PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

SURFACE TENSION

Example

1. A U-shaped wire is dipped in a soap solution, and removed. A thin soap film formed between

the wire and a light slider supports a weight of $1.5 \times 10^{-2} N$ (which includes the small weigh of the slider). The length of the slider is 30cm. What is the surface tension of the film?

A. $5.6 \times 10^{-4} Nm^{-1}$

B. $3.8 \times 10^{-6} Nm^{-1}$

C. $2.5 \times 10^{-2} Nm^{-1}$

D. $7.3 \times 10^{-5} Nm^{-1}$

Answer: C

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2. A rectangular plate of dimension $6cm \times 4cm$ and thickness $2mm$ is placed with its largest face flat on the surface of water. Find the downward force on the plate due to surface tension. Surface tension of water is $7.0 \times 10^{-2} Nm^{-1}$.

A. $1.8 \times 10^{-2} N$

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

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

D. $2.5 \times 10^{-2} N$

Answer: B

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3. What should be the pressure inside a small air bubble of 0.1 mm radius situated just below the water surface? Surface tension of water is $7.2 \times 10^{-2} Nm^{-1}$ and atmospheric pressure is $1.013 \times 10^{5} Nm^{-2}$.

A. $2.13 \times 10^{3} Nm^{-2}$

B. $1.027 \times 10^{5} Nm^{-2}$

C. $2.5 \times 10^5 Nm^{-2}$

D. $1.5 \times 10^{-2} Nm^{-2}$

Answer: B

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4. What is the excess pressure inside a bubble of soap solution of radius 5.00mm, given that the surface tension of soap solution at the temperature $(20^\circ C)$ is $2.50 \times 10^{-2} Nm^{-1}$? If an air bubble of the same dimension were

formed at a depth of 40.0 cm inside a container containing the soap solution (of relative density 1.20), what would be the pressure inside the bubble? (1atm. is $1.01 \times 10^5 Pa$).

A. $2 \times 10^4 Pa$

B. $1.06 \times 10^5 Pa$

C. $3 \times 10^4 Pa$

D. $5 \times 10^3 Pa$

Answer: B

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5. What will happen to the motor bike, if some water is poured in its machinery parts?

A. Machinery parts are jammed due to decrease in surface tension

B. Machinery parts are jammed due to decrease calorific value

C. Machinery parts are jammed due to increase in surface tension

D. nothing will happen

Answer: A

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6. A rectangular film of liquid is extended from $5cm \times 3cm \rightarrow 6cm \times 5cm$. If the work done is $3.0 \times 10^{-4} J$. The surface tension of liquid is

A. $0.5 Nm^{-1}$

B. $0.1 Nm^{-1}$

C. $0.2Nm^{-1}$

D. $2Nm^{-1}$

Answer: B

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7. How much work will be done in increasing the diameter of a soap bubble from 2cm to 5cm? Surface tension solution is $3.0 \times 10^{-2} N/m.$

A. $3.2 \times 10^{-4} J$

B. $3.9 \times 10^{-4} J$

C. $4.2 \times 10^{-4} J$

D. $4.7 \times 10^{-4} J$

Answer: B

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8. Calculate the energy released when 1000 small water drops each of same radius $10^{-7} m$

coalesce to form one large drop. The surface tension of water is $7.0 \times 10^{-2} N/m$.

A. $7 \times 10^{-12} J$

B. $7.5 \times 10^{-12} J$

C. $7.9 \times 10^{-12} J$

D. $8.5 \times 10^{-12} J$

Answer: C

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9. Two mercury droplets of radii 0.1 cm and 0.2 cm collapse into one single drop. What amount of energy is released? The surface tension of mercury $T = 435.5 \times 10^{-3} Nm^{-1}$

A. $3.22 \times 10^{-6} J$

B. $4 \times 10^{-4} J$

C. $9 \times 10^{-3} J$

D. $6 \times 10^{-4} J$

Answer: A

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10. In figures, the contact angle between water and glass is

A. acute

B. obtuse

C. right angled

D. Neither (a) nor (b)

Answer: A

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11. The lower end of a capillary tube is dipped into water and it is seen that water rises through 7.5 cm in the capillary. Given surface tension of water is $7.5 \times 10^{-2} N/m$ and angle of contact between water and glass capillary tube is zero, What will be diameter of the capillary tube ? (Given, $g = 10 ms^{-2}$)

