# PHYSICS

## BOOKS - MTG GUIDE PHYSICS (HINGLISH)

## PROPERTIES OF BULK MATTER

### Illustration

**1.** A rope 1 cm in diameter breaks if the tension in it exceeds 500 N. The maximum tension that any be given to a similar rope of diameter 2 cm is

A. 500N

B. 250N

C. 1000N

D. 2000N

**Answer: D**

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**2.** A metal wire can sustain the weight of 25kg wt without breaking. The wire is cut into three equal parts. How much weight can each part sustain?

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**3.** The breaking stress for a metal wire is $2 \times 10^8 Nm^{-2}$. Density of metal $= 8 \times 10^3 kgm^{-3}$. Calculate the maximum length of copper wire which will not break under its own weight, when held in vertical position.

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**4.** A thick pipe of length 5m is made of rubber having $Y = 10^6 Nm^{-2}$, density = 1500 $kgm^{-3}$. It is held in vertical position when suspended from a ceiling. Calculate the extension produced in the pipe under its own weight.

A. Extension, $l = \frac{MgL}{AY}$

Its weight is supposed to act at its centre of gravity which lies midway at $\frac{L}{2}$. The centre of gravity is displaced under its own weight of pipe.

$\therefore$ Extension $l = \frac{(AL\rho)g}{AY} \times \left(\frac{L}{2}\right) = \frac{L^2\rho g}{2Y}$

or $l = \frac{(5)^2 \times 1500 \times 10}{2 \times 10^6} = \frac{25 \times 15}{2 \times 1000}$

l= 0.1875m

B.

C.

D.

**Answer:**

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**5.** Two wires A and B are made of same material. The wire A has a length l and diameter r while the wire B has a length l and diameter r while the wire B has a length 2l and diameter r/2. If the two wires are stretched by the same force the elongationn in A divided by the elongation in B is

A. $1/8$

B. $1/4$

C. 4

D. 8

**Answer: A**

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**6.** The length of a metal wire is $l_1$ when the tension in it is $T_1$ and is $l_2$ when the tension is $T_2$. Then natural length of the wire is

A. $\frac{l_1 + l_2}{2}$

B. $\sqrt{l_1 l_2}$

C. $\frac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$

D. $\frac{l_1 T_2 + l_2 T_1}{T_1 + T_1}$

**Answer: C**

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**7.** The bulk modulus of a metal is $8 \times 10^9 Nm^{-2}$ and its density is 11 g $cm^{-3}$. The density of this metal under a pressure of 20000 N $cm^{-2}$ will be (in g $cm^{-3}$ )

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**8.** The area of cross-section of railway track is $0.01m^2$. The temperature variation is $10^\circ C$. Coefficient of

linear expansion of steel $= 10^{-5}/^{\circ}C$. (Young's modulus of steel $= 10^{11} Nm^{-2}$). Calculate the energy stored per meter in the track.

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**9.** 10g of a liquid of density $5gcm^{-3}$ is mixed with 12g of another miscible liquid of density $4gcm^{-3}$. Find the density of mixture.

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**10.** When floated in water $(\sigma = 1000kgm^{-3})$, only 0.6 fraction of volume of a solid is submerged. Find the

density of liquid in which the solid just floats?

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**11.** A pipe of wood is floating in water kept in a bottle. The bottle is connected to an air pump. Neglect the compressibility of water. When more air is pushed into the bottle from the pump, the piece of wood will float with

A. larger part in the water

B. lesser part in the water

C. same part in the water

D. it will sink

**Answer: C**

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**12.** Eight equal drops of water are falling through air with a steady velocity of 10 $cms^{-1}$. If the drops combine to form a single drop big in size, then the terminal velocity of this big drop is

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**13.** Three capillaries of internal radii 2r, 3r and 4r, all of the same length, are joined end to end. A liquid passes through the combination and the pressure difference across this combination is 20.2 cm of mercury. The pressure differene across the capillary of internal radius 2r is

A. 2cm of Hg

B. 4cm of Hg

C. 8cm of Hg

D. 16cm of Hg

**Answer: D**

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**14.** A vessel having area of cross- section A contains a liquid up to a height h. At the bottom of the vessel, there is a small hole having area of cross- section a. Then the time taken for the liquid level to fall from height $H_1$ to$H_2$ is given by

A. $\sqrt{2g(H_1 - H_2)}$

B. $\frac{A}{a}\sqrt{\frac{2}{g}}\left(\sqrt{H_1} - \sqrt{H_2}\right)$

C. $\frac{A}{a}\sqrt{\frac{g}{2}}\left(\sqrt{H_1} - \sqrt{H_2}\right)$

D. $\sqrt{2gH}$

**Answer: B**

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**15.** A large open tank has two holes in the wall. One is a square hole of side L at a depth y from the top and the other is a circular hole of radius R at a depth 4y from the top. When the tank is completely filled with water, the quantities of water flowing out per second from the two holes are the same. The value of R is

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**16.** Air is pushed inot a soap bubble of radius r to duble its radius. If the surface tension of the soap solution is S, the work done in the process is

A. $8\pi r^2 S$

B. $12\pi r^2 S$

C. $16\pi r^2 S$

D. $24\pi r^2 S$

**Answer: D**

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**17.** Two soap bubbles of radii $a$ and $b$ coalesce to form a single bubble of radius $c$. If the external pressure is $P$, find the surface tension of the soap solution.

A. $\frac{P\left(c^3+a^3+b^3\right)}{4\left(a^2+b^2-c^2\right)}$

B. $\frac{P\left(c^3-a^3-b^3\right)}{4\left(a^2+b^2-c^2\right)}$

C. $Pc^3-4a^2-4b^2$

D. $Pc^2-2a^2-3b^2$

**Answer: B**

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**18.** What is the work done in blowing a soap bubble of radius r and surface tension S?


**19.** A centigrade and a Fehrenheit thermometer are dipped in boiling water. The water temperature is lowered until the Fehrenheit thermometer registers $140^\circ F$ . What is the fall in temperature as register by the centigrade thermometer

A. $30^\circ$

B. $40^\circ$

C. $60^\circ$

D. $80^\circ$

**Answer: B**

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**20.** Two liquid A and B are at $32^\circ C$ and $24^\circ C$. When mixed in equal masses the temperature of the mixture is found to be $28^\circ C$. Their specific heats are in the ratio of

A. $3:2$

B. $2:3$

C. $1:1$

D. $4:3$

**Answer: C**

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**21.** A metallic rod l cm long, A square cm in cross-section is heated through $t^{\circ}\mathrm{C}$. If Young's modulus of elasticity of the metal is E and the mean coefficient of linear expansion is $\alpha$ per degree celsius, then the compressional force required to prevent the rod from expanding along its length is

A. $Y\alpha t$

B. $\frac{Y\alpha t}{1+\alpha t}$

C. $\frac{Y\alpha t}{1-\alpha t}$

D. None of these

**Answer: A**

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**22.** The absolute coefficient of expansion of a liquid is 7 times that the volume coefficient of expansion of the vessel. Then the ratio of absolute and apparent expansion of the liquid is

A. $\frac{1}{7}$

B. $\frac{7}{6}$

C. $\frac{6}{7}$

D. None of these

**Answer: B**

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**23.** A composite slab is prepared by pasting two plates of thickness $L_1$ and $L_2$ and thermal conductivites $K_1$ and $K_2$ . The slab have equal cross-

sectional area. Find the equivalent conductivity of the composite slab.

A. $\frac{d_1}{K_1}$

B. $d_1K_1 + d_1K_2 = K$

C. $\frac{d_1}{K_1} + \frac{d_2}{K_2} = \frac{d_1 + d_2}{K}$

D. $K(d_1 + d_2) = K_1K_2d_1d_2$

**Answer: C**

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**24.** A sphere at temperature $600K$ is placed in an enviroment to temperature is $200K$. Its cooling rate

is $H$. If its temperature reduced to $400K$ then cooling rate in same enviorment will become

A. $\frac{3}{16}R$

B. $\frac{16}{3}R$

C. $\frac{9}{27}R$

D. None of these

**Answer: A**

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**25.** A rectangular body has maximum wavelength $\lambda_m$ at $2000K$. Its corresponding wavelength at $3000K$

will be

A. $\frac{3}{2}\lambda_m$

B. $\frac{2}{3}\lambda_m$

C. $\frac{16}{81}\lambda_m$

D. $\frac{81}{16}\lambda_m$

**Answer: B**

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**26.** The plots of intensity versus wavelength for three black bodies at temperatures $T_1, T_2$ and $T_3$ respectively are shown. Which, of these temperatures

are the lowest and the highest? Grade $T_1, T_2$ and $T_3$

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**27.** A body takes 10 min to cool from $60^\circ C$ to $50^\circ C$. Temperature of surrounding is $25^\circ C$. Find the temperature of body after next 10 min.

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Neet Cafe Topicwise Practice Questions

**1.** A cube is subjected to a uniform volume.compression, if the side of the cube decreases by 1% the bulk strain is

A. 0.01

B. 0.02

C. 0.03

D. 0.06

**Answer: C**

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**2.** For wires of the the same material are stretched by the same load. The dimensions are given below, which of them will elongate most ?

A. Length 100cm, diameter 1cm

B. Length 200cm, diameter 2cm

C. Length 300cm, diameter 3cm

D. Length 400cm, diameter 0.5cm

**Answer: D**

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**3.** Two wires of equal length and cross -section area are suspended as shown in figure. Their Young's modulus are $Y_1$ and $Y_2$ respectively. The equivalent Young's modulus will be

A. $Y_1 + Y_2$

B. $\frac{Y_1 + Y_2}{2}$

C. $\frac{Y_1 Y_2}{Y_1 + Y_2}$

D. $\sqrt{Y_1 Y_2}$

**Answer: B**

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**4.** A light rod of length 200cm is suspended from the ceiling horizontally by means of two vertical wires of equal length tied to its ends. One of the wires is made of steel and is of cross-section $0.1cm^2$ and the other of brass of cross-section $0.2cm^2$. A distance long the rod at which a weight may be hung to produce equal stresses in both the wires?

A. $\frac{4}{3}$ m from steel wire

B. $\frac{4}{3}$ m from brass wire

C. 1m from steel wire

D. $\frac{1}{4}$ m from brass wire

**Answer: A**

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**5.** Two wires A and B have the same length and area of cross-section. But Young's modulus of A is two times the Young's modulus of B. Then the ratio of force constant of A to that of B is

A. 1

B. 2

C. $\frac{1}{2}$

D. $\sqrt{2}$

**Answer: B**

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**6.** A wire of cross section 4 mm is stretched by 0.1 mm by a certain weight. How far (length) will be wire of same material and length but of area $8mm$ stretch under the action of same force.

A. 0.05mm

B. 0.10mm

C. 0.15mm

D. 0.20mm

**Answer: A**

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**7.** If Y and B represent Young's modulus and bulb modulus for a material, then in partice

A. $Y < 3B$

B. $Y = 3B$

C. $Y > 3B$

D. $B = 3Y$

**Answer: A**

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**8.** If the ratio of lengths, radii and Young's moduli of steel and brass wires in the figure are a, b and c respectively. Then the corresponding ratio of increase in their lengths would be

A. $\frac{2ac}{b^2}$

B. $\frac{3a}{2b^2c}$

C. $\frac{3c}{2ab^2}$

D. $\frac{2a^2c}{b}$

**Answer: B**

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**9.** The shear modulus of a liquid is

A. zero

B. unity

C. infinity

D. may have any finite non-zero value

**Answer: A**

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**10.** A steel wire of length 4.87 mm and cross-section $3.0 \times 10^{-5} m^2$ stretches by the same amout as a copper wire of length 3.5 m and cross -section $4.0 \times 10^{-5} m^2$ under a given load . White is the ratio of the Young's modulus of steel so that of copper ?

A. $1.8:1$

B. $2.8:1$

C. $3.8:1$

D. $4.8:1$

**Answer: A**

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**11.** The relation between Y. $\eta$ and B is

A. $\frac{1}{Y} = \frac{1}{3\eta} + \frac{1}{9B}$

B. $\frac{9}{Y} = \frac{1}{\eta} + \frac{3}{B}$

C. $\frac{1}{\eta} = \frac{1}{B} + \frac{1}{Y}$

D. $\frac{9}{Y} = \frac{3}{\eta} + \frac{1}{B}$

**Answer: D**

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**12.** The length of a metal wire is $l_1$ when the tension in it is $T_1$ and is $l_2$ when the tension is $T_2$. Then natural length of the wire is

A. $\frac{l_1 + l_2}{2}$

B. $\frac{L_1T_2 + L_2T_1}{T_1 + T_2}$

C. $\frac{L_1T_2 - L_2T_1}{T_2 - T_1}$

D. $\sqrt{T_1T_2L_1L_2}$

**Answer: C**

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**13.** The mean distance between the atoms of iron is $3 \times 10^{-10}$ m and interatomic fore constant for iron is $7N/m$. The Young's modulus of elasticity for iron is

A. $2.33 \times 10^5 N/m^2$

B. $23.3 \times 10^{10} N/m^2$

C. $2.33 \times 10^9 N/m^2$

D. $2.33 \times 10^{10} N/m$

**Answer: D**

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**14.** Which of the following substances has highest value of Young's modulus?

