

B-21-X

Roll No.

Total No. of Questions : 26]

[Total No. of Printed Pages : 4

XIIARJKUT23

9121-X

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

SECTION-A

1 each

1. Why are resistances connected in series and in parallel ?
2. Why can a d.c. ammeter not read an a.c. ?
3. Why are electromagnetic waves called so ?
4. What is the effect of decrease in wavelength of incident light on the velocity of photoelectrons ?
5. What type of charge carriers are there in a *p*-type semiconductor ?

SECTION-B

2 each

6. What is maximum value of angle of dip ? At what places does it occur ?

Or

Why do two parallel conductors carrying current exert force on each other ?

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Turn Over

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7. State and explain Fleming's right hand rule.
8. What does an electromagnetic wave consist of ? On what factors does its velocity in vacuum depend ?
9. If amplitude of two coherent sources producing interference is in the ratio of 1 : 2, find ratio of I_{\max} to I_{\min} .
10. (a) What is Demodulation ?
(b) Draw a labelled block diagram for demodulation of amplitude modulated wave.

SECTION-C

3 each

11. Explain how you will compare the e.m.f.'s of two cells by a potentiometer ?
12. Find an expression for the electric field at any point outside a uniformly charged thin spherical shell.

Or

Explain, what is meant by quantization of charge ?

13. A wire has a resistance of 10.5Ω at 21°C and 16.4Ω at 147°C . Find the value of co-efficient of resistance.
14. Using Biot-Savart's law, calculate the magnetic field at the centre of a circular coil.
15. Obtain an expression for torque acting on a rectangular current loop, when placed inclined at an angle ' θ ' with the direction of magnetic field ' B '.

16. A ray of light is incident on the surface of glass plate of refractive index 1.5 at the polarising angle. What is the angle of refraction ?
17. Write the postulates of Bohr's model of hydrogen atom.
18. Define binding energy of a nucleus. Draw a curve between mass number and binding energy per Nucleon.
19. What is Photoelectric effect ? Derive the Einstein's equation.
20. Distinguish between an intrinsic semiconductor and *p*-type semiconductor. Why is *p*-type semiconductor crystal neutral ?
21. How is Junction diode formed ? Discuss the working of a junction diode as full wave rectifier. <https://www.jkboseonline.com>
22. Explain the sky wave propagation of radio waves.

SECTION-D

4

23. Ram is using yellow light in a single slit diffraction experiment with slit of width 0.6 mm. The teacher replaces yellow light by X-rays. Now he is not able to observe diffraction pattern. He feels sad. Again the teacher replaces X-rays by yellow light and the diffraction pattern appears again. The teacher now explains the facts :

Questions :

- (a) Which value is displayed by the teacher ?
- (b) Give the necessary conditions for diffraction.

SECTION-E

5 each

24. (a) What is an electric dipole and electric dipole moment ?
(b) Derive an expression for electric potential at a point due to an electric dipole. Also discuss the special cases.

Or

- (a) Define capacitance of a capacitor. Give its S.I. unit.
(b) Prove that the total electrostatic energy stored in a parallel plate capacitor is $\frac{1}{2}cv^2$.

25. With the help of a labelled diagram, explain the construction and working of an a.c. generator. Find an expression for e.m.f. produced by the generator.

Or

Derive an expression for impedance and phase angle for series LCR a.c. circuit. How does impedance differ from ohmic resistance ?

26. Stating the assumptions made and convention of signs used, derive the lens maker's formula in case of a double convex lens.

Or

Define fringe width. Derive an expression for fringe width in Young's double slit experiment of interference of light.