DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

12NPCB11 (2023-24)	NEET PRACTICE QUESTIONS (TEST-11)	Class : XII Time : 1.15 hrs Total Marks : 240

Answer key

12TH Physics

1. Ans: B)

$$\frac{1}{f} (\mu-1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right] = \frac{1}{0.3} = (1.5-1)\left(\frac{1}{\alpha} - \frac{1}{R}\right)$$

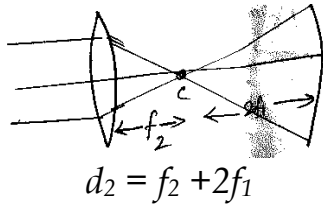$$\frac{1}{0.3} = 0.5 \times \frac{1}{R}$$

R = 0. 15m

2. Ans: D)

Mirror formula $m = \dfrac{fu}{u-f}$

$$u_1 = u - \frac{L}{2} \qquad u_2 = u + \frac{L}{2}$$

$$L^1 = u_1 - u_2 = \frac{f\left(u - \frac{L}{2}\right)}{\left(u - \frac{L}{2} - f\right)} - \frac{f\left(u + \frac{L}{2}\right)}{\left(u + \frac{L}{2} - f\right)}$$

$$= f - \frac{Lf}{(u-f)^2 - \frac{L^2}{4}} = L\left(\frac{f}{u-f}\right)^2$$

3. Ans: B)

$$I \propto \frac{1}{\lambda 4}$$

$$\frac{\lambda_1}{\lambda_2} = \left(\frac{I_2}{I_1}\right)^{\frac{1}{4}} = \left(\frac{4}{1}\right)^{\frac{1}{4}} = \sqrt{2} : 1$$

4. Ans: C)

$$d_2 = f_2 + 2f_1$$
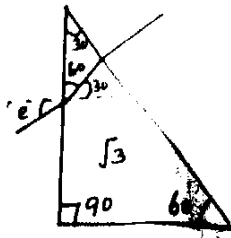
5. Ans: D)

$$\sqrt{3}\sin 30° = 1\sin e$$

$$\frac{\sqrt{3}}{2} = \sin e$$

$$e = 60°$$

6. Ans: C)

$$u \to f \quad v \to \infty \qquad u \to \infty \quad v \to f$$

7. Ans: D)

If mirror is placed in medium other than air its focal length does not change as $f = R/2$ But for lens

$$\frac{1}{f_a} = \left({}_a\mu_g - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{f_w} = \left({}_w\mu_g - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$${}_w\mu_g <_a \mu_g$$

Hence focal length of lens in water increases more. More over refractive index of water 4/3 and for air 1, so both assertion and reason wrong.

8. Ans: D

9. Ans: D)

$$KQ = \frac{KP}{2}$$

$$F = Kx$$

$$u = \frac{1}{2}kx^2$$

$$F_p = k_p x_p$$

$$F_Q = -KQx_p$$

$$\frac{F_P}{F_Q} = \frac{x_P}{x_Q}$$

$$F_P = F_Q$$

$$\frac{U_P}{U_Q} = \frac{K_P \times P^2}{K_Q \times Q^2}$$

$$= \frac{K_P}{K_Q} \times \frac{KQ^2}{KP^2} = \frac{1}{2}$$

$$U_p = \frac{E}{2}$$

10. Ans: D)

   Force constant (K) = young modules × Interatomic distance

   $$7 = 3 \times 10^{10}\, Y$$

   $$Y = \frac{7}{3} \times 10^{10}$$

   $$= 2.33 \times 10^{10}\, N/m^2$$

11. Ans: B)

   $$T = kx$$

   $$x = \frac{T}{K}$$

   Energy stored

   $$= \frac{1}{2}Kx^2$$

   $$= \frac{1}{2}K\left(\frac{T}{K}\right)^2$$

   $$= \frac{1}{2}\frac{T^2}{K}$$

   $$= \frac{T^2}{2K}$$

12. Ans: A)

Both assertion and reason are correct Reason is correct explanation for assertion