A. Steel

B. Rubber

C. Wood

D. Copper

**Answer: A**

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**15.** Which one of the following statements is wrong

A. Young's modulus for a perfectly rigid body is zero

B. Bulk modulus is relevant for solids, liquids and gases.

C. Rubber is less elastic than steel.

D. The Young's modulus and shear modulus are relevant for solids.

**Answer: A**

**16.** Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area A and wire 2 has cross-sectional area 3A. If the length of wire 1 increases by $\Delta x$ on applying force F, how much force is needed to stretch wire 2 by the same amount?

A. 4F

B. 6F

C. 9F

D. F

**Answer: C**

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**17.** A uniform wire of mass m, length L, area of cross-section A and Young's modulus Y hange from the ceiling. Its elongation under its own weight will be

A. zero

B. $\frac{mgL}{2AY}$

C. $\frac{mgL}{AY}$

D. $\frac{2mgL}{AY}$

**Answer: B**

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**18.** A polyster fibre rope of diameter 3cm has a breaking strength of 150kN. If it is required to have 600kN breaking strength. What should be the diameter of similar rope?

A. 12cm

B. 6cm

C. 3cm

D. 1.5cm

**Answer: B**

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**19.** Two wires A and B are of the same material. Their lengths are in the ratio 1 : 2 and the diameter are in the ratio 2 : 1. If they are pulled by the same force, then increase in length will be in the ratio

A. $1:2$

B. $4:1$

C. $1:8$

D. $1:4$

**Answer: C**

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**20.** Identify the incorrect statement

A. Young's modulus and shear modulus are relevant only for solids.

B. Bulk modulus is relevant for solids, liquids and gases.

C. Alloys have larger values of Young's modulus than metals

D. Metals have large values of Young's modulus than elastomers.

**Answer: C**

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**21.** The compressibility of water is $6 \times 10^{-10} m^2 / N$. If one litre of water is subjected to a pressure of $4 \times 10^7 N / m^2$, then the decrease in volume will be

A. 10cc

B. 24cc

C. 15cc

D. 12cc

**Answer: B**

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**22.** Which one of the following statements is correct?

In the case of

A. shearing stress there is change in volume

B. hydraulic stress there is no change in shape

C. shearing stress there is no change in shape

D. hydraulic stress there is no change in volume.

**Answer: B**

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**23.** For most materials the Youngs modulus is n times the modulus of rigidity, where n is

A. 2

B. 3

C. 4

D. 5

**Answer: B**


**24.** The Young's modulus of the material of a wire is equal ot the

A. stress required to increase its length four times

B. stress required to produce unit strain

C. strain produced in it

D. stress acting on it

**Answer: B**

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**25.** A stress of $3.18 \times 10^8 Nm^{-2}$ is applied to a steel rod of length 1m along its length, its Young's modulus is $2 \times 10^{11} Nm^{-2}$. Then the elongation produced in the rod (in mm) is

A. 3.18

B. 6.36

C. 5.18

D. 1.59

**Answer: D**

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**26.** What will be the stress required to double the length of a wire of Young's modulus Y?

A. $\frac{Y}{2}$

B. 2Y

C. Y

D. 4Y

**Answer: C**

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**27.** The ratio of tensile stress to the longitudinal strain is defined as

A. bulk modulus

B. Young's modulus

C. shear modulus

D. compressibility

**Answer: B**


**28.** For a perfectly rigid body

A. Young's modulus is infinite and bulk modulus is zero

B. Young's modulus is zero and bulk modulus is infinite

C. Young's modulus is infinite and bulk modulus is also infinite

D. Young's modulus is zero and bulk modulus is also zero

**Answer: C**

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**29.** A rubber rope of length 8 m is hung from the ceiling of a room. What is the increases in length of the rope due to its own weight? (Given, Young's modulus of elasticity of rubber $= 5 \times 10^6 Nm^{-2}$ and

density of rubber $= 1.5 \times 10^3 kgm^{-3}$ and $g = 10ms^{-2}$)

A. 1.5mm

B. 6mm

C. 24mm

D. 96mm

**Answer: D**

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**30.** The bulk modulus of a spherical object is $B$ if it is subjected to uniform pressure $p$, the fractional

decrease in radius is:

A. $\frac{P}{B}$

B. $\frac{P}{3B}$

C. $\frac{3P}{B}$

D. $\frac{B}{3P}$

**Answer: B**

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**31.** Young's modulus of a wire depends on

A. length of the wire

B. diameter of the wire

C. material of the wire

D. mass hanging from the wire

**Answer: C**

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**32.** A wire of length L is hanging from a fixed support. The length changes to $L_1$ and $L_2$ when masses $M_1$ and $M_2$ are suspended respectively from its free end. Then L is equal to

A. $\frac{L_1 + L_2}{2}$

B. $\sqrt{L_1 L_2}$

C. $\frac{L_1 M_2 + L_2 M_1}{M_1 + M_2}$

D. $\frac{L_1 M_2 - L_2 M_1}{M_2 - M_1}$

**Answer: D**

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**33.** A body undergoes no change in volume. Poisson's ratio is

A. 0.5

B. 0.05

C. 0.25

D. 2.5

**Answer: A**

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**34.** When metal wire is stretched by a load the fectional change in its volume $\triangle \frac{V}{V}$ is proportional to

A. $\frac{\Delta l}{l}$

B. $\left(\frac{\Delta l}{l}\right)^2$

C. $\left(\frac{\Delta l}{l}\right)^3$

D. $\sqrt{\frac{\Delta l}{l}}$

**Answer: A**

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**35.** The increase in length of a wire on stretching is 0.025%. If its Poisson's ratio is 0.4, then the percentage decrease in diameter is

A. 0.0001

B. 0.0002

C. 0.0003

D. 0.0004

**Answer: A**

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**36.** If longitudinal strain for a wire is 0.03 and its Poisson's ratio is 0.5, then its lateral strain is

A. 0.003

B. 0.0075

C. 0.015

D. 0.4

**Answer: C**

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**37.** A material has Poisson's ratio $0.5$, If a uniform rod of it suffers a longtiudinal strain of $2 \times 10^{-3}$ then the percentage increases in its volume is

A. 0.6

B. 0.4

C. 0.2

D. zero

**Answer: D**

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**38.** If 'S' is stress and 'Y' is young's modulus of material of a wire, the energy stored in the wire per unit volume is

A. $\frac{S^2}{2Y}$

B. $\frac{2Y}{S^2}$

C. $\frac{S}{2Y}$

D. $2S^2Y$

**Answer: A**

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**39.** Two wires of the same material and length but diameter in the ratic 1: 2 are stretched by the same load. The ratio of elastic potential energy per unit volume for the two wires is

A. $1:4$

B. $1:2$

C. $2:1$

D. $1:1$

**Answer: D**

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**40.** Two wire of same radius and lengh the are subjected to the same load. One wire is of steel and the other is of copper. If the Young's modulus of steel is twice that of copper, the ratio the energy stored per unit volume in steel to that of copper wire is

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

**Answer: B**

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**41.** A metallic wire is suspended by suspending weight to it. If S is longitudinal strain and Y its young's modulus of elasticity then potential energy per unit volume will be

A. $Y\alpha^2$

B. $\frac{1}{2}Y\alpha^2$

C. $\frac{3}{2}Y\alpha^2$

D. $\frac{Y}{\alpha^2}$

**Answer: B**

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**42.** Two wires of the same material and length but diameters in the ratio 1 : 2 are stretched by the same force. The potential energy per unit volume for the two wire when stretched will be in the ratio

A. $1:2$

B. $4:1$

C. $1:1$

D. $16:1$

**Answer: D**

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**43.** A wire of natural length l, young's modulus Y and ares of cross-section A is extended by x. Then, the energy stored in the wire is given by

A. $\frac{1}{2}\frac{YA}{l}x^2$

B. $\frac{1}{2}\frac{Yl}{A}x^2$

C. $\frac{1}{2}\frac{YA}{l^2}x^2$

D. $\frac{1}{2}\frac{A}{Yl}x^2$

**Answer: A**

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**44.** The Young's modulus of the meterial of a wire is $2 \times 10^{10} Nm^{-2}$ If the elongation strain is 1% then the energy stored in the wire per unit volume is $Jm^{-3}$ is

A. $10^6$

B. $10^8$

C. $2 \times 10^6$

D. $2 \times 10^8$

**Answer: A**

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**45.** A metallic rod of length l and cross-sectional area A is made of a material of Young's modulus Y. If the rod is elongated by an amount y,then the work done is proportional to

A. y

B. $1/y$

C. $y^2$

D. $1/y^2$

**Answer: C**

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**46.** Two rain drops falling through air have radii in the ratio $1:2$. They will have terminal velocity in the ratio

A. $4:1$

B. $1:4$

C. $2:1$

D. $1:2$

**Answer: B**

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**47.** When cooking oil is heated in a frying pan, the oil moves arround in the pan more easily when it is hot. The main reason for this is that with rise in temperature ,there is a decrease in

A. surface tension

B. viscosity

C. angle of contact

D. density

**Answer: B**

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**48.** Viscous force on a small sphere of radius r moving in a fluid varies directly with

A. $\propto R^2$

B. $\propto R$

C. $\propto (1/R)$

D. $\propto (1/R)^2$

**Answer: B**

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**49.** A spherical solild of volume V is made of a material of density $\rho_1$. It is falling through a liquid of density $\rho_2(\rho_2 < \rho_1)$. Assume that the liquid applies a viscous froce on the ball that is proportional ti the its speed v, i.e., $F_{viscous} = -kv^2(k > 0)$. The terminal speed of the ball is

A. $\frac{Vg(\rho_1 - \rho_2)}{k}$

B. $\sqrt{\frac{Vg(\rho_1 - \rho_2)}{k}}$

C. $\frac{Vg\rho_1}{k}$

D. $\sqrt{\frac{Vg\rho_1}{k}}$

**Answer: B**

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**50.** Water is following in a river. If the velocity of a layer at a distance 10 cm from the bottom is 20n cm/s. Find the velocity of layer at a height of 40 cm from the bottom.

A. 10cm/s

B. 20cm/s

C. 30cm/s

D. 80 cm/s

**Answer: D**

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**51.** A metal block of area $0.10m^2$ is connected to a 0.010 kg mass via a string that passes over an ideal pulley (considered massless and frictionless) as shown in figure. A liquid with a film thickness of 0.30 mm is placed between the block and the table. When released the block moves to the right with a constant speed of $0.085ms^{-1}$. The coefficient of viscosity of the liquid is (Take $g = 9.8ms^{-2}$)

A. $2.45 \times 10^{-3} Pas$

B. $3.45 \times 10^{-3} Pas$

C. $6.45 \times 10^{-3} Pas$

D. $7.45 \times 10^{-3} Pas$

**Answer: B**

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**52.** A metal ball $B_1$ (density $3.2 g/cc$) is dropped in water, while another metal ball $B_2$ (density $6.0 g/cc$) is dropped in a liquid of density $1.6 g/cc$. If both the balls have the same diameter and attain the same terminal velocity, the ratio of viscosity of water to that of the liquid is

A. $2.0$

B. $0.5$

C. $4.0$

D. Indeterminate due to insufficient data

**Answer: B**

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**53.** If two capillary tubes of radii $r_1$ and $r_2$ and having length $l_1$ and $l_2$ respectively are connected in series across a heaed of pressure p, find the rate of

flow of the liqid through the tubes, if $\eta$ is the coefficient of viscosity of the liquid.

