

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

*Time allowed: 3 hours*  
*Maximum Marks: 70*

*SET A*

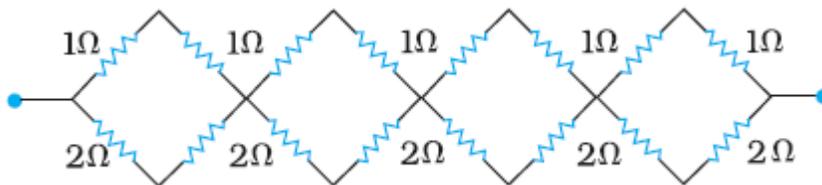
**General Instructions:**

- (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 16 are short answer type questions, carrying two marks each.
- (v) Q.No. 17 to 25 are also short answer type questions, carrying three marks each.
- (vi) Q.No. 27 to 29 are long answer type questions, carrying five marks each.
- (viii) Q.No. 26 is a value based question of four marks
- (ix) 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

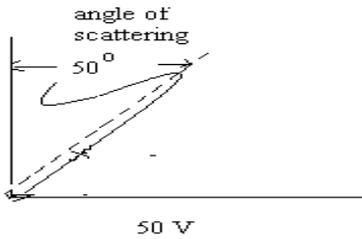
1. You are given following three lenses. Which of the two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope?

Lenses	Power	Aperture
L1	3D	8cm
L2	6D	1cm
L3	10D	1cm

2. Three concentric metallic spherical shells of radii R, 2R, 3R, are given charges Q1, Q2, Q3, respectively. find the surface charges given to the shells, Q1 : Q2 : Q3
3. The mean life of a radioactive sample is T. What is the time in which 50% of this sample would get delayed?
4. Find the net resistance between two ends.



5. Two identical charged particles moving with same speed enter a region of uniform magnetic field. If one of these enters normal to the field direction and the other enters along a direction at  $30^\circ$  with the field, what would be the ratio of their angular frequencies?
6. Name the experiment for which the following graph, showing the variation of intensity of scattered electrons with the angle of scattering, was obtained.



7. A proton, and an alpha particle, both initially at rest, are (suitably) accelerated so as to have the same kinetic energy .What is the ratio of their de-Broglie wavelength?
8. Optical and radio telescopes are built on the ground but X-ray astronomy is possible only from satellites orbiting the earth. Why?
9. Why infrared waves are heating waves .Write two uses of the waves.

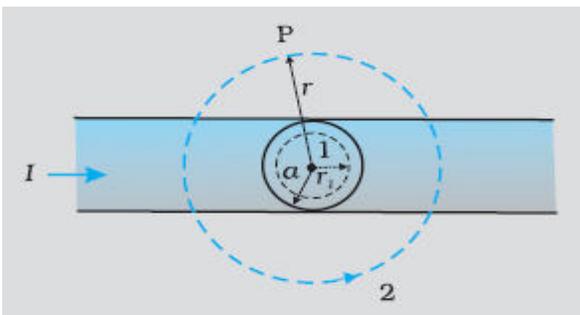
**VECTOR CLASSES**

**The classes with a direction.**

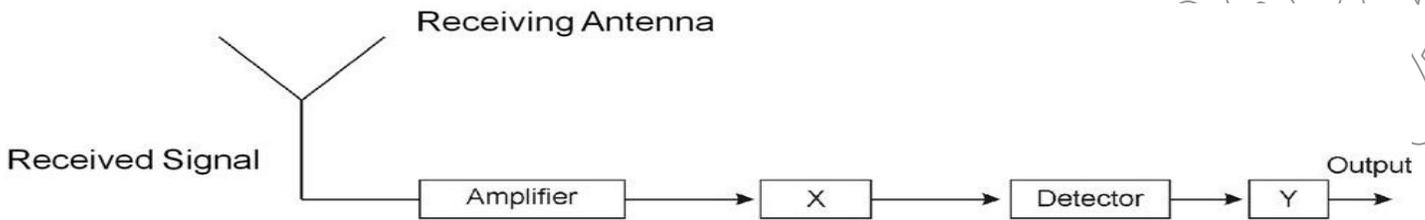
**Ph.No. 9910826233, 9213122859**

**SET A**

10. Figure shows a long straight wire of a circular cross-section (radius  $a$ ) carrying steady current  $I$ . The current  $I$  is uniformly distributed across this cross-section. Calculate the magnetic field in the region  $r < a$  and  $r > a$ .