13. Ans: D)

$$l = F\,{}^{l}\!/\!_{Ay} \qquad l \propto \frac{1}{r^2}$$

For same load thickest wire will show less elongation. So d is correct

14. Ans: D)

$$\text{Compressibility} \;=\; \frac{1}{Bulk\; mod\,ulus} = \frac{-\Delta V / V}{\Delta P}$$

$$50 \times 10^{-11} m^2 N^{-1} = \frac{\Delta V}{10^{-3} \times 9 \times 10^5}$$

$$\Delta V = -50 \times 10^{-11} \times 10^{-3} \times 9 \times 10^5 = -4.5 \times 10^{-7} m^3$$

$$= \text{-0.45 cm}^3$$

15. Ans: B)

Surface area of the drop be fore merging = $4\pi r^2$

Total area of both drop = $8\pi r^2$

$$\text{Volume of big gest drop} \;= 2 \times \frac{4}{3}\pi r^3$$

$$\frac{4}{3}\pi R^3 = \frac{8}{3}\pi r^3$$

$$R = 2^{1/2} r$$

Surface energy $8\pi r^2 S - 4 \times 2^{2/3} \pi r^2 S$

$$= 1.65\pi r^2 S$$

DIRECTORATE OF SCHOOL EDUCATION TAMILNADU

11NPCB11 (2023-24)	NEET PRACTICE QUESTIONS (TEST-11)	Class : XII Time : 1.15 hrs Total Marks : 240

Answer key

11TH - Physics

1. Ans: D)

$$KQ = \frac{KP}{2}$$

$$F = Kx$$

$$u = \frac{1}{2}kx^2$$

$$F_p = k_p x_p$$

$$F_Q = -KQ x_p$$

$$\frac{F_P}{F_Q} = \frac{x_P}{x_Q}$$

$$F_P = F_Q$$

$$\frac{U_P}{U_Q} = \frac{K_P \times P^2}{K_Q \times Q^2}$$

$$= \frac{K_P}{K_Q} \times \frac{KQ^2}{KP^2} = \frac{1}{2}$$

$$U_p = \frac{E}{2}$$

2. Ans: D)

Force constant (K) = young modules × Interatomic distance

$$7 = 3 \times 10^{10} \, Y$$

$$Y = \frac{7}{3} \times 10^{10}$$

$$= 2.33 \times 10^{10} \, N/m^2$$

3. Ans: B)

$T = kx$

$x = \dfrac{T}{K}$

Energy stored

$$= \frac{1}{2}Kx^2$$

$$= \frac{1}{2}K\left(\frac{T}{K}\right)^2$$

$$= \frac{1}{2}\frac{T^2}{K}$$

$$= \frac{T^2}{2K}$$

4. Ans: A)

   Both assertion and reason are correct Reason is correct explanation for assertion

5. Ans: D)

   $$l = F\bigg/{Ay} \qquad l \propto \frac{1}{r^2}$$

   For same load thickest wire will show less elongation. So d is correct

6. Ans: D)

   Compressibility $= \dfrac{1}{Bulk\,modulus} = \dfrac{-\Delta V/V}{\Delta P}$

   $$50\times10^{-11}m^2N^{-1} = \frac{\Delta V}{10^{-3}\times9\times10^5}$$

   $$\Delta V = -50\times10^{-11}\times10^{-3}\times9\times10^5 = -4.5\times10^{-7}m^3$$

   $$= -0.45\ \text{cm}^3$$

7. Ans: B)

   Surface area of the drop be fore merging $= 4\pi r^2$

   Total area of both drop $= 8\pi r^2$

   Volume of big gest drop $= 2\times\dfrac{4}{3}\pi r^3$

   $$\frac{4}{3}\pi R^3 = \frac{8}{3}\pi r^3$$

   $$R = 2^{1/2}r$$

Surface energy $8\pi r^2 S - 4 \times 2^{2/3} \pi r^2 S$

$$= 1.65 \pi r^2 S$$

8. Ans: C)

   m = 1 kg

   V = 3.6 × 10⁻⁴ m³

   T = mg = mg – VP$_w$g

   Decrease in tension

   T – T¹

   = mg – [mg-vP$_w$g]

   = v P$_w$g

   = 3.6 × 10⁻⁴ × 10³ × 10

   = 3.6 N

9. Ans: D)

   According to continuity equation $A_1 V_1 = A_2 V_2 = $ Const

   So the rate of flow of liquid is same

10. Ans: A)

   It is based on Torricelli theorem Torricelli, law states that the speed v of a liquid flowing under gravity out of an opining is propofional to square rnt of a vertical distance $v = \sqrt{2g\Delta y}$

