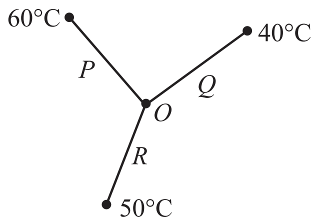
NEET UG (2024)
Physics
Quiz-20

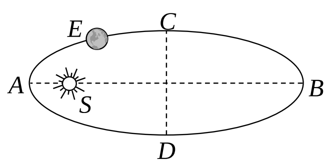
SECTION-A

1. Three identical conductors, P, Q and R are symmetrically fixed at point O as shown in figure. The temperature of junction O is



(1) 60°C (2) 40°C
(3) 50°C (4) 45°C

2. The earth E moves in an elliptical orbit with the sun S at one of the foci as shown in figure. Its speed of motion will be maximum at the point



(1) C (2) A
(3) B (4) D

3. A body cools in 4 minute from 60°C to 50°C. The temperature of the body after the next 4 minute is (The temperature of the surroundings is 10°C)

(1) Greater than 40°C but less than 50°C
(2) 40°C
(3) Less than 40°C
(4) Less than 40°C but greater than 35°C

4. A faulty thermometer reads melting point of water as 10° and boiling point as 190°. How much will the faulty thermometer read when the actual temperature is 60°C?

(1) 108° (2) 118°
(3) 128° (4) 138°

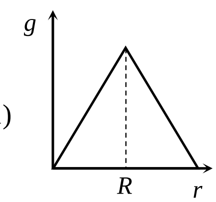
5. The thermal coefficient of linear expansion of an anisotropic solid metal along x, y, z directions are $\alpha_x = 2 \times 10^{-5}$ per °C $\alpha_y = 3 \times 10^{-5}$ per °C and $\alpha_z = 4 \times 10^{-5}$ per °C respectively. Its thermal coefficient of volume expansion γ should be

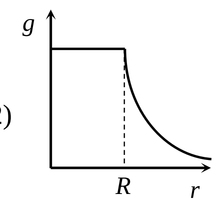
(1) 6×10^{-5} per °C
(2) 7×10^{-5} per °C
(3) 8×10^{-5} per °C
(4) 9×10^{-5} per °C

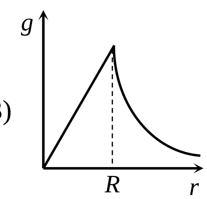
6. A body of mass m rises to height $h = R/5$ from the earth's surface, where R is earth's radius. If g is acceleration due to gravity at earth's surface, the increase in potential energy is

(1) mgh
(2) $\frac{4}{5}mgh$
(3) $\frac{5}{6}mgh$
(4) $\frac{6}{7}mgh$

7. Assuming the earth to have a constant density, point out which of the following curves show the variation of acceleration due to gravity from the centre of earth to the points far away from the surface of earth

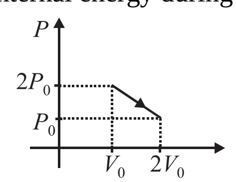
(1) 

(2) 

(3) 

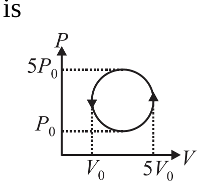
(4) None of these

8. A monatomic gas contained in vessel is subjected to a thermodynamic process such that its pressure changes with volume as shown in graph, then change in internal energy during process will be



(1) Zero (2) $3P_0V_0$
(3) $\frac{3}{2}P_0V_0$ (4) $5P_0V_0$

9. The work done during the cyclic process shown in the diagram is



(1) $4\pi P_0V_0$ (2) $-4\pi P_0V_0$
(3) $-\pi P_0V_0$ (4) πP_0V_0

10. An ideal gas has initial volume V and pressure P. To triple its volume the minimum work done will be in

(1) Isothermal process

(2) Adiabatic process

(3) Isobaric process

(4) Equal in all process

11. Which of the following is incorrect?

(1) If two systems A and B are in thermal equilibrium with system C separately, then A and B will be in thermal equilibrium.

(2) Zeroth law of thermodynamics defines temperature.

(3) Temperature does not determine the direction of flow of heat when two bodies are placed in thermal contact.