A. 0.2 mm

B. 0.3 mm

C. 0.4 mm

D. 0.5 mm

Answer: C

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Exercise 1

1. Surface tension vanishes at

A. absolute zero temperature

B. transition temperature

C. critical temperature

D. None of these

Answer: C

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2. The diameter of one drop of water is 0.2 cm. The work done in breaking one drop into 1000 droplets will be (Given, $S_{\text{water}} = 7 \times 10^{-2} Nm^{-1}$)

A. $7.9 \times 10^{-6} J$

B. $5.92 \times 10^{-6} J$

C. $2.92 \times 10^{-6} J$

D. $1.92 \times 10^{-6} J$

Answer: A

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3. The surface tension of a liquid is 5 Newton per metre. If a film is held on a ring of area $0.02 metres^2$, its surface energy is about :

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

B. $2.5 \times 10^{-3} J$

C. $2 \times 10^{-1} J$

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

Answer: C

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4. A water film is formed between two parallel wires of 10 cm length. The distance of 0.5 cm between the wires is increased by 1mm. What

will be the work done ? (Given, surface tension of water of $72Nm^{-1}$)

A. 288 erg

B. 144 erg

C. 72 erg

D. 36 erg

Answer: B

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5. The work done in blowing a soap bubble of volume V is W. The work done in blowing a soap bubble of volume $2V$ is

A. W

B. 2W

C. $\sqrt{2}W$

D. $4^{1/3}W$

Answer: D

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6. 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

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7. Two liquid drop have diameters of 1 cm and 1.5 cm. The ratio of excess pressures inside them is

A. $1:1$

B. $5:3$

C. $2:3$

D. $3:2$

Answer: D

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8. What should be the pressure inside a small air bubble of 0.1 mm radius situated just below the water surface? Surface tension of water is $7.2 \times 10^{-2} Nm^{-1}$ and atmospheric pressure is $1.013 \times 10^{5} Nm^{-2}$.

A. $2.012 \times 10^{5} Nm^{-2}$

B. $2.012 \times 10^{4} Nm^{-2}$

C. $1.027 \times 10^{5} Nm^{-2}$

D. $1.027 \times 10^{4} Nm^{-2}$

Answer: C

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9. 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

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10. A glass tube of uniform internal radius r has a valve separating the two identical ends. Initially, the valve is in a tightly closed position. End 1 has a hemispherical soap bubble of radius r.

End 2 has sub-hemispherical soap bubble as shown in the figure. Just after opening the valve,

A. air from End 1 flows towards End 2. No change in the volume of the soap bubbles

B. air from End 1 flows towards End 2. Volume of the soap bubble at End 1 decreases

C. air from End 2 flows towards End 1. Volume of the soap bubble at End 1 increases

D. no change occurs

Answer: D

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11. Match the following columns.

A. A-1, B-3, C-1

B. A-1, B-2, C-3

C. A-1, B-1, C-3

D. A-2, B-1, C-3

Answer: A

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12. Find the difference of air pressure between the inside and outside of a soap bubble is 5mm in diameter, if the surface tension is $1.6Nm^{-1}$.

A. $2560Nm^{-2}$

B. $3720Nm^{-2}$

C. $1208Nm^{-2}$

D. $10132Nm^{-2}$

Answer: A

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13. If R is the radius of a soap bubble and S its surface tension, then the excess pressure inside is

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

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

C. $\frac{4S}{R}$

D. $\frac{S}{R}$

Answer: C

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14. The excess pressure inside one soap bubble is three times that inside a second bubble. The ratio of the volume of first bubble to that of the second

A. $1:3$

B. $1:9$

C. $1:27$

D. $9:1$

Answer: C

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15. There is a small bubble at one end and bigger bubble at other end of a rod. What will

happen ?

