CLASS XII
SAMPLE PAPER
PHYSICS

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

General Instructions: All questions are compulsory. Q. No. 1 to 5 -1 mark each ,Q. No. 6 to 10 - 2 marks each Q. No .11 to 22 -3 marks each,Q. No 23 is a value based question of 4 marks , Q. No 24 to 26 - 5 marks each.
You may use the following physical constants wherever necessary:

$c=3x10^8$ m/s h=6.6 x 10^{-34} Js e=1.6 x 10^{-19} C N_A = 6.023 x 10^{23} /mole $c=3x10^8$ m/s h=6.6 x 10^{-34} Js e=1.6 x 10^{-19} C

1. The power factor of an ac circuit is 0.5.What will be the phase difference between voltage and current in the circuit.

2. In which orientation, a dipole placed in a uniform electric field is in (i) stable (ii) unstable equilibrium

3. An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of the magnetic field?

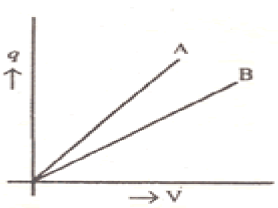
4. You are given following three lenses. Which of the two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope.

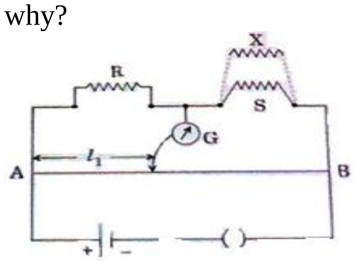
Lenses	Power	Aperture
L1	3D	8cm
L2	6D	1cm
L3	10D	1cm

5. The stopping potential in an experiment on photoelectric effect is 1.5 V. What is the maximum kinetic energy of the photo electrons emitted?

6. State Gauss theorem in electrostatics. Using Gauss's law to find the electric field due to a line charge.

7. The given graph shows the variation of charge q versus potential difference V for two capacitors. The two capacitors C1 and C2 have same plate separation but the plate area of C2 is double than that of C1. Which of the lines in the graph correspond to C1 and C2 and why?





8. In a meter bridge balance point is found at a distance l_1 with resistances R and S as shown in figure. When an unknown resistance X is connected in parallel with resistance S, the balance point shifts to a distance l_2. Find the expression for X in terms of l_1, l_2 and S.

9. Define current sensitivity and voltage sensitivity of a galvanometer. Increasing the current sensitivity may not necessarily increase the voltage sensitivity of a galvanometer. Justify.

10. Write the function of (i) Amplifier and (ii) transmitter in the context of communication system.

OR

What is meant by term modulation? Draw a block diagram of a simple modulator for obtaining an AM Signal.

11. When 100 volts d.c is applied across an inductor, a current of 1A flows through it. If the same inductor is connected across 100 v a.c. source, a current reduces to 0.5 A. Why is the current reduced in later case? Calculate the reactance

12. Name the part o f e electromagnetic spectrum to which waves o f wavelength (i)1A° and (ii) 10^{-2-} belong. Using the relation λT = (0.29 cm) K, obtain in the characteristic Kelvin temperature corresponding to these two wavelengths.(i) X -rays, (ii) Microwaves.

13. (a) The bluish colour predominates in clear sky.
(b) Violet colour is seen at the bottom of the spectrum when white light is dispersed by a prism.
State reasons to explain these observations

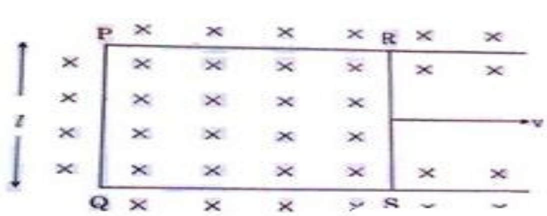
14. A radioactive isotope has a half life of T years. How long will it take the activity to reduce to (i) 3.125 % and ii) 1 % of its original value?

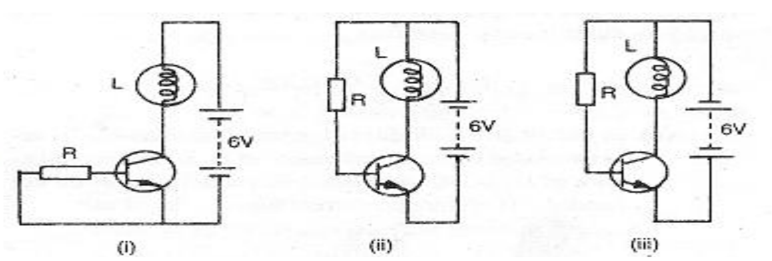
15. Show that an electric dipole kept in uniform electric field does not experience force but experiences a torque. Deduce an expression for torque. Draw electric lines force for an electric dipole.

