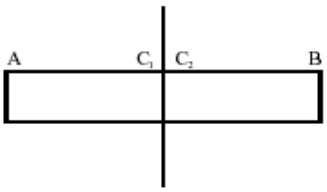
Guess Paper – 2014
Class – XII
Subject – PHYSICS (Theory)

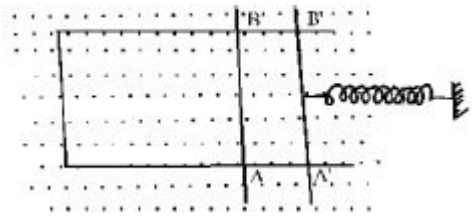
Time allowed: 3 hours *Maximum Marks: 70*

General Instructions:
(i) All questions are compulsory..
(iii) Q.No. 1 to 8 are very short answer type questions, carrying one mark each.
(iv) Q.No numbers 9 to 18 are short answer type questions, carrying two marks each.
(v) Q.No. 19 to 27 are also short answer type questions, carrying three marks each.
(vi) Q.No. 28 to 30 are long answer type questions, carrying five marks each.
(viii) You may use the following values of physical constants wherever necessary
$c=3x10^8$ m/s $h=6.6 \times 10^{-34}$ Js $e=1.6 \times 10^{-19}$ C $N_A = 6.023 \times 10^{23}$ /mole $m_n = 1.67 \times 10^{-27}$ kg $\mu_0 = 4\pi \times 10^{-7}$ T-m/A $m_e = 9 \times 10^{-31}$ kg

1. A (hypothetical) bar magnet (AB) is cut into two equal parts. One part is now kept over the other, so that pole C2 is above C1. If M is the magnetic moment of the original magnet, what would be the magnetic moment of the combination so formed? 1



2. Define electric dipole moment. Write its S I unit
3. A rectangular wire frame, shown below, is placed in a uniform magnetic field directed upward and normal to the plane of the paper. The part AB is connected to a spring. The spring is stretched and released when the wire AB has come to the position A\B\(t=0). How would the induced emf vary with time? Neglect damping



4. Name the characteristics of electromagnetic waves that (i) increases (ii) remains constant in the electromagnetic spectrum as one moves from radiowave region towards ultraviolet region.
5. A partially plane polarized beam of light is passed through a Polaroid. Show graphically the variation of the transmitted light intensity with angle of rotation of the Polaroid.
6. The de Broglie wavelengths, associated with a proton and a neutron, are found to be equal. Which of the two has a higher value for kinetic energy?

7. Carbon and silicon are known to have similar lattice structures. However, the four bonding electrons of carbon are present in second orbit while those of silicon are present in its third orbit. How does this difference result in a difference in their electrical conductivities?
8. Four nuclei of an element fuse together to form a heavier nucleus. If the process is accompanied by release of energy, which of the two - the parent or the daughter nucleus would have a higher binding energy/nucleon?

9. Keeping the voltage of the the charging source constant, what would be the percentage change in the energy stored in a parallel plate capacitor if the separation between its plates were to be decreased by 10%?

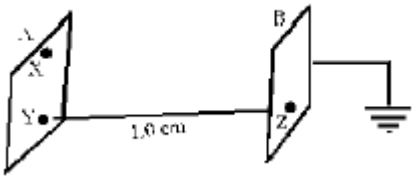
10. Two cells of emf E1 and E2 have internal resistance r1 and r2. Deduce an expression for equivalent emf of their parallel combination.

OR

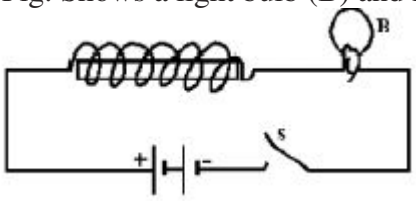
A cell of emf (E) and internal resistance (r) is connected across a variable external resistance (R). Plot graphs to show variation of

(i) E with R (ii) Terminal p.d. of the cell (V) with R

11. Two identical plane metallic surfaces A and B are kept parallel to each other in air separated by a distance of 1.0 cm as shown Surface A is given a positive potential of 10V and the outer surface of B is earthed. (i) What is the magnitude and direction of the uniform electric field between points Y and Z? (ii) What is the work done in moving a charge of 20 C from point X to point Y?



