NeetPreparation

Properties of Bulk Matters Important Questions With Answers

NEET Physics 2023

1. A tiny sphere of mass m and density x is dropped in a jar of glycerine of density y. When the sphere acquires terminal velocity, the magnitude of the viscous force acting on it is:
   a) $\frac{mgx}{y}$ b) $\frac{mgy}{x}$ **c)** $mg(1-\frac{y}{x})$ d) $mg(1+\frac{y}{x})$
2. The product of the coefficient of viscosity and volume of liquid flowing through a tube of area of cross-section A and length l in time t is x. Then, the pressure difference P between the two ends of the tube is given by:
   a) $\frac{8\pi xL}{A^2}$ **b)** $\frac{8\pi xL}{tA^2}$ c) $\frac{8\pi^2 xL}{tA^2}$ d) $\frac{8xL}{tA^2}$

   Solution : -
   From Poiseuilli's formula,
   $\frac{V}{t}=\frac{\pi Pr^4}{8\eta L}$
   A=πr^2 or r^4=$\frac{A^2}{\pi^2}$
   ∴ $\frac{V}{t}=\frac{\pi P(A^2/\pi^2)}{8L\eta}$
   or $\frac{V\eta}{t}=\frac{PA^2}{8\pi L}$
   or $\frac{x}{t}=\frac{PA^2}{8\pi L}$
   [∵ given that Vη=x]
   Thus, P=$\frac{8\pi xL}{tA^2}$
3. Velocity of water in a river is :
   a) Same everywhere   **b) More in the middle and less near its banks**
   c) Less in the middle and more near its banks   d) Increase from one bank to other bank

   Solution : -
   The velocity of water in a river is less on the bank and larger in middle as force of adhesion between water and the bank is so large that it decreases the velocity near the bank but in the middle the velocity remains almost unaffected.
4. Two syringes of different cross-sections (without needles) filled with water are connected with a tightly filted rubber tube filled with water. Diameters of the smaller piston and larger piston are 1.0 cm and 3.0 cm respectively. Find the force exerted on the larger piston when a force of 10 N is applied to the smaller piston.
   a) 90 N   b) 40 N   c) 50 N   d) 80 N

   Solution : -
   Since the pressure is transmitted undiminished throughout the fluid, hence
   $$F_2=\frac{A_2}{A_1}F_1=\frac{\pi(\frac{3}{2}\times10^{-2})^2}{\pi(\frac{1}{2}\times10^{-2})^2}\times 10N$$
   = 90 N
5. (A) A hydrogen filled balloon stops rising after it has attained a certain height in the sky.
   (R) The atmosphere pressure decreases with height and becomes zero when maximum height is attained by hydrogen balloon.
   a) If both assertion and reason are true and reason is the correct explanation of assertion
   b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

6. Which one of the following would a hydrogen balloon find easiest to lift?
a) 1 kg of steel b) 1 kg of water **c) 1 kg of lightly packed feathers** d) All of the above are same

7. The light machine oil used for lubrication is about:
a) one hundred times more viscous than water b) ten times more viscous than water

c) one thousand times more viscous than water d) ten times less viscous than water

Solution : -
Light machine oil is 100 times more viscous than water.

8. Two small spheres of radii rand 4r fall through a viscous liquid with the same terminal velocity. The ratio between the viscous forces acting on them is:
a) 1:2 b) 4:1 c) 1:16 **d) 1:4**

Solution : -
According to Stokes' law
Viscous force, F = 6 πηrv
Since, v, η remains the same
F∝r
or $\frac{F_1}{F_2}=\frac{r_1}{r_2}=\frac{r}{4r}=\frac{1}{4}$.

9. If a small sphere is let fall vertically in a large quantity of still liquid of density smaller than that of the material of the sphere:
a) at first its velocity increases, but soon approaches a constant value

b) it falls with a constant velocity all along from the very beginning

c) at first it falls with a constant velocity which after some time goes on decreasing

d) nothing can be said about its motion

Solution : -
Initially, the velocity of the sphere goes on increasing because effective weight > upward viscous force As upward viscous force cc velocity, hence after some time effective weight of the sphere is balanced by upward viscous force, i.e., net force =0.