A. Smaller will grow until that collapse

B. Bigger will grow until they collapse

C. Remain in equilibrium

D. None of the above

Answer: B

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16. Pressure inside two soap bubbles are 1.01 and 1.02 atmospheres. Ratio between their volumes is

A. 2

B. 4

C. 6

D. 8

Answer: A

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17. A thread is tied slightly loose to a wire frame as shown in the figure and the frame is dipped into a soap solution and taken out. The frame is completely covered with the film. When the portion A is punctured with a pin, the thread

A. become concave towards A

B. becomes convex towards A

C. either (a) or (b) depending on the position of A with respect to B

D. remains in the initial position

Answer: C

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18. If two soap bubbles of different radii are connected by a tube

A. air flows from the bigger bubble to the smaller bubble till the sizes become equal

B. air flows from bigger bubble to the smaller bubble till the sizes are interchanged

C. air flows from the smaller bubble to the smaller bubble till the sizes are interchanged

D. there is no flow of air

Answer: C

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19. The figure shows three soap bubbles A, B and C prepared by blowing the capillary tube fitted with soap cocks S, S_1, S_2 and S_3. With soap cock S closed and stop cocks S_1, S_2 and S_3 opened. Then,

A. B will start collapsing with volume of A and C increasing

B. C will start collapsing with volume of A and B increasing

C. volume of A, B and C will become equal in equilibrium

D. C and A will both start collapsing with volume of B increasing

Answer: B

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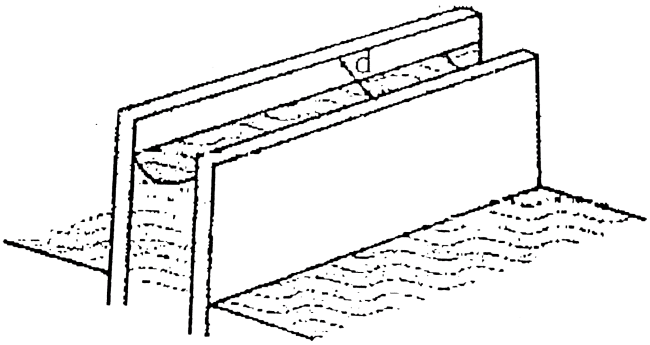

20.

Two very wide parallel glass plates are held vertically at a small separation d, and dipped in water. Some water climbs up in the gap between the plate. Let S be the surface tension of water $P_0 =$ atmospheric pressure, $P =$ pressure of water just below the water surface in the region between the plates-

A. $p_0 - \frac{2S}{r}$

B. $p_0 + \frac{2S}{r}$

C. $p_0 - \frac{4S}{r}$

D. $p_0 + \frac{4S}{r}$

Answer: A

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21. When two soap bubbles of radius r_1 and $r_2(r_2 > r_1)$ coalesce, the radius of curvature of common surface is

A. $(r_2 - r_1)$

B. $(r_2 + r_1)$

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

D. $\frac{r_1 r_2}{r_2 - r_1}$

Answer: D

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22. A soap bubble A of radius 0.03 m and another bubble B of radius 0.04 m are brought together, so that the combined

bubble has a common interface of radius r, then the value of r is

A. $0.24m$

B. $0.48m$

C. $0.12m$

D. None of these

Answer: C

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23. If two soap bubbles of equal radii r coalesce then the radius of curvature of interface between two bubbles will be

A. r

B. zero

C. infinity

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

Answer: C

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24. A liquid will not wet the surface of a solid if the angle of contact is

A. zero

B. equal to 45°

C. smaller than 90°

D. greater than 90°

Answer: D

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25. Angle of contact of a liquid with a solid depends on

A. solid only

B. liquid only

C. both solid and liquid

D. orientation of the solid surface in liquid

Answer: C

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26. Two capillary tubes of same diameter are put vertically one each in two liquids whose relative densities are 0.8 and 0.6 and surface tensions are 60 dyne/cm and 50 dyne/cm respectively. Ratio of heights of liquids in the two tubes $\frac{h_1}{h_2}$ is

A. $\frac{10}{9}$

B. $\frac{10}{3}$

C. $\frac{10}{3}$

D. $\frac{9}{10}$

Answer: D

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27. A capillary tube (A) is dipped in water. Another identical tube (B) is dipped in a soap-water solution. Which of the following shows the relative nature of the liquid columns in the two tubes?

A. 

