**SIR CV RAMAN COACHING CENTRE**
Xll – PHYSICS – PUBLIC MODEL EXAM [FULL PORTION]-2024
TOTAL MARK : 70 M   TIME : 3 HRS
SECTION – A (15 X 1= 15 M)
**CHOOSE THE CORRECT BEST ANSWER**

1. In an unbiased *p-n* junction, the majority charge carriers (that is, holes) in the *p-* region diffuse into *n*-region because of
a) The potential difference across the *p-n* junction
b) The higher hole concentration in *p*-region than that in n-region
c) The attraction of free electrons of   *n*-region   d) All of the above

2. The half-life period of a radioactive element A is same as the mean life time of another radioactive element B. Initially both have the same number of atoms. Then
(a) A and B have the same decay rate initially
(b) A and B decay at the same rate always   (c) B will decay at faster rate than A
(d) A will decay at faster rate than B

3. In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is changed to 224 kV, then the de Broglie wavelength associated with the electrons would
a) Increase by 2 times   b) decrease by 2 times
c) decrease by 4 times   d) increase by 4 times

4. Two point white dots are 1 mm apart on a black paper. They are viewed by eye of pupil diameter 3 mm approximately. The maximum distance at which these dots can be resolved by the eye is, [take wavelength of light, λ = 500 nm]
a) 1m   b) 5m   c) 3m   d) 6m

5. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index, (a) less than one (b) less than that of glass (c) greater than that of glass (d) equal to that of glass

6. The electric and magnetic fields of an electromagnetic wave are
(a) In phase and perpendicular to each other
(b) out of phase and not perpendicular to each other
(c) In phase and not perpendicular to each other
(d) out of phase and perpendicular to each other

7. An electron moves on a straight line path XY as shown in the figure. The coil *abcd* is adjacent to the path of the electron. What will be the direction of
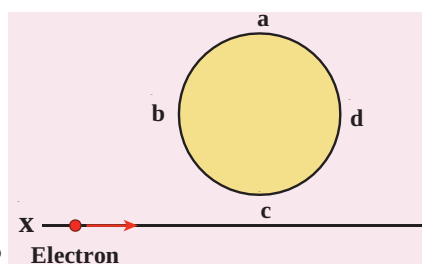
current, if any, induced in the coil?

(a) The current will reverse its direction as the electron goes past the coil
(b) No current will be induced   (c) abcd   (d) adcb

8. The BH curve for a ferromagnetic material is shown in the figure. The material is placed inside a long solenoid which contains 1000 turns/cm.The current that should be passed in the solenonid to demagnetize the ferromagnet completely is
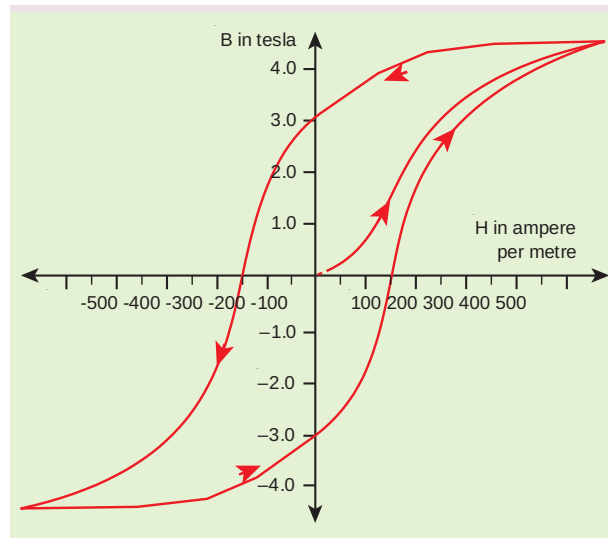
(a) 1.00 m A   (b) 1.25 mA   (c) 1.50 mA   (d) 1.75 mA

9.Bohr magneton values are ……...

a) 9.27×10^{-24} Am^2 b) 9.27×10^{24} Am^2 c) 8.27×10^{-24} Am^2 d) 8.27×10^{24}Am^2

10. Positive Thomson effect examples are ……...

a) Ag   b) cu   c) Pt   d) Co

11. One Rydberg = …………….

a) – 13.6 eV   b) -3.4 eV   c) – 1.51 eV   d) Zero eV

12. The unit of electric susceptibility is

a) Nm^2 C^{-2} b) N^{-1} m^{-2} C^2 c) N^{-1} m^2 C^2 d) N^{-1} m^{-2} C^{-2}

13. Duane- Hunt law formula is

a) $\lambda_0 = \dfrac{12400}{V}$ Å   b) $\lambda_0 = \dfrac{1240}{V}$ Å   c) $\lambda_0 = \dfrac{12400}{VI}$ Å   d) All