   Let t_1 be the time taken by level to $h/2$ and t_2 be from $h/2$ to zero

   $$t_1 \propto \left(\sqrt{h} - \sqrt{h/2} \right) \qquad\qquad t \propto \sqrt{h/2}$$

   $$\dfrac{\dfrac{\sqrt{2}-1}{\sqrt{2}}}{\dfrac{1}{\sqrt{2}}} = \dfrac{\sqrt{2}-1}{\sqrt{2}} \times \sqrt{2}$$

   $$\dfrac{1 - \dfrac{1}{\sqrt{2}}}{1/\sqrt{2}} = \sqrt{2} - 1 : 1$$

11. Ans: B)

   Tensile stress in wire will be – Tensile force / Area of cross section

$$= \frac{mg}{\pi R^2} = \frac{4 \times 3.14}{\cancel{\pi} \times 4 \times 10^6} = 3.1 \times 10^6 \, Nm^{-2}$$

12. Ans: C)

$$2TL = mg \quad T = \frac{mg}{2L} = \frac{1.5 \times 10^{-2}}{2 \times 30 \times 10^{-2}} = \frac{1.5}{600} = 0.025 \, N/m$$

13. Ans: B)

$$h \propto \frac{1}{r}$$

$$\therefore \text{ Reduces to half}$$

14. Ans: A)

$$\Delta P_1 = 0.01 = \frac{4T}{R_1}$$

$$\Delta P_2 = 0.02 = \frac{4T}{R_2}$$

$$\frac{0.01}{0.02} = \frac{4T}{R_1} \times \frac{R_2}{4T}$$

$$\frac{1}{2} = \frac{R_2}{R_1} \quad R_1 = 2R_2$$

$$v_1/v_2 = R_1^3/R_2^3 = \frac{8R_2^3}{R_2^3} = \frac{8R_2^3}{R_2^3} = 8 : 1$$

15. Ans: C)

$$v = \frac{1}{2} \times \text{Force} \times \text{elongation}$$

$$= \frac{1}{2} Mg \times l$$

$$= \frac{1}{2} Mgl$$

12JPCM11 (2023-24)	JEE PRACTICE QUESTIONS (TEST-11)	Class : XII Time : 1.15 hrs Total Marks : 180

Answer key

12TH - Physics

1. **Ans: B)**

$$\tfrac{1}{f}(\mu-1)\left[\frac{1}{R_1}-\frac{1}{R_2}\right]=\frac{1}{0.3}=(1.5-1)\left(\frac{1}{\alpha}-\frac{1}{R}\right)$$

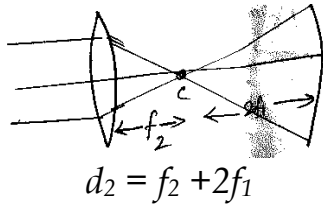$$\frac{1}{0.3}=0.5\times\frac{1}{R}$$

R = 0. 15m

2. **Ans: D)**

Mirror formula $m=\dfrac{fu}{u-f}$

$$u_1=u-\tfrac{L}{2} \qquad u_2=u+\tfrac{L}{2}$$

$$L^1=u_1-u_2=\frac{f\left(u-\tfrac{L}{2}\right)}{\left(u-\tfrac{L}{2}-f\right)}-\frac{f\left(u+\tfrac{L}{2}\right)}{\left(u+\tfrac{L}{2}-f\right)}$$

$$=f-\frac{Lf}{(u-f)^2-\tfrac{L^2}{4}}=L\left(\frac{f}{u-f}\right)^2$$

3. **Ans: B)**

$$I\propto\frac{1}{\lambda^4}$$

$$\frac{\lambda_1}{\lambda_2}=\left(\frac{I_2}{I_1}\right)^{\tfrac{1}{4}}=\left(\frac{4}{1}\right)^{\tfrac{1}{4}}=\sqrt{2}:1$$
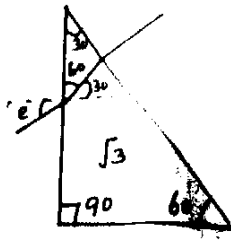
4. **Ans: C)**

$$d_2 = f_2 + 2f_1$$

5. **Ans: D)**

$$\sqrt{3}\sin 30° = 1\sin e$$

$$\frac{\sqrt{3}}{2} = \sin e$$

$$e = 60°$$

6. **Ans: C)**

$$u \to f \quad v \to \infty \qquad u \to \infty \quad v \to f$$

7. **Ans: D)**

If mirror is placed in medium other than air its focal length does not change as $f = R/2$ But for lens

$$\frac{1}{f_a} = \left(_a\mu_g - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{f_w} = \left(_w\mu_g - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$_w\mu_g <_a \mu_g$$

Hence focal length of lens in water increases more. More over refractive index of water 4/3 and for air 1, so both assertion and reason wrong.