10. The cylindrical tube of a spray pump has a cross-section of 8 cm^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 0.15 m min^{-1}, the speed with which the liquid is ejected through the holes is:
a) 50 ms^{-1} **b) 5 ms^{-1}** c) 0.05 ms^{-1} d) 0.5 ms^{-1}

Solution : -
According to equation of continuity,
(area a) x (velocity v) = constant
∴ (8 x 10^{-4}) x $\left(\frac{0.15}{60}\right)$=$a_1v_1$
For holes: (40 x 10^{-8}) x v = a_2v_2
∴ a_2v_2=a_1v_1
∴ 40 x 10^{-8} x v = $\frac{8\times10^{-4}\times0.15}{60}$
or v=$\frac{8\times10^{-4}\times0.15}{40\times10^{-8}\times60}=\frac{8\times15}{4\times6}$=5 ms^{-1}.

11. The adiabatic elasticity of a gas is equal to :
a) γ X density b) γ X Volume **c) γ X Pressure** d) γX Specific heat

Solution : -
Adiabatic elasticity of gas
$k_\alpha \times \gamma P$

12. A parrot sitting on the floor of a wire cage which is being carried by a boy, starts flying. The boy will feel that the box is now:

a) heavier **b) lighter** c) same in weight d) lighter in the beginning and heavier later

Solution : -

In a wire cage, if the parrot flies, its reaction is experienced by floor and not on the base of the cage. So, when the parrot flies, the boy feels the weight of box only. When the parrot is sitting in the cage. the weight of the system is the sum of the weight of parrot and that of box.

13. A balloon with mass 'm' is descending down with an acceleration' a' where $a < g$. How much mass should be removed from it so that it starts moving up with an acceleration' a'?

a) 2ma/(g + a) b) 2ma/(g-a) c) ma/(g + a) d) ma/(g - a)

Solution : -

When balloon is descending, then
mg-F = ma
where, F is thrust force
If mass m' is removed, then balloon will start
moving up, then
F - (m - m')g = (m - m')a
From above equations
mg - (m - m ')g = ma + (m - m')a
Now,
m'g = ma + ma - m 'a
m'(g + a) = 2ma
m' = 2ma/(g+a)

14. A beam of metal supported at the two ends is loaded at the centre. The depression at the centre is proportional to :

a) Y^2 b) Y **c) 1/Y** d) $1/Y^2$

Solution : -

It is observed that depression in beam will be:
$8 = WL^3/4Ybd3$
So $\delta \propto 1/Y$

15. In Bernoulli's theorem which of the following is conserved?

a) Mass **b) Energy** c) Linear momentum d) Angular momentum

16. If the length of a cylinder on heating increases by 2%, the area of its base will increase by:

a) 0.5% b) 2% c) 1% **d) 4%**

Solution : -

We see that $A \propto L^2$
Also,$\Delta A/A = 2\Delta L/L$
$\Delta A/A = 2 \times 2 = 4$

17. A closed vessel is half-filled with water. There is a hole near the top of the vessel and air is pumped out from this hole:

a) the water level will rise up in the vessel **b) the pressure at the surface of water will decrease**

c) the force exerted due to the water on the bottom of the vessel will decrease

d) the density of the liquid will decrease

Solution : -

If air from the vessel is pumped out, then pressure in the upper hal f of the vessel will decrease. Pressure on water surface is equal to pressure of air in upper half of the vessel. So, option (b) is correct. Since, volume of water remains same, therefore level of water will neither rise nor fall. Hence, option (a) is wrong. At bottom of the vessel, pressure due to water will be equal to $P = h\rho g$. Since, height and density of water remain unchanged, therefore. pressure due to water will remain unchanged. Though total pressure at the bottom will decrease because pressure above water surface has decreased. Hence, options (c) and (d) are also wrong.