11. Draw the diagram of a compound microscope. Write the expression of the magnifying power if the object is at the focus of the objective lens.
12. A monochromatic light of wavelength  $\lambda$  is incident on an isolated metallic sphere of radius  $a$ . The threshold wavelength is  $\lambda_0$  which is larger than  $\lambda$ . Find the number of photoelectrons emitted before the emission of photoelectrons will stop.
13. State Gauss theorem in electrostatics. Find the electric field intensity due to a thin line charge at any point.
14. Block diagram of receiver is given. (a) Identify X and Y (b) State their functions.



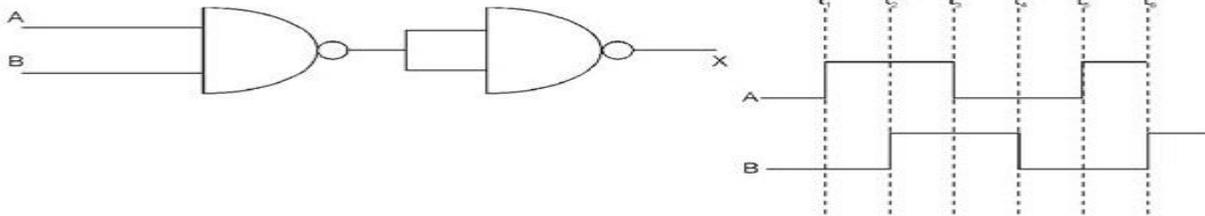
15. Name the physical quantity whose SI unit is Rutherford (rd); how is this quantity related to (a) disintegration constant (b) half life, and(c) mean life of the radioactive element?

OR

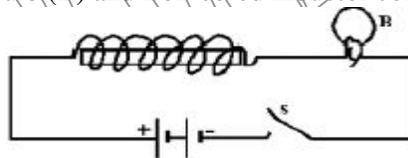
Write the equations for the two types of  $\beta$ -decay .Why is it very difficult to detect the neutrino?

16. How a Zener diode works. Draw its voltage – current graph.

17. Draw the output wave from at X, using the given inputs A, B for the logic circuit shown below. Also identify the equivalent gate.



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



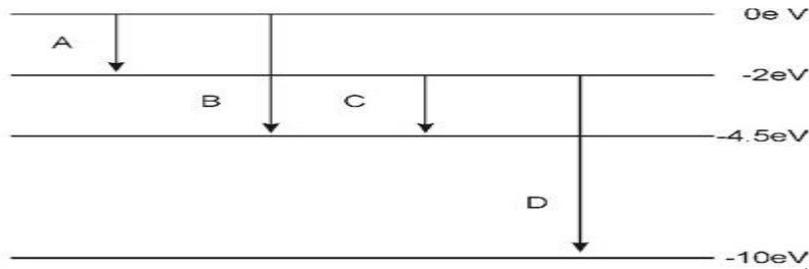
(i) What will one observe when switch (S) is closed?

(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.

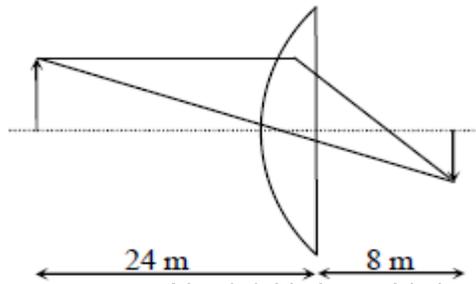
19. Define impedance. With the help of phasor diagram of LCR series circuit derive the expression for impedance. Draw

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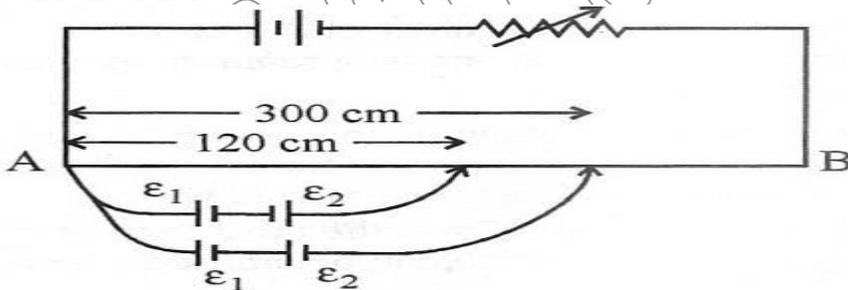
20. The energy levels of a hypothetical atom are as shown below. Which of the shown transitions will result in the emission of a photon of wavelength 275nm? Which transition will correspond to minimum wavelength



21. The image of an object, formed by a plano-convex lens at a distance of 8 m behind the lens, is real and is one-third the size of the object. The wavelength of light inside the lens is  $\frac{2}{3}$  times the wavelength in free space. Find the radius of the curved surface of the lens .



