Guess Paper – 2014
Class – XII
Subject – PHYSICS 2014

Marks =70

1. Name the physical quantity whose SI unit is JC^{-1}. Is it a scalar or vector quantity?
2. Is the motion of a charge across junction momentum conserving? Why or why not?
3. Two wires of equal length , one of copper and another of manganin have the same resistance. Which wire is thicker?
4. The susceptibility of a magnetic material is -4.2×10^{-6}. Name the type of the magnetic material represent ?
5. What is the power dissipated in a.c. circuit in which voltage and current are given by $V = 230\sin(\omega t + \frac{\pi}{2})$ and $I = 10\sin\omega t$?
6. For a glass prism $\left(\mu = \sqrt{3}\right)$ the angle of minimum deviation is equal to the angle of the prism . find the angle of prism.
7. Would the sky waves be suitable for transmission of TV signals of 60MHz frequency?
8. What is the role of band pass filter in modulation circuit?
9. Show that the electric field at the surface of a charged conductor is given by $\vec{E} = \frac{\sigma}{\varepsilon_0}\hat{n}$, where σ is the surface charge density and $\hat{n}$ is a unit vector normal to the surface in the outward direction .
10. A charge q is placed at the centre of the line joining two equal charges Q. Show that the system of three charges will be in equilibrium if q=-Q/4.
11. State the principle of working of a potentiometer . Define potential gradient and write its unit.
12. Prove that an ideal inductor does not dissipate power in an a.c. circuit.
13. What is the effect on the interference fringes in a Youngs double slit experiment due to each of the following operations:
    (a) The screen is moved away from the plane of the slit;
    (b) The monochromatic source is replaced by white source;
    (c) Separation between the slits is increased;
    (d) The source slit is moved closer to the double slit plane;

14. **Monochromatic light of frequency $6.0\times10^{14}\,Hz$ is produced by a laser. The power emitted is $2.0\times10^{-3}W$.**
    (a) What is the energy of a photon in the light?
    (b) How many photons per second ,on average, are emitted by the source?
15. **Write Einstein's photo electric equation. State clearly the three salient features observed in photoelectric effects, which can be explained on the basis of the above equation.**
16. **Name the semiconductor device that can be used to regulate an unregulated D.C. power supply . With the help of I-V characteristics of this device, explain its working principle.**
17. **Define electric flux . Write SI unit . Using Gauss' theorem , derive an expression for the electric field intensity at any point outside a charged spherical shell.**
18. **Define the term temperature coefficient of resistivity. Write its SI unit.Plot a graph showing the variation of resistivity of copper with temperature.**
19. **Two straight parallel , current carrying conductors are kept at a distance 'r' from each other in air . The direction of current in both the conductors are same . Find the magnitude and direction of force between them . Hence , define one ampere.**
20. **Define the term impedance of an a.c. circuit . How does the total impedance of a series LCR circuit changes if the frequency of the applied a.c. supply is increased?**
21. **Suppose that the electric field amplified of an electromagnetic wave is $E_0=120NC^{-1}$ and that its frequency is ν =50.0MHz (a) Determine $B_0,\omega,\kappa and\lambda$. (b) Find expression for E and B.**
22. **(i) Draw a neat labeled ray diagram of an astronomical telescope in normal adjustment. Explain briefly its working.**
    (ii) An astronomical telescope uses two lenses of power 10D and 1D . What is its magnifying power in normal adjustment?
23. **Derive the lens maker formula in case of a double convex lens. State the assumptions made and the sign conventions used.**
24. **(a) Using the postulates of Bohr's theory of hydrogen atom, show that**
    (i) The radii of orbits increases as n^2, and
    (ii) The total energy of electron increases as $1/n^2$ where nis the principal quantum number of the atom.
    (c) Calculate the wave length of H_α line in Balmar series of hydrogen atom , given Rydberg constant $R=1.0947\times10^7\,m^{-1}$
25. **Derive the law of radioactive decay, viz. $N=N_0e^{-\lambda t}$. Explain , giving necessary reactions , how energy is released during (a) fission (b) fusion.**

26. **Draw a schematic sketch showing the (i) ground wave (ii) sky wave (iii) space wave modes of propagation . Write the frequency range for each of these modes of propagation.**
27. **State the working of a.c. generator with the help of a labeled diagram.**
    The coil of an ac generator having N turns , each of area A , is rotated with a constant angular velocity ω. Deduce the expression for the alternating e.m.f. generated in the coli.
    What is the source of energy generated in this device?
28. **(a) How is a wavefront is different from a ray?**
    Draw geometrical shape of the wave front when (i) light diverges from a point source. (ii) light emerges out from a convex lens when point source is placed at its focus.
    (b) State Huygen's principle . write the help of a suitable diagram , prove Snell' law of refraction using Huygens ' principle.

29. Draw I-V characteristic of Zener diode. Explain with help of circuit diagram, the use of a Zener diode as a voltage regulator.

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