B. 

C. 

D. 

Answer: C

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28. A 20 cm long capillary tube is dipped in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator, the length of water column in the capillary tube will be

A. 8 cm

B. 10 cm

C. 4 cm

D. 20 cm

Answer: D

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29. A vessel whose bottom has round holes with diameter of 1 mm is filled with water Assuming that surface tension acts only at

holes, then the maximum height to which the water can be filled in vessel without leakage is (given surface tension of water is $75 \times 10^{-3} N/m$) and $g = 10 m/s^2$

A. $0.3 cm$

B. 3 mm

C. 3 cm

D. 3m

Answer: C

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30. T_{LA}, T_{SA} and T_{SL} be the value of surface tension at liquid-air, solid air and solid-liquid interface, respectively. Match the following columns.

A. A-1, B-2, C-3

B. A-2, B-3, C-1

C. A-1, B-3, C-2

D. A-3, B-1, C-2

Answer: A

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Exercise 2 Miscellaneous Problems

1. 8000 identical water drops are combined to form a big drop then the ratio to the final surface energy to the initial surface energy. If all the drops together is

A. $1:10$

B. $1:15$

C. $1:20$

D. $1:25$

Answer: c

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

A. u

B. 10 u

C. 100 u

D. 1000 u

Answer: B

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3. A water drop of $0.05cm^3$ is squeezed between two glass plates and spreads into area of $40cm^2$. If the surface tension of water

is 70 dyne cm^{-1}, then the normal force required to separate the glass plates from each other will be

A. 22.5 N

B. 45 N

C. 90 N

D. 450 N

Answer: B

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4. What is the radius of the biggest aluminium coin of thickness t and density ρ, which will still be able to that on the water surface of surface tension S ?

A. $\frac{4S}{3\rho gt}$

B. $\frac{3S}{4\rho gt}$

C. $\frac{2S}{\rho gt}$

D. $\frac{S}{\rho gt}$

Answer: C

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5. A sphere liquid drop of radius R is divided into eight equal droplets. If surface tension is S, then the work done in this process will be

A. $2\pi R^2 S$

B. $3\pi R^2 S$

C. $4\pi R^2 S$

D. $2\pi R S^2$

Answer: C

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6. A 10 cm long wire is placed horizontal on the surface of water and is gently pulled up with a force of 2×10^2 N to keep the wire in equilibrium. The surface tension, in Nm^{-1} of water is

A. 0.002

B. 0.001

C. 0.2

D. 0.1

Answer: D

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7. A drop of water breaks into two droplets of equal size. In this process which of the following statements is correct?

(1). The sum of temperature of the two droplets together is equal to the original temperature of the drop.

(2).the sum of masses of the two droplets is equal to the original mass of the drop.

(3). the sum of the radii of the two droplets is equal to the radius of the original drop.

(4). the sum of the surface areas of the two droplets is equal to the surface area of the original drop.

A. The sum of the temperatures of the two droplets together is equal to temperature of the original drop

B. The sum of the masses of the two droplets is equal to mass of drop

C. The sum of the radii of the two droplets is equal to the radius of the drop

D. The sum of the surface areas of the two droplets is equal to the surface area of the original drop

Answer: B

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8. A mercury drop of radius 1.0 cm is sprayed into 10^6 droplets of equal sizes. The energy expended in this process is (Given, surface tension of mercury is $32 \times 10^{-2} Nm^{-1}$)

A. $3.98 \times 10^{-4} J$

B. $8.46 \times 10^{-4} J$

C. $3.98 \times 10^{-2} J$

D. $8.46 \times 10^{-2} J$

Answer: C

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9. 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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10. Under a pressure head, the rate of orderly volume of liquid flowing through a capillary tube is Q. If the length of capaillary tube were doubled and diameter of the bore is halved, the rate of flow would become

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

B. 16 Q

C. $\frac{Q}{8}$

D. $\frac{Q}{32}$

Answer: D

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11. Water flows through a frictionless tube with a varying cross-section as shown in the figure. Pressure p at points along the Y-axis is represented by

A. 

B. 

C. 

D. 

Answer: A

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12. The ratio of radii of two bubbles is $2:1$. What is the ratio of excess pressures inside them ?