(4) Internal energy of an ideal gas depends on the state of the system.

12. An aluminum rod (Young's modulus $= 7\times10^9$ N/m^2) has a breaking strain of 0.2%. The minimum cross-sectional area of the rod in order to support a load of 10^4 Newton's is

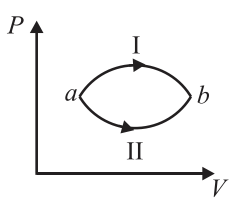
(1) $1\times10^{-2}\,\text{m}^2$

(2) $1.4\times10^{-3}\,\text{m}^2$

(3) $3.5\times10^{-3}\,\text{m}^2$

(4) $7.1\times10^{-4}\,\text{m}^2$

13. An ideal gas goes from state a to state b through two process I and II as shown.



The heat absorbed and work done in process I are 100 J and 80 J respectively. If work done in process II is 60 J, then heat absorbed in process Il will be

(1) 90 J (2) 85 J

(3) 80 J (4) 75 J

14. The internal energy of the gas remains constant during

(1) Adiabatic expansion

(2) Adiabatic compression

(3) Isobaric expansion

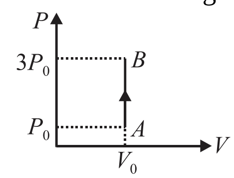
(4) Isothermal compression

15. A monatomic gas (ideal) is supplied 80 joule heat at constant pressure. The internal energy of gas, increases by

(1) 58 J (2) 48 J

(3) 44 J (4) 32 J

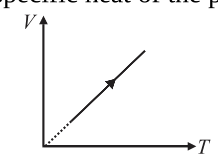
16. Work done by thermodynamic system during process AB as shown in the figure, is



(1) P_0V_0 (2) $2P_0V_0$

(3) $3P_0V_0$ (4) Zero

17. A monatomic ideal gas undergoes a thermodynamic process as shown in the figure. The molar specific heat of the process is



(1) $\frac{3}{2}R$ (2) $\frac{5}{2}R$

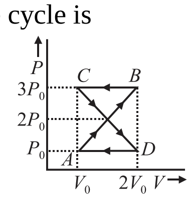
(3) $\frac{7}{5}R$ (4) $2R$

18. A monoatomic gas at a pressure P, having a volume V expands isothermally to a volume $2V$ and then adiabatically to a volume 16 V. the final pressure of the gas is: (take $\gamma = 5/3$)

(1) $64P$ (2) 32P

(3) P/64 (4) 16P

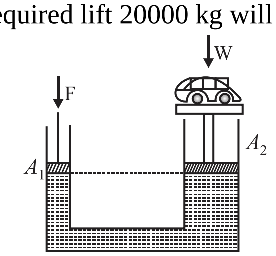
19. A thermodynamic system undergoes cyclic process $ABCDA$ as shown in figure. The work done by the system in the cycle is



(1) P_0V_0 (2) $2P_0V_0$

(3) $P_0V_0/2$ (4) Zero

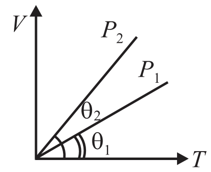
20. In hydraulic lift area of two cross-section are A_1 = 1 cm^2 and A_2 = 1000 cm^2 respectively, then force required lift 20000 kg will be :



(1) 1 N (2) 2 N

(3) 4 N (4) 200 N

21. In the given (V–T) diagram, what is the relation between pressures P_1 and P_2?



(1) $P_2 > P_1$
(2) $P_2 < P_1$
(3) Cannot be predicted
(4) $P_2 = P_1$

22. 2 moles of a gas having $\gamma = \frac{7}{5}$ is mixed with 1 mole of a gas having $\gamma = \frac{5}{3}$. The γ for the mixture will be

(1) $\frac{5}{11}$ (2) $\frac{19}{13}$
(3) $\frac{13}{19}$ (4) $\frac{15}{11}$

23. The average kinetic energy of a gas molecule at 27°C is 6.2×10^{-21} J. Its average kinetic energy at 227°C will be

(1) 58.6×10^{-21} J (2) 8.32×10^{-21} J
(3) 10.33×10^{-21} J (4) 13.72×10^{-21} J

24. The volume of a certain mass of gas at constant pressure is doubled to its value at 0°C. The temperature of the gas will be

