Sample Paper 2014
Class - XII
PHYSICS (042)

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 26 are also short answer type questions, carrying three marks each.

(vi)Q.No. 27 is a value based question, carrying three marks

(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

$c=3 \times 10^8$ 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

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1. Two nuclei have mass number in the ratio 1:8, what is the ratio of nuclear radii.   (1)

2. How does focal length of a lens change when red light is replaced by blue light?   (1)

3. Name the series of hydrogen spectrum which lies in the visible region of electromagnetic spectrum. (1)

4. Unpolarised light is incident on a plane surface of glass of refractive index 'n' at an angle 'i '. If the reflected light get totally polarized, write the relation between the angle ' i' and refractive index 'n'. (1)

5. The element of the heater is very hot while the wires carrying current are cold, why?   (1)

6. For a given medium, the dielectric constant is unity. What is its permittivity?   (1)

7. No two lines of force can cross each other. Give reason.   (1)

8. Two wires A and B are of the same metal and of the same length have their areas of cross-section in the ratio of 2:1. If the same potential difference is applied across each wire in turn, what will be the ratio of the current flowing in A and B.?

9. Define the refractive index of a transparent medium.

   A ray of light passes through a triangular prism. Plot a graph showing the variation of angle of deviation with the angle of incidence.   (2)

10. Draw a plot of potential energy of a pair of nucleons as a function of their separation. Write two important conclusions which you can draw regarding the nature of nuclear forces.   (2)

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11. Two fixed point charges +4e and +e units are separated by a distance 'a'. Where should the third point Charge be placed for it to be in equilibrium. (2)

12. Sate which reason, how would the linear width of central maximum change if (i) monochromatic yellow light is replaced with red light(ii)distance between the slit and the screen is increased. (2)

13. For the same angle of incidence, the angle of refraction in media P, Q, R are $35^{°}, 25^{°}, 15^{°}$ respectively .In which medium will the velocity of light is minimum and maximum. (2)

OR

In young's double slit, the slit is illuminated by using yellow, green, and orange color. How the fringe width in each case will vary. Write the fringe width in increasing order. (2)

14. Distingush between electric charge and mass. (2)

15. How is wavefront different from a ray? Draw the geometrical shape of wave front when (i) light from a point source (ii) light emerges out of a convex lens when a point source is placed at its focus. (2).

16. The V-I graphs for parallel and series combination of two metallic resistors are as shown in figure which graph represents parallel combination. Justify your answer.
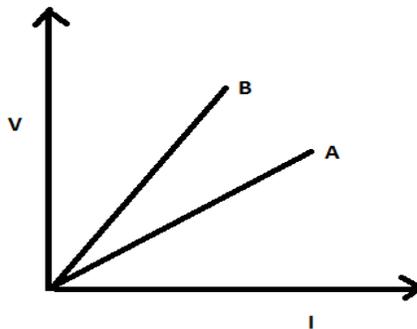
17. Green light incident at the polarizing angle on a certain glass plate. The angle of refraction is $32^{°}$. What are (i) the polarizing angle (ii) indicate the polarization component on the reflected and refracted ray, by double arrows and dots. (2)

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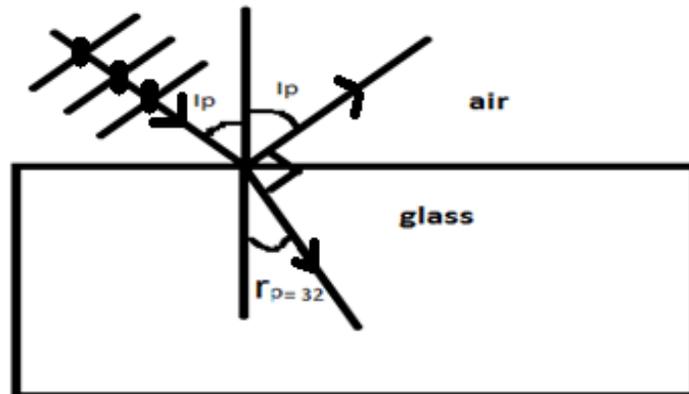
18. Using the data given below, state which two of the given lens will you prefer to construct a best possible (i) telescope (ii) microscope. Also indicate which of the selected lenses is to be used as objective and as an eyepiece in each case.   (2)

lenses	Power	Aperture
L_1	6D	1 cm
L_2	3D	8 cm
L_3	10D	1 cm

19. The given figure shows the experimental setup of a meter bridge. The null point is found to be 60 cm away from the end A with X and Y in position as shown. When a resistance 15ohm is connected in series with Y, the null point is found to shift by 10 cm towards the end of A of the wire. Find the position of null point it resistances of 30 ohm were connected in parallel with Y.   (3)