A. $1:2$

B. $1:4$

C. $2:1$

D. $4:1$

Answer: A

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13. $16cm^3$ of water flows per second through a capillary tube of radius a cm and of length l cm when connected to a pressure head of h cm of water if a tube of the same length and

radius a/2 cm is connected to the same pressure head the quantity of water flowing through the tube per second will be-

A. $16cm^3$

B. $1cm^3$

C. $4cm^3$

D. $8cm^3$

Answer: B

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14. At critical temperature, the surface tension of a liquid

A. zero

B. infinity

C. the same as that at any other temperature

D. cannot be determined

Answer: A

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15. 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. V/9

B. 3V/8

C. V/4

D. V/3

Answer: C

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16. 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: D

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17. Two spherical soap bubbles of radii a and b in vacuum coalesce under isothermal conditions. The resulting bubble has a radius given by

A. $\frac{(a+b)}{2}$

B. $\frac{ab}{a+b}$

C. $\sqrt{a^2+b^2}$

D. a+b

Answer: C

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18. The air pressure inside a soap bubbles of radius R exceeds the out side air pressure by 10 Pa. By how much will the pressure inside a

bubble of radius 2R exceed the out side air pressure.

A. 20 Pa

B. 40 Pa

C. 2.4 Pa

D. 5 Pa

Answer: A

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19. On mixing the salt in water, the surface tension of water will

A. increases

B. decreases

C. may increase or decrease depending upon salt

D. None of the above

Answer: A

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20. 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. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: B

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21. By inserting a capillary tube upto a depth l in water, the water rises to height h. if the lower end of the capillary is closed inside water and the capillary is taken out and closed end opened, to what height the water will remain in the tube

A. zero

B. l+h

C. 2h

D. h

Answer: C

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22. A wire of length L metres, made of a material of specific gravity 8 is floating horizontally on the surface of water. If it is not wet by water, the maximum diameter of the wire (in mm) upto which it can continue to

float is (surface tension of water is $T = 70 \times 10^{-3} Nm^{-1}$)

A. 1.5

B. 1.1

C. 0.75

D. 0.55

Answer: B

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23. A soap bubble in air (two surfaces) has surface tension $0.03Nm^{-1}$. Find the excess pressure inside a bubble of diameter 30 mm.

A. 2 Pa

B. 4 Pa

C. 16 Pa

D. 8 Pa

Answer: D

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24. If a liquid is placed in a vertical cylinerical vessel and the vessel is rotated about its axis, the liquid will take the shape of figure.

A. 

B. 

C. 

D. 

Answer: C

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25. Water rises in a capillary tube to a height h . It will rise to a height more than h

A. on the surface of sun

B. in a lift moving down with an acceleration

C. at the poles

D. in a lift moving up with an acceleration

Answer: B

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26. The radius of a spherical drop of water is 1 mm. If surface tension of water be $70 \times 10^{-3} Nm^{-1}$, the pressure difference between inside and outside the drop will be

A. $70 Nm^{-2}$

B. $140 Nm^{-2}$

C. $280 Nm^{-2}$

D. zero

Answer: B

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27. What is ratio of surface energy of 1 small drop and 1 large drop, if 1000 small drops combined to form 1 large drop

A. $100:1$

B. $1000:1$

C. $10:1$

D. $1:1000$

Answer: D

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28. Water rises to a height of 10.3 cm in a capilaary of height 18 cm above the water level. If the tube is out at a height of 12 cm in the capillary tube

A. water will come as a fountain from the capillary tube

B. water will stay at a height of 12 cm in the capillary tube

C. the height of water in the capillary tube will be 10.3 cm

D. water height flow down the sides of the capillary tube

Answer: C

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29. Water rises to a height of $10cm$ in a capillary tube and mercury falls to a depth of 3.42 cm in the same capillary tube. If the

contact angle for mercury and surface tension of water and mercury is

A. $1:0.15$

B. $1:3$

C. $1:6.5$

D. $1.5:1$

Answer: C

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30. The amount of work done in blowing a soap bubble such that its diameter increases from d to D is (T=surface tension of the solution)