12. Fig. Shows a light bulb (B) and iron-cored inductor connected to a DC battery through a switch (S).



(i) What will one observe when switch (S) is closed?

(ii) How will the glow of the bulb change when the battery is replaced by an ac source of rms voltage equal to the Voltage of DC battery? Justify your answer in each case.'

13. Write the relation between the angle of incidence (i), the angle of emergence (e), the angle of prism (A) and the angle of deviation (D) for rays undergoing refraction through a prism. What is the relation between andfor rays undergoing minimum deviation? Using this relation, write the expression for the refractive index (μ) of the material of a prism in terms of and the angle of minimum deviation (D_m)

14. Define α decay. Give one example of α decay.

15. Light of wavelength 550 nm. is incident as parallel beam on a slit of width 0.1mm. Find the angular width and the linear width of the principal maxima in the resulting diffraction pattern on a screen kept at a distance of 1.1m from the slit. Which of these widths would not change if the screen were moved to a distance of 2.2m from the slit?
16. How the detection of Amplitude modulated wave is done. What is the function of rectifier in detection?

17. When a charge particle enters the magnetic field with some velocity
    (a) What will be the direction and magnitude of force on charged particle
    (b) In which two cases their will be no force on the charge particle
18. An armature coil consists of 20 turns of wire, each of area A = $0.09m^2$ and total resistance15Ω .It rotates in a magnetic field of 0.5T at a constant frequency of $150/\pi$ Hz. Calculate the value of (i) maximum (ii) average induced emf produced in the coil
19. Electromagnetic radiations with wavelength (i) λ_1 are used to kill germs in water purifiers. (ii) λ_2 are used in TV communication systems (iii) λ_3 plays an important role in maintaining the earth's warmth. Name the part of electromagnetic spectrum to which these radiations belong. Arrange these wavelengths in decreasing order of their magnitude decreasing order of their magnitude.
20. Two capacitors with capacity C1 and C2 are charged to potential V1 and V2 respectively and then connected in parallel. Calculate the common potential across the combination, the charge on each capacitor, the electrostatic energy stored in the system and the change in the electrostatic energy from its initial value.

OR

Deduce an expression for electric potential due to an electric dipole at any point on its axis. Mention one contrasting feature of electric potential of a dipole at a point as compared to that due to a single charge.

21. Draw the input and output characteristics of a transistor in its common emitter configuration. Explain briefly the meaning of the term 'active region' in these characteristics. For what practical use, do we use the transistor in this 'active region'?

22. What is satellite wave propagation? Which two communication methods make use of this mode of propagation? If the sum of the heights of transmitting and receiving antennae in line of sight of communication is fixed at h, show that the range is maximum when the two antennae have a height h/2 each.

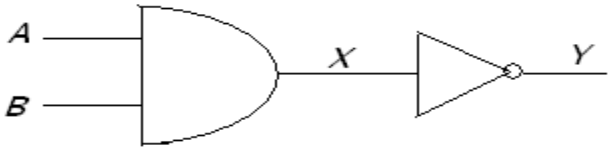
23. Explain the origin of spectral lines of hydrogen using Bohr's theory. Mark transisitions corresponding Lyman and Balmer series The wavelength of the second line of the balmer series in the hydrogen spectrum is 4861 A^o .Calculate the wavelength of the first line.

24. When a circuit element 'X' is connected across an a.c. source, a current of A flows through it and this current is in phase with the applied voltage. When another element 'Y' is connected across the same a.c. source, the same current flows in the circuit but it leads the voltage by $\pi/2$ radians. (i) Name the circuit elements X and Y.(ii) Find the current that flows in the circuit when the series combination of X and Y is connected across the same a.c.voltage.(iii) Plot a graph showing variation of the net impedance of this series combination of X and

Y as a function of the angular frequency of the applied voltage.