20. A concave lens made of material of refractive index n_1 is kept in medium of refractive index n_2. A parallel beam of light is incident on the lens. Complete path of ray of light emergent from a concave lens if (i) $n_1 > n_2$ (ii) $n_1 = n_2$ (iii) $n_1 < n_2$.   (3)

21. Write the limitation of ohm's law.   (3)

22. A dipole is placed in a uniform electric field. (i) Show that the net force acting on it is zero. (ii) Find the torque acting on it.   (3)

23. Define the term decay constant of a radioactive nucleus.   (3)

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OR

The energy level diagram on an atom of element is shown in the following diagram. Which one of the level transition will result in the emission of wavelength 620nm? Support your answer with mathematical calculation.   (3)
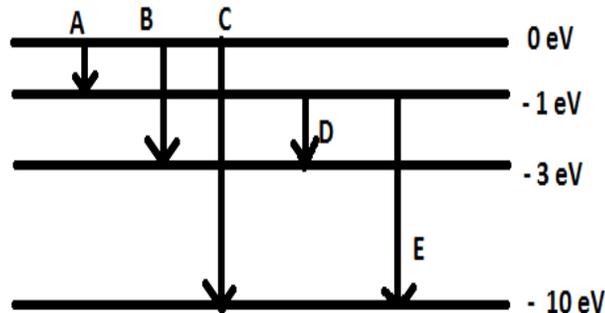
24. Why does the capacitance of a conductor increase, when an earthed connected conductor is placed near it? Briefly explain?   (3)

25. Calculate resolving power of a telescope, assuming diameter of objective lens to be 6 cm and wavelength of light used is 540nm. How the diameter of objective affect the resolving power of a telescope.   (3)

26. Draw a labeled ray diagram of compound microscope and write the equation for its magnifying power.
                                                                                                                    (3)

27. **Geeta has dry hair. A comb ran through her dry hair attract small bits of paper. She observes that Neeta with oily hair combs her hair; the comb could not attract small bits of paper. She consults her teacher for this and gets the answer. She then goes to the junior classes and shows this Phenomenon as Physics Experiment to them. All the juniors feel very happy and tell her that they will also look for such interesting things in nature and try to find the answers .she succeeds in forming a Science Club in her school.**

    1. What according to you are the values displayed by Geeta?

    2. Write and explain the scientific for this

28.(A) (a.) Using Kirchhoff's law, find the relation between the resistances of four arms of a Wheatstone bridge, when the bridge is balanced.

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(b.) Draw a circuit diagram to determine the unknown resistance of a metallic conductor using meterbridge.

OR

(B.) Write the principle of potentiometer. How will you compare emfs of two cells using a potentiometer, explain with circuit diagram.

29. (A.) State and explain the law of radioactive disintegration. And hence define the half life period, establish a relation for this.

OR

(B.) State the basic postulates of Bohr's theory of atomic spectra. Hence obtain expression for radius of orbit and energy of orbital electron in hydrogen atom.

30. (A.) Derive the relation between the focal length of a convex lens in terms of the radius of curvature of the two surfaces and refractive index of its materials. Write the sign convention and two assumptions used in the derivation.

A convex lens of focal length 40 cm and a concave lens of focal length -25cm are kept in contact with each other. What is the value of this combination?

OR

(B.) Define the term wavefront. Draw the wavefront and corresponding rays in the case of a (i) diverging spherical wave (ii) plane waves.

Using Huygen's construction of a wave front, explain the refraction of a plane wavefront at a plane surface and hence verify Snell's law.

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