A. $\pi\left(D^2-d^2\right)S$

B. $2\pi\left(D^2-d^2\right)S$

C. $4\pi\left(D^2-d^2\right)S$

D. $8\pi\left(D^2-d^2\right)S$

Answer: B

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31. A vessel, whose bottom has round holes with diameter of 0.1 mm , is filled with water. The maximum height to which the water can be filled without leakage is (S.T. of water =75 dyne/cm , g=1000 cm/s)

A. 100 cm

B. 75 cm

C. 60 cm

D. 30 cm

Answer: D

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32. The lower end of a capillary tube is dipped into water and it is seen that water rises through 7.5 cm in the capillary. Given surface tension of water is $7.5 \times 10^{-2} N/m$ and angle of contact between water and glass capillary tube is zero, What will be diameter of the capillary tube ? (Given, $g = 10 ms^{-2}$)

A. 0.2 mm

B. 0.33 mm

C. 0.4 mm

D. 0.5 mm

Answer: C

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33. The work done in blowing a soap bubble of surface tension $0.60Nm^{-1}$ from 2 cm radius to 5 cm radius is

A. 0.004168 J

B. 0.003168 J

C. 0.003158 J

D. 0.004568 J

Answer: B

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34. Several spherical drops of a liquid of radius r coalesce to form a single drop of radius R. If

T is surface tension and V is volume under consideration, then the release of energy is

A. $3VS\left(\frac{1}{r}+\frac{1}{R}\right)$

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

C. $VS\left(\frac{1}{r}-\frac{1}{R}\right)$

D. $VS\left(\frac{1}{r^2}+\frac{1}{(R)^2}\right)$

Answer: B

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35. A drop of some liquid of volume $0.04cm^3$ is placed on the surface of a glass slide. Then, another glass forms a thin layer of area $20cm^2$ between the surfaces of the two slides. To separate the slides a force of 16×10^5 dyne has to be applied normal to the surfaces. The surface tension of the liquid is (in dyne cm^{-1})

A. 60

B. 70

C. 80

D. 90

Answer: C

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36. When a big drop of water is formed from n small drops of water, the energy loss is 3E, where, E is the energy of the bigger drop. If R is the radius of the bigger drop and r is the radius of the smaller drop then number of smaller drops (n) is?

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

B. $\frac{4R}{r}$

C. $\frac{2R^2}{r}$

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

Answer: D

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37. Two drops of equal radius coalesce to form a bigger drop. What is ratio of surface energy of bigger drop to smaller one?

A. $2^{1/2}:1$

B. $1:1$

C. $2^{2/3}:1$

D. None of these

Answer: C

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38. A capillary tube is taken from the Earth to the surface of the moon. The rise of the liquid column on the Moon (acceleration due to

gravity on the Earth is 6 times that of the Moon) is

A. six times that on the earth's surface

B. $\frac{1}{6}$ that on the earth's surface

C. equal to that on the earth's surface

D. zero

Answer: A

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

A. On the surface of jupiter, height will be less than h

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

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

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

Answer: D

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40. Calculate the heat evolved for the rise of water when one end of the capillary tube of radius r is immeresed vartically into water. Asssume surface tension =T and density of water to be ρ

A. $\frac{2\pi S}{\rho g}$

B. $\frac{\pi S^2}{\rho g}$

C. $\frac{2\pi S^2}{\rho g}$

D. $\frac{4\pi S^2}{\rho g}$

Answer: C

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41. One end of a uniform glass capillary tube of radius r = 0.025 cm is immersed vertically in water to a depth h = 1cm. The excess pressure

(in Nm^{-2}) required to blow an air bubble out of the tube (Given , surface tension of water $= 7 \times 10^{-2} Nm^{-1}$, density of water $= 10^{-3} kgm^{-3}$ and acceleration due to gravity $= 10ms^{-2}$)

A. 0.0048×10^5

B. 0.0066×10^5

C. 1.0048×10^5

D. 1.0066×10^5

Answer: B

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42. A glass capillary of radius 0.4 mm is inclined at 60° with the vertical in water. Find the length of water in the capillary tube.

(Given, surface tension of water $= 7 \times 10^{-2} N^{-1}$).

