

Jupiter Academy

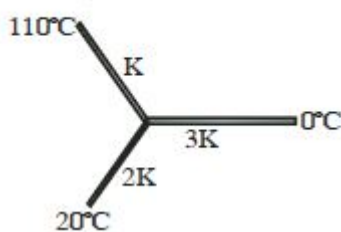
Subjects : Physics

PRACTICE PAPER 07

Total Marks : 180

Physics - Section A (MCQ.)

- Certain substance emits only the wavelengths λ_1 , λ_2 , λ_3 and λ_4 when it is at a high temperature. When this substance is at a colder temperature, it will absorb only the following wavelengths
 A) λ_1
 B) λ_2
 C) λ_1 and λ_2
 D) λ_1 , λ_2 , λ_3 and λ_4
- A black body at a temperature of 1640 K has the wavelength corresponding to maximum emission equal to $1.75\text{ }\mu\text{m}$. Assuming the moon to be a perfectly black body, the temperature of the moon, if the wavelength corresponding to maximum emission is $14.35\text{ }\mu\text{m}$ is..... K
 A) 100 B) 150 C) 200 D) 250
- Three rods of equal length and cross sectional area and coefficient of thermal conductivities K , $2K$ and $3K$ are joined as shown in figure temperature of their ends are 110°C , 20°C and 0°C respectively then temperature of junction will be $^\circ\text{C}$

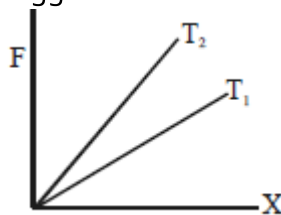


- A) 15 B) 25 C) 30 D) 35
- A composite rod made of three rods of equal length and cross-section as shown in the fig. The thermal conductivities of the materials of the rods are $K/2$, $5K$ and K respectively. The end A and end B are at constant temperatures. All heat entering the face A goes out of the end B there being no loss of heat from the sides of the bar. The effective thermal conductivity of the bar is



- A) $15K/16$ B) $6K/13$
 C) $5K/16$ D) $2K/13$

- The length of the two rods made up of the same metal and having the same area of cross-section are 0.6 m and 0.8 m respectively. The temperature between the ends of first rod is 90°C and 60°C and that for the other rod is 150°C and 110°C . For which rod the rate of conduction will be greater
 A) First B) Second
 C) Same for both D) None of the above
- Newton's law of cooling is a special case of
 A) Stefan's law B) Kirchhoff's law
 C) Wien's law D) Planck's law
- The diagram below shows the change in the length X of a thin uniform wire caused by the application of stress F at two different temperatures T_1 and T_2 . The variation shown suggests that



- A) $T_1 > T_2$ B) $T_1 < T_2$
 C) $T_2 > T_1$ D) $T_1 \geq T_2$
- 1 kg of ice at -10°C is mixed with 4.4 kg of water at 30°C . The final temperature of mixture is $^\circ\text{C}$ (specific heat of ice is 2100 J/kg/K)
 A) 2.3 B) 4.4 C) 5.3 D) 8.7
 - The coefficient of apparent expansion of a liquid when determined using two different vessels A and B are γ_1 and γ_2 respectively. If the coefficient of linear expansion of vessel A is α , the coefficient of linear expansion of vessel B is

- A) $\frac{\alpha\gamma_1\gamma_2}{\gamma_1+\gamma_2}$ B) $\frac{\gamma_1-\gamma_2}{2\alpha}$
 C) $\frac{\gamma_1-\gamma_2+\alpha}{3}$ D) $\frac{\gamma_1-\gamma_2}{3} + \alpha$