(1) 173°C (2) 273 K
(3) 273°C (4) 173 K

25. The rms speed of a molecule of oxygen at 127°C is half that of a molecule of hydrogen at

(1) 100 K (2) 273 K
(3) 173 K (4) 100°C

26. Five molecules of a gas have speeds 1, 2, 3, 4 and 5 km/s. The ratio of rms speed to the average speed of the gas molecule will be

(1) 10 : 3 (2) $\sqrt{11} : 3$
(3) 3 : 10 (4) $\sqrt{3} : \sqrt{10}$

27. The RMS speed of hydrogen gas molecules at 27°C is v. The RMS speed of oxygen gas molecules at 927°C will be

(1) $\frac{v}{\sqrt{2}}$ (2) $2v$
(3) $\frac{v}{2}$ (4) $\frac{v}{4}$

28. The RMS speed of an ideal gas is v. If the pressure of the gas molecules is quadrupled while keeping the temperature constant, then the new RMS speed will be

(1) $2v$ (2) v
(3) $\frac{V}{2}$ (4) $\frac{v}{4}$

29. The rotational kinetic energy of two moles of monatomic gas at 27°C is equal to

(1) 400 R (2) 1200 R
(3) 300 R (4) Zero

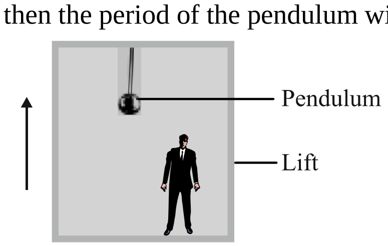
30. Two particles are executing S.H.M. The equation of their motion are $y_1 = 10\sin\left(\omega t + \frac{\pi T}{4}\right)$, $y_2 = 25\sin\left(\omega t + \frac{\sqrt{3}\pi T}{4}\right)$. What is the ratio of their amplitude

(1) 1 : 1
(2) 2: 5
(3) 1 : 2
(4) None of these

31. The mass and diameter of a planet are twice those of earth. The period of oscillation of pendulum on this planet will be (If it is a second's pendulum on earth)

(1) $\frac{1}{\sqrt{2}}$ sec (2) $2\sqrt{2}$ sec
(3) 2 sec (4) $\frac{1}{2}$ sec

32. A man measures the period of a simple pendulum inside a stationary lift and finds it to be T sec. If the lift accelerates upwards with an acceleration $g/4$, then the period of the pendulum will be



(1) T
(2) $\frac{T}{4}$
(3) $\frac{2T}{\sqrt{5}}$
(4) $2T\sqrt{5}$

33. An elastic material of Young's modulus Y is subjected to a stress S. The elastic energy stored per unit volume of the material is

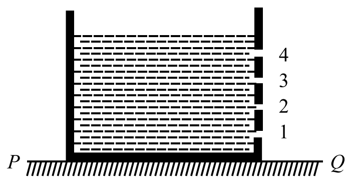
(1) $\frac{2Y}{S^2}$

(2) $\frac{S^2}{2Y}$

(3) $\frac{S}{2Y}$

(4) $\frac{S^2}{Y}$

34. A cylindrical vessel of 90 cm height is kept filled upto the brim. It has four holes 1, 2, 3, 4 which are respectively at heights of 20 cm, 30 cm, 45 cm and 50 cm from the horizontal floor PQ. The water falling at the maximum horizontal distance from the vessel comes from



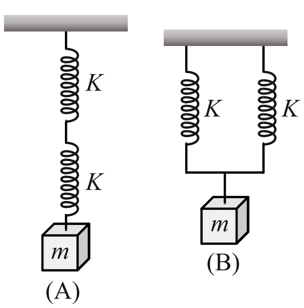
(1) Hole number 4
(2) Hole number 3
(3) Hole number 2
(4) Hole number 1

35. A capillary tube when immersed vertically in liquid records a rise of 3 cm. If the tube is immersed in the liquid at an angle of 60° with the vertical. The length of the liquid column along the tube is

(1) 9 cm (2) 6 cm
(3) 3 cm (4) 2 cm

SECTION-B

36. Two identical spring of constant K are connected in series and parallel as shown in figure. *A* mass m is suspended from them. The ratio of their frequencies of vertical oscillations will be



(1) 2 : 1 (2) 1 : 1
(3) 1 : 2 (4) 4 : 1

37. **Assertion:** It is better to wash the clothes in cold soap solution.