OR

A parallel plate capacitor is charged by a battery. After some time the battery remains connected and a dielectric slab of dielectric constant K is inserted between the plates. How would (i) the capacitance, (ii) the electric field between the plates and (iii) the energy stored in the capacitor, be affected? Justify your answer.

16. Figure shows a rectangular conducting loop PQSR in which arm RS of length 'l' is movable. The loop is kept in a uniform magnetic field 'B' directed downward perpendicular to the plane of the loop. The arm RS is moved with a speed 'v'. (a) the emf induced across the arm RS (ii) the external force required to move the arm, and (iii) the power dissipated as heat.





17. In only one of the circuits given below the lamp"L" light glow. Identify which circuit is it? Give reason for your answer? A germanium diode is preferred to a silicon one for rectifying small voltages. Explain why?

18. In Young's double slit experiment, monochromatic light of wavelength 630 nm illuminates the pair of slits and produces an interference pattern in which two consecutive bright fringes are separated by 8.1 mm. Another source of monochromatic light produces the interference pattern in which the two consecutive bright fringes are separated by 7.2 mm. Find the wavelength of light from the second source.What is the effect on the interference fringes if the monochromatic source is replaced by a source of white light?

19. Plot a graph showing the variation of stopping potential with the frequency of incident radiation for two different photosensitive materials having work functions W_1 and W_2 ($W_1 > W_2$).On what factors does the (a) slope and (b) intercept of the line depends

20. **(i)** Draw a labeled ray diagram to show the formation of image in an astronomical telescope for a distant object **(ii)** Write two distinct advantages of a reflecting type telescope over a refracting type telescope

21. On the basis of energy level diagram, identify the P-type semi conductor & N-type semi conductor. How does its width change when the junction is (i) forward biased, and (ii) reverse biased?

22. Draw a plot of the variation of amplitude versus ω for an amplitude modulated wave .Define modulation index. Find the modulation index of an AM wave for which the maximum amplitude is 'a' while the minimum amplitude is 'b'.

23. In April 2010, the locality of Mayapuri in New Delhi was affected by a serious radiological accident. The cobalt-60 source was recovered from the market. Eight people were hospitalized as a result of radiation exposure, where one later died. The government authorities shut the market area for number of a days aftermath the accident.
(a) What responsible values were displayed by the government authorities?
(b) Name the radiations developed by the cobalt 60.Write the range of frequency of the radiations.

24. Draw a schematic sketch of a cyclotron. Explain briefly how it works and how it is used to accelerate the charged particles. (i) Show that time period of ions in a cyclotron is independent of both the speed and radius of circular path. (ii) What is resonance condition? How is it used to accelerate the charged particles?

OR

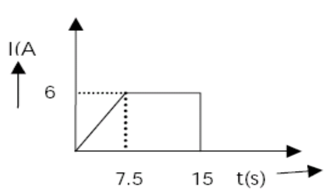
(i) Derive an expression for the magnetic field at a point on the axis of a current carrying circular loop.(ii)A galvanometer can be converted into a voltmeter of certain range by connecting a resistance of 980Ω in series with it. When the resistance is 470 Ω connected in series, the range is halved .Find the resistance of the galvanometer

25. Draw the labeled ray diagram for the information of image by a compound microscope.
Derive the expression for the total magnification of a compound microscope.Expalin why both objective and the eyepiece of a compound microscope must have short focal lengths.

OR

Obtain the conditions of path and phase difference for the constructive and destructive interference. Derive the expression for the fringe width. Draw intensity distribution graph for the interference.

26. Plot of current I versus time interval is given below. Find the charge that flows through the wire during this time period. Derive the expression for the drift velocity of electrons in the wire. A conductor of length l is connected to a D C source of potential V .If the length is tripled by starching it, Keeping V constant. Explain how the following factors vary in the conductor. (i) drift speed of the electrons (b) resistance (c) conductivity



OR

Describe the formula for the equivalent EMF and internal resistance for the parallel combination of two cells with EMF $E_1$and $E_2$and internal resistances $r_1$and $r_2$respectively. What is the corresponding formula for the series combination? Two cells of EMF 1V and 2V and internal resistances 2Ω and 1Ω 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.