10. A thin walled cylindrical metal vessel of linear coefficient of expansion $10^{-3} \text{ } ^\circ\text{C}^{-1}$ contains benzenr of volume expansion coefficient $10^{-3} \text{ } ^\circ\text{C}^{-1}$. If the vessel and its contents are now heated by 10°C , the pressure due to the liquid at the bottom.
- A) increases by 2%
B) decreases by 1%
C) decreases by 2%
D) remains unchanged
11. 0.93 watt – hour of energy is supplied to a block of ice weighing 10 gm. It is found that
- A) Half of the block melts
B) The entire block melts and the water attains a temperature of 4°C
C) The entire block just melts
D) The block remains unchanged
12. Which of the following material is used to make calorimeter?
- A) Glass B) Ebonite C) Metal D) Superconductor
13. Fire is extinguished more effectively by
- A) Hot water B) Cold water
C) Equally by both D) Ice
14. A 2 kg copper block is heated to 500°C and then it is placed on a large block of ice at 0°C . If the specific heat capacity of copper is $400 \text{ J/kg/}^\circ\text{C}$ and latent heat of fusion of water is $3.5 \times 10^5 \text{ J/kg}$, the amount of ice, that can melt is :-
- A) $(7/8) \text{ kg}$ B) $(7/5) \text{ kg}$
C) $(8/7) \text{ kg}$ D) $(5/7) \text{ kg}$
15. When a copper ball is heated, the largest percentage increase will occur in its
- A) Diameter B) Area
C) Volume D) Density
16. A razor-blade floats on the surface of water contained in a glass. When the glass is gently shaken, the razor-blade sinks. Mark the incorrect statement
- A) Volume of displaced water is lesser than blades own volume
B) When the razor-blade sinks, the height of the water decreases.
C) For a floating body of greater density than water its weight is balanced by the compressive forces of the water below it.
D) Weight of razor-blade is equal to the weight of the displaced water due to volume occupied by the razor-blade and some additional region affected by surface tension.
17. Two soap bubbles of radii 2 cm and 4 cm join to form a double bubble in air, then radius of curvature of interface is cm
- A) $2\sqrt{5}$ B) 2 C) 4 D) $2\sqrt{3}$
18. Water rises in a capillary tube to a certain height such that the upward force due to surface tension is balanced by $75 \times 10^{-4} \text{ N}$ force due to the weight of the liquid. If the surface tension of water is $6 \times 10^{-2} \text{ Nm}^{-1}$, the inner circumference of the capillary must be
- A) $1.25 \times 10^{-2} \text{ m}$ B) $0.50 \times 10^{-2} \text{ m}$
C) $6.5 \times 10^{-2} \text{ m}$ D) $12.5 \times 10^{-2} \text{ m}$
19. When there is no external force, the shape of a liquid drop is determined by
- A) Surface tension of the liquid
B) Density of liquid
C) Viscosity of liquid
D) Temperature of air only
20. The water rises in the capillary to a height of 10 cm. If the surface tension of water is $73 \times 10^{-3} \text{ N/m}$, density is 10^3 kg/m^3 and $g = 9.8 \text{ m/sec}^2$, then find radius of capillary
- A) 0.02 cm B) 0.015 cm
C) 0.05 cm D) 0.08 cm
21. If the diameter of a capillary tube is doubled, then the height of the liquid that will rise is
- A) Twice B) Half
C) Same as earlier D) None of these
22. If pressure at half the depth of a lake is equal to $2/3$ pressure at the bottom of the lake then what is the depth of the lake..... m
- A) 10 B) 20 C) 60 D) 30
23. One thousand small water drops of equal radii combine to form a big drop. The ratio of final surface energy to the total initial surface energy is
- A) 1000 : 1 B) 1 : 1000
C) 10 : 1 D) 1 : 10
24. What is the pressure in atm on a swimmer 10 m below the surface of a lake?
- A) 1 B) 2 C) 3 D) 4
25. Different heads are in Column - I and its formulas are given in Column - II. Match them appropriately.