Reason: The surface tension of cold solution is more than the surface tension of hot solution.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

38. **Assertion:** When height of a tube is less than liquid rise in the capillary tube, the liquid does not overflow.

Reason: Product of radius of meniscus and height of liquid in capillary tube always remains constant.

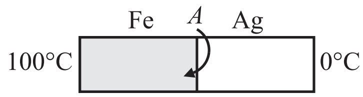
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

39. **Assertion:** The impurities always decrease the surface tension of a liquid.

Reason: The change in surface tension of the liquid depends upon the degree of contamination of the impurity.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

40. Two cylinders of same diameter and length one of iron and other of silver are placed in close contact as shown. If thermal conductivity of silver is 11 times than that of iron, then temperature of interface A is approximately



(1) 91.7°C (2) 80°C
(3) 8.3°C (4) 50°C

41. The apparent volume expansion coefficient of a liquid in steel vessel is A and that in aluminium vessel is B. If the thermal coefficient of linear expansion of aluminium is C, then that of steel will be

(1) $\frac{A-B+3C}{3}$ (2) $\frac{B-A+3C}{3}$
(3) $\frac{A-B-3C}{3}$ (4) $\frac{B-A-3C}{3}$

42. There are two bodies of masses 100 kg and 10000 kg separated by a distance 1 m. At what distance from the smaller body, the intensity of gravitational field will be zero

(1) $\frac{1}{9}$m (2) $\frac{1}{10}$m
(3) $\frac{1}{11}$m (4) $\frac{10}{11}$m

43. The escape velocity of an object from the earth depends upon the mass of the earth (M), its mean density (ρ), its radius (R) and the gravitational constant (G). Thus the formula for escape velocity is

(1) $v = R\sqrt{\frac{8\pi}{3}G\rho}$

(2) $v = M\sqrt{\frac{8\pi}{3}GR}$

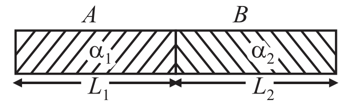
(3) $v = \sqrt{2GMR}$

(4) $v = \sqrt{\frac{2GM}{R^2}}$

44. The escape velocity of a planet having mass 6 times and radius 2 times as that of earth is

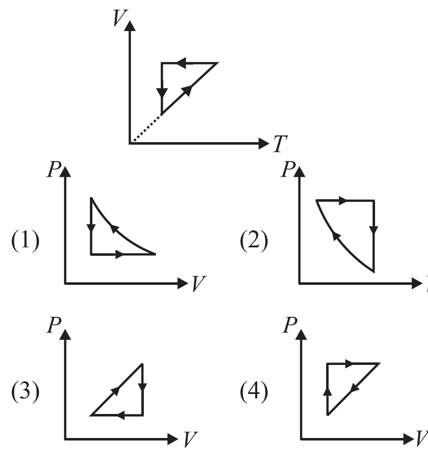
(1) $\sqrt{3}V_e$
(2) $3V_e$
(3) $\sqrt{2}V_e$
(4) $2V_e$

45. Shown below is a composite rod of metal A and B. Their thermal coefficients of linear expansion are α_1 and α_2. Their lengths are L_1 and L_2 respectively. If on heating the length of the entire composite rod does not change, then which of the following relations is true?



(1) $\alpha_1 = \alpha_2$
(2) $\alpha_1 L_1 = \alpha_2 L_2$
(3) $\alpha_1 L_1 + \alpha_2 L_2 = 0$
(4) $(\alpha_1 L_1)^2 + (\alpha_2 L_2)^2 = 0$

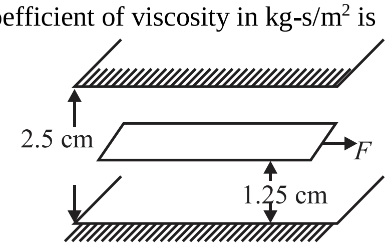
46. If a thermodynamic cyclic process is as shown on volume-temperature (V-T) diagram, then on pressure - volume (P-V) diagram it will be shown as