A. $\frac{\pi P}{8\eta}\left(\frac{l_1}{r_1^4}+\frac{l_2}{r_2^4}\right)^{-1}$

B. $\frac{8\pi P}{\eta}\left(\frac{l_1}{r_1^4}+\frac{l_2}{r_2^4}\right)$

C. $\frac{\pi P}{8\eta}\left(\frac{r_1^4}{l_1}+\frac{r_2^4}{l_2}\right)^{-1}$

D. $\frac{8\pi P}{\eta}\left(\frac{l_1}{r_1^4}+\frac{l_2}{r_2^4}\right)^{-1}$

**Answer: A**

Watch Video Solution

**54.** The terminal speed of a sphere of gold (density = 19.5 kg $m^{-3}$) is 0.2 $ms^{-1}$ in a viscous liquid (density = 1.5 kg $m^{-3}$). Then, the terminal speed of a sphere of silver (density = 10.5 kg $m^{-3}$) of the same size in the same liquid is

A. $0.1ms^{-1}$

B. $0.4ms^{-1}$

C. $0.2ms^{-1}$

D. $0.3ms^{-1}$

**Answer: A**

Watch Video Solution

**55.** The velocity of water in river is 180 km $h^{-1}$ near the surface .If the river is 5 m deep,then the shearing stress between the surface layer and the bottom layer is ( cofficient of viscosity of water $\eta = 10^{-3}$ Pa s)

A. $0.6 \times 10^{-3} Nm^{-2}$

B. $0.8 \times 10^{-3} Nm^{-2}$

C. $0.5 \times 10^{-3} Nm^{-2}$

D. $10^{-3} Nm^{-2}$

**Answer: C**

Watch Video Solution

**56.** A drop of water of radius 0.0015 mm is falling in air .If the cofficient of viscosity of air is $2.0 \times 10^{-5} kgm^{-1}s^{-1}$ ,the terminal velocity of the drop will be

(The density of water = $10^3 kgm^{-3}$ and g = $10ms^{-2}$ )

A. $1.0 \times 10^{-4} m/s$

B. $2.0 \times 10^{-4} m/s$

C. $2.5 \times 10^{-4} m/s$

D. $5.0 \times 10^{-4} m/s$

**Answer: C**

Watch Video Solution

**57.** When the temperature increases the viscosity of

A. gases decreases and liquid increases

B. gases increases and liquids decreases

C. gases and liquids increases

D. gases and liquids decreases

**Answer: B**

Watch Video Solution

**58.** When a sphere falling in a viscous fluid attains a terminal velocity, then

A. viscous force plus buoyant force becomes equal to force of gravity

B. viscous force is zero

C. viscous force plus force of gravity becomes equal to buoyant force

D. buoyant force becomes equal to force of gravity

**Answer: A**

Watch Video Solution

**59.** A metallic sphere of mass M falls through glycerine with a terminal velocity v. If we drop a ball of mass 8M of same metal into a column of glycerine, the terminal velocity of ball will be

A. 2v

B. 4v

C. 8v

D. 16v

**Answer: B**

Watch Video Solution

**60.** The rate of flow of liquid through a capillary tube of radius r is V, when the pressure difference across the two ends of the capillary is p. If pressure is increased by 3p and radius is reduced to r/2, then the rate of flow becomes

A. $\frac{V}{8}$

B. $\frac{V}{4}$

C. $\frac{V}{2}$

D. $\frac{V}{9}$

**Answer: B**

Watch Video Solution

**61.** Two metal spheres are falling through a liquid of density $2 \times 10^3 kg/m^3$ with the same uniform speed. The material density of sphere 1 and sphere 2 are $8 \times 10^3 kg/m^3$ and $11 \times 10^3 kg/m^3$ respectively. The ratio of their radii is :-

A. $\frac{11}{8}$

B. $\sqrt{\frac{11}{8}}$

C. $\frac{3}{2}$

D. $\sqrt{\frac{3}{2}}$

**Answer: D**

Watch Video Solution

**62.** The onset of turbulence in a liquid is determined by

A. Pascal's law

B. Reynolds number

C. Bernoulli's principle

D. Torricelli's law

**Answer: B**

Watch Video Solution

**63.** The water flows form a tap of diameter $1.25$ cm with a rate of $5 \times 10^{-5} m^3 s^{-1}$. The density and coefficient of viscosity of water are $10^3 kgm^{-3}$ and $10^{-3}$ Pa. s respectively. The flow of water is

A. Steady with Reynolds number 5100

B. turbulent with Reynolds number 5100

C. steady with Reynolds number 3900

D. turbulent with Reynolds number 3900

**Answer: B**

Watch Video Solution

**64.** An incompressible liquid flows through a horizontal tube as shown in the following figure. Then the velocity v of the fluid is

A. 3.0 m/s

B. 1.5 m/s

C. 1.0 m/s

D. 2.25 m/s

**Answer: C**

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**65.** The cylindrical tube of a spray pump has a cross-section of $8cm^2$, one end of which has $40$ fine holes each of area $10^{-8}m^2$. If the liquid flows inside the tube with a speed of $0.15m\ \min^{-1}$, the speed with which the liquid is ejected through the holes is.

A. $50ms^{-1}$

B. $5ms^{-1}$

C. $0.05ms^{-1}$

D. $0.5ms^{-1}$

**Answer: B**

Watch Video Solution

**66.** A horizontal pipe of cross-section diameter 5cm carries water at a speed of $4ms^{-1}$. The pipe is connected to a smaller pipe with a cross-sectional diameter 4cm. The velocity of water through the smaller pipe is

A. $6.25ms^{-1}$

B. $5.0ms^{-1}$

C. $3.2ms^{-1}$

D. $2.56ms^{-1}$

**Answer: A**

View Text Solution

**67.** In the figure, the velocity $v_3$ will be

A. zero

B. $4ms^{-1}$

C. $1ms^{-1}$

D. $3ms^{-1}$

**Answer: C**

View Text Solution

**68.** Horizontal tube of non-uniform cross-section has radii of 0.1m and 0.05m respectively at M and N . For a streamline flow of liquid the rate of liquid flow is

A. continuously changes with time

B. greater at M than at N

C. greater at N than at M

D. same at M and N

**Answer: D**

View Text Solution

**69.** Blood is flowing at the rates of 200 $cm^3/\sec$ in a capillary of cross-sectional area $0.5m^2$. The velocity of flow, (in mm/sec) is:

A. 0.1

B. 0.2

C. 0.3

D. 0.4

**Answer: D**

Watch Video Solution

**70.** A cylinderical vessel is filled with water up to height H. A hole is bored in the wall at a depth h from the free surface of water. For maximum range h is equal to

A. $\frac{H}{4}$

B. $\frac{H}{2}$

C. $\frac{3H}{4}$

D. H

**Answer: B**

Watch Video Solution

**71.** At two points on a horizontal tube of varying cross section carrying water, the radii are 1cm and 0.4cm. The pressure difference between these points is 4.9cm of water. How much liquid flows through the tube per second?

A. 100c.c, per sec

B. 80 c.c per sec

C. 50 c.c per sec

D. 70 c.c per sec

**Answer: C**

View Text Solution

**72.** Calculate the rate of flow of glycerine of density $1.25 \times 10^3 kg/m^3$ through the conical section of a pipe if the radii of its ends are 0.1m and 0.04 m and the pressure drop across its lengths is $10N/m^2$.

A. $5.28 \times 10^{-4} m^3/s$

B. $6.28 \times 10^{-4} m^3/s$

C. $7.28 \times 10^{-4} m^3/s$

D. $8.28 \times 10^{-4} m^3/s$

**Answer: B**

Watch Video Solution

**73.** Bernouli's equation for a steady streamline flow of a non-viscous incompressible fluid expresses the principle of

A. conservation of angular momentum

B. conservation of density

C. conservation of momentum

D. conservation of energy

**Answer: D**

 Watch Video Solution

**74.** A cylindrical tank is filled with water to a level of 3m. A hole is opened at a height of 52.5 cm from bottom. The ratio of the area of the hole to that of cross-sectional area of the cylinder is 0.1. The square of the speed with which water is coming out from the orifice is (Take $g = 10m/s^2$)

A. $50m^2/s^2$

B. $40m^2/s^2$

C. $51.5m^2/s^2$

D. $50.5m^2/s^2$

**Answer: C**

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**75.** A water barrel stands on a table of height $h$. If a small holes is punched in the side of the barrel at its base, it is found that the resultant stream of water strikes the ground at a horizontal distance $R$ from the table. What is the depth of water in the barrel?

A. $\frac{R^2}{h}$

B. $\frac{R^2}{2h}$

C. $\frac{R^2}{4h}$

D. $\frac{4R^2}{h}$

**Answer: C**

Watch Video Solution

**76.** A horizontal pipelline carries water in a streamline flow . At a point along the pipe , where the cross - sectional area is $10cm^2$ , the water velocity is 1 m/s and pressure is 2000 Pa . The pressure of water at another point where cross - sectional area is $5cm^2$ , is _____ (in Pa)

A. 200Pa

B. 300Pa

C. 400Pa

D. 500Pa

**Answer: D**

Watch Video Solution

**77.** A tank full of water has a small hole at the bottom. If one-fourth of the tank is emptied in $t_1$ seconds and the remaining three-fourths of the tank is emptied in $t_2$ seconds. Then the ratio $\frac{t_1}{t_2}$ is

A. $\sqrt{3}$

B. $\sqrt{2}$

C. $\frac{2-\sqrt{2}}{\sqrt{2}}$

D. $\frac{2-\sqrt{3}}{\sqrt{3}}$

**Answer: D**

Watch Video Solution

**78.** The level of water in a tank is 5 m high . A hole of the area $10cm^2$ is made in the bottom of the tank . The rate of leakage of water from the hole is

A. $10^{-2}m^3s^{-1}$

B. $10^{-3}m^3s^{-1}$

C. $10^{-4}m^3s^{-1}$

D. $10^3m^3s^{-1}$

**Answer: A**

Watch Video Solution

**79.** Two horizontal pipes of radii 1 cm and 2cm are connected with one-another. Water is flowing through them. If the velocity of water in first pipe is $8ms^{-1}$ and the pressure is $1.0 \times 10^5 Nm^{-2}$, then pressure (in N $m^{-2}$) and velocity (in $ms^{-1}$) of water in second pipe are (Density of water $= 10^3 kgm^{-3}$)

A. $1.0 \times 10^5, 8$

B. $2 \times 10^5, 16$

C. $1.3 \times 10^5, 2$

D. $1.8 \times 10^5, 4$

**Answer: C**

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**80.** In old age arteries carrying blood in the human body become narrow resulting in an increase in the blood pressure, this follows from

A. Pascal's law

B. Stockes law

C. Bernoulli's principle

D. Archimedes' principle

**Answer: C**

Watch Video Solution

**81.** A large open tank has two holes in its wall. Ine is a square hole of side a at a depath of x from the top and the other is a cirular hle of radius r at a depth 4x from the top. When the tank is completely filled with water, the quantities of water flowing out per second from both holes are the same. Then r is equal to

A. $2\pi a$

B. $\frac{a}{2\pi}$

C. $\frac{a}{\pi}$

D. $\frac{a}{\sqrt{2\pi}}$

**Answer: D**

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**82.** Bernoulli's principle is not involved in the working explanation of

A. movement of spinning ball

B. carburetor of automobile

C. blades of a kitchen mixer

D. dyanmic life of an aeroplane

**Answer: C**

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**83.** The working of venturimeter is based on

A. Torricelli's law

B. Bernoulli's theorem

C. Archimedes' principle

D. Stokes' law

**Answer: B**

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**84.** Water flows steadily through a horizontal pipe of a variable cross-section. If the pressure of the water is p at a point , where the speed of the flow is v. What is the pressure at another point , where the speed of the flow is 2 v ? Let the density of water be $1gcm^{-3}$.

A. $P - \frac{3\rho v^2}{2}$

B. $P - \frac{\rho v^2}{2}$

C. $P - \frac{3\rho v^2}{4}$

D. $P - \rho v^2$

**Answer: A**

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**85.** A container of height 10m which is open at the top, has water to its full height. Two small openings are made on the walls of the container one exactly at the middle and the other at the bottom. The ratio of the velocities with which water comes out from the middle and the bottom region respectively is

A. 2

B. $\frac{1}{2}$

C. $\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

**Answer: D**

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**86.** Equal volume of two immiscible liquids of densities $\rho$ and $2\rho$ are filled in a vessel as shown in figure. Two small holes are punched at depths $\frac{h}{2}$ and $\frac{3h}{2}$ from the surface of lighter liquid. If $v_1$ and $v_{20}$ are the velocities of efflux at these two holes, then $\frac{v_1}{v_2}$ is

A. $\frac{1}{2\sqrt{2}}$

B. $\frac{1}{2}$

C. $\frac{1}{4}$

D. $\frac{1}{\sqrt{2}}$

**Answer: D**

View Text Solution

**87.** If the surface tension of water is 0.06 Nm, then the capillary rise in a tube of diameter 1mm is $(\theta = 0^\circ)$

A. 1.22cm

B. 2.44cm

C. 3.12cm

D. 3.86 cm

**Answer: B**

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**88.** Surface tension of water is $0.072Nm^{-1}$. The excess pressure inside a water drop of diameter 1.2 mm is

A. $240Nm^{-2}$

B. $120Nm^{-2}$

C. $60Nm^{-2}$

D. $72Nm^{-2}$

**Answer: A**

Watch Video Solution

**89.** If two soap bubble of different radii are in communication with each other

A. air flows from larger bubble into the smaller one until the two bubbles are of equal size

B. the size of the bubbles remains the same

C. air flows from the smaller bubble into the larger one and larger bubble grows at the expense of the smaller one

D. the air flows from the larger bubble into the smaller bubble until the radius of the smaller one becomes equal to that of the larger one, and of the larger one equal to that of the smaller one.