22. In the figure a long uniform potentiometer wire AB is having a constant potential gradient along its length. The null points for the two primary cells emfs  $E_1$  and  $E_2$  connected in the manner shown are obtained at a distance of 120cm and 300cm from the end A. Find (i)  $E_1/E_2$  and (ii) position of null point for the cell  $E_1$ . How is the sensitivity of a potentiometer increased?



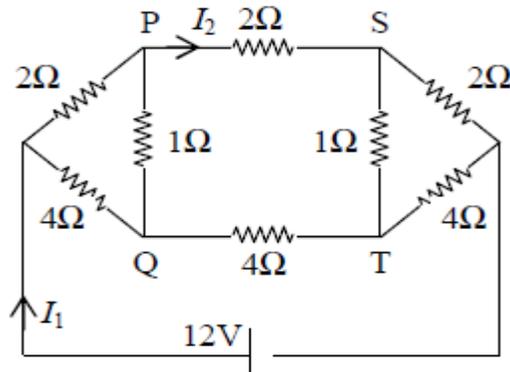
23. What does the term LOS communication mean? Name the types of waves that are used for this communication. Which of the two-height of transmitting antenna and height of receiving antenna-can affect the range over which this mode of communication remains effective?

24. How a full wave rectifier works. Draw its Diagram. Write the function of filter circuits

OR

Explain how a p-n junction diode works. What is diffusion current and drift current/

25. For the resistance network in the figure below find the (a) current  $I_1$  (b) current  $I_2$  (c) Potential difference in P and Q



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SET A

26. Yash and friends decided to have a astronomy club in their society. Yash collected the information of buying telescopes. The telescopes were too expensive .They convinced the people of society and collected the money for an astronomical telescope. Yash father insisted on buying refracting telescopes. Yash told his father the advantages of reflecting telescopes. He explained how their resolving and magnifying power is better than others. The whole society appreciated their steps.
- What values have yash\_to form a astronomy club in his society?
  - Reflecting telescopes are preferred over refracting. Write two advantages.
  - On what factor the resolving power of telescope depends?
27. State the essential condition for the diffraction of light to take place. A parallel beam of monochromatic light falls normally on a narrow slit and light coming out of the slit is obtained on the screen. Derive the expression for the width of central maxima obtained on the screen.  
“Diffraction defines the limit of the ray optics” Give the explanation
- OR
- What is fringe width? Derive the expression. How the fringe pattern will change if screen is moved away from the slits?
  - A beam of light consisting of two wavelengths, 650 nm and 520 nm, is used to obtain interference fringes in a Young’s double-slit experiment. (a) Find the distance of the third bright fringe on the screen from the central maximum for wavelength 650 nm. (b) What is the least distance from the central maximum where the bright fringes due to both the wavelengths coincide? Take distance of the screen 2m and slits gap 1mm.
28. (a) With the help of a diagram, explain the principle and working of a moving coil galvanometer.  
(b) What is the importance of a radial magnetic field and how is it produced?  
(c) why is it that while using a moving coil galvanometer as a voltmeter a high resistance in series is required whereas in an ammeter a shunt is used ?

OR

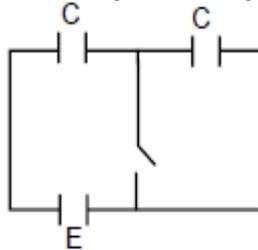
State Biot-Savat law, expressing it in the vector form. Use it to obtain the expression for the magnetic field at an axial point, distance ‘d’ from the centre of a circular coil of radius ‘a’ carrying current ‘I’. Also find the ratio of the magnitudes of the magnetic field of the coil at the centre and at the axial point for which  $d = (3)^{1/2}a$

29. Find the expression for the electric field intensity, and the electric potential, due to a dipole at a point on the equatorial line. Two non-conducting solid spheres of radii  $R$  and  $2R$ , having uniform volume charge densities  $\sigma_1$  and  $\sigma_2$  respectively, touch each other. The net electric field at a distance  $2R$  from the centre of the smaller sphere, along the line joining the centre of the spheres is zero. Find the ratio  $\sigma_1/\sigma_2$ .

OR

Find the expression for the capacitance of a parallel plate capacitor of area 'A' and plate separation 'd' when a dielectric slab of thickness  $t$  is introduced between the plates of the capacitor. In which case would the capacitance be more and why?

In given diagram a switch is open for long time and then closed (a) find the charge flown through the battery when the switch is closed. (b) Find the work done by the battery (c) find the change in energy stored in the capacitors



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