47. The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_p and C_v respectively. If $\gamma = \frac{C_p}{C_v}$ and R is the universal gas constant, then C_v is equal to

(1) $\frac{R}{(\gamma-1)}$ (2) $\frac{(\gamma-1)}{R}$
(3) γR (4) $\frac{1+\gamma}{1-\gamma}$

48. A space 2.5 cm wide between two large plane surface is filled with oil. Force required to drag a very thin plate of area 0.5 m^2. Just midway the surface at a speed of 0.5 m/sec is 1 N. The coefficient of viscosity in kg-s/m^2 is



(1) 5×10^{-2} (2) 2.5×10^{-2}
(3) 1×10^{-2} (4) 7.5×10^{-2}

49. Match the **List-I** with **List-II**.

	List-I		**List-II**
(I)	Young's modulus of a substance	**(A)**	Depends on temperature
(II)	Bulk modulus of a substance	**(B)**	Depends on length
(III)	Modulus of rigidity of substance	**(C)**	Depends on area of cross section
(IV)	Volume of a substance for a given mass	**(D)**	Depends on the nature of material

(1) (I)-(B, D), (II)-(A, D), (III)-(A, D), (IV)-(A, B, C)

(2) (I)-(A, D), (II)-(A, D), (III)-(A, D), (IV)-(A, D)

(3) (A)-(A, B, C), (II)-(A, D), (III)-(A, D), (IV)-(A, B, C)

(4) (I)-(A, B, C), (II)-(A, D), (III)-(A, D), (IV)-(A, D)

50. A ball of density σ and radius r is dropped on the surface of a liquid of density ρ from certain height. If speed of ball does not change even on entering in liquid and viscosity of liquid is η, then the height from which ball dropped is-

(1) $2g\left[\frac{(\sigma-\rho)r}{9\eta}\right]^2$

(2) $\frac{2g(\sigma-\rho)^2r^2}{9\eta}$

(3) $\frac{2(\sigma-\rho)gr^2}{9\eta}$

(4) $2g\left[\frac{(\sigma-\rho)r^2}{9\eta}\right]^2$

Solution

1. **(3)**

$$\frac{KA(60° - \theta)}{L} = \frac{KA(\theta - 40°)}{L} = \frac{KA(\theta - 50°)}{L}$$

$\Rightarrow \theta = 50°c$

(NEW NCERT 11th Page No. 192)

2. **(2)**

Speed of the earth will be maximum when its distance from the sun is minimum because mvr = constant. **(NEW NCERT 11th Page No. 185)**

3. **(1)**

(NEW NCERT 11th Page No. 298)

4. **(2)**

$$\frac{x-10}{190°-10} = \frac{60-0}{100-0} \Rightarrow x = 118°C$$

(NEW NCERT 11th Page No. 280)

5. **(4)**

$\gamma = \alpha_x + \alpha_y + \alpha_z$

(NEW NCERT 11th Page No. 282)

6. **(3)**

$$\Delta U = \frac{mgh}{1 + h/R}$$

Substituting $R = 5h$ we get $\Delta U = \frac{mgh}{1+1/5} = \frac{5}{6}mgh$

(NEW NCERT 11th Page No. 193)

7. **(3)**

$g \propto r$ (if $r < R$) and $g \propto \frac{1}{r^2}$ (if r > R)

(NEW NCERT 11th Page No. 192)

8. **(1)**

$T_1 = T_2$, Hence $\Delta T = 0 \Rightarrow \Delta U = 0$

(NEW NCERT 11th Page No. 304)

9. **(2)**

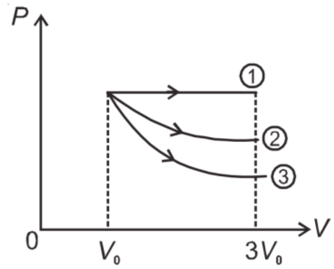
Work done = area under $P - V$ curve

$W = \pi(-2P_0)(2V_0) = -4\pi P_0 V_0$

(NEW NCERT 11th Page No. 312)

10. **(2)**

Slope of adiabatic curve is steepest.