18. The centre of pressure on a vertical wall of height h immersed in a liquid is at a depth of___________ from the free surface of liquid.

a) $\frac{h}{2}$ b) $\frac{h}{3}$ **c)** $\frac{2h}{3}$ d) zero

Solution : -

In order to calculate the thrust on the vertical wall, consider a thin strip of width dy at a depth y. Let L be the length ofthe wall. If D represents density of liquid, then thrust on strip = area x pressure

=L dy x yDg

= LDgy dy

Total thrust on wall =$\int_o^h$ LDgydy =$\frac{LDgh^2}{2}$

Area of wall = A = Lh

Mean pressure =$\frac{Thrust}{Area}$

$=\frac{\frac{LDgh^2}{2}}{A}=\frac{\frac{LDgh^2}{2}}{Lh}=\frac{Dgh}{2}$......(1)

Let the centre of pressure on the wall be at a depth h;

Moment of thrust on the element of area = thrust x perpendicular distance = (LDg) Y dy x y

Total moment =$\int_o^h$ LDgy^2 dy

= LDg $\frac{h^3}{3}=(Dg\frac{h^2}{3})(Lh)$.......(ii)

Moment of resultant thrust = $(\frac{Dgh}{2})Ah'$.......(iii)

From eqns. (ii) and (iii),$\frac{1}{2}(Dgh)Ah'=Dg\frac{h^2}{3}A$

or$h'=\frac{2h}{3}$.

19. Stream-line flow is more likely for liquids with:

a) low density and low viscosity b) high viscosity and high density **c) high viscosity and low density**

d) low viscosity and high density

Solution : -

Stream-line motion is more likely for liquids having high viscosity and low density.

20. Two identical cylindrical vessels with their bases at same level, each contains a liquid of density d. The height of the liquid in one vessel is h_1 and that in the other vessel is h_2. The area of either base is A. The work done by gravity in equalizing the levels when the two vessels are connected is:

a) (h_1 - h_2)gd b) (h_1 - h_2)gAd c) $\frac{1}{2}$ (h_1 - h_2)^{2}gAd **d) $\frac{1}{4}$ (h_1 - h_2)^{2}gAd**

Solution : -

Work done = initial potential energy - final potential energy or

$$W=Adg[\frac{h_1^2+h_2^2}{2}-(\frac{h_1+h_2}{2})^2]=\frac{Adg}{4}(h_1-h_2)^2$$

21. The flow rate of water from a tap of diameter 1.25 cm is 3 L per min. The coefficient of viscosity of water is 10^{-3} Pa-s. The nature of flow is:

a) unsteady **b) turbulent** c) laminar d) none of these

Solution : -

Here diameter of the tap, D = 1.25 cm = 1.25 x 10^{-2} m

Density of water, ρ=10^3 kg m^{-3}

Coefficient of viscosity, η=10^{-3} Pa-s

Volume of water flowing out per second is

Q = 3 litre per minute

=$\frac{3\times10^{-3}m^3}{60s}$ =5 x 10^{-5}m^{3}s^{-1}

Reynold's number is given by

R=$\frac{4\rho Q}{\pi D\eta}=\frac{4\times10^3kgm^{-3}\times5\times10^{-5}m^3s^{-1}}{3.14\times1.25\times10^{-2}m\times10^{-3}Pa-s}$=5095

i.e., R>2000. Hence, the flow will be turbulent.

22. (A) A dam for water reservoir is built thicker at bottom than at the top.

(R) Pressure of water is very large at the bottom.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.   d) If both assertion and reason are false.

e) If assertion is false but reason is true.

