Class : 12

Register Number [ ][ ][ ][ ][ ][ ]

COMMON HALF YEARLY EXAMINATION - 2023 - 24

Time Allowed : 3.00 Hours]   **PHYSICS**   [Max. Marks : 70

PART-I

I. **Choose the correct answer.**   15x1=15

1. An electric field $\vec{E} = 10\, x\, \hat{i}$ exists in a certain region of space. Then the potential difference $V = V_0 - V_A$, where V_0 in the potential at the origin and V_A is the potential at x=2m is
   a) 10 V   b) -20 V   c) + 20V   d) -10 V

2. A wire connected to a power supply of 230 V has power dissipation P_1. Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case the power dissipation is P_2. The ratio P_2/P_1 is
   a) 1   b) 2   c) 3   d) 4

3. The melting point of tungsten filament is
   a) 3380°C   b) 4380°C   c) 3830°C   d) 2830°C

4. Three wires of equal lengths are bent in the form of loops. One of the loop is circle, another is semi circle and the third one is square. They are placed in a uniform magnetic field and same electric current is passd through them. Which of the following loop configuration will experience greater torque?
   a) Circle   b) Semi circle   c) Square   d) All of them

5. The instantaneous values of alternating current and voltage in a circuit are $i = 1/\sqrt{2} \sin(100\pi t)$ A and $V = 1/\sqrt{2} \sin(100\pi t + \pi/3)$ V. The average power in watt consumed in the circuit is
   a) $1/4$ b) $\sqrt{3}/4$ c) $1/2$ d) $1/8$

6. ---------- is used in food industry to kill pathogenic microorganism
   a) Infrared   b) Ultraviolet   c) X-rays   d) Gamma rays

7. The speed of light in an isotropic medium depends on
   a) its intensity   b) its wavelength
   c) the nature of propogation   d) the motion of the source with respect to medium

8. What is the radius of illumination when seen above from inside a swimming pool from a depth of 10 m on a sunny day? [Given refractive index of water is 1.33]
   a) 13.33 m   b) 11.32 m   c) 0.133 m   d) 1.132 m

9. When light is incident on a soap film of thickness 5×10^{-4} cm, the wavelength of light reflected maximum in the visible region is 5320 Å. Refractive index of the film will be
   a) 1.22   b) 1.33   c) 1.51   d) 1.83

10. In photoelectric emission, a radiation whose frequency is 4 times threshold frequency of certain metal in incident on the metal. Then the maximum possible velocity of the emitted electron will be
    a) $\sqrt{\dfrac{h\gamma_0}{m}}$ b) $\sqrt{\dfrac{6h\gamma_0}{m}}$ c) $2\sqrt{\dfrac{h\gamma_0}{m}}$ d) $\sqrt{\dfrac{h\gamma_0}{2m}}$

11. What is the maximum kinetic energy of the photo electrons emitted when the stopping potential is 16 V
    (a) 1×10^{-20} J   (b) 1×10^{-18} J   (c) 2.56×10^{-18} J   (d) 2.56×10^{-20} J

12. If the nuclear radius of the ^{27}Al in 3.6 fermi the approximate nuclear radius of ^{64}Cu in fermi is
    (a) 2.4 F   (b) 1.2 F   (c) 4.8 F   (d) 3.6 F

13. The frequency range of 3 MHz to 30 MHz is used for
    (a) Ground wave propogation   (b) Space wave propogation
    (c) Sky wave propogation   (d) Satellite communication

14. In extrinsic semiconductor, the impurity atoms order is approximately
    a) $1 : 10^4$ b) $1 : 10^5$ c) $1 : 10^6$ d) $1 : 10^8$

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15. The technology used for stopping the brain from processing pain is
    a) Precision medicine
    b) Wireless brain sensor
    c) Virtual reality
    d) Radiology

PART-B

II. Answer Any SIX of The Following. (Answer Question No.24 Compulsory)   6x2 =12

16. What is peltier effect?
17. Define barrier potential.
18. State Fleming's left hand rule.
19. On your birthday, you measure the activity of the sample ^{210}Bi which has a half life of 5.01 days. Calculate the mean life.
20. What are the properties of an equipotential surface?
21. Compute the speed of electromagnetic wave in a medium if the amplitude of electric and magnetic field are 3x10⁴ NC⁻¹ and 2 x 10⁻⁴ T respectively.
22. What is Photo cell? Mention its types.
23. Define Q factor.
24. An object is placed at a certain distance from a convex lens of focal length 20 cm. Find the object distance if the image obtained is magnified 4 times.

PART-C

III. Answer Any SIX of The Following. (Answer Question No.33 Compulsory)   6x3=18

25. Write note on Nicol prism.
26. A cell supplies a current of 0.9 A through a 2 Ω resistor and a current at 0.3 A through 7 Ω resistor. Calculate the internal resistance of a cell.
27. Discuss the beta (β+) decay process with examples.
28. Obtain the expression for capacitance for a parallel plate capacitor.
29. Derive the relation between f and R for a spherical mirror.
30. The workfunction of potassium is 2.3 eV. UV light of wavelength 3000 Å and intensity 2 Wm² is incident on the Potassium Surface. Determine the maximum kinetic energy of the photo electrons.
31. Discuss the conversion of galvanometer into an ammeter.
32. List the application of light emitting diode.
33. An electric power of 2 MW is transmitted to a place through transmission lines of total resistance R = 40 Ω and voltage V = 100 KV. Calculate the percentage of power loss.

PART-D

IV. Answer ALL Questions.   5x5 =25

34. a) Derive the expression for the force between two parallel, current carrying conductors.
    (OR)
    b) Obtain lens maker's formula.

35. a) Explain the principle and working of electron microscope.
    (OR)
    b) Write down maxwell equations in integral form.

36. a) Calculate the electric field due to a dipole on its axial line.
    (OR)
    b) Explain the J.J. Thomson experiment to determine the specific charge to electron.

37. a) How the emf of two cells are compared using potentiometer?
    (OR)
    b) Prove law of reflection using Huygen's principle.

38. a) Draw the circuit diagram of a half wave rectifier and explain its working.
    (OR)
    b) Find out the phase relationship between voltage and current in a pure inductive circuit.

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