

Optică

Barem corectură

1. A
2. C.
3. B
$$n = \frac{\sin i}{\sin r} = \frac{\sin(90^\circ - r)}{\sin r} = \operatorname{ctg} r = \sqrt{3} \rightarrow r = 30^\circ$$
4. C
$$\frac{R}{h} = \operatorname{tg} l = \frac{\sin l}{\cos l} = \frac{1}{\sqrt{n^2 - 1}} \quad \text{unde unghiul limita } l = \arcsin \frac{1}{n}$$
5. A
$$D = f_1 + f_2 = 20 \text{ cm}$$
6. B
$$C = (n_s - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) C_a = \left(\frac{n_s}{n_a} - 1 \right) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) = \frac{n_s - n_a}{n_a (n_s - 1)} C = 1.25 \text{ dioptrii}$$
7. D
$$\beta' \beta'' = 1 \rightarrow h = \sqrt{h' h''} = 2 \text{ cm}$$
8. C.
9. D
$$\lambda = \frac{li}{D} = 600 \text{ nm}$$
10. B
$$L = \frac{hc}{\lambda_{\max}} \lambda_{\max} = \frac{hc}{L} = 618.75 \text{ nm}$$

11.

- A.
$$i = \frac{\lambda D}{d} = 0,26 \text{ mm} \quad (1\text{p})$$
- B.
$$i' = \frac{i}{n} = 0,217 \text{ mm} \quad (1\text{p})$$
- C.
$$\delta = \Delta m \lambda = 1,56 \mu\text{m} \quad (1\text{p})$$
- D.
$$(n' - 1) e = \delta e = \frac{\delta}{n' - 1} = 3,9 \mu\text{m} \quad (1\text{p})$$

12.

- A.
$$\frac{1}{f} = (n_s - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \quad R_1 = -R_2 = R = 50 \text{ cm} \rightarrow f = 50 \text{ cm} \quad (1\text{p})$$
- B.
$$C_{\text{sistem}} = C_1 + C_2 = 2C = 2 \frac{1}{f} = 4 \text{ m}^{-1} \quad (1\text{p})$$
- C.
$$\frac{1}{x'} - \frac{1}{x} = \frac{1}{f_{\text{sistem}}} = C_{\text{sistem}} \quad x' = 33.3 \text{ cm}$$

$$\beta_t = \frac{x'}{x} = \frac{-1}{3} \quad (1\text{p})$$
- D.
$$\frac{1}{x''} - \frac{1}{x} = \frac{1}{f'_{\text{sistem}}} = C'_{\text{sistem}} \rightarrow C'_{\text{sistem}} = \frac{8}{3} \text{ m}^{-1} \quad (2\text{p})$$

$$C_{sistem}'=C+C_l+C \rightarrow C_l=\frac{-4}{3}m^{-1}$$

$$C_l=\frac{1}{f_l}=(n_l-1)\left(\frac{1}{R_{1l}}-\frac{1}{R_{2l}}\right)=\frac{-2(n_l-1)}{R} \quad R_{1l}=-R \quad R_{2l}=+R$$

$$n_l=1-\frac{C_lR}{2}=\frac{4}{3}$$