ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

WORK SHEET: 38

Subject : PHYSICS

Date : 16.11.2020

CLASS : XII

Chapter- Refraction of light at plane surface. **Topic: Refraction on parallel slab, T.I.R.**

Multiple Choice Questions : **1 x 15 = 15**

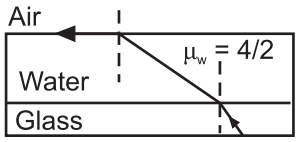
1: In total internal reflection,
(a) light ray travelling through a denser medium is completely reflected back to denser medium
(b) light ray travelling through a denser medium is completely refracted to rare medium
(c) light ray is partially reflected back to denser medium and partially refracted to rare medium
(d) light ray is absorbed completely by denser medium

2: Total internal reflection of a light ray travelling from denser medium to rare medium occurs only when angle of incidence is
(a) 45° (b) 90° (c) acute (d) more than a certain value

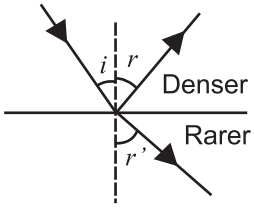
3: A green light is incident from the water to the air-water interface at the critical angle (θ). Select the correct statement.
(a) The entire spectrum of visible light will come out of the water at an angle of 90° to the normal
(b) The spectrum of visible light whose frequency is less than that of green light will come out of the air medium
(c) The spectrum of visible light whose frequency is more than that of green light will come out to the air medium
(d) The entire spectrum of visible light will come out of the water at various angles to the normal

4. Two transparent media *A* and *B* are separated by a plane boundary. The speed of light in medium *A* is 2×10^8 ms $^{-1}$ and in medium *B* is 2.5×10^8 ms $^{-1}$. The critical angle for which a ray of light going from *A* to *B* is totally internally reflected is
(a) $\sin^{-1}(1/2)$ (b) $\sin^{-1}(2/5)$ (c) $\sin^{-1}(4/5)$ (d) $\sin^{-1}(3/4)$

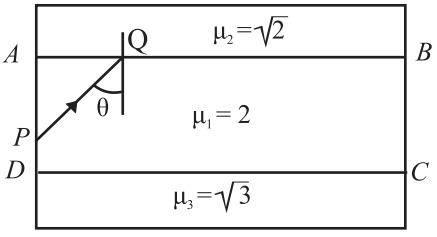
5. A ray of light is incident at the glass-water interface at an angle *i*, it emerges finally parallel to the surface of water, then the value of μ_g would be
(a) (4/3) sin *i* (b) 1/sin *i* (c) 4/3 (d) 1



6: A ray of light from a denser medium strikes a rarer medium at an angle of incidence i (see figure). The reflected and refracted rays make an angle of 90° with each other. The angle of reflection and refraction are r and r'. The critical angle is
(a) $\sin^{-1}(\tan r)$ (b) $\sin^{-1}(\cot i)$ (c) $\sin^{-1}(\tan r')$ (d) $\tan^{-1}(\sin i)$



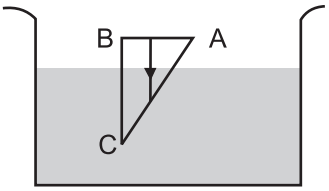
7: A parallel sides slab *ABCD* of refractive index 2 is sandwiched between two slabs of refractive indices $\sqrt{2}$ and $\sqrt{3}$ as shown in the figure. The minimum value of angle θ such that the ray *PQ* suffers total internal reflection at both the surfaces *AB* and *CD* is
(a) 30° (b) 45° (c) 60° (d) 75°



8: A glass prism of refractive index 1.5 is immersed in water ($\mu = 4/3$). A light beam incident normally on the face *AB* is totally reflected to reach the face *BC*, if

(a) $\sin\theta > 8/9$ (b) $2/3 \sin\theta < 8/9$

(c) $\sin\theta < 2/3$ (d) None of these



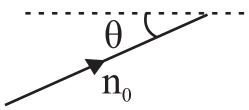
9: A light source is placed at a depth of *d* below the surface of water (μ). A wooden disc is placed on the surface so that light from the source is not visible from the surface. Find out the radius of the wooden disc.

(a) $\frac{d}{(\mu^2 - 1)^{1/2}}$ (b) $\frac{2d}{(\mu^2 - 1)^{1/2}}$ (c) $\frac{d}{2(\mu^2 - 1)^{1/2}}$ (d) $2d(\mu^2 - 1)^{1/2}$

10: If the critical angle for light going from medium *A* to *B* is θ. Then find the speed of light in medium *B*, if speed of light is *v* in medium *A*.

(a) $v(1 - \cos\theta)$ (b) $\frac{v}{\cos\theta}$ (c) $\frac{v}{\sin\theta}$ (d) $v(1 - \sin\theta)$

11: . A light beam is travelling from region I to region IV (refer figure). The refractive index in regions I, II, II and IV are n_0, $\frac{n_0}{2}$, $\frac{n_0}{6}$ and $\frac{n_0}{8}$, respectively. The angle of incidence θ for which the beam



(a) $\sin^{-1}(3/4)$ (b) $\sin^{-1}(1/8)$

(c) $\sin^{-1}(1/4)$ (d) $\sin^{-1}(1/8)$

Region I	Region II	Region III	Region IV
n_0	$\frac{n_0}{2}$	$\frac{n_0}{6}$	$\frac{n_0}{8}$

12: Mirage in hot deserts occurs due to

(a) reflection of light (b) refraction of light (c) total internal reflection of light

(d) scattering of light

13: A diamond piece has more brilliance than a glass piece of same shape and size, because

(a) diamond has tetrahedral arrangement of carbon atoms

(b) diamond has more mass density than the glass

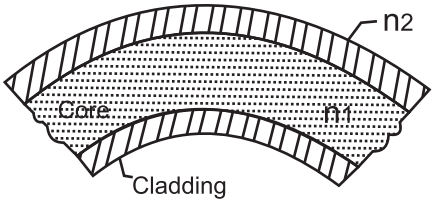
(c) diamond is more hard than glass (d) critical angle for diamond is less than that of glass

14: An optical fibre is

(a) a fiber optically visible in light (b) a fiber optically invisible in light

(c) a fiber through which light can travel (d) a fiber opaque to ordinary light

15: In an optical fiber (shown), correct relation of refractive indices of core cladding is



(a) $n_1 = n_2$ (b) $n_1 > n_2$ (c) $n_1 < n_2$ (d) $n_1 + n_2 = 2$