8. **Ans: D**

9. **Ans: D)**

$$KQ = \frac{KP}{2}$$

$$F = Kx$$

$$u = \frac{1}{2}kx^2$$

$$F_p = k_p x_p$$

$$F_Q = -KQx_p$$

$$\frac{F_P}{F_Q} = \frac{x_P}{x_Q}$$

$$F_P = F_Q$$

$$\frac{U_P}{U_Q} = \frac{K_P \times P^2}{K_Q \times Q^2}$$

$$= \frac{K_P}{K_Q} \times \frac{KQ^2}{KP^2} = \frac{1}{2}$$

$$U_p = \frac{E}{2}$$

10. Ans: D)

Force constant (K) = young modules × Interatomic distance

$$7 = 3 \times 10^{10}\ Y$$

$$Y = \frac{7}{3} \times 10^{10}$$

$$= 2.33 \times 10^{10}\ \text{N/m}^2$$

11. Ans: B)

$$T = kx$$

$$x = \frac{T}{K}$$

Energy stored

$$= \frac{1}{2}Kx^2$$

$$= \frac{1}{2}K\left(\frac{T}{K}\right)^2$$

$$= \frac{1}{2}\frac{T^2}{K}$$

$$= \frac{T^2}{2K}$$

12. Ans: A)

Both assertion and reason are correct Reason is correct explanation for assertion

13. Ans: D)

$$l = F \frac{l}{Ay} \qquad l \propto \frac{1}{r^2}$$

For same load thickest wire will show less elongation. So d is correct

14. Ans: D)

$$\text{Compressibility} = \frac{1}{Bulk\ mod\,ulus} = \frac{-\Delta V / V}{\Delta P}$$

$$50 \times 10^{-11} m^2 N^{-1} = \frac{\Delta V}{10^{-3} \times 9 \times 10^5}$$

$$\Delta V = -50 \times 10^{-11} \times 10^{-3} \times 9 \times 10^5 = -4.5 \times 10^{-7} m^3$$

$$= \text{-0.45 cm}^3$$

15. Ans: B)

Surface area of the drop be fore merging = $4\pi r^2$

Total area of both drop = $8\pi r^2$

$$\text{Volume of big gest drop} = 2 \times \frac{4}{3}\pi r^3$$

$$\frac{4}{3}\pi R^3 = \frac{8}{3}\pi r^3$$

$$R = 2^{1/2} r$$

Surface energy $8\pi r^2 S - 4 \times 2^{2/3} \pi r^2 S$

$$= 1.65\pi r^2 S$$

11JPCM11 (2023-24)	JEE PRACTICE QUESTIONS (TEST-11)	Class : XI Time : 1.15 hrs Total Marks : 180

Answer key

11ᵀᴴ - Physics

1. Ans: D)

$$KQ = \frac{KP}{2}$$

$$F = Kx$$

$$u = \frac{1}{2}kx^2$$

$$F_p = k_p x_p$$

$$F_Q = -KQx_p$$

$$\frac{F_P}{F_Q} = \frac{x_P}{x_Q}$$

$$F_P = F_Q$$

$$\frac{U_P}{U_Q} = \frac{K_P \times P^2}{K_Q \times Q^2}$$

$$= \frac{K_P}{K_Q} \times \frac{KQ^2}{KP^2} = \frac{1}{2}$$

$$U_p = \frac{E}{2}$$

2. Ans: D)

Force constant (K) = young modules × Interatomic distance

$$7 = 3 \times 10^{10} \, Y$$

$$Y = \frac{7}{3} \times 10^{10}$$

$$= 2.33 \times 10^{10} \, N/m^2$$

3. Ans: B)

$T = kx$

$x = \dfrac{T}{K}$

Energy stored

$\quad = \dfrac{1}{2}Kx^2$

$\quad = \dfrac{1}{2}K\left(\dfrac{T}{K}\right)^2$

$\quad = \dfrac{1}{2}\dfrac{T^2}{K}$

$\quad = \dfrac{T^2}{2K}$

4. Ans: A)

   Both assertion and reason are correct Reason is correct explanation for assertion