**Answer: C**

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**90.** Water rises up to a height h in a capillary tube of certain diameter. This capillary tube is replaced by a

similar tube of half the diameter. Now the water will rise to the height of

A. 4h

B. 3h

C. 2h

D. $h/2$

**Answer: C**

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**91.** n' droplets of equal of radius r coalesce to form a bigger drop of radius R. The energy liberated is equal

to ( T = Surface tension of water )

A. $\frac{2S}{rJ}$

B. $\frac{3S}{J}\left(\frac{1}{r}-\frac{1}{R}\right)$

C. $\frac{3S}{rJ}$

D. $\frac{3S}{J}\left(\frac{1}{r}+\frac{1}{R}\right)$

**Answer: B**

Watch Video Solution

**92.** The rise in the water level in a capillary tube of radius 0.07 cm when dipped veryically in a beaker

containing water of surface tension $0.07Nm^{-1}$ is (g = $10ms^{-2}$)

A. 2cm

B. 4cm

C. 1.5 cm

D. 3 cm

**Answer: A**

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**93.** Two capillary tubes of radii 0.2 cm and 0.4 cm are dipped in the same liquid. The ratio of height through

which liquid will rise in the tube is

A. $2:3$

B. $1:4$

C. $2:1$

D. $4:1$

**Answer: C**

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**94.** Water rises against gravity in a capillary tube when its one end is dipped into water because

A. capillary attracts water with a greater force

B. pressure below the meniscus is less than atmospheric pressure

C. pressure below the meniscus is greater than atmospheric pressure

D. pressure below the meniscus is zero

**Answer: B**

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**95.** What is the excess pressure inside a drop of mercury of radius 3.0 mm? (Surface tension of

mercury is $4.65 \times 10^{-1} Nm^{-1}$)

A. 310 Pa

B. 410 Pa

C. 210 Pa

D. 510 Pa

**Answer: A**

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**96.** A drop of liquid of diameter 2.8 mm breaks up into 125 identical drops. The change in energy is nearly (s = 75 dyne/cm).

A. zero

B. 19 erg

C. 46 erg

D. 74 erg

**Answer: D**

Watch Video Solution

**97.** Water rises in a capillary tube to a height of 2.0cm. In another capillary tube whose radius is one third of it, how much the water will rise?

A. 5cm

B. 3cm

C. 6cm

D. 9cm

**Answer: C**

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**98.** The work done in increasing the size of a rectangular soap film with dimensions 8 cm x 3.75 cm to 10 cm x 6 cm is $2 \times 10^{-4} J$. The surface tension of the film in $\left(Nm^{-1}\right)$ is

A. $1.65 \times 10^{-2}$

B. $33 \times 10^{-2}$

C. $6.6 \times 10^{-2}$

D. $8.25 \times 10^{-2}$

**Answer: B**

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**99.** The radii of the two columne is U-tube are $r_1$ and $r_2 (> r_1)$. When a liquid of density $\rho$ (angle of contact is $0^\circ$)) is filled in it, the level different of liquid in two arms is h. The surface tension of liquid is ($g =$ acceleration due to gravity)

A. $\frac{\rho g h r_1 r_2}{2(r_2 - r_1)}$

B. $\frac{\rho g h (r_2 - r_1)}{2 r_1 r_2}$

C. $\frac{2(r_2 - r_1)}{\rho g h r_1 r_2}$

D. $\frac{\rho g h}{2(r_2 - r_1)}$

**Answer: A**

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**100.** Water raises to a height of $10cm$ in a capillary tube and mercury falls to a depth of 3.5 cm in the same capillary tube. If the density of mercury is $13.6 \frac{gm}{c.c}$ and its angle of contact is $135^\circ$ and density

of water is $1\frac{gm}{c.c}$ and its angle of contact is $0^{\circ C}$ then the ratio of surface tensions of two liquids is $(\cos 135^{\circ} = 0.7)$

A. $1:14$

B. $5:24$

C. $1:5$

D. $5:27$

**Answer: B**

Watch Video Solution

**101.** A spherical soap bubble of radius 1 cm is formed inside another of radius 4 cm. The radius of single soap bubble which maintains the same pressure difference as inside the smaller and outside the larger soap bubble is____cm.

A. 0.75cm

B. 0.75cm

C. 7.5cm

D. 7.5cm

**Answer: A**

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**102.** The surface energy of a liquid drop is $E$. It is sprayed into $1000$ equal droplets. Then its surface energy becomes

A. u

B. 10u

C. 100u

D. 1000u

**Answer: B**

Watch Video Solution

**103.** A mercury drop of radius 1 cm is broken into $10^6$ droplets of equal size. The work done is $\left(T = 35 \times 10^{-2} \frac{N}{m}\right)$

A. $4.35 \times 10^{-2} J$

B. $4.35 \times 10^{-3} J$

C. $4.35 \times 10^{-6} J$

D. $4.35 \times 10^{8} J$

**Answer: A**

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**104.** If T is the surface tension of a liquid, the energy needed to break a liquid drop of radius R into 64 drops is

A. $6\pi R^2 S$

B. $4\pi R^2 S$

C. $12\pi R^2 S$

D. $8\pi R^2 S$

**Answer: C**

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**105.** The excess pressure inside a spherical drop of water is four times that of another drop. Then, their respective mass ratio is

A. $1:16$

B. $8:1$

C. $1:4$

D. $1:64$

**Answer: D**

Watch Video Solution

**106.** Consider a soap film on a rectangular frame of wire of area $4 \times 4cm^2$. If the area of the soap film is increased to $4 \times 5cm^2$, the work done in the process will be (The surface tension of the soap film is $3 \times 10^{-2} N/m$)

A. $12 \times 10^{-6} J$

B. $24 \times 10^{-6} J$

C. $60 \times 10^{-6} J$

D. $96 \times 10^{-6} J$

**Answer: B**

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**107.** Angle of contact of a liquid with a solid depends on

A. solid only

B. liquid only

C. both solid and liquid only

D. orientation of the solid surface in liquid

**Answer: C**

 Watch Video Solution

**108.** If the radius of a spherical liquid (of surface tension S) drop increases from r to $r + \Delta r$, the corresponding increase in the surface energy is

A. $8\pi r \Delta r S$

B. $4\pi r \Delta r S$

C. $16\pi r \Delta r S$

D. $2\pi r \Delta r S$

**Answer: A**

View Text Solution

**109.** Two spherical soap bubble coalesce. If $V$ is the consequent change in volume of the contained air and $S$ the change in total surface area, show that

$3PV + 4ST = 0$

where $T$ is the surface tension of soap bubble and $P$ is

Atmospheric pressure

A. $3P_0V + 4ST = 0$

B. $4P_0V + 3ST = 0$

C. $P_0V + 4TS = 0$

D. $4P_0V + ST = 0$

**Answer: A**


**110.** A capillary tube of radius r is immersed in water and water rises in to a height h. The mass of water in the capillary tube is 5g. Another capillary tube of radius 2 r is immersed in water. The mass of water that will rise in this tube is

A. 2.5g

B. 5.0g

C. 10g

D. 20 g

**Answer: C**

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**111.** The excess pressure in dyne/ inside a liquid drop of radius 2 mm and fsurface tension T is

A. directly proportional to r and inversely proportional to S.

B. directly proportional to S and inversely proportional to r.

C. directly proportional to the product of S and r

D. inversely proportional to the product of S and r

**Answer: B**

Watch Video Solution

**112.** If h is the height of capillary rise and r is the radius of capillary tube, then which of the following relation will be correct?

A. hr= constant

B. $h/r^2$ = constant

C. $hr^2$ = constant

D. $h/r$ = constant

**Answer: A**

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**113.** On a thermometer, the freezing points of water is marked as $20^\circ C$ and the boiling points of water is marked as $150^\circ C$ . A temperature of $60^\circ C$ will be read on this thermometer as

A. $98^\circ C$

B. $110^\circ C$

C. $40^\circ C$

D. $60^\circ C$

**Answer: A**

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**114.** On a temperature scale Y, water freezes at $-160^\circ$ Y and boils at $-50^\circ$ Y . On this Y scale , a temperature of 340 K is

A. $-106.3^\circ Y$

B. $-96.3^\circ Y$

C. $-86.3^\circ Y$

D. $-76.3^\circ Y$

**Answer: C**

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**115.** Two temperature scales A and B are related by :

$$\frac{A-42}{110}=\frac{B-72}{220}$$

At which temperature two scales have the same reading ?

A. $-42^{\circ}$

B. $-72^{\circ}$

C. $-40^{\circ}$

D.

**Answer: C**

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**116.** For measuring temperature in the range of $2000^\circ C \quad \text{to} \quad 2500^\circ C$, we should employ

A. gas thermometer

B. platinum-rhodium thermometer

C. barometer

D. pyrometer

**Answer: D**

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**117.** Driver of a truck gets his steel petrol tank filled with $75L$ of petrol at $10^{\circ}C$. If a $\alpha_{\text{steel}}$ is $12 \times 10^{-6}/.^{\circ}C$ and $\gamma_{\text{pet}}$ is $9.5 \times 10^{-4}/.^{\circ}C$ the overflow of petrol at $30^{2}C$ is -

A. 1.35L

B. 1.38 L

C. 1.45L

D. 1.48L

**Answer: B**

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**118.** A one litre flask contains certain quantity of mercury. If the volume of air inside the flask remains the same at all temperatures then the volume of mercury in the flask is (volume expansion coefficient of mercury is 20 times that of flask)

A. 100cc

B. 50cc

C. 200cc

D. 150cc

**Answer: B**

View Text Solution

**119.** Maximum density of $H_2O$ is at the temperature

A. $32^\circ F$

B. $39.2^\circ F$

C. $42^\circ F$

D. $4^\circ F$

**Answer: B**

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**120.** The coefficient of volumetric expansion of mercury is $18 \times 10^{-5} / ^{\circ} C$ . A thermometer bulb has a volume $10^{-6} m^3$ and cross section of stem is $0.004 cm^2$. Assuming that bulb is filled with mercury at $0^{\circ} C$ then the length of the mercury column at $100^{\circ} C$ is

A. 9cm

B. 9mm

C. 18cm

D. 18mm

**Answer: A**

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**121.** The coefficient of apparent expansion of a liquid when determined using two different vessle A and B are $\gamma_1$ and $\gamma_2$, respectily. If the coefficient of linerar expansion of vesel A is $\alpha$. Find the coefficient of linear expension of the vessel B.

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. $\frac{\gamma_1-\gamma_2}{3}+\alpha$

**Answer: D**

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**122.** A flask of volume $10^3$ cc is completely filled with mercury at $0^\circ C$ The coefficient of cubical expansion of mercury is $180 \times 10^{-6}/^\circ C$ and heat of glass is $40 \times 10^{-6}/^\circ C$. If the flask in now placed in boiling water at $100^\circ C$ how much mercury will overflow?

A. 7cc

B. 14 cc

C. 21cc

D. 28cc

**Answer: B**

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**123.** A hole is drilled in a copper sheet. The diameter of the hole is 4.24 cm at $27^\circ C$. What is the change in the diameter of the hole when the sheet is heated to $227^\circ C$ ? (Coefficent of linear expansion of copper $= 1.70 \times 10^{-5} {}^\circ C^{-1}$)

A. $1.44 \times 10^{-2} cm$

B. $1.44 \times 10^{-3} cm$

C. $1.44 \times 10^{-1} cm$

D. $1.44cm$

**Answer: A**

View Text Solution

**124.** An ideal gas is expanding such that $PT^2 =$ constant. The coefficient of volume expansion of lthe gas is:

A. $\frac{1}{T}$

B. $\frac{2}{T}$

C. $\frac{3}{T}$

D. $\frac{4}{T}$

**Answer: C**

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**125.** A horizontal tube, open at both ends, contains a column of liquid. The length of this liquid column does not change with temperature. Let $\gamma$ : coefficient of volume expansion of the liquid and $\alpha$ : coefficient of linear expansion of the material of the tube

A. $\gamma = \alpha$

B. $\gamma = 2\alpha$

C. $\gamma = 3\alpha$

D. $\gamma = 0$

**Answer: B**

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**126.** A liquid with coefficient of volume expansion $\gamma$ is filled in a container of a material having coefficient of linear expansion $\alpha$ . If the liquid overflows on heating, then

A. $\gamma = 3\alpha$

B. $\gamma > 3\alpha$

C. $\gamma < 3\alpha$

D. $\gamma > 3\alpha^3$

**Answer: B**

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**127.** The volume of a metal sphere increases by $0.24\,\%$ when its temperature is raised by $40^\circ C$ . The coefficient of linear expansion of the metal is ..... $.^\circ C$

A. $2 \times 10^{-5\circ} C^{-1}$

B. $6 \times 10^{-5\circ} C^{-1}$

C. $18 \times 10^{-5\circ} C^{-1}$

D. $1.2 \times 10^{-5} {}^{\circ} C^{-1}$

**Answer: A**

Watch Video Solution

**128.** Two rods of different materials having coefficient of thermal expansion $\alpha_1$ and $\alpha_2$ and Young's modulues $Y_1$ and $Y_2$ respectively are fixed betwee two rigid massive walls. The rods are heated such that these undergo same increase in temperature. there is no bending of the rods. if $\alpha_1 : \alpha_2 = 2:3$, the thermal stress developed in the two rods are equal, provided $Y_1 : Y_2$ is

A. $2:3$

B. $4:9$

C. $1:2$

D. $3:2$

**Answer: D**

Watch Video Solution

**129.** There is same change in length when a 33000 N tensile force is applied on a steel rod of area of cross-section $10^{-3}m^2$ . The change of temperature reuired to produce the same elongation, if the steel rod is

heated , if (The modulus of elasticitay is $3 \times 10^{11} N/m^2$ and the coefficient of linear expansion of steel is $11 \times 10^{-5}/^{\circ} C$).

