CLASS XII
GUESS PAPER
PHYSICS

Time allowed: 3 hrs Maximum Marks: 70

General Instructions:

(i) All questions are compulsory. There are 27 questions in all.

(ii) This question paper has four sections: section A, section B, section C and section D

(iii) Section A contains five questions of one mark each, Section B contains seven questions of two marks each, Section C contains twelve questions of three marks each, Section D contains three questions of five marks each.

(iv) There is no overall choice. However, an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.

Section A

1. Name the type of modulation scheme preferred for digital communication.

   Or

   What is transducer?
2. How are X rays produced? Give two applications of X rays.
3. The ratio of vertical component to the horizontal component of earth's magnetic field at a given place is 1. What is the angle of dip at that place?

   Or

   Write two properties of a material suitable for making permanent magnet and an electromagnet.
4. A lens when immersed in a transparent liquid becomes invisible. What is the condition?

5. What will the effect on the fringes formed in Young's double slit experiment, if white light is used instead of monochromatic light.

Section B

6. Using potentiometer how will you compare the emf of two cells?
7. The electric field and electric potential at any point due to a point charge kept in air is 20 N/C and 10 J/C respectively. Compute the magnitude of this charge and the distance.

   OR

   Derive an expression for electric field intensity on the axis of an electric dipole.
8. A cylindrical metallic wire is stretched to increase its length by 5%. Calculate percentage change in its resistance.
9. Derive an expression for resistivity in terms of electron density and relaxation time.

   OR

   Use Kirchoff's rules to obtain the balance condition in a Wheat Stone bridge.
10. What is meant by transverse nature of electromagnetic wave? Draw a diagram showing the propagation of an electromagnetic wave along the X direction, indicating clearly the directions of the oscillating electric and magnetic field.
11. The output of a two input NAND gate is fed as input to a NOT gate. Write down the truth table for the final output of the combination. Name the gate so formed. Draw its logical symbol.
12. Define modulation index or modulating factor. Why it's value is kept less than unity? Draw frequency graph with respect amplitude.

Section C

13. A rectangular loop of sides 25 cm and 10 cm carrying a current of 15A is placed with its longer side parallel to a long straight conductor 2.0 cm apart carrying a current of 25A. What is the net force on the loop?
14. State Biot Savert' s law. Using this law derive an expression for magnetic field on the axis of current loop.

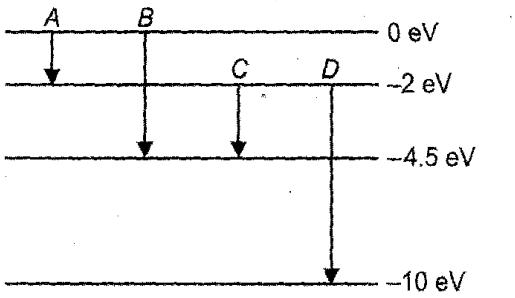
15.The sequence of the stepwise decays of radioactive nucleus is

$$D \xrightarrow{\alpha} D_1 \xrightarrow{\beta} D_2 \xrightarrow{\alpha} D_3 \xrightarrow{\alpha} D_4$$

If the nucleon number and atomic number for D_2 are 176 and 71, what are the corresponding values for D and D_4 nuclei?

OR

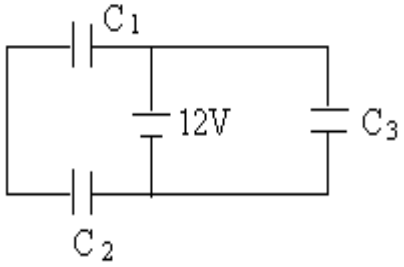
(a) The energy levels of an atom are as shown below. Which of them will result in the transition of a photon of wavelength 275nm?



(b) Which transition corresponds to emission of radiation of maximum wavelength?

16.State Gauss's theorem. Derive an expression for electric field intensity due to a charged sheet.