A. 7.1 cm

B. 3.6 cm

C. 1.8 cm

D. 0.9 cm

Answer: A

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Mht Cet Corner

1. In a capillary tube of radius 'R' a straight thin metal wire of radius 'r' $(R > r)$ is inserted symmetrically and one of the combination is dipped vertically in water such that the lower end of the combination Is at same level . The rise of water in the capillary tube is [T=surface

tensiono of water ρ =density of water ,g =gravitational acceleration]

A. $\frac{T}{(R+r)\rho g}$

B. $\frac{R\rho g}{2T}$

C. $\frac{2T}{(R-r)\rho g}$

D. $\frac{(R-r)\rho g}{T}$

Answer: C

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2. A liquid drop having surface energy E is spread into 512 droplets of same size. The final surface energy of the droplets is

A. 2E

B. 4R

C. 8E

D. 12

Answer: C

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3. A large number of liquid drops each of radius 'a' coalesce to form a single spherical drop of radish b. The energy released in the process is converted into kinetic energy of the big drops formed. The speed of big drop will be

A. $\left[\frac{6T}{\rho}\left(\frac{1}{a}-\frac{1}{b}\right)\right]^{1/2}$

B. $\left[\frac{6T}{\rho}\left(\frac{1}{b}-\frac{1}{a}\right)\right]^{1/2}$

C. $\left[\frac{\rho}{6T}\left(\frac{1}{a}-\frac{1}{b}\right)\right]^{1/2}$

D. $\left[\frac{\rho}{6T}\left(\frac{1}{b}-\frac{1}{a}\right)\right]^{1/2}$

Answer: A

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4. A liquid rises to a height of 1.8 cm in a glass capillary A another glass capillary B having diameter 90% of capillary A is immersed in the same liquid the rise of liquid in capillary B is

A. $1.4cm$

B. 1.8 cm

C. $2.0cm$

D. 2.2 cm

Answer: C

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5. The wattability of a surface by a liquid depends primarily on

A. viscosity

B. surface tension

C. density

D. angle of contact between the surface and the liquid

Answer: D

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6. With an increase in temperature , surface tension of liquid (except molten copper and cadmium)

A. increases

B. remain same

C. decreases

D. first decreases, then increases

Answer: C

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7. On the surface of the liquid in equilibrium , molecules of the liquid possess

A. maximum potential energy

B. minimum potential energy

C. maximum kinetic energy

D. minimum kinetic energy

Answer: A

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8. The potential energy of molecule on the surface of a liquid as compared to in side the liquid is

A. zero

B. lesser

C. equal

D. greater

Answer: D

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9. Work done in forming a liquid drop of radius R is W_1 and that of radius 3R is W_2. The ratio of work done is

A. $1:3$

B. $1:2$

C. $1:4$

D. $1:9$

Answer: D

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10. A liquid rises in a capillary tube when the angle of contact is:

A. obtuse

B. 180°

C. acute

D. 90°

Answer: C

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11. If the surface of a liquid is plane, then the angle of contact of the liquid with the walls of container is

A. acute angle

B. obtuse angle

C. 90°

D. 0°

Answer: C

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12. The surface tension for pure water in a capillary tube experiment is

A. $\frac{pg}{2hr}$

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

C. $\frac{rpg}{2h}$

D. $\frac{hrpg}{2}$

Answer: D

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13. The work done in blowing a soap bubble of 10 cm radius is (Surface tension of the soap solution is $\frac{3}{100}$ N/m)

A. $37.68 \times 10^{-4} J$

B. $75.36 \times 10^{-4} J$

C. $75.36 J$

D. $150.72 \times 10^{-4} J$

Answer: B

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14. A capillary tube when immersed vertically in a liquid records a rise of 3cm.if the tube is immersed in the liquid at an angle of 60° with

the vertical, then find the length of the liqiud column along the tube.

A. 9 cm

B. 6 cm

C. 3 cm

D. 2 cm

Answer: B

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15. The surface tension of a liquid is 10^8 dyne cm^{-1}. It is equivalent to

A. $10^{-4} Nm^{-1}$

B. $10^5 Nm^{-1}$

C. $10^6 Nm^{-1}$

D. $10^7 Nm^{-1}$

Answer: B

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