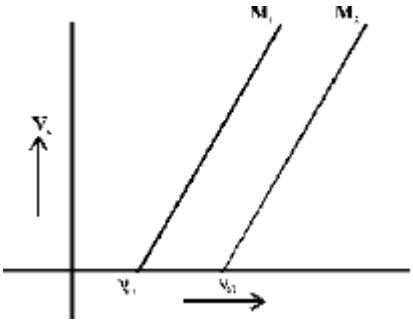
25. Bhavika lives in a society in Dwarka. She with her friends of NGO contacted the RWA of the society to organize a eye camp. She gathered old and young people suffering from different eye defects. Most of them get cured their eyes. All people of the society appreciated her steps.(i) List three values Bhavika displayed in her act .(ii) Name two general eye defects and their causes

26. How a OR gate is realized from the NOR gate. Draw diode circuit of OR gate. Find the output at Y if (i) A=1, B=0 (ii) A=0, B=1



27. The given graphs show the variation of the stopping potential Vs with the frequency (ν) of the incident radiations for two different photosensitive materials M1 and M2.(i) What are the values of work functions for M1 and M2? (ii) The values of the stopping potential for M1 and M2 for a frequency ν_3 ($>\nu_{02}$) of the incident radiations are V1 and V2 respectively. Show that the slope of the lines equals

$$\frac{V_1 - V_2}{\nu_{02} - \nu_{01}}$$



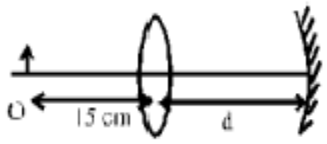
28. Two circular coils X and Y having radii R and R /2 respectively are placed in horizontal plane with their centers coinciding with each other. Coil X has a current I flowing through it in the clockwise sense. What must be the current in coil Y to make the total magnetic field at the common centre of the two coils, zero? With the same currents flowing in the two coils, if the coil Y is now lifted vertically upwards through a distance R, what would be the net magnetic field at the centre of coil Y?

OR

State Biot-Savart's Law. Using this law, derive the expression for the magnetic field due to current carrying circular loop of radius R, at a point, which is at a distance X from its center along the axis of loop. Consider two parallel co-axial circular coils of same radius R and number of turns N, carrying same current I in same direction, separated by a distance R Show that the field on the axis around the mid-point between the coils in uniform over a distance that is small as compared to R is given by

$B = (0.72\mu_0 NI) / R$

29. (i) Using the relation for refraction at a single spherical refracting surface, derive the lens maker's formula.(ii) Calculate the distance d, so that a real image of an object at O, 15cm in front of a convex lens of focal length10cm be formed at the same point O. The radius of curvature of the mirror is 20cm. Will the image be inverted or erect?



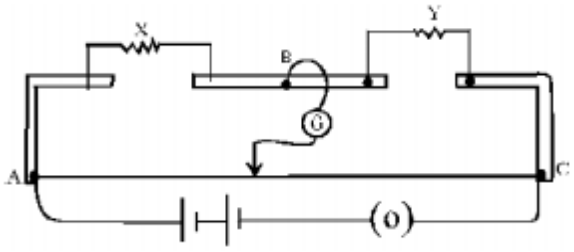
OR

Explain how the polarization takes place? Write two uses of polaroids?
Light from an ordinary source (say a sodium lamp) is passed through a Polaroid sheet P1 .The transmitted light is then made to pass through a second Polaroid sheet P2 that can be rotated so that the angle (θ) between the two Polaroid sheets varies from 0^0 to 90^0. Show graphically the variation of the intensity of light, transmitted by P1 and P2, as a fuction of the angle θ. Take the incident beam intensity as I0. Why does the light from a clear blue portion of the sky, show a rise and fall of intensity when viewed through a Polaroid, which is rotated?

30. Describe the formula for the equivalent EMF and internal resistance for the parallel combination of two cells with EMF E1 and E2 and internal resistances r1 and r2 respectively. What is the corresponding formula for the series combination? Two cells of EMF 1V, 2V and internal resistances 2 and 1 respectively are connected in (i) series, (ii) parallel. What should be the external resistance in the circuit so that the current through the resistance be the same in the two cases? In which case more heat is generated in the cells?

OR

Explain how the meter bridge calculates the specific resistance of a wire? The given figure shows the experimental set up of a metre bridge. The null point is found to be 60cm away from the end A with X and Y in position as shown.



When a resistance of 15Ω is connected in series with 'Y', the null point is found to shift by 10cm towards the end A of the wire. Find the position of null point if a resistance of 3Ω were connected in parallel with 'Y'.

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