A. $20^{\circ} C$

B. $15^{\circ} C$

C. $10^{\circ} C$

D. $0^{\circ} C$

**Answer: C**

Watch Video Solution

**130.** When the temperature of a rod increases from t to $r + \Delta t$, its moment of inertia increases from I to $I + \Delta I$. If $\alpha$ is the value of $\Delta I / I$ is

A. $2\alpha\Delta T$

B. $\alpha\Delta T$

C. $\frac{\alpha\Delta T}{2}$

D. $\frac{\Delta T}{\alpha}$

**Answer: A**

Watch Video Solution

**131.** The property of water that has an important environment effect is its

A. low surface tension

B. high heat capacity

C. maximum density at $4^{\circ} C$

D. low thermal conductivity

**Answer: C**

View Text Solution

**132.** Two rods, one of aluminium and other made of steel, having initial lengths $l_1$ and $l_2$ are connected together to form a single rod of length $(l_1 + l_2)$. The coefficient of linear expansions for aluminium and steel are $\alpha_a$ and $\alpha_s$ respectively. If length of each rod increases by same amount when their tempertures are raised by $t^\circ C$, then find the ratio $l_1(l_1 + l_2)$.

A. $\frac{\alpha_s}{\alpha_a}$

B. $\frac{\alpha_a}{\alpha_s}$

C. $\frac{\alpha_s}{\alpha_a + \alpha_s}$

D. $\frac{\alpha_a}{\alpha_a + \alpha_s}$

**Answer: C**

Watch Video Solution

**133.** A thin brass sheet at $10^\circ C$ and a thin steel sheet at $20^\circ C$ have the same surface area. The common temperature at which both would have the same area is (Coefficient of linear expansion for brass and steel are respectively, $19 \times 10^{-6/\circ} C$ are $11 \times 10^{-6/\circ} C$)

A. $-3.75^\circ C$

B. $-2.75^\circ C$

C. $+2.75^\circ C$

D. $+3.75^{\circ}C$

**Answer: A**

 Watch Video Solution

**134.** Two substance of same size are made of same material but one is hollow and the other is solid. They are heated to same temperature, then

A. the solid sphere expands more

B. the hollow sphere expands more

C. expansion is same for both

D. nothing can be said about their relative expansion if their masses are not given

**Answer: C**

Watch Video Solution

**135.** The densities of two substances are in the ratio $2:3$ and their specific heats are 0.12 and 0.09 CGS units respectively. The ratio of their thermal capacities per unit volume is

A. $8:9$

B. $1:2$

C. $3:2$

D. $4:9$

**Answer: A**

View Text Solution

**136.** Calorie is defined as the amount of heat required to raise temperature of 1 g of water by $1^{\circ}C$ and it is defined under which of the following conditions?

A. From $14.5^{\circ}C$ $\text{to}15.5^{\circ}C$ at 760 mm of Hg

B. From $98.5^{\circ}C$ $\text{to}99.5^{\circ}C$ at 760 mm of Hg

C. From $13.5^{\circ}C$ $\text{to}14.5^{\circ}C$ at 76mm of Hg

D. From $3.5^\circ C$ to$4.5^\circ C$ at 76 mm of Hg

**Answer: A**

Watch Video Solution

**137.** A metal sphere of radius r and specific heat s is rotated about an axis passing through its centre at a speed of n rotation/s. It is suddenly stopped and $50\,\%$ of its energy is used in increasing its temperature. Then, the rise in temperature of the sphere is

A. $\frac{2\pi^2 v^2 r^2}{5s}$

B. $\frac{\pi^2 v^2}{10r^2 s}$

C. $\frac{7}{8}\pi r^2 v^2 s$

D. $\frac{5\pi^2 r^2 v^2}{14s}$

**Answer: A**

Watch Video Solution

**138.** Water is used as a coolant in automobile radiators owing to its high

A. viscosity

B. surface tension

C. latent heat

D. specific heat capacity

**Answer: D**

View Text Solution

**139.** The quantities of heat required to raise the temperature of two solid copper spheres of radii $r_1$ and $r_2$ $(r_1 = 1.5r_2)$ through 1K are in ratio

A. $\frac{27}{8}$

B. $\frac{9}{4}$

C. $\frac{3}{2}$

D. 1

**Answer: A**

Watch Video Solution

**140.** The thermal capacity of 40 g of aluminium (specific heat $= 0.2 cal / gm^{\circ} C$)

A. $168 J / ^{\circ} C$

B. $672 J / ^{\circ} C$

C. $840 J / ^{\circ} C$

D. $33.6 J / ^{\circ} C$

**Answer: D**

Watch Video Solution

**141.** The letent heat of vaporisation of a substance is always

A. greater than its latent heat of fusion

B. greater than its latent heat of sublimation

C. equal to its latent heat of sublimation

D. less than its latent heat of fusion

**Answer: A**

Watch Video Solution

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**142.** The temperature of 100g of water is to be raised from $24^\circ C$ to $90^\circ C$ by adding steam to it. Calculate the mass of the steam required for this purpose.

A. 10g

B. 12g

C. 14g

D. 16g

**Answer: B**

Watch Video Solution

**143.** A piece of ice of mass $50g$ exists at a temperature of $-20^{\circ}C$. Determine the total heart required to covert it completely to steam at $100^{\circ}C$. (Specific heat capacity of ice $= 0.5cal/g-^{\circ}C$, specific latent heat of fusion for ice $= 80cal/g$ and specific latent heat of vaporization for water $= 540cal/g$).

A. 425g

B. 525g

C. 625g

D. 725g

**Answer: A**

Watch Video Solution

**144.** How many grams of ice at $-14.^{\circ} C$ are needed to cool 200 gram of water form $25.^{\circ} C$ to $10.^{\circ} C$? Take specific heat of ice $= 0.5 cal g^{-1}.^{\circ} C^{-1}$ and latant heat of ice = $80 cal g^{-1}$.

A. 11g

B. 21g

C. 31g

D. 41g

**Answer: C**

Watch Video Solution

**145.** An ice cube of mass 0.1 kg at $0^{\circ}C$ is placed in an isolated container which is at $227^{\circ}C$. The specific heat s of the container varies with temperature T according to the empirical relation $s = A + BT$, where

$A = 100cal/kg.K$ and $B = 2 \times 10^{-2} cal/kg.K^2$.

If the final temperature of the container is $27^{\circ}C$, determine the mass of the container.

(Latent heat of fusion for water = $8 \times 10^4 cal/kg$, specific heat of water $= 10^3 cal/kg.K$).

A. 0.495 kg

B. 0.595 kg

C. 0.695 kg

D. 0.795 kg

**Answer: A**

Watch Video Solution

**146.** 200g of a solid ball at $20^\circ C$ is dropped in an equal amount of water at $80^\circ C$. The resulting temperature is $60^\circ C$. This means that specific heat of solid is

A. One fourth of water

B. one half of water

C. twice of water

D. four times of water

**Answer: B**

View Text Solution

**147.** 22320 cal of heat is supplied to 100g of ice at $0^\circ C$. If the latent heat of fusion of ice is 80 cal $g^{-1}$ and latent heat of vaporization of water is 540 cal $g^{-10}$, the final amount of water thus obtained and its temperature respectively are

A. $8g, 100^\circ C$

B. $100g$, $90^\circ C$

C. $92g$, $100^\circ C$

D. $8g$, $100^\circ C$

**Answer: C**

View Text Solution

**148.** A block of ice at $-10^\circ C$ is slowly heated and converted to steam at $100^\circ C$. Which of the following curves represents the phenomenon qualitatively?

A. 

B. 

C. 

D. 

**Answer: A**

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**149.** A copper block of mass $2.5kg$ is heated in a furnace to a temperature of $500^\circ C$ and then placed on a large ice block. What is the maximum amount (approx.) of ice that can melt? (Specific heat copper $= 0.39J/g^\circ C$ heat of fusion of water $= 335J/g$).

A. 1.5kg

B. 2.5kg

C. 3.5kg

D. 4.5kg

**Answer: A**

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**150.** Rays from the sun ar focuseed by a lens of diameter 5 cm on to a block of ice and 10 g of ice is melted in 20 min. Therefore the heat from the sun reaching the earth per min per square centrimetre is (Latent heat of ice $L = 80calg^{-1}$)

A. 2.04 cal $cm^{-2}\min^{-1}$

B. 0.51 cal $cm^{-2}\min^{-1}$

C. 4.08 cal $cm^{-2}\min^{-1}$

D. 3.02 cal $cm^{-2}\min^{-1}$

**Answer: A**

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**151.** The temperature of equal masses of three different liquids A,B and C are $12^{\circ}C, 19^{\circ}C$ and $28^{\circ}C$ respectively. The temperature when A and B are mixed is $16^{\circ}C$ and

when B and C are mixed it is $23^\circ C$. What should be the temperature when A and C are mixed?

A. $18.2^\circ C$

B. $22^\circ C$

C. $20.2^\circ C$

D. $24.2^\circ C$

**Answer: C**

Watch Video Solution

**152.** Certain amount of heat is given to 100 g of copper to increase its temperature by $21^\circ C$. If same

amount of heat is given to 50 g of water, then the rise in its temperature is (specific heat capacity of copper $= 400 Jkg^{-1}K^{-1}$ and that for water $= 4200 Jkg^{-1}K^{-1}$)

A. $4^{\circ}C$

B. $5.25^{\circ}C$

C. $8^{\circ}C$

D. $6^{\circ}C$

**Answer: A**

Watch Video Solution

**153.** $0.1m^3$ of water at $80^\circ C$ is mixed with $0.3m^3$ of water at $60^\circ C$. The finial temparature of the mixture is

A. $65^\circ C$

B. $70^\circ C$

C. $60^\circ C$

D. $75^\circ C$

**Answer: A**

Watch Video Solution

**154.** The sprinkling of wate slightly reduces the temperature of a closed room because

A. temperature of water is less than that of the room

B. specific heat of water is high

C. water has large latent heat of vaporisation

D. water is a bad conductor of heat

**Answer: C**

Watch Video Solution

**155.** A piece of ice (heat capacity $= 2100 Jkg^{-1}.^{\circ} C^{-1}$ and latent heat $= 3.36 \times 10^{5} Jkg^{-1}$) of mass m grams is at $-5.^{\circ} C$ at atmospheric pressure. It is given 420 J of heat so that the ice starts melting. Finally when the ice . Water mixture is in equilibrium, it is found that 1 gm of ice has melted. Assuming there is no other heat exchange in the process, the value of m in gram is

A. 4

B. 6

C. 8

D. 10

**Answer: C**

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**156.** A wall has two layers A and B, each made of different material. Both the layers have the same thickness. The thermal conductivity of the material of A is twice that of B . Under thermal equilibrium, the temperature difference across the wall is $36^\circ C$. The temperature difference across the layer A is

A. $12^\circ C$

B. $18^\circ C$

C. $6^\circ C$

D. $24^\circ C$

**Answer: A**

Watch Video Solution

**157.** The amount of heat conducted out per second through a window, when inside temperature is $10^\circ C$ and outside temperature is $-10^\circ C$, is 1000 J. Same heat will be conducted in through the window, when outside temperature is $-23^\circ C$ and inside temperature is:

A. $23^\circ C$

B. 230K

C. 270K

D. 296K

**Answer: C**

Watch Video Solution

**158.** Two identical rectangular rods of metal are welded end to end as shown in figure (a) and 10J of heat flows through the rods in 2min. How long would it take for 30J of heat to flow through the rods if they are welded as shown in figure (b)?

A. 1.5min

B. 2.5min

C. 3.5min

D. 4.5min

**Answer: A**

View Text Solution

**159.** The coefficient of thermal conductivity of copper is nine times that of steel. In the composite cylindrical bar shown in figure, what will be the temperature at

the junction of copper and steel?