(NEW NCERT 11th Page No. 305)

11. **(3)**

Temperature determines the direction of flow of heat when two bodies are placed in thermal contact.

(NEW NCERT 11th Page No. 306)

12. **(4)**

$$= \frac{10^4}{7 \times 10^9 \times 0.002}$$

$$= \frac{1}{14} \times 10^{-2} = 7.1 \times 10^{-4}\, m^2$$

(NEW NCERT 11th Page No. 307)

13. **(3)**

$100 - 80 = Q - 60$

$\therefore\ Q = 80$ J **(NEW NCERT 11th Page No. 308)**

14. **(4)**

(NEW NCERT 11th Page No. 313)

15. **(2)**

$$\frac{\Delta U}{W} = \frac{1}{\gamma} = \frac{3}{5}$$

$$\Delta U = \frac{3}{5} \times 80 = 48 \text{ J}$$

(NEW NCERT 11th Page No. 310)

16. **(4)**

Work done in isochoric process is zero.

(NEW NCERT 11th Page No. 311)

17. **(2)**

Process is isobaric

$C = C_P = C_V + R$

$= \frac{3}{2}R + R$

$C_P = \frac{5}{2}R$ **(NEW NCERT 11th Page No. 327)**

18. (3)

In isothermal process

$$P_1V_1 = P_2V_2$$

$$PV = P_2(2V)$$

$$P_2 = \frac{P}{2} \quad \ldots (1)$$

In adiabatic process

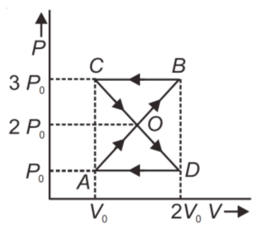
$$P_2V_2^{\gamma} = P_3V_3^{\gamma}$$

$$\left(\frac{P}{2}\right)(2V)^{\gamma} = P_3(16V)^{\gamma}$$

$$P_3 = \frac{P}{2}\left(\frac{2V}{16V}\right)^{\gamma} = \frac{P}{2}\left(\frac{1}{8}\right)^{5/3} = \frac{P}{64}$$

(NEW NCERT 11th Page No. 328)

19. (4)



W = area enclosed by $AODA$ + by area enclosed OBCO

$$= \left[\frac{1}{2} \times (2V_0 - V_0) \times P_0\right] + \left[-\frac{1}{2}(2V_0 - V_0)P_0\right]$$

$$= 0 \left\{ \begin{array}{l} AODA \text{ is a clockwise} \\ \text{while } DBCO \text{ is anticlockwise} \end{array} \right.$$

(NEW NCERT 11th Page No. 309)

20. (4)

(NEW NCERT 11th Page No. 257)

21. (2)

$$\because PV = RT$$

$$\frac{V}{T} = \frac{R}{P} = \tan\theta \qquad \left\{ \begin{array}{c} \because \text{ Slope of } V - T \text{ graph} \\ m = \tan\theta = \dfrac{V}{T} \end{array} \right\}$$

i.e., $P = \dfrac{1}{\tan\theta}$

$\theta_2 > \theta_1$ so $\tan\theta_2 > \tan\theta_1 \Rightarrow P_2 < P_1$, then $P_2 < P_1$

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22. (2)

For $\gamma = \dfrac{7}{5}$

$$C_V = \frac{R}{\gamma - 1} = \frac{R}{\frac{7}{5} - 1} = \frac{5R}{2}$$

$$C_P = \frac{\gamma R}{\gamma - 1} = \frac{5R}{2} \times \frac{7}{5} = \frac{7R}{2}$$

For $\gamma = \dfrac{5}{3}$

$$C_V = \frac{R}{\frac{5}{3} - 1} = \frac{3R}{2}$$

$$C_P = \frac{3R}{2} \times \frac{5}{3} = \frac{5R}{2}$$

$$\gamma_{\text{min}} = \frac{2 \times \frac{7R}{2} + 1 \times \frac{5R}{2}}{2 \times \frac{5R}{2} + 1 \times \frac{3R}{2}} = \frac{7 + \frac{5}{2}}{5 + \frac{3}{2}}$$

$$= \frac{19}{2} \times \frac{2}{13} = \frac{19}{13}$$

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23. (3)

$$\frac{E_2}{E_1} = \frac{T_2}{T_1} = \frac{5}{3}$$

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24. (3)

$$\frac{V_2}{V_1} = \frac{T_2}{T_1} \Rightarrow \frac{T_2}{273} = 2 \Rightarrow T_2 = 546 \text{ K}$$

