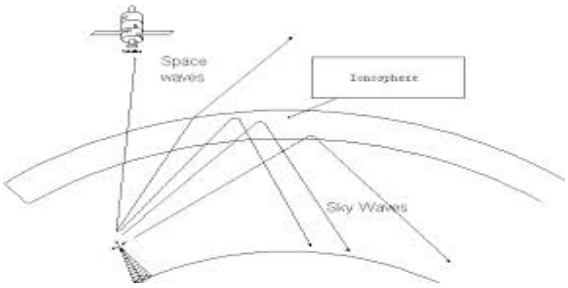
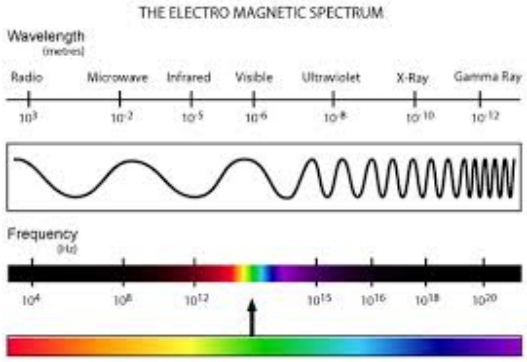
Q1. What is sky wave propagation?



Radio waves from the transmitting antenna reach the receiving antenna after reflection in the ionosphere, this wave propagation is called *sky wave propagation.*

Q2. Write the following radiations in ascending order in respect of their frequencies : X-rays, microwaves, UV rays and radio waves.



The ascending order of the frequencies of the radiations are : Radio waves, microwaves, UV rays and X-rays.

Q3. Magnetic field lines can be entirely confined within the core of a toroid, but not within a straight solenoid. Why?

If the currents are running strictly around the surface of the solenoid or torus, the field will be inside and strictly vanish outside Since the magnetic field induction outside the toroid is zero.

Q4. You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope?

Lenses	Power (P)	Aperture (A)
1.1	3D	8 cm.
1.2	6D	1 cm.
1.3	10D	1 cm.

We know that P=1/f , f=1/P , for P = 3 f=0.33, For P=10, f=0.1, Magnifying power = fo/fe i.e for higher magnification fo>fe, if aperature is more it will allow more light to come in.

For a telescope, lens L_1 is used as objective as its aperture is largest(focal length is maximum). The lens L_3 is used as eye piece as its focal length is smaller.

Q5. If the angle between the pass axis of polarizer and the analyzer is 45^0, write the ratio of the intensities of original light and the transmitted light after passing through the analyzer.

Given $\theta = 45^\circ \;\therefore\; \cos\theta = \cos 45^\circ = \frac{1}{\sqrt{2}}$

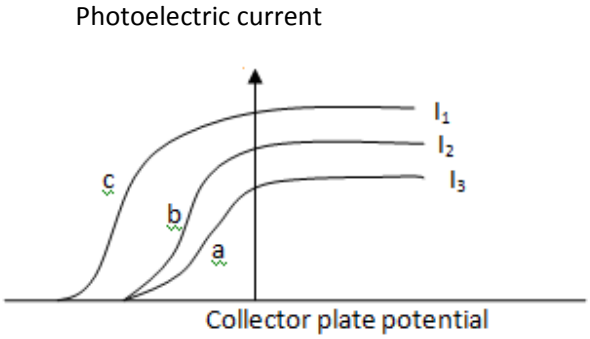
$\because I = I_0 \cos^2\theta$

$\therefore\; I = I_0 \left(\frac{1}{\sqrt{2}}\right)^2$

$\frac{I}{I_0} = \frac{1}{2} \Rightarrow I :\; I_0 = 1:2$

Q6. The figure shows a plot of three curves a, b, c, showing the variation of photocurrent vs. collector plate potential for three different intensities I_1, I_2 and I_3 having frequencies v_1, v_2 and v_3 respectively incident on a photosensitive surface.

Point out the two curves for which the incident radiations have same frequency but different intensities.



The stopping potential Vs is same for a and b, hence frequencies of incident light are same for a and b curve, but intensities are different ($I_2 > I_1$).

Q7. What type of wavefront will emerge from a (i) point source, and (ii) distant light source?

(i) For the point source lights touches the surface of sphare at the same time, since the point is near, curvature is more and type of wave front is Spherical wavefront . Point source → Spherical wave front.

(ii) If the source of light is at distant place, curvature is less as radius of curvature is more and it it becomes a Plane wavefront. Distance Source → Plant wave front.

Q8. Two nuclei have mass numbers in the ratio 1 : 2. What is the ratio of their nuclear densities?

Nuclear density is the density of the nucleus of an atom, nuclear density is independent of mass number. Since the nuclear density is same for all nuclei. The ratio of their densities are 1 : 1.