

(ii) No force acts on a current carrying conductor in a magnetic field when angle between current and magnetic field is :

(A) Zero (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$ (D) $\frac{3\pi}{4}$

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(iii) Torque acting on a magnet held at angle θ with magnetic field is maximum when θ is equal to :

(A) 0°

(B) 180°

(C) 360°

(D) 90°

(iv) The SI unit of magnetic flux is :

(A) Weber

(B) Gauss

(C) Orested

(D) Tesla

(v) The dimensions of $\frac{E}{B}$ are same as that of :

(A) Acceleration

(B) Velocity

(C) Charge

(D) Current

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(vi) The velocity of light in vacuum is 3×10^8 ms^{-1}. The velocity of light in a medium of refractive index 1.5 is :

(A) 4.5×10^8 ms^{-1}

(B) 3×10^8 ms^{-1}

(C) 2×10^8 ms^{-1}

(D) 1.5×10^8 ms^{-1}

(vii) In a compound microscope, the distance between objective lens and eye lens is :

(A) Fixed

(B) Variable

(C) Infinite

(D) 1 metre

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(viii) The series of hydrogen spectrum which lies in visible region is :

(A) Lyman series

(B) Paschen series

(C) Balmer series

(D) None of these

(ix) 'A' stands for atomic mass number and 'Z' for atomic number. The number of electrons in an atom is :

(A) A – Z

(B) A + Z

(C) Z

(D) A

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(x) What is the order of the forbidden gap in energy bands of silicon ?

(A) 0.1 eV

(B) 1.1 eV

(C) 2.1 eV

(D) 0.7 eV

SECTION–B

2 each

2. Draw the lines of force due to two equal and similar charges for :

(i) $q_1 = q_2 < 0$ and

(ii) $q_1 = q_2 > 0$

3. An electron is separated from the proton through a distance of 0.53 Å. Calculate the electric field at the location of the electron.

4. State *two* factors on which the sensitivity of a moving coil galvanometer depends.

5. A magnetic flux of 5 μ Wb is linked with a coil when a current of 1 mA flows through it. What is the self-inductance of coil ?

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6. State *four* characteristics of e.m. waves.

7. Write *four* applications of optical fibers.

8. What are conditions for sustained interference of light ?

9. Explain the term stopping potential and threshold frequency.

Or

Is photoelectric emission possible at all frequencies ? Give reasons for your answer.

10. What is the de-Broglie wavelength of 0.3 kg object moving with a speed of 6 ms^{-1} ?

SECTION–C

3 each

11. Calculate the number of electrons moving per second through the filament of a lamp of 100 watt operating at 200 volt.

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

Or

Define drift velocity of electrons and establish relation between drift velocity and electric current.

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13. A conducting wire of 100 turns is wound over and near the centre of a solenoid of 100 cm length and 2 cm radius having 600 turns. Calculate mutual inductance of two coils.

14. Using phasor treatment derive an expression for impedance and phase angle of LCR circuit.

15. Explain refraction through prism and show $\delta = (i_1 + i_2) - A$.

16. Distinguish between excitation potential and ionization potential.

17. What are nuclear forces ? Give their important characteristics.

18. What is meant by depletion region in a junction diode ? Explain its formation.

19. With the help of a circuit diagram, explain forward characteristics of a *p-n* diode.

SECTION–D

5 each

20. Using Gauss' theorem derive an expression for electric field due to infinitely long straight wire. https://www.jkboseonline.com

Or

What is electric potential ? Derive an expression for electric potential at a distance from a charge +Q.

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

Or

What are dia, para and ferromagnetic substances ? Discuss their important properties.

22. State Huygens' principle and prove the laws of refraction on its basis.

Or

Describe an Astronomical telescope. Drive an expression for its magnifying power when image is formed at infinity.

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