OPTICS 1

Note: vacuum light speed $c = 3 \cdot 10^8$ m/s, Planck's constant $= 6.6 \cdot 10^{-34}$ J·s and electric charge of electron $e = 1.6 \cdot 10^{-19}$ C.

1. When a light ray travels from a medium of one refractive index to another medium of higher refractive index:
a. the ray always bends away the normal;
b. the ray always bends towards the normal;
c. the ray can pass unbent.

2. An object moves with a speed of 5 m/s towards a plane mirror then the image:
a. moves at a speed of 10 m/s towards the mirror;
b. moves at a speed of 5 m/s towards the mirror;
c. moves at a speed of 10 m/s in opposite direction.

3. A real object reflected through a plane mirror has an image that is:
a. real, erected, and the same size as the object;
b. virtual, reversed and the same size as the object;
c. virtual, erected and the same size as the object.

4. The speed of light wave:
a. changes always when light passes through a boundary between two different isotropic media;
b. decreases when light passes from air to glass;
c. increases when light passes from air to water.

5. Two identical thin lenses, each with convergence of $C = 4$ m^{-1}, joined form a system with focal length of:
a. 0.025 m;   **b.** 25 cm;   **c.** 12.5 cm.

6. The image obtained on screen of a real object by means of a thin lens has the same size as object. Distance from object to screen is 2 m. The focal length of lens is:
a. 50 cm;   **b.** 25 cm;   **c.** 40 cm.

7. Both radii of a biconvex lens equal 1.5f. The refractive index has the value of:
a. 1.5;   **b.** 1.75;   **c.** 1.9.

8. Monochromatic light passes through a double slit device (Young experiment) and forms on screen an interference pattern with interfringe distance of 0.4 mm. Knowing slits are separated by a distance of 1.5 mm and the screen is placed at 1.5 m far away from slits, find the color of the radiation:
a. violet;   **b.** green;   **c.** red.

9. Two biconvex lenses with focal length f_1 and f_2, respectively, form an afocal system. Distance between lenses is:

a. $f_1 + f_2$; **b.** $f_1 - f_2$; **c.** $f_1 \pm f_2$.

10. The unit in I.S. of physical quantity obtained as ratio between the speed of light and frequency is:
a. J; **b.** s; **c.** m.

11. A light ray travels a distance through air. One inserts a thin glass plate with thickness d and refractive index n normal to the direction of propagation of the ray. The optical path of light through the glass plate compared to the same path through the air:
a. is n times longer; **b.** is n times shorter; **c.** is $(n-1)$ times greater.

12. A radiation with wavelength $\lambda = 500$ nm is incident normally to a diffraction grating. The second maximum is observed at an angle of $30°$. What is the grating constant:
a. 2 mm; **b.** 0.002 mm; **c.** 0.2 μm.