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25. (1)

$$v_{O_2} = \sqrt{\frac{3R \times 400}{32}} = \frac{1}{2}\sqrt{\frac{3R \times T}{2}}$$

$$\Rightarrow \frac{T}{2} = 4 \times \frac{400}{32}$$

$$\Rightarrow T = 100 \text{ K}$$

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26. (2)

$$v_{\text{rms}} = \sqrt{\frac{1^2 + 2^2 + 3^2 + 4^2 + 5^2}{5}} = \sqrt{11} \text{ km/s}$$

$$v_{\text{mean}} = \frac{1 + 2 + 3 + 4 + 5}{5} = 3 \text{ km/s}$$

(NEW NCERT 11th Page No. 336)

27. **(3)**

$$v=\sqrt{\frac{3R\times 300}{2}}$$

$$x=\sqrt{\frac{3R\times 1200}{32}}\ \therefore x=\frac{v}{2}$$

(NEW NCERT 11th Page No. 337)

28. **(2)**

RMS speed is independent of pressure change.

(NEW NCERT 11th Page No. 333)

29. **(4)**

(NEW NCERT 11th Page No. 330)

30. **(2)**

$$\frac{a_1}{a_2}=\frac{10}{25}=\frac{2}{5}$$ **(NEW NCERT 11th Page No. 344)**

31. **(2)**

As we know $g=\frac{GM}{R^2}$

$$\Rightarrow \frac{g_{\text{earth}}}{g_{\text{planet}}}=\frac{M_e}{M_p}\times\frac{R_p^2}{R_e^2}\Rightarrow\frac{g_e}{g_p}=\frac{2}{1}$$

$$T\propto\frac{1}{\sqrt{g}}\Rightarrow\frac{T_e}{T_p}=\sqrt{\frac{g_p}{g_e}}\Rightarrow\frac{2}{T_p}=\sqrt{\frac{1}{2}}$$

Also $T\propto\frac{1}{\sqrt{g}}\Rightarrow\frac{T_e}{T_p}=\sqrt{\frac{g_p}{g_e}}\Rightarrow\frac{2}{T_p}=\sqrt{\frac{1}{2}}$

$$\Rightarrow T_p=2\sqrt{2}\ \text{sec}.$$

(NEW NCERT 11th Page No. 346)

32. **(3)**

In stationary lift $T=2\pi\sqrt{\frac{l}{g}}$

In upward moving lift $T'=2\pi\sqrt{\frac{l}{(g+a)}}$

(a =Acceleration of lift)

$$\Rightarrow\frac{T'}{T}=\sqrt{\frac{g}{g+a}}=\sqrt{\frac{g}{\left(g+\frac{g}{4}\right)}}=\sqrt{\frac{4}{5}}$$

$$\Rightarrow T'=\frac{2T}{\sqrt{5}}$$ **(NEW NCERT 11th Page No. 347)**

33. **(2)**

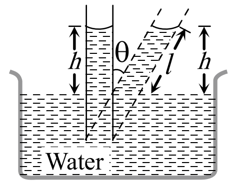
(NEW NCERT 11th Page No. 344)

34. **(2)**

Horizontal range will be maximum when $h=\frac{H}{2}=\frac{90}{2}=45$ cm i.e. hole 3.

(NEW NCERT 11th Page No. 188)

35. **(2)**



Vertical height of the water in the tube remains constant

So, $l=\frac{h}{\cos\theta}=\frac{3}{\cos 60^\circ}=6\,\text{cm}$

[NCERT Pg No. 345]

36. **(3)**

$$n=\frac{1}{2\pi}\sqrt{\frac{k}{m}}\Rightarrow\frac{n_S}{n_P}=\sqrt{\frac{k_S}{k_P}}$$

$$\Rightarrow\frac{n_S}{n_P}=\sqrt{\frac{\left(\frac{k}{2}\right)}{2k}}=\frac{1}{2}$$

(NEW NCERT 11th Page No. 194)

37. **(4)**

The soap solution, has less surface tension as compared to ordinary water and its surface tension decreases further on heating. The hot soap solution can, therefore spread over large surface area and also it has more wetting power. It is on account of this property that hot soap solution can penetrate and clean the clothes better than the ordinary water.