A. $75^\circ C$

B. $67^\circ C$

C. $33^\circ C$

D. $25^\circ C$

**Answer: A**

View Text Solution

**160.** Two metal rods 1 and 2 of same lengths have same temperature difference between their ends.

Their thermal conductivities are $K_1$ and $K_2$ and cross sectional areas $A_1$ and $A_2$ respectively. If the rate of heat conduction in 1 is four times that in 2, then

A. $K_1A_1 = 4K_2A_2$

B. $K_1A_1 = 2K_2A_2$

C. $4K_1A_1 = K_2A_2$

D. $K_1A_1 = K_2A_2$

**Answer: A**

Watch Video Solution

**161.** A body A of mass 0.5kg and specific heat $0.85Jg^{-1}K^{-1}$ is at a temperature of $60^{\circ}C$. Another body B of mass 0.3kg and specific heat $0.9Jg^{-1}K^{-10}$ is at a temperature of $90^{\circ}C$. When they are connected through a conducting rod, heat will flow from

A. A to B

B. B to A

C. heat can't flow

D. first from A to B, then B to A

**Answer: B**

View Text Solution

**162.** A cylinder of radius R made of a material of thermal conductivity $K_1$ is surrounded by a cylindrical shell of inner radius R and outer radius 2R made of a material of thermal conductivity $K_2$. The two ends of the combined system are maintained at two different temperatures. There is no loss of heat across the cylindrical surface and the system is in steady state. The effective thermal conductivity of the system is

A. $K_1 + K_2$

B. $\frac{K_1 K_2}{K_1 + K_2}$

C. $\frac{K_1 + 3K_2}{4}$

D. $\frac{3K_1 + K_2}{4}$

**Answer: C**

Watch Video Solution

**163.** Two metallic roads PQ and QR of different material are joined together at the junction Q as shown in figure. It is observed that if the ends P and R are kept at $100^\circ C$ and $0^\circ C$ respectively, the temperature of the junction Q is $60^\circ C$. There is no loss of heat to the surroundings. THe rod QR is replaced by another rod QR' of the same material and length (OR=QR'). If the area of cross -section of QR' is

twice that of QR and the ends P and R' are maintained at $100^\circ C$ and $0^\circ C$ respectively, the temperature of the junctions Q will be nearly

A. $29^\circ C$

B. $33^\circ C$

C. $60^\circ C$

D. $43^\circ C$

**Answer: D**

View Text Solution

**164.** The temperature of the two outer surface of a composite slab, consisting of two material having coefficients of thermal conductivity K and 2K and thickness x and 4x respectively are $T_2$ and $T_1(T_2 > T_1)$ The rate of heat transfer through the slab, in a steady state is $\left(\frac{A(T_2 - T_1)K}{x}\right)$f, with f equal to

A. 1

B. $\frac{1}{2}$

C. $\frac{2}{3}$

D. $\frac{1}{3}$

**Answer: D**

View Text Solution

**165.** Three metal rod A, B and C of same length and cross-section are placed end to end and a temperature difference is maintained between the free ends of A and C. If the thermal conductivity of $B(K_B)$ is twice that of $C(K_C)$ and half that of $A(K_A)$, then the effective thermal conductivity of the system will be

A. $\frac{K_X}{7}$

B. $\frac{6K_Y}{7}$

C. $\frac{7K_Y}{3}$

D. $7K_Z$

**Answer: B**

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**166.** The figure shows a system of two concentric spheres of radii $r_1$ and $r_2$ and kept at tempeatures $T_1$ and $T_2$ respectively. The radial rate of flow of heat in a substance between the two concentric spheres is proportional to

A. $\frac{(r_2 - r_1)}{(r_1 r_2)}$

B. $\ln\left(\frac{r_2}{r_1}\right)$

C. $\frac{r_1 r_2}{(r_2 - r_1)}$

D. $(r_2 - r_1)$

**Answer: C**

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**167.** Three metal rods of the same material and identical in all respects are joined as shown in the figure. The temperature at the ends are maintained as indicated. Assuming no loss of heat from the curved

surfaces of the rods, the temperature at the junction X would be

A. $45^\circ C$

B. $60^\circ C$

C. $30^\circ C$

D. $20^\circ C$

**Answer: B**

View Text Solution

**168.** Three rods of identical cross-sectional area made from the same metal form the sides of an isosceles triangle ABC right angled at B. The points A and B are maintained at temperature T and $\sqrt{2}T$ respectively in the steady state. Assuming that only heat conduction takes place, temperature of point C will be

A. $\frac{3T}{\sqrt{2}+1}$

B. $\frac{T}{\sqrt{2}+1}$

C. $\frac{T}{\sqrt{3}\left(\sqrt{2}-1\right)}$

D. $\frac{T}{\sqrt{2}-1}$

**Answer: A**

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**169.** Three rods of material x and three rods of material y are connected as shown in figure. All are identical in length and cross sectional area. If end A is maintained at $60^\circ C$, end E at $10^\circ C$, thermal conductivity of x is 0.92 cal $s^{-1}cm^{-1\circ}C^{-10}$ and that of y is 0.46 cal $s^{-1}cm^{-1\circ}C^{-1}$, then find the temperatures of junctions B,C,D

A. $20^2C, 30^\circ C, 20^\circ C$

B. $30^2C, 20^\circ C, 20^\circ C$

C. $20^2C, 30^\circ C, 30^\circ C$

D. $20^2C, 20^\circ C, 20^\circ C$

**Answer: B**

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**170.** $1.56 \times 10^5 J$ of heat is conducted through is $2m^2$ wall of 12 cm thick in one hour. Temperature difference between the two sides of the wall is $20^\circ C$. The thermal conductivity of the material of the wall is (in $Wm^{-1}K^{-1}$)

A. 0.11

B. 0.13

C. 0.15

D. 1.2

**Answer: B**

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**171.** Which one of the following statements is not true about thermal radiations ?.

A. The wavelength changes when it travels from one medium to another

B. The frequency changes when it travels from one medium to another

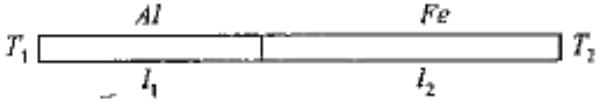
C. The speed changes when it travels from one medium to another

D. They travel in straight line in a given medium

**Answer: B**

Watch Video Solution

**172.** Consider two rods of equal cross - sectionai area A, one of Aluminium and other of iron joined end to end as shown in figure -4.8. Length of the two rods and their thermal coductivities are $l_1, k_1$and $l_2, k_2$ respectively . If the ends of the rods are maintained at temperature $T_1$ and $T_2, (T_1 > T_2)$ find the temperature of the junction in steady state .




A. $\frac{K_1T_1 + K_2T_2}{T_1 + T_2}$

B. $\frac{K_1T_1d_1 + K_2T_2d_2}{K_1d_2 + K_2d_1}$

C. $\frac{K_1T_1d_2 + K_2T_2d_1}{K_1d_2 + K_2d_1}$

D. $\frac{K_1 T_{10} + K_2 T_2}{K_1 + K_2}$

**Answer: C**

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**173.** The thermal radiation from a hot body travels with a velocity of

A. $330 ms^{-1}$

B. $2 \times 10^8 ms^{-1}$

C. $1200 ms^{-1}$

D. $3 \times 10^8 ms^{-1}$

**Answer: D**

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**174.** The absolute temperature of a body X is 4 times that of body Y. For X and Y, the difference in wavelength at which enrgy radiated is maximum is $3\mu m$. What is the wavelength (in $\mu m$) at which the body Y radiates maximum energy ?

A. 2

B. 2.5

C. 4

D. 4.5

**Answer: C**

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**175.** If wavelength of maximum intensity of radiation emitted by Sun and Moon are $0.5 \times 10^{-6}$m and $10^{-4}$ m respectively, then the ratio of their temperature is

A. $1:100$

B. $1:200$

C. $200:1$

D. $400:1$

**Answer: C**

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**176.** The maximum energy is the thermal radiation from a hot source occurs at a wavelength of $11 \times 10^{-5} cm$. According to Wien's law, the temperature of this source (on Kelvin scale) will be $n$ times the temperature of another source (on Kelvin scale) for which the wavelength at maximum energy is $5.5 \times 10^{-5} cm$. The value of $n$ is:

A. 2

B. 4

C. $1/2$

D. 1

**Answer: C**

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**177.** The surface temperature of the sun which has maximum energy emission at 500nm is 6000K. The temperature of a star which has maximum energy emission at 400nm will be

A. 8500K

B. 4500K

C. 7500K

D. 6500K

**Answer: C**

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**178.** Three stars $A, B, C$ have surface temperatures $T_A, T_B$ and $T_C$. A appaears bluish, B appears reddish and C appears yellowish. We can conclude that

A. $T_A > T_C > T_B$

B. $T_A > T_B > T_C$

C. $T_B > T_C > T_A$

D. $T_C > T_B > T_A$

**Answer: A**

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**179.** Experimental investigations show that the intensity of solar radiation is maximum for a wavelength $480nm$ in the visible ragion. Estimate the surface temperature of sun. (Given Wien's constant $b = 2.88 \times 10^{-3} mK$).

A. 4000K

B. 6000K

C. 8000K

D. $10^6 K$

**Answer: B**

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**180.** Temperature of the star is determined by

A. Planck's law

B. Wien's displacement law

C. Rayleigh Jeans law

D. Kirchhoff's law

**Answer: B**

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**181.** Which one of the following is $v_m - T$ graph for perfectly black body? $v_m$ is the frequency of radiation with maximum intensity and T is the absolute temperature.

A. A

B. B

C. C

D. D

**Answer: C**

View Text Solution

**182.** The plots of intensity of radiation versus wavelength of three black bodies at temperature $T_1, T_2$ and $T_3$ are shown. Then

A. $T_3 > T_2 > T_1$

B. $T_1 T_2 > T_3$

C. $T_2 > T_3 > T_1$

D. $T_1 > T_3 > T_2$

**Answer: D**

View Text Solution

**183.** A black body radiates heat energy at the rate of $2 \times 10^5 J/sm^2$ at the temperature of $127^\circ C$. Temperature of the black body at which rate of heat radiation $32 \times 10^5 J/sm^2$, is

A. 400K

B. 600K

C. 800K

D. 200K

**Answer: C**

View Text Solution

**184.** A thin square steel plate 10 cm on a side is heated in a black smith's forge to temperature of $800^\circ C$. If the emissivity is 0.60, what is the total rate of radiation of energy ?

A. 1402W

B. 1503W

C. 1603W

D. 1703W

**Answer: B**

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**185.** A cup of tea cools from $65.5^{\circ}$ C to $62.55^{\circ}C$ in one minute is a room at $225.^{\circ}C$. How long will the same cup of tea take to cool from $46.5^{\circ}C$ to $40.5^{\circ}C$ in the same room ? (Choose the nearest value in min).

A. 1

B. 2

C. 3

D. 4

**Answer: D**

Watch Video Solution

**186.** If the temperature of hot black body is raised by 5%, rate of heat energy radiated would be increased by how much percentage ?

A. 0.12

B. 0.22

C. 0.32

D. 0.42

**Answer: B**

Watch Video Solution

**187.** A body takes 10min to cool from $60^\circ C$ $\text{to}50^{\circ 0C}$. If the temperature of surrounding is $25^\circ C$, then temperature of body after next 10 min will be

A. $45^\circ C$

B. $42.85^\circ C$

C. $30^\circ C$

D. $32.50^\circ C$

**Answer: B**

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**188.** The temperature of two bodies A and B are respectively $727^\circ C$ and $327^\circ C$ . 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. $625 : 81$

**Answer: D**

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**189.** Two spheres of the same material have radii $1m$ and $4m$ and temperatures $4000K$ and $2000K$ respectively. The energy radiated per second by the first sphere is greater than that by the second.

A. greater than that by the second

B. less than that by the second

C. equal in both cases

D. the information is incomplete to drawn any conclusion

**Answer: C**

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**190.** Two spherical black bodies of radii $R_1$ and $R_2$ and with surface temperature $T_1$ and $T_2$ respectively radiate the same power. $R_1 / R_2$ must be equal to

A. $\left(\frac{T_1}{T_2}\right)^2$

B. $\left(\frac{T_2}{T_1}\right)^2$

C. $\left(\frac{T_1}{T_2}\right)^4$

D. $\left(\frac{T_2}{T_1}\right)^4$

**Answer: B**

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**191.** A planet is at an average distance d from the sun and its average surface temeperature is T. Assume that the planet receives energy only from the sun and loses energy only through radiation from the surface. Neglect atmospheric effects. If $T \propto d^{-n}$, the value of n is

A. 2

B. 1

C. $\frac{1}{2}$

D. $\frac{1}{4}$

**Answer: C**

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**192.** A hot liquid kept in a beaker cools from $80^\circ C$ to $70^\circ C$ in two minutes. If the surrounding temperature is $30^\circ C$, find the time of coolilng of the same liquid from $60^\circ C$ to $50^\circ C$.

A. 240s

B. 360s

C. 480s

D. 216s

**Answer: D**

Watch Video Solution

**193.** A bucket full of hot water is kept in a room and it cools from 75°C to 70°C in T1 minutes, from 70°C to 65°C in $T_2$ minutes and from 65°C to 60°C in $T_3$ minutes. Then –

A. $t_1 = t_2 = t_3$

B. $t_1 <_2 >_3$

C. $t_1 >_2 >_3$

D. $t_1 <_2 <_3$

**Answer: D**

Watch Video Solution

**194.** Two black bodies at temperature $327^\circ C$ and $427^\circ C$ are kept in an evacuated chamber at $27^\circ C$. The ratio fo their rates of loss of heat is

A. $\left(\frac{6}{7}\right)$

B. $\left(\frac{6}{7}\right)^2$

C. $\left(\frac{6}{7}\right)^3$

D. $\frac{243}{464}$

**Answer: D**

View Text Solution

**195.** The temperature of a body is increased from $-73^{\circ}C$ to 327°C. Then the ratio of emissive power is –

A. $27:1$

B. $81:1$

C. $1:27$

D. $1:81$

**Answer: D**

Watch Video Solution

**196.** According to Newton's law of cooling, the rate of cooling of a body is proportional to $(\Delta\theta)^n$, where $\Delta\theta$

is the difference of the temperature of the body and the surroundings, and n is equal to

A. three

B. two

C. one

D. four

**Answer: C**

Watch Video Solution

**197.** Two spherical bodies A (radius 6cm) and B (radius 18cm) are at temperature $T_1$ and $T_2$ respectively The

maximum intensity in the emission spectrum of A is at $500nm$ and in that of $B$ is at $1500nm$ considering them to be black bodies, what will be the ratio of the rate of total energy radiated by A to that of $B$ . ?