23. A cylindrical vessel of 92 cm height is kept filled upto the brim. It has four holes 1, 2, 3 and 4 which are respectively at heights of 20 cm, 30 cm, 46 cm and 80 cm from the horizontal floor. The water falling at the maximum horizontal distance from the vessel comes from:
a) hole no. 4   **b) hole no. 3**   c) hole no. 2   d) hole no. 1

24. A wooden ball of density D is immersed in water of density d to a depth h below the surface of water and then released. Upto what height will the ball jump out of water?
a) $\frac{d}{D}h$ **b)** $(\frac{d}{D}-1)h$ c) h   d) zero

25. Consider the following equation of Bemoulli's theorem;
p+$\frac{1}{2}\rho v^2$+ρgh=K (constant)
The dimensions of K/p are same as that of which of the following?
a) Thrust   b) Pressure   **c) Angle**   d) Viscosity

26. The following four wires are made of same material. Which of these will have the largest extension when the same tension is applied?
a) Length = 50 em, diameter = 0.5 mm   b) Length= 100 em, diameter= 1mm
c) Length = 200 em, diameter = 2 mm   d) Length= 300 em, diameter= 3 mm

Solution : -
To find the largest extension in the wires, we use Young's Modulus
Y = Fl/AΔl or Δl = Fl/AY∝l/A
Among the following wires, wire of least length and least diameter will have largest extension.

27. (A) Cars and aeroplanes are streamlined.
(R) Bernoulli's theorem hold for incompressible, non-viscous fluids.
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false   d) If both assertion and reason are false

e) If assertion is false but reason is true

28. 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 70 cm^3 /sec then the maximum height upto which water can rise in the tank is:
a) 2.5 cm   b) 5 cm   c) 10 cm   d) 0.25 cm

Solution : -
The height of water in the tank becomes maximum when the volume of water flowing into the tank per second becomes equal to the volume flowing out per sec. Volume of water flowing out per second
= Av = A$\sqrt{2gh}$
Volume of water flowing in one second = 70 cm^3/sec
A$\sqrt{2gh}$=70, 1 x $\sqrt{2gh}$ = 70
or 2 x 980 x h = 4900
∴ h = 2.5 cm

29. (A) To float, a body must displace liquid whose weight is greater than the actual weight of the body.
(R) The body will experience no net downward force, in the case of floating.
a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.   d) If both assertion and reason are false.

e) If assertion is false but reason is true.

Solution : -
Assertion is true but reason is false.
Net force = actual weight - upthrust
(upthrust = weight of liquid displaced)

The body will rise above the surface of liquid to such an extent that the weight of the liquid displaced by the immersed part of the body (i. e., upward thrust) becomes equal to weight of the body. Thus, the body will float when upward thrust is more than its actual weight. In this special case, the density of solid body is less than the density of liquid.

30. Terminal velocity depends on radius of drop rand viscosity η according to:
a) $v_T \propto r\eta$ b) $vT \propto r^2\eta$ c) $v_T \propto \frac{\eta}{r^2}$ **d) $v_T \propto \frac{r^2}{\eta}$**

31. The isothermal elasticity of a gas is equal to :
a) Density b) Volume **c) Pressure** d) Specific heat

Solution : -
Isothermal elasticity of gas is given as K_i = P, it is equal to pressure

32. Of the following thermometers, the one which can be used for measuring a rapidly changing temperature is a
a) Thermocouple thermometer b) Gas thermometer c) Maximum resistance thermometer
d) Vapour pressure thermometer

Solution : -
Rapidly changing temperature is measured by thermocouple thermometers.

33. The cylinder is placed in a lift which is moving upwards with an acceleration a, then the pressure on the bottom is:
a) hdg b) $\frac{1}{2}$ hdg **c) hd(g + a)** d) hd(g -a)

34. A black body at 200 K is found to emit maximum energy at a wavelength 14 urn, When its temperature is raised to 1000 K, then wavelength at which maximum energy emitted is :
a) 14 mm b) 7 μm **c) 2.8 μm** d) 28 mm

Solution : -
Now λmT = onstant
Further, $\lambda_{m1} T_1 = \lambda m_2 T_2$
$\lambda m_2 = \lambda m_1 T_1 / T_2$