(NEW NCERT 11th Page No. 267)

38. **(1)**

$$hR=\frac{2T}{dg}\Rightarrow hR=\frac{2T}{Rdg}\quad\therefore hR=constant$$

Hence when the tube is of insufficient length, radius of curvature of the liquid meniscus increases, so as to maintain the product hR a finite constant.

i.e. as h decreases, R increases and the liquid meniscus becomes more and more flat, but the liquid does not overflow.

(NEW NCERT 11th Page No. 197)

39. **(4)**

The presence of impurities either on the liquid surface or dissolved in it, considerably affect the force of surface tension, depending upon the degree of contamination. A highly soluble substance like sodium chloride when dissolved in water increase the surface tension. But the sparing soluble or substance like phenol when dissolved in water reduces the surface tension of water.

(NEW NCERT 11th Page No. 197)

40. **(3)**

$$\frac{KA(100-\theta)}{l}=\frac{11KA(\theta-0)}{l}$$

$$\Rightarrow 100-\theta=11\theta$$

$$\Rightarrow \theta=\frac{100}{12}=8.3^{\circ}C$$

(NEW NCERT 11th Page No. 284)

41. **(2)**

$$A=\gamma-3x$$

$$B=\gamma-3C$$

$$\therefore\ x=\frac{B-A+3C}{3}$$

(NEW NCERT 11th Page No. 282)

42. **(3)**

$$\frac{G\times 100}{x^2}=\frac{G\times 10000}{(1-x)^2}\Rightarrow\frac{10}{x}=\frac{100}{1-x}\Rightarrow x=\frac{1}{11}\text{m}$$

(NEW NCERT 11th Page No. 189)

43. **(1)**

(NEW NCERT 11th Page No. 181)

44. **(1)**

$$\frac{v_p}{v_e}=\sqrt{\frac{M_p}{M_e}\times\frac{R_e}{R_p}}=\sqrt{6\times\frac{1}{2}}=\sqrt{3}$$

$\therefore\ v_p=\sqrt{3}v_e$ **(NEW NCERT 11th Page No. 194)**

45. **(3)**

$$\Delta L_1+\Delta L_2=0$$

$$\therefore\ (\alpha_1 L_1+\alpha_2 L_2)\Delta\theta=0$$

$$\alpha_1 L_1+\alpha_2 L_2=0$$

(NEW NCERT 11th Page No. 189)

46. **(2)**

(NEW NCERT 11th Page No. 309)

47. **(1)**

$$\gamma=\frac{C_p}{C_V}$$

We know $C_p-C_v=R$

So $C_V=\dfrac{R}{\gamma-1}$.

(NEW NCERT 11th Page No. 308)

48. **(2)**

Velocity gradient or strain rate in liquid

$$\eta=\frac{\text{shearing stress}}{\text{strain rate}}$$

$\Rightarrow$ shearing stress $\eta\times$ strain rate

Shearing stress $=10^{-3}\times\dfrac{5}{20}=2.5\times10^{-4}\ \text{N/m}^2$

(NEW NCERT 11th Page No. 363)

49.(2)

Young's modulus, Bulk modulus and modulus of rigidity all depend on nature of material and temperature.

Volume depends on temperature because density depends on temperature.

(NEW NCERT 11th Page No. 344)

50. **(4)**

$$v=\frac{2}{9}\frac{r^2g(\sigma-\rho)}{\eta}$$

$$\because\quad v=\sqrt{2gh}$$

$$\sqrt{2gh}=\frac{2}{9}\frac{r^2g(\sigma-\rho)}{\eta}$$

$$2gh=\left[\frac{2g}{9}\frac{r^2(\sigma-\rho)}{\eta}\right]^2$$

$$h=2g\left[\frac{(\sigma-\rho)r^2}{9\eta}\right]^2$$

(NEW NCERT 11th Page No. 364)