A. 9

B. 12

C. 3

D. 6

**Answer: A**

Watch Video Solution

**198.** A pan pizza cools from $91^\circ C$ to $79^\circ C$ in 2 minutes, on a summer day, when the room temperature is $25^\circ C$. How long will the pan pizza take to cool from $91^\circ C$ to $79^\circ C$, on a winter day, when the room temperature is $5^\circ C$?

A. $\frac{3}{2}$ minutes

B. 1 minutes

C. $\frac{1}{2}$ minutes

D. $\frac{1}{4}$ minutes

**Answer: A**

View Text Solution

**199.** A spherical body of 5 cm radius is maintained at a temperature of $327^{\circ}C$. The wavelength at which maximum energy radiated will be nearly $\left(b = 2.898 \times 10^{-3} m \quad K\right)$

A. 1.72W

B. 2.73W

C. 11.0W

D. 2.15W

**Answer: C**

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**200.** The temperature at which a black body ceases to radiate energy is .

A. 0K

B. 273K

C. 30K

D. 400K

**Answer: A**

Watch Video Solution

Check Your Neet Vitals

**1.** Two wires of the same material and length but diameters in the ratio 1 : 2 are stretched by the same force. The potential energy per unit volume for the two wire when stretched will be in the ratio

A. $81:1$

B. $4:1$

C. $2:1$

D. $1:1$

**Answer: A**

Watch Video Solution

**2.** A thick rope of rubber of density $1.5 \times 10^3 kgm^{-3}$ and Young's modulus $5 \times 10^6 Nm^{-2}$, 8 m in length, when hung from ceiling of a room, the increases in length due to its own weight is

A. $9.6 \times 10^{-2} m$

B. $9.6 \times 10^{-50m}$

C. $9.6 \times 10^{-7} m$

D. 9.6m

**Answer: A**

Watch Video Solution

**3.** Two glass plates are separated by water. If surface tension of water is $75dyn/cm$ and the area of each plate wetted by water is $8cm^2$ and the distance between the plates is $0.12mm$, then the force applied to separate the two plates is

A. $10^2$ dyne

B. $10^4$ dyne

C. $10^5$ dyne

D. $10^6$ dyne

**Answer: C**

Watch Video Solution

**4.** Calculate the rate of flow of glycerine of density $1.25 \times 10^3 kgm^{-3}$ through the conical section of a pipe, if the radii of its ends are$0.1$ m and $0.04$ m and the pressure drop across its length is $10Nm^{-2}$.

A. $5.28 \times 10^{-4} m^3 s^{-1}$

B. $6.28 \times 10^{-4} m^3 s^{-1}$

C. $7.28 \times 10^{-4} m^3 s^{-1}$

D. $8.28 \times 10^{-4} m^3 s^{-1}$

**Answer: B**

Watch Video Solution

**5.** Water rises in a capillary tube a height h. Choose false statement regarding capillary rise from the following.

A. On the surface of the Jupiter, height is less than h

B. In a lift, moving up with constant acceleration, height is less than h

C. On the surface of the moon, the height is more than h

D. In a lift moving down with constant acceleration, height is less than h

**Answer: D**

Watch Video Solution

**6.** A frame made of metallic wire enclosing a surface area A is covered with a soap film. If the area of the frame of metallic wire is reduced by 25%, the energy of the soap film will be changed by

A. 1

B. 0.75

C. 0.5

D. 0.25

**Answer: C**

Watch Video Solution

**7.** A water drop is divided into 8 equal droplets. The pressure difference between the inner and outer side of the big drop will be

A. same as for smaller droplet

B. $\frac{1}{2}$ of that for smaller droplet

C. $\frac{1}{4}$ of that for smaller droplet

D. twice that for smaller droplet

**Answer: B**

Watch Video Solution

**8.** The terminal speed of a sphere of gold (density = 19.5 kg $m^{-3}$) is 0.2 $ms^{-1}$ in a viscous liquid (density = 1.5 kg $m^{-3}$). Then, the terminal speed of a sphere of silver (density = 10.5 kg $m^{-3}$) of the same size in the same liquid is

A. $0.4ms^{-1}$

B. $0.133ms^{-1}$

C. $0.1ms^{-1}$

D. $0.2ms^{-1}$

**Answer: C**

Watch Video Solution

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

A. 2.5cm

B. 5cm

C. 10cm

D. 0.25cm

**Answer: A**

Watch Video Solution

**10.** A uniform plant of Young's modulus Y is moved over a smooth horizontal surface by a constant horizontal force F. The area of cross section of the plank is A. The compressive strain on the plank in the direction of the force is

A. $\frac{F_0}{AY}$

B. $\frac{2F_0}{AY}$

C. $\frac{F_0}{2AY}$

D. $\frac{3F_0}{2AY}$

**Answer: C**

Watch Video Solution

**11.** On a temperature scale Y, water freezes at $-160^\circ Y$ and boils at $-50^\circ Y$. On this Y scale, a temperature of 340K is

A. $-106.3^\circ Y$

B. $-96.3^\circ Y$

C. $-86.3^\circ Y$

D. $-76.3^\circ Y$

**Answer: C**

View Text Solution

**12.** Two rods of lengths $L_1$ and $L_2$ are welded together to make a composite rod of length $(L_1 + L_2)$. If the coefficient of linear expansion of the materials of the rod are $\alpha_1$ and $\alpha_2$ respectively. The effective coefficient of linear expansion of the composite rod is

A. $\frac{\alpha_1 + \alpha_2}{2}$

B. $\sqrt{\alpha_1 + \alpha_2}$

C. $\frac{L_1\alpha_2 + L_2\alpha_1}{L_1 + L_2}$

D. $\frac{L_1\alpha_1 + L_2\alpha_2}{L_1 + L_2}$

**Answer: D**

Watch Video Solution

**13.** Temperature of 100 g of water in a thermoflask remains fixed for a pretty long time at $50^\circ C$. An equal mass of sand at $20^\circ C$ is poured in the flask and shaken for some time so that the temperature of the mixture is $40^\circ$. Now the experiment is repeated with 100g of a liquid at $50^\circ C$ and an equal amount of

sand at $20^\circ C$ when the temperature of the mixture is found to be $30^\circ C$ The specific heat of the liquid $(\in KJ/KgxK)$ is

A. 1.05

B. 2.01

C. 1.55

D. 1.95

**Answer: A**

Watch Video Solution

**14.** Two slabs A and B of different materials but of the same thicknesss are joined end to end to form a composite slab. The thermal conductivities of A and B are $K_1$ and $K_2$ respectively. A steady temperature difference of $12^\circ$C is maintained across the composite slab. If $K_1 = \frac{K_2}{2}$, the temperature difference across slabs A is

A. $4^\circ C$

B. $6^\circ C$

C. $8^\circ C$

D. $10^\circ C$

**Answer: C**

Watch Video Solution

**15.** An ideal gas is expanding such that $PT^2 =$ constant. The coefficient of volume expansion of lthe gas is:

A. $\frac{1}{T}$

B. $\frac{2}{T}$

C. $\frac{3}{T}$

D. $\frac{4}{T}$

**Answer: D**

Watch Video Solution

**16.** 7500 cal of heat is supplied to 100g of ice $0^\circ C$. If the latent heat of fusion of ice is 80 cal $g^{-1}$ and latent heat of vaporization of water is 540 cal $g^{-1}$, the final temperature of water is

A. $100^\circ C$

B. $90^\circ C$

C. $0^\circ C$

D. $20^\circ C$

**Answer: C**

View Text Solution

**17.** When a liquid is heated in a glass vessel, its coefficient of apparent expension is $1.03 \times 10^{-3} / {}^{\circ} C$. When the same liquid is heated in a copper vessel, its coefficient of apparent expansion is $1.006 \times 10^{-3} / {}^{\circ} C$. If the coefficient of linear expension of copper is $17 \times 10^{-6} / {}^{\circ} C$, then the coefficient of linear expansion of glass

A. $8.5 \times 10^{-4} {}^{\circ} C^{-1}$

B. $9 \times 10^{-6} {}^{\circ} C^{-1}$

C. $27 \times 10^{-6} {}^{\circ} C^{-1}$

D. $10 \times 10^{-4} {}^{\circ} C^{-1}$

**Answer: B**

Watch Video Solution

**18.** A lead bullet of unknown mass is fired with a speed of $180 ms^{-1}$ into a tree in which it stops. Assuming that in this process two third of heat produced goes into the bullet and one third into wood. The temperature of the bullet raises by (Specific heat of lead = 0.12J $g^{-1} {}^{\circ} C^{-1}$)

A. $140^{\circ} C$

B. $106^\circ C$

C. $90^\circ C$

D. $100^\circ C$

**Answer: C**

View Text Solution

**19.** The fraction of the volume of a glass flask must be filled with mercury so that the volume of the empty space may be the same at all temperature is $\left(\alpha_{\text{glass}} = 9 \times 10^{-6}/^0 C, \gamma_{Hg} = 18.9 \times 10^{-5}/^0 C\right)$

A. $\frac{1}{2}$

B. $\frac{1}{7}$

C. $\frac{1}{4}$

D. $\frac{1}{5}$

**Answer: B**

Watch Video Solution

**20.** A block of aluminium of mass 1 kg and volume $3.6 \times 10^{-4} m^3$ is suspended from a string and then completely immmersed in a container of water. The decreases in tension in the string after immersion is (use $g = 10 ms^{-2}$)

A. 9.8N

B. 6.2N

C. 3.6N

D. 1.0 N

**Answer: C**

Watch Video Solution

**21.** A vertical capillary is brought in contact with the water surface (surface tension = T). The radius of the capillary is r and the contact angle $\theta = 0^\circ$. The

increase in potential energy of the water (density $= \rho$) is

A. independent of $\rho$

B. independent of r

C. independent of T

D. zero

**Answer: B**

 Watch Video Solution

**22.** A man grows into a giant such that his linear dimension increase by a factor of 9. Assuming that his

density remains same, the stress in the leg will change by a factor of

A. 9

B. $1/9$

C. 81

D. $1/81$

**Answer: A**

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Aipmt Neet Mcqs

**1.** The total radiant energy per unit area, normal to the direction of incidence, received at a distance $R$ from the centre of a star of radius $r$ whose outer surface radiates as a black body at a temperature $TK$ is given by

(where $\sigma$ is Stefan's constant)

A. $\frac{\sigma r^2 T^4}{R^2}$

B. $\frac{\sigma r^2 T^4}{4\pi r^2}$

C. $\frac{\sigma r^4 T^4}{r^4}$

D. $\frac{4\pi\sigma r^2 T^4}{R^2}$

**Answer: A**

Watch Video Solution

**2.** A cylindrical metallic rod in thermal contact with two reservoirs of heat at its two ends conducts an amount of heat Q in time t. The metallic rod is melted and the material is formed into a rod of half the radius of the original rod. What is the amount of heat conducted by the new rod, when placed in thermal contact with the two reservoirs in time t?

A. $\frac{Q}{4}$

B. $\frac{Q}{16}$

C. 2Q

D. $\frac{Q}{20}$

**Answer: B**

Watch Video Solution

**3.** When $1kg$ of ice at $0^\circ C$ melts to water at $0^\circ C$, the resulting change in its entropy, taking latent heat of ice to be $80cal/g$ is

A. 273cal/K

B. $8 \times 10^4$ cal/K

C. 80cal/K

D. 293 cal/K

**Answer: D**

Watch Video Solution

**4.** If the radius of a star is $R$ and it acts as a black body, what would b the temperature of the star, in which the rate of energy production is $Q$?

A. $\frac{Q}{4\pi R^2\sigma}$

B. $\left(\frac{Q}{4\pi R^2\sigma}\right)^{-1/2}$

C. $\left(\frac{4\pi R^2 Q}{\sigma}\right)^{1/4}$

D. $\left(\frac{Q}{4\pi R^2\sigma}\right)^{1/4}$

**Answer: D**

Watch Video Solution

**5.** Liquid oxygen at $50K$ is heated to $300K$ at constant pressure of $1atm$. The rate of heating is constant. Which of the following graphs represents the variation of temperature with time?

A. 

B. 

C. 

D. 

**Answer: A**

Watch Video Solution

**6.** A slab of stone of area of $0.36m^2$ and thickness $0.1m$ is exposed on the lower surface to steam at $100^\circ C$. A block of ice at $0^\circ C$ rests on the upper surface of the slab. In one hour $4.8kg$ of ice is melted. The thermal conductivity of slab is

(Given latent heat of fusion of ice $= 3.63 \times 10^5 Jkg^{-1}$)

A. 1.24 J/m/s/$^\circ C$

B. 1.29 J/m/s/$^\circ C$

C. 2.05 J/m/s/$^\circ C$

D. 1.02

**Answer: A**

Watch Video Solution

**7.** The wattability of a surface by a liquid depends primarily on

A. density

B. angle of contact between the surface and the liquid

C. viscosity

D. surface tension

**Answer: B**

Watch Video Solution

**8.** The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?

A. length= 200cm, diameter = 2mm

B. length= 300cm, diameter =3mm

C. length= 50cm, diameter = 0.5mm

D. length= 100cm, diameter = 1mm

**Answer: C**

Watch Video Solution

**9.** A piece of iron is heated in a flame. It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is possible by using.