14. is type of diode

  a) LED   b) Photo diode   c) Zener diode   d) PN junction diode

15. Electromagnetic induction is not used in

a) Transformer   b) room heater   c) AC generator   d) Choke coil

SECTION – B (6 x 2 = 12m)

Answer any six qustions .compulsory Q. No : 24

16. Give the relation between electric field and electric potential

17. What do you mean by internal resistance of a cell?

18. Explain centre frequency or resting frequency in frequency modulation.

19. Define electric resonance.

20. Give two uses each of (i) IR radiation, (ii) Microwaves and (iii) UV radiation

21. What is the reason for reddish appearance of sky during sunset and sunrise?

22. A person has farsightedness with the far distance he could see clearly is 75 cm. Calculate the power of the lens of the spectacles needed to rectify the defect

23. What is Bremsstralung?

24. Let the magnetic moment of a bar magnet be P_m whose magnetic length is $d = 2l$ and pole strength is q_m . Compute the magnetic moment of the bar magnet when it is cut into two pieces (a) along its length   (b) perpendicular to its length

SECTION – C (6 x 3 = 18m)

Answer any six qustions .compulsory Q.No : 33

25. Explain in detail Coulomb's law and its various aspects.

26. Explain the equivalent Cell of a series and parallel cell network.

27. Compare the properties of soft and hard ferromagnetic materials

28. An electric power of 2 MW is transmitted to a place through transmission lines of total resistance $R = 40$ Ω, at two different voltages. One is lower voltage (10 kV) and the other is higher (100 kV). Let us now calculate and compare power losses in these two cases.

29. Discuss the Hertz experiment.

30. How does an endoscope work?

31. Explain the idea of carbon dating.

32. How do we obtain characteristic x-ray spectra?

33. A silicon diode is connected with 1kΩ resistor as shown. Find the value of current

flowing through *AB*

SECTION – D (5x 5 = 25m)

Answer any all questions

34.a) (i) Explain in detail the construction and working of a Van de Graaff generator (ii) Dielectric strength of air is 3×10^6 V m–1. Suppose the radius of a hollow sphere in the Van de Graff generator is R = 0.5 m, calculate the maximum potential difference created by this Van de Graaff generator.

(or)

b) (i) What is meant by optical fibre (ii) Derive the equation for acceptance angle and numerical aperture of optical Fibre

35 a) (i) How the emf of two cells are compared using potentiometer? (ii) A potentiometer wire has a length of 4m and resistance of 20 Ω. It is connected in series with resistance of 2980 Ω and a cell of emf 4 V. Calculate the potential gradient along the wire.

(or)

b) (i) Obtain the equation for resultant intensity due to interference of light (ii) Two light sources of equal amplitudes interfere with each other. Calculate the ratio of maximum and minimum intensities

36 a) (i) Derive the expression for the force on a current-carrying conductor in a

magnetic field   (ii) A metallic rod of linear density is 0.25 kg m–1 is lying horizontally on a smooth inclined plane which makes an angle of 45^0 with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of strength 0.25 T is acting on it in the vertical direction. Calculate the electric current flowing in the rod to
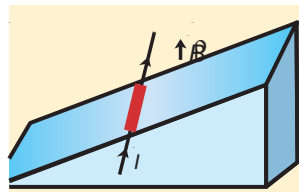
keep it stationary .

(or)

b) (i) Give the construction and working of photo emissive cell (ii) A radiation of wavelength 300 nm is incident on a silver surface. Will photoelectrons be observed? [work function of silver = 4.7 eV]

37 a) (i) Give the principle of AC generator (ii) How are the three different emfs generated in a three-phase AC generator? Show the graphical representation of these three emfs

(or)

b) (i) What are cathode rays? (ii) Explain the J.J. Thomson experiment to determine the specific charge of electron

38 a) (i) State and prove De Morgan's first and second theorem (ii) prove the following Boolean expressions using the laws and theorems of Boolean algebra. $(A+B)(A+C) = A+BC$

(0r)

b) (i) Compute the speed of the electromagnetic wave in a medium if the amplitude of electric and magnetic fields are 3×10^{-4} N C^{-1} and 2×10^{-4} T, respectively.(ii)Discuss the source of electromagnetic waves.

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