Column - I	Column - II
(a) Velocity head	(i) $\frac{P}{\rho g}$
(b) Pressure head	(ii) h
	(iii) $\frac{v^2}{2g}$

- A) $(a - i), (b - iii)$ B) $(a - iii), (b - ii)$
C) $(a - iii), (b - i)$ D) $(a - ii), (b - i)$

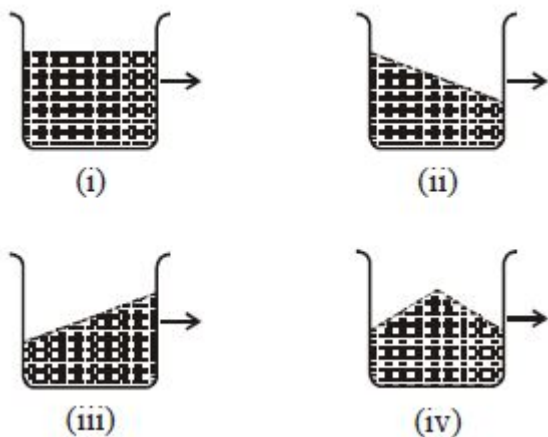
26. Water is flowing with a velocity of 2 m/s in a horizontal pipe where cross-sectional area is $2 \times 10^{-2} \text{ m}^2$ at pressure $4 \times 10^4 \text{ pascal}$. The pressure at cross-section of area 0.01 m^2 in pascal will be

- A) 32 B) 3.4 C) 3.4×10^4 D) 3.4×10^5

27. There is a 1 mm thick layer of glycerine between a flat plate of area 100 cm^2 and a big plate. If the coefficient of viscosity of glycerine is 1.0 kg (m-s) , then N force is required to move the plate with a velocity of 7 cm/s .

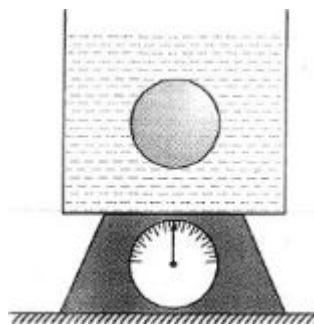
- A) 0.7 B) 0.1 C) 0.2 D) 0.6

28. A vessel containing water is moving with a constant speed towards right along a straight horizontal path. if the vessel is given a constant retardation towards the right along a straight line, which of the above diagram represents the surface of the liquid?



- A) (i) B) (ii) C) (iii) D) (iv)

29. A container of mass M containing liquid of mass m_0 is kept on weighing machine. A ball of mass m is released from rest from given position. Then choose correct option just after ball is released



- A) Reading of weighing machine must be equal to $(M + m + m_0)g$
B) Reading of weighing machine $> (M + m + m_0)g$ only if density of ball $<$ density of liquid
C) Reading of weighing machine $> (M + m + m_0)g$ if density of ball $\neq$ density of liquid
D) Reading of weighing machine $< (M + m + m_0)g$ if density of ball $\neq$ density of liquid

30. An ice block contains a glass ball when the ice melts within the water containing vessel, the level of water

- A) Rises
B) Falls
C) Unchanged
D) First rises and then falls

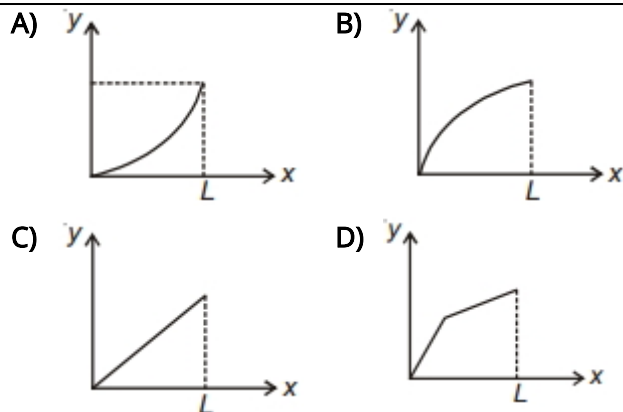
31. The coefficient of viscosity for hot air is

- A) Greater than the coefficient of viscosity for cold air
B) Smaller than the coefficient of viscosity for cold air
C) Same as the coefficient of viscosity for cold air
D) Increases or decreases depending on the external pressure