5. Ans: D)

   $$l = F\,{}^{l}\!/\!_{Ay} \qquad l \propto \dfrac{1}{r^2}$$

   For same load thickest wire will show less elongation. So d is correct

6. Ans: D)

   Compressibility $= \dfrac{1}{Bulk\,mod\,ulus} = \dfrac{-\Delta V / V}{\Delta P}$

   $$50 \times 10^{-11} m^2 N^{-1} = \dfrac{\Delta V}{10^{-3} \times 9 \times 10^5}$$

   $$\Delta V = -50 \times 10^{-11} \times 10^{-3} \times 9 \times 10^5 = -4.5 \times 10^{-7} m^3$$

   $$= -0.45 \text{ cm}^3$$

7. Ans: B)

   Surface area of the drop be fore merging $= 4\pi r^2$

   Total area of both drop $= 8\pi r^2$

   Volume of big gest drop $= 2 \times \dfrac{4}{3}\pi r^3$

   $$\dfrac{4}{3}\pi R^3 = \dfrac{8}{3}\pi r^3$$

   $$R = 2^{{1}/{3}} r$$

Surface energy $8\pi r^2 S - 4 \times 2^{2/3} \pi r^2 S$

$$= 1.65 \pi r^2 S$$

8. Ans: C)

    m = 1 kg

    V = 3.6 × 10⁻⁴ m³

    $T = mg = mg - VP_w g$

    Decrease in tension

        $T - T^1$

        $= mg - [mg - vP_w g]$

        $= v P_w g$

        $= 3.6 \times 10^{-4} \times 10^3 \times 10$

        = 3.6 N

9. Ans: D)

According to continuity equation $A_1 V_1 = A_2 V_2 = Const$

So the rate of flow of liquid is same

10. Ans: A)

It is based on Torricelli theorem Torricelli, law states that the speed v of a liquid flowing under gravity out of an opining is propofional to square rnt of a vertical distance $v = \sqrt{2g\Delta y}$

    Let t_1 be the time taken by level to $h/2$ and t_2 be from $h/2$ to zero

$$t_1 \propto \left(\sqrt{h} - \sqrt{h/2} \right) \qquad t \propto \sqrt{h/2}$$

$$\frac{\dfrac{\sqrt{2}-1}{\sqrt{2}}}{\dfrac{1}{\sqrt{2}}} = \frac{\sqrt{2}-1}{\cancel{\sqrt{2}}} \times \cancel{\sqrt{2}}$$

$$\frac{1 - \dfrac{1}{\sqrt{2}}}{1/\sqrt{2}} = \sqrt{2} - 1 : 1$$

11. Ans: B)

Tensile stress in wire will be – Tensile force / Area of cross section

$$= \frac{mg}{\pi R^2} = \frac{4 \times 3.14}{\cancel{\pi} \times 4 \times 10^6} = 3.1 \times 10^6 \, Nm^{-2}$$

12. Ans: C)

$$2TL = mg \quad T = \frac{mg}{2L} = \frac{1.5 \times 10^{-2}}{2 \times 30 \times 10^{-2}} = \frac{1.5}{600} = 0.025 \, N/m$$

13. Ans: B)

$$h \propto \frac{1}{r}$$

$\therefore$ Reduces to half

14. Ans: A)

$$\Delta P_1 = 0.01 = \frac{4T}{R_1}$$

$$\Delta P_2 = 0.02 = \frac{4T}{R_2}$$

$$\frac{0.01}{0.02} = \frac{4T}{R_1} \times \frac{R_2}{4T}$$

$$\frac{1}{2} = \frac{R_2}{R_1} \quad R_1 = 2R_2$$

$$v_1 / v_2 = R_1^3 / R_2^3 = \frac{8R_2^3}{R_2^3} = \frac{8R_2^3}{R_2^3} = 8:1$$

15. Ans: C)

$$v = \frac{1}{2} \times \text{Force} \times \text{elongation}$$

$$= \frac{1}{2} Mg \times l$$

$$= \frac{1}{2} Mgl$$