A. Kirchhoff's law

B. Newton's law of cooling

C. Stefan's law

D. Wien's displacement law

**Answer: D**

Watch Video Solution

**10.** Copper of fixed volume $V$ is drawn into wire of length l. When this wire is subjected to a constant force F, the extension produced in the wire is $\triangle l$. Which of the following graphs is a straight line?

A. $\Delta l \text{versus} 1/l$

B. $\Delta l \text{versus} 1/l^2$

C. $\Delta l \text{versus} 1/l^2$

D. $\Delta l \text{versus} l$

**Answer: B**

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**11.** A certain number of spherical drops of a liquid of radius $r$ coalesce to form a single drop of radius $R$ and volume $V$. If $T$ is the surface tension of the liquid, then

A. energy $4VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released

B. energy $3VT\left(\frac{1}{r}+\frac{1}{R}\right)$ is absorbed

C. energy $3VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released

D. energy is neither released nor absorbed

**Answer: C**

Watch Video Solution

**12.** Stream at $100^\circ C$ is passed into 20 g of water at $10^\circ C$. When water acquires a temperature of $80^\circ C$, the mass of water present will be [Take specific heat of water $= 1 cal g^{-1}.^\circ C^{-1}$ and latent heat of steam $= 540 cal g^{-1}$]

A. 24g

B. 31.5g

C. 42.5g

D. 22.5g

**Answer: D**

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Watch Video Solution

**13.** Certain quantity of water cools from $70^\circ C$ to $60^\circ C$ in the first $5$ minutes and to $54^\circ C$ in the next $5$ minutes. The temperature of the surrounding is

A. $45^\circ C$

B. $20^\circ C$

C. $42^\circ C$

D. $10^\circ C$

**Answer: A**

Watch Video Solution

**14.** The two ends of a metal rod are maintained at temperatures $100^\circ C$ and $110^\circ C$ . The rate of heat flow in the rod is found to be $4.0 j / s$. If the ends are maintaind at temperatures $200^\circ C$ and $210^\circ C$, the rate of heat flow will be :

A. 8.0 J/s

B. 4.0 J/s

C. 44.0 J/s

D. 16.8 J/s

**Answer: B**

Watch Video Solution

**15.** A wind with speed $40m/s$ blows parallel to the roof of a house. The area of the roof is $250m^2$ . Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be : $\left(\rho_{air} = 1.2kg/m^3\right)$

A. $2.4 \times 10^5 N$, upwards

B. $2.4 \times 10^5 N$, downwards

C. $4.8 \times 10^5 N$, downwards

D. $4.8 \times 10^5 N$, upwards

**Answer: A**

Watch Video Solution

**16.** On observing light from three different stars $P$, $Q$ and $R$, it was found that intensity of violet colour is maximum in the spectrum of $P$, the intensity of green colour is maximum in the spectrum of $R$ and the intensity of red colour is maximum in the spectrum of $Q$. if $T_P$, $T_Q$ and $T_R$ are respective absolute temperature of $P$, $Q$ and $R$. then it can be concluded from the above observation that

A. $T_P < T_R < T_Q$

B. $T_P < T_Q < T_R$

C. $T_P > T_Q > T_R$

D. $T_P > T_R > T_Q$

**Answer: D**

Watch Video Solution

**17.** The approximate depth of an ocean is 2700 m. The compressibility of water is $45.4 \times 10^{-11} Pa^{-1}$ and density of water is $10^3 kg/m^3$. What fractional compression of water will be obtained at the bottom of the ocean ?

A. $1.2 \times 10^{-2}$

B. $1.4 \times 10^{-2}$

C. $0.8 \times 10^{-2}$

D. $1.0 \times 10^{-2}$

**Answer: A**

Watch Video Solution

**18.** The cylinderical tube of a spray pump has radius R, One end of which has n fine holes, each of radius r. If the speed of the liquid in the tube is V, the speed of the ejection of the liquid through the holes is :

A. $\frac{VR^2}{n^3r^2}$

B. $\frac{V^2R}{nr}$

C. $\frac{VR^2}{n^2r^2}$

D. $\frac{VR^2}{nr^2}$

**Answer: D**

Watch Video Solution

**19.** Water rises to height $h$ in capillary tube. If the length of capillary tube above the surface of water is made less than $h$ then

A. water rises upto a point a little below the top and stays there

B. water does not rise at all

C. water rises upto the tip of capillary tube and then starts overflowing like a fountain

D. water rises upto the top of capillary tube and stays there without overflowing

**Answer: D**

Watch Video Solution

**20.** The value of coefficient of volume expansion of glycerin is $5 \times 10^{-4} K^{-1}$. The fractional change in

the density of glycerin for a rise of $40^{\circ}C$ in its temperature is

A. 0.025

B. 0.01

C. 0.015

D. 0.02

**Answer: D**

Watch Video Solution

**21.** The Young's modulus of steel is twice that of brass. Two wires of the same length and of the same area of

cross section, one of steel and another of brass are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weight added to the steel and brass wires must be in the ratio of

A. $4:1$

B. $1:1$

C. $1:2$

D. $2:1$

**Answer: D**

Watch Video Solution

**22.** Coefficient of linear expansion of brass and steel rods are $\alpha_1$ and $\alpha_2$. Length of brass and steel rods are $l_1$ and $l_2$ respectively. If $(l_2 - l_1)$ is maintained same at all temperature, which one of the following relations holds good?

A. $\alpha_1^2 l_2 = \alpha_2^2 l_1$

B. $\alpha_1 l_1 = \alpha_2 l_2$

C. $\alpha_1 l_2 = \alpha_2 l_1$

D. $\alpha_1 l_2^2 = \alpha_2 l_1^2$

**Answer: B**

Watch Video Solution

**23.** A piece of ice falls from a height $h$ so that it melts completely. Only one-quarter of the heat produced is absobed by the ice and all energy of ice gets converted into heat during its fall. The value of $h$ is [Latent heat of ice is $3.4 \times 10^5 J/kg$ and $g = 10N/kg$]

A. 136km

B. 68km

C. 34km

D. 544km

**Answer: A**

Watch Video Solution

**24.** A black body is at a temperature of $5760K$. The energy of radiation emitted by the body at wavelength $250nm$ is $U_1$ at wavelength $500nm$ is $U_2$ and that at $1000nm$ is $U_3$. Wien's consant, $b = 2.88 \times 10^6 nmK$. Which of the following is correct?

A. $U_1 > U_2$

B. $U_2 > U_1$

C. $U_1 = 0$

D. $U_3 = 0$

**Answer: B**

Watch Video Solution

**25.** Two non-mixing liquids of densities $\rho$ and $(n > 1)$ are put in a container. The height of each liquid is $h$. A solid cylinder of length $L$ and density $d$ is put in this container. The cylinder floats with its axis vertical and length $pL(p < 1)$ in the denser liquid. The density $d$ is equal to :

A. $\{2 + (n-1)p]\rho$

B. $\{1 + (n-1)p\}\rho$

C. $(1 + (n+1)p\}\rho$

D. $\{2+(n+1)p\}\rho$

**Answer: B**

 Watch Video Solution

**26.** A rectangular film of liquid is extended from $(4cm \times 2cm)$ to $(5cm \times 4 \times cm)$. If the work done is $3 \times 10^{-4} J$, the value of the surface tension of the liquid is

A. $0.250 Nm^{-1}$

B. $0.125 Nm^{-1}$

C. $0.2 Nm^{-1}$

D. $8.0Nm^{-1}$

**Answer: B**

Watch Video Solution

**27.** Three liquids of densities $\rho_1, \rho_2$ and $\rho_3$ (with $\rho_1 > \rho_2 > \rho_3$), having the same value of surface tension T, rise to the same height in three identical capillaries. The angles of contact $\theta_1, \theta_2$ and $\theta_3$ obey

A. $\frac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$

B. $0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$

C. $\frac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$

D. $\pi > \theta_1 > \theta_2 > \theta_3 > \frac{\pi}{2}$

**Answer: B**

Watch Video Solution

**28.** Two identical bodies are made of a material for which the heat capacity increases with temperature. One of these is at $100^\circ C$. While the other one is at $0^\circ C$. If the two bodies are brought into contact, then assuming no heat loss, the final common temperature is

A. $50^\circ C$

B. more than $50^\circ C$

C. less than $50^\circ C$ but greater than $0^\circ C$

D. $0^\circ C$

**Answer: B**

Watch Video Solution

**29.** A body cools from a temperature $3T$ to $2T$ in $10$ minutes. The room temperature is $T$. Assume that Newton's law of cooling is applicable. The temperature of the body at the end of next $10$ minutes will be

A. $\frac{7}{4}T$

B. $\frac{3}{2}T$

C. $\frac{4}{3}T$

D. T

**Answer: B**

Watch Video Solution

**30.** Two rods A and B of different material are welded together as shown in figure. Their thermal conductivities are $K_1$ and $K_2$. The thermal

conductivity of the composite rod will be

A. $\frac{3(K_1 + K_2)}{2}$

B. $K_1 + K_2$

C. $2(K_1 + K_2)$

D. $\frac{K_1 + K_2}{2}$

**Answer: D**

View Text Solution

**31.** A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were

halved and the temperature doubled, the power radiated in watt would be

A. 450

B. 1000

C. 1800

D. 225

**Answer: C**

Watch Video Solution

**32.** The bulk modulus of a spherical object is $B$ if it is subjected to uniform pressure $p$, the fractional

decrease in radius is:

A. $\frac{B}{3p}$

B. $\frac{3p}{B}$

C. $\frac{p}{3B}$

D. $\frac{p}{B}$

**Answer: C**

Watch Video Solution

**33.** A U tube with both ends open to the atmosphere, is partially filled with water. Oil, which is immiscible with water, is poured into one side until it stands at a

distance of 10mm above the water level on the other side. Meanwhile the water rises by 65 mm from its original level (see diagram). The density of the oil is

A. $425kgm^{-3}$

B. $800kgm^{-3}$

C. $928kgm^{-3}$

D. $650kgm^{-3}$

**Answer: C**

View Text Solution

**34.** A small sphere falls from rest in a viscous liquid. Due to frication, heat is produced. Find the relation between the rate of production of heat and the radius of the sphere at terminal velocity.

A. $r^3$

B. $r^2$

C. $r^5$

D. $r^4$

**Answer: C**

Watch Video Solution

**35.** Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area A and wire 2 has cross-sectional area 3A. If the length of wire 1 increases by $\Delta x$ on applying force F, how much force is needed to stretch wire 2 by the same amount?

A. 9F

B. 6F

C. 4F

D. F

**Answer: A**

Watch Video Solution

**36.** The power radiated by a black body is 'P' and it radiates maximum energy around the wavelength $lmbda_0$ If the temperature of the black body is now changed so that it raddiates maximum energy around a wavelength

$\lambda_0 / 2$ the power radiated becomes .

A. $\frac{3}{4}$

B. $\frac{4}{3}$

C. $\frac{256}{81}$

D. $\frac{81}{256}$

**Answer: C**

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**37.** A copper rod of 88 cm and an aluminium rod of unknown length have their increase in length independent of increase in temperature. The length of aluminium rod is $\left(\alpha cu = 1.7 \times 10^{-5} K^{-1} \text{ and } \alpha Al = 2.2 \times 10^{-5} K^{-1}\right)$

A. 68cm

B. 6.8cm

C. 113.9cm

D. 88cm

**Answer: A**

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**38.** A small hole of area of cross-section 2 $mm^2$ present near the bottom of a fully filled open tank of height 2. Taking g=10$m/s^2$, the rate of flow of water through the open hole would be nearly

A. $6.4 \times 10^{-6} m^3/s$

B. $12.6 \times 10^{-6} m^3/s$

C. $8.9 \times 10^{-6} m^3/s$

D. $2.23 \times 10^{-6} m^3 / s$

**Answer: B**

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**39.** When a block of mass M is suspended by a long wire of length L, the length of the wire becomes (L+l). The elastic potential energy stored in the extended wire is

A. $\frac{1}{2} MgL$

B. Mgl

C. MgL

D. $\frac{1}{2}$ Mgl

**Answer: D**

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**40.** A soap bubble, having radius of 1 mm, is blown from a detergent solution having radius of 1 mm is blown from a detergent solution having a surface tension of $2.5 \times 10^{-2} N/m$. The pressure inside the bubble equals at a point $Z_0$ below the free surface of water in a container. Taking $g = 10 m/s^2$, density of water $= 10^3 kg/m^3$, the value of $Z_0$ is :

A. 0.5cm

B. 100cm

C. 10cm

D. 1cm

**Answer: D**

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