17.Three identical capacitors C_1, C_2 and C_3 of capacitance 6 μF each are connected to a 12 V battery as shown. Find the charge on each capacitor.



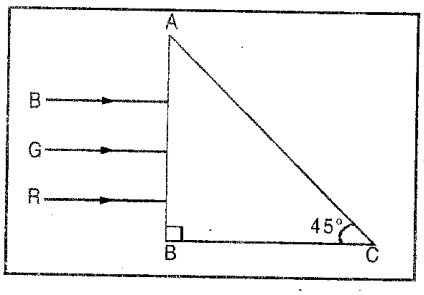
18.Show that Bohr's second postulate "the electron revolves around the nucleus only in certain fixed orbits without radiation energy" can be explained on the basis of de-broglie hypothesis of wave nature of electron.

19. X rays of wavelength λ fall on a photosensitive surface emitting electron. Assuming that the work function of the surface can be neglected. Prove that the de- Broglie wavelength of electrons emitted will be $\sqrt{\frac{h\lambda}{2mc}}$.

OR

A proton and an alpha particle are accelerated through the same potential. Which one of the two has greater value of de Broglie wavelength associated with it, and less kinetic energy? Justify your answers.

20. Three rays of light red(R), green (G) and blue (B) are incident on the face AB of a right-angled prism ABC. The refractive indices of the material of the prism for red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. Trace the path of the rays through the prism. How will the situation change if these rays were incident normally on one of the faces of an equilateral prism?

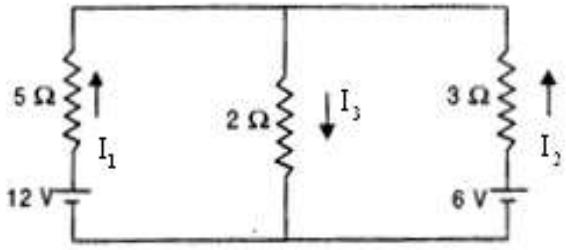


OR

With the help of labelled ray diagram obtain an expression for magnifying power of compound microscope.

21. Draw a labeled diagram to explain the principle and working of an a.c. generator.

22. Using Kirchoff's law in the given electrical network, calculate the values of I_1, I_2 and I_3.



23. Derive an expression for force per unit length between two parallel conductors carrying current. Hence define one ampere.

OR

What is moving coil galvanometer. Explain its construction, principle and working with diagram.

24. A double concave lens of glass of RI 1.6 has radii of curvature of 40cm, 60cm. write the sign convention used. Calculate its focal length. Also find focal length of lens if it is immersed in a liquid of RI 1.3.

Section D

25. Define the term reactance and inductance in an ac circuit.

When 100 V d.c. is applied across a coil, a current of one ampere flows through it. When 100 V a.c. of 50 cycles per second is applied to the same coil, only 0.5 A flows. Calculate impedance of the coil, inductive reactance of the coil and inductance of the coil.

OR

What is meant by series resonance circuit? What is Q factor of LCR series circuit? Derive an expression for the average power over a complete cycle of alternating current in LCR circuit.

26. (a) Explain the use of a transistor as an CE amplifier with the help of labeled circuit diagram.

(b) Explain briefly the working of a full wave rectifier.

OR

(a) Distinguish between metals, semiconductor and insulator on behalf of energy band.

(b) How is a p-n junction formed? Explain with diagram the effect of biasing of p-n junction diode on depletion layer.

27. Derive the relation between distance of object and distance of image and radius of curvature of a convex spherical surface. When refraction takes place from a rarer medium of refractive index μ_1 to the denser medium of refractive index μ_2 and the image produced is real. Using this relation derive lens maker's formula for a thin convex lens.

OR

Two narrow slits are illuminated by a single monochromatic source. Name the pattern obtained on the screen. One slit is covered then name the pattern obtained. Draw the intensity pattern obtained in both the two cases. Also write the differences b/w the two patterns obtained.