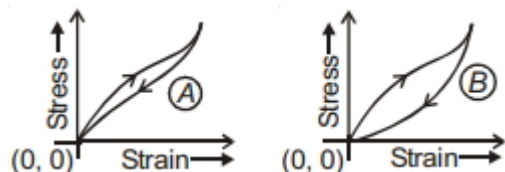
32. A cylindrical tank has a hole of 1 cm^2 in its bottom. If the water is allowed to flow into the tank from a tube above it at the rate of $70 \text{ cm}^3/\text{sec}$. then the maximum height up to which water can rise in the tank is cm

- A) 2.5 B) 5 C) 10 D) 0.25

33. Which of the following curve represents the correctly distribution of elongation (y) along heavy rod under its own weight $L \rightarrow$ length of rod, $x \rightarrow$ distance of point from lower end?



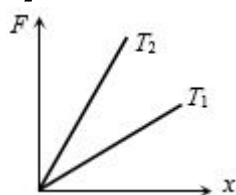
34. Two different types of rubber are found to have the stress-strain curves as shown. Then



- A) *A* is suitable for shock absorber
 B) *B* is suitable for car tyres
 C) *B* is suitable for shock absorber
 D) None of these
35. A steel wire is 1 m long and 1 mm^2 in area of cross-section. If it takes 200 N to stretch this wire by 1 mm , how much force will be required to stretch a wire of the same material as well as diameter from its normal length of 10 m to a length of 1002 cm is N

A) 1000 B) 200 C) 400 D) 2000

36. The diagram shows the change x in the length of a thin uniform wire caused by the application of stress F at two different temperatures T_1 and T_2 . The variations shown suggest that



- A) $T_1 > T_2$
 B) $T_1 < T_2$
 C) $T_1 = T_2$
 D) None of these
37. Young's modulus of perfectly rigid body material is
- A) Zero
 B) Infinity
 C) $1 \times 10^{10}\text{ N/m}^2$
 D) $10 \times 10^{10}\text{ N/m}^2$

38. On applying a stress of $20 \times 10^8\text{ N/m}^2$ the length of a perfectly elastic wire is doubled. Its Young's modulus will be

A) $40 \times 10^8\text{ N/m}^2$ B) $20 \times 10^8\text{ N/m}^2$
 C) $10 \times 10^8\text{ N/m}^2$ D) $5 \times 10^8\text{ N/m}^2$

39. A rubber ball is taken to a 100 m deep lake and its volume changes by 0.1% . The bulk modulus of rubber is nearly

A) $1 \times 10^{-6}\text{ N/m}^2$ B) $1 \times 10^{-8}\text{ N/m}^2$
 C) $1 \times 10^7\text{ N/m}^2$ D) $1 \times 10^9\text{ N/m}^2$

40. If the length of a wire is reduced to half, then it can hold the load

A) Half B) Same C) Double D) One fourth

41. The ratio of Young's modulus of the material of two wires is $2 : 3$. If the same stress is applied on both, then the ratio of elastic energy per unit volume will be

A) $3 : 2$ B) $2 : 3$ C) $3 : 4$ D) $4 : 3$

42. *Assertion* : Perspiration from human body helps in cooling the body.

Reason : A thin layer of water on the skin enhances its emissivity.

- A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
 B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
 C) If the Assertion is correct but Reason is incorrect.
 D) If both the Assertion and Reason are incorrect.

43. For a black body at temperature 727°C , its radiating power is 60 watt and temperature of surrounding is 227°C . If temperature of black body is changed to 1227°C then its radiating power will be watt

A) 304 B) 320 C) 240 D) 120

44. The temperatures of two bodies *A* and *B* are respectively 727°C and 327°C . The ratio $H_A : H_B$ of the rates of heat radiated by them is

A) $727 : 327$ B) $5 : 3$
 C) $25 : 9$ D) $625 : 81$

45. The work done in blowing a soap bubble of radius 0.2 m is (the surface tension of soap solution being 0.06 N/m)

A) $192\pi \times 10^{-4} J$

B) $280\pi \times 10^{-4} J$

C) $200\pi \times 10^{-3} J$

D) None of these