DIRECTORATE OF SCHOOL EDUCATION
TAMILNADU

12NPCB13 (2023-24)	NEET PRACTICE QUESTIONS (TEST-13)	Class : XII Time : 1.15 hrs Total Marks : 240

Answer key

12TH Physics

1. Ans :C)

   Magnification of Telescope $M = {fo}/{fe}$

   Magnification of eyepiece

   $$M = {fo}/{fe+4} = {L_1}/{L_0}$$

   For the eye piece the distance of the object is $-(fo+fe)$

   $${fe}/{fe-(fo+fe)} = {-1}/{2} \quad {fe}/{fo} = {1}/{2}$$

   $$M = {fo}/{fe} = {L}/{l}$$

2. Ans :C)

   The magnifying power of a telescope is the ratio of angular size of the image to angular size of the object Magnifying power = 20. The angular size of the image is 20 times that of object

   The image formed is 20 times nearer to the object.

3. Ans :A)

   $U = -8\ cm \qquad f = 10\ cm$

   $$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \qquad {1}/{10} = \frac{1}{v} - \left(\frac{1}{-8}\right)$$

   $$v = -40cm$$

   $$m = \frac{-40}{-8} = 5$$

4. Ans :D)

R.P α λ

$$\frac{(R.P)}{RP_2} = \frac{\lambda_1}{\lambda_2} = 5/4$$

5. Ans :C)

For astronomical refracting telescope Angular magnification is more for large focal length

M.P = fo/fe

Resolving power = $d/1.22\lambda$

Resolving power is high for large diameter

6. Ans : D)

Po = 0.5D

Pe = 20D

M = fo/fe

or = Pe/Po

$$= \frac{20}{0.5} = 40$$

7. Ans : C)

The resolving power of an instrument is given by the formal

$$\text{R.P} = 1.22 \times \frac{\lambda D}{d}$$

$$\text{R.P} = \frac{1.22 \times 500 \times 10^{-9}}{5 \times 10^{-3}} \times 400 \times 1000$$

$$= \frac{1.22 \times 10^{-2}}{10^{-3}} \times 4 = 1.22 \times 40$$

= 50 m

8. Ans : B)

$$\text{Resolution} = \frac{1.22\lambda}{d}$$

$$= \frac{1.22 \times 600 \times 10^{-9}}{250 \times 10^{-2}}$$

$= 2.9 \times 10^{-7}$ rad

9. Ans :A)

As per Question $\Delta l_{cu} = \Delta l_{Al}$

(or)

$$t_{cu}\alpha_{cu}\,\Delta lT = l_{Al}\,\alpha_{Al}\,\Delta T$$

$$l_{Al} = \frac{l_{cu}\times\alpha_{cu}\times\Delta T}{\alpha_{Al}\,\Delta T}$$

$$= \frac{88\times1.7\times10^{-3}}{2.2\times10^{-5}} = 68cm$$

10. Ans :A)

Heat required ΔQ = mS ΔT

$$\Delta Q = V\times P\times S\times\Delta T$$

$$\frac{4}{3}\pi r^3 P\ \ S\,\Delta T$$

$$\Delta Q_1 \Big/ \Delta Q_2 = \frac{r_1^3}{r_2^3} = \frac{(1.5r_1)^3}{(r_2)^3} = (1.5)^3$$

10.375 = 27/8

11. Ans :D)

Gravitational potential energy – mgh

Heat absorbed by ice to melt completely

$$\Delta Q = mL$$

$$\therefore = mL = \frac{1}{4}mgh \qquad h = \frac{4L}{g}$$

$$h = \frac{4\times3.4\times10^5}{10} = 13.6\times10^4$$

$= 136 \times 10^3 = 136$ km

12. Ans :B)

Equivalent thermal conductivity of the composite rod in parallel combination will be

From the figure length and breadth are same So area is same

$A_1 = A_2 = A$

$$K = \frac{K_1A + K_2A}{A + A}$$

$$\frac{\cancel{A}(K_1 + K_2)}{2\cancel{A}} = \frac{K_1 + K_2}{2}$$

13. Ans :A)

According to Steffen's law

$E \propto T^4$

$E \propto (727 + 273)^4$

$E \propto (1000)^4$

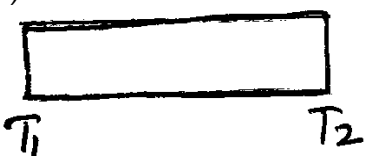
14. Ans : B)

According to weans law

λmT = constant

$\lambda^1 = 2/3\,\lambda m$

15. Ans :C)



$K = \frac{QL}{A\Delta T}$ $\quad R = L/KA$

$\frac{dQ}{dt} = \frac{\Delta T}{R}$

$R = \frac{L}{K}$

$\frac{dQ}{dt} = \frac{KA(T_1 - T_2)}{L}$

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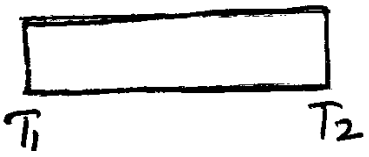

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8. Ans :B)

Linear expansion brass = α_1

Linear expansion of steel = α_2

$$l_1^1 = l_1(1+\alpha_1\ \Delta T)$$

$$l_2^1 = l_2(1+\alpha_2\ \Delta T)$$

$$\left(l_2^1 - l_1^1\right) = \left(l_2 - l_1\right) + (l_2\alpha_2 - l_1 d_1)\ \Delta T$$

$$\left(l_2^1 - l_1^1\right) = \left(l_2 - l_1\right) \text{(for all temp)}$$

$(l_2\alpha_2 - l_1\alpha_1) = 0$

$l_2\alpha_2 = l_1\alpha_1$

9. Ans : C)

r = 10 cm – 0.10 m

T = 1000 K

$\sigma - 5.67\times10^{-8}$ SI units

Heat energy incident / see/ area

$$-\sigma T^4$$

Total energy incident / see

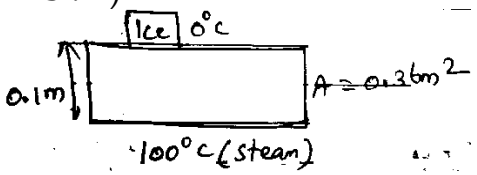
$$= \sigma T^4 \times \text{ Area of sphere}$$

$$E = \sigma T^4 \times 4\pi r^2$$

$$= 5.67\times10^{-8}(10^3)^4 \times 4 \times \frac{22}{7} \times (0.01)^2$$

$$= 7128 \text{ J S}^{-1}$$

10. Ans :A)



$$Q = \frac{KA(T_1T_2)t}{L} = \frac{K\times0.36(100-0)\times3600}{0.1}$$

$$\frac{K\times0.36\times100\times3600}{0.1} \rightarrow (1)$$

$$m_{ice} = \frac{Q}{4f} \rightarrow (2)$$

$$Q = m_{ice}\times Lf = 4.8\times3.36\times^5 J$$

From (1) (2)

$$\frac{K\times 0.36\times 100\times 3600}{0.1}=4.8\times 3.36\times 10^5$$

$$K=\frac{4.8\times 3.36\times 10^5\times 0.1}{0.36\times 100\times 3600}$$

$$= 1.24 \text{ J/ m /s/°C}$$

11. Ans : A)

$$m_w\ S_w\ \Delta_\theta = m_{ice}\ L_{ice}$$

$$m_{ice}=\frac{m_w S_w \Delta_\theta}{Lice}$$

$$\frac{0.2\times 4200\times 25}{3.4\times 10^5}=0.0617kg$$

$$= 61.7\text{g}$$

12. Ans : B)

Both assertion and reason are correct

When rod is heated its length automatically increases and thermal stress developed

For not producing thermal stress we use claiming on both end of the rod and when we heat the rod the claiming help not to increase length of the rod and no thermal stress is developed

$\therefore$ R is correct

But Reason is not correct explanation

13. Ans : B)

According to newton's Law of cooling $\frac{dT}{dt}=K(T-Ts)$

$$\frac{dT_1}{dt}=K(T_1-T_s)$$

$$\frac{dT_2}{dt}=K(T_2-T_s)$$

$$\frac{T_1-T_2}{\Delta t}=C\left[\frac{T_1+T_2}{2}-T_o\right]$$

$$\frac{3T-2T}{10}=C\left[\frac{3T+2T}{2}-T\right]$$

$$\frac{T}{10}=C\left[\frac{3T}{2}\right]$$

$$C = 2/30$$

x be the temperature of the body

$$\frac{2T - x}{10} = \frac{2}{30}\left(\frac{2T + x}{2} - T\right)$$

$$= 2/30\left(x/2\right)$$

$$x = 3T/2$$

14. Ans : A)

Slabs are in series

$R = R_1 + R_2$

$$1/AK_{eff} = 1/AK_{eff} - \frac{1}{AK} + \frac{1}{A2K}$$

$$= 1/K + 1/2K = \frac{3}{2}K$$

Keff = $\frac{2K}{3}$

15. Ans :C)

$$E = \sigma AT^4$$

$$\frac{E_1}{E_2} = \frac{r_1^2 T_1^4}{r_2^2 \times T_2^4}$$

$$= \frac{(0.12)^2 \times 500^4}{(0.06)^2 \times (1000)^4}$$

$$= 1800W$$

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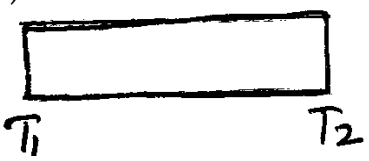

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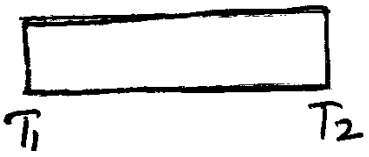

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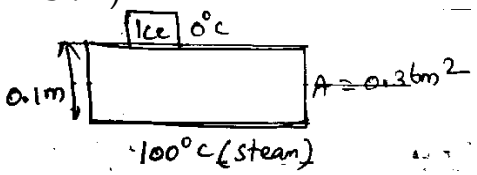

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