**INDIAN SCHOOL DARSAIT**
**DEPARTMENT OF PHYSICS**

| Subject : Physics | Topic : EM waves | Date of Worksheet : 1.10.19 |
|---|---|---|
| Resource Person: Susan Anil | | Objective type question |
| Name of the Student :_____ | Class & Div : XII____ | Roll No : __ |

1) The electromagnetic waves in the range of wavelengths from 3mm to 100cm are used for the purpose of satellite communication. The range of frequencies corresponding to this range of wavelengths is

(a) 30MHz to $10^4$MHz
**(b) 300MHz to $10^5$MHz**
(c) 3MHz to $3\times10^8$MHz
(d) 3MHz to $10^6$MHz

2) Astronomers have found that the EM waves of wavelength 21cm are continuously reaching the Earth's surface. The frequency of this radiation is

**(a) 1.43GHz**
(b) 1.43MHz
(c) 1.43kHz
(d) 1.43Hz

3) If $V_g$, $V_x$ and $V_m$ are the velocities of gamma rays, X-rays and microwaves respectively in space, then

(a) $V_g > V_x > V_m$
(b) $V_g < V_x < V_m$
(c) $V_x > V_m > V_g$
**(d) $V_g = V_x = V_m$**

4) If $\mu_r$ be relative permeability and K be dielectric constant of a given medium, then the refractive index of the medium is n=

**(a)** $\sqrt{\mu_r K}$
(b) $\sqrt{\mu_o \varepsilon_0}$
(c) $1/\mu_r K$
(d) $\sqrt{\mu_r / K}$

5) The maximum value of $\vec{E}$ in an EM wave is equal to 18V/m. Thus the maximum value of $\vec{B}$ is

(a) $3\times10^{-6}$T
**(b) $6\times10^{-8}$T**
(c) $9\times10^{-9}$T
(d) $2\times10^{-10}$T

6) An EM wave passing through the space is given by equations:
$E = E_0 \sin(\omega t - kx)$ and $B = B_0 \sin(\omega t - kx)$. Which of the following is true?

(a) $E_0 B_0 = \omega k$
(b) $E_0 \omega = B_0 k$
**(c) $E_0 k = B_0 \omega$**
(d) $E_0 / B_0 = 1/\omega k$

7) A plane EM wave is travelling along the X-direction. The electric field vector at an arbitrary point at a time is $\vec{E} = 6.3\hat{j}\ V/m$. The magnetic field at that point at that time is

(a) $2.1\text{x}10^{-8}\hat{k}$ T **(b) $\mathbf{-2.1\text{x}10^{-8}\hat{k}}$ T**
(c) $6.3\hat{k}$ T (d) $-6.3\hat{k}$ T

8) Two opposite charged particles oscillate about their mean equilibrium position in free space, with a frequency of $10^9$Hz. The wavelength of the corresponding EM wave produced is

**(a) 0.3m** (b) $3\text{x}10^{17}$m
(c) $10^9$m (d) 3.3m

9) The wavelength $5890A^0$ and $5896A^0$ of sodium doublet correspond to ---------- region of the EM wave

(a) Infrared **(b) Visible light**
(c) ultraviolet (d) Microwave

10) The frequency of an EM wave in free space is 2MHz. When it passes through a region of relative permittivity $\varepsilon_r$=4.0, then its wavelength ------- and frequency--------

(a) Becomes double, become half (b) Becomes double, remains constant
(c) Becomes half, becomes double **(d) Becomes half, remains constant**

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| Subject : Physics | Topic : Ray Optics | Date of Worksheet : 1.10.19 |
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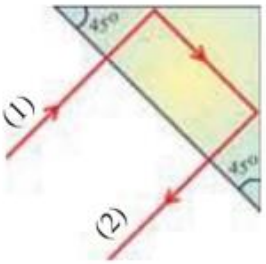
| Name of the Student :_____ | Class & Div : XII____ | Roll No : __ |

1) For a thin plano convex glass lens with radius of curvature 20cm, focal length is ------ cm. Refractive index (n) of the material of the lens is 1.5 and it is kept in air

(a) 20 (b) 40
(c) 60 (d) 80

2) For right angled prism, ray 1 is the incident ray and ray 2 is the emergent ray, as shown in the figure. Refractive index of the prism is ---------




(a) $1/\sqrt{2}$ (b) $\sqrt{3}/2$
(c) $2/\sqrt{3}$ (d) $\sqrt{2}$

3) A ray of light is incident normally on the surface of an equilateral prism made up of material with refractive index 1.5. The angle of deviation is--------

(a) $30^0$ (b) $45^0$
(c) $60^0$ (d) $75^0$

4) Which of the following is responsible for glittering of a diamond?

(a) Interference (b) diffraction
(c) Total internal reflection (d) refraction

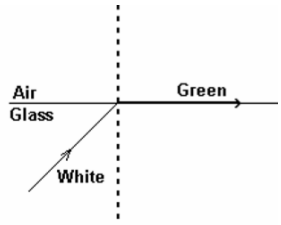
5) The radii of curvature of both the sides of a convex lens are 15cm and if the refractive index of the material of the lens is 1.5, then focal length of lens in air is -------cm

(a) 10 (b) 15
(c) 20 (d) 30

6) The focal length of an equi-convex lens in air is equal to either of its radii of curvature. Refractive index of the material of the lens is

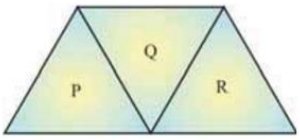
(a) 4/3 (b) 1.5
(c) 2.5 (d) 0.8

7) When light is incident on the interface of glass and air as shown in the figure. If green light is just totally reflected, then the emerging ray in air conatins




(a) Yellow, orange, red (b) Violet, indigo, blue
(c) All colours (d) All colours except green

8) A ray of light experiences minimum deviation by an equilateral prism P. Now two prisms Q and R made of the same material as that of P are arranged as shown in the figure. The ray of light will now experience. (The dimensions of P,Q and R are same.)




(a) Larger deviation (b) No deviation
(c) Same deviation as that due to P (d) Total internal reflection

9) For a thin convex lens when the heights of the object is double than its image, its object distance is equal to -------- focal length of a lens is f.

(a) f (b) 2f
(c) 3f (d) 4f

10) The astronomical telescope consists of objective and eyepiece. The focal length of the objective is

(a) Equal to that of the eyepiece (b) Shorter than that of eyepiece
(c) Greater than that of eyepiece (d) Five times shorter than that of eyepiece

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|---|---|---|
| Subject : Physics | Topic : Wave Optics | Date of Worksheet : 1.10.19 |
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1. Resolving power of telescope can be increased by increasing

(a) The wavelength
(b) The diameter of the objective
(c) Diameter of eyepiece
(d) Focal length of eyepiece

2. The wave front due to a source situated at infinity is

(a) Spherical
(b) Cylindrical
(c) Planar
(d) Circular

3. If two sources have a randomly varying phase difference, the resultant intensity will be given by

(a) $I_0/\sqrt{2}$
(b) $I_0/2$
(c) $2I_0$
(d) $\sqrt{2}\ I_0$

4. Two coherent monochromatic light beams of intensities I and 4I superimpose. The maximum and minimum possible intensities in the resulting beam are

(a) 5I and I
(b) 5I and 3I
(c) 3I and I
(d) 9I and I

5. In a YDSE, the source is white light. One of the hole is covered by a red filter and another by a blue filter. In this case

(a) There shall be alternate interference patterns of red and blue
(b) There shall be an interference pattern for red distinct from that for blue
(c) There shall be no interference fringes
(d) There shall be an interference pattern for red mixing with one for blue

6. Consider the diffraction pattern for a small pinhole. As the size of the hole is increased

(a) The size decreases
(b) The intensity increases
(c) The size increases
(d) The intensity decreases

7. What is the path difference for destructive interference?

(a) $n\lambda$
(b) $n(\lambda+1)$
(c) $(2n+1)\lambda/2$
(d) $(n+1)\lambda/2$

8. What happens, if the monochromatic light used in YDSE is replaced by white light

(a) No fringes are observed
(b) All bright fringes become white
(c) All bright fringes have colour between violet and red
(d) Only central fringe is white and all other fringes are coloured

9. The phenomenon of interference is based on

(a) Conservation of momentum
(b) Conservation of energy
(c) Conservation of momentum and energy
(d) Quantum nature of light

10. An unpolarised beam of intensity $I_o$ is incident on a pair of nicols making angle of $60^0$ with each other. The intensity of light emerging from the pair is

(a) $I_0$
(b) $I_0/2$
(c) $I_0/4$
(d) $I_0/8$

11. A double slit interference experiment is carried out in air and the entire arrangement is dipped in water. The fringe width

(a) Increases
(b) decreases
(c) Remains unchanged
(d) Pattern disappears

12. When unpolarised light beam is incident from air onto glass (n=1.5) at the polarizing angle

(a) Reflected beam is completely polarized
(b) Reflected and refracted beams are partially polarized
(c) Refracted beam is plane polarized
(d) Whole beam is refracted

13. When exposed to sunlight, thin films of oil on water often exhibit brilliant colours due to the phenomenon of

(a) Interference
(b) Diffraction
(c) Dispersion
(d) Polarisation

14. Consider sunlight incident on a slit of width 104 A. The image seen through the slit shall

(a) be a fine sharp slit white in colour at the center
(b) a bright slit white at the center diffusing to zero intensities at the edges.
(c) a bright slit white at the center diffusing to regions of different colours
(d) only be a diffused slit white in colour.

15. Two source S1 and S2 of intensity I1 and I2 are placed in front of a screen [Fig. 10.3 (a)]. The pattern of intensity distribution seen in the central portion is given by Fig. 10.3 (b).

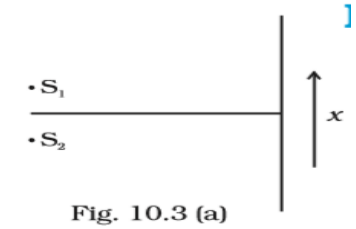

Fig. 10.3 (a)

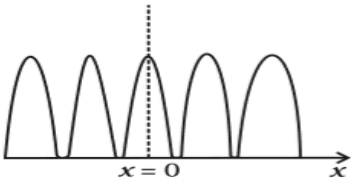

Fig. 10.3 (b)

In this case which of the following statements are true.
(a) S1 and S2 have the same intensities.
(b) S1 and S2 have a constant phase difference.
(c) S1 and S2 have the same phase. (d) S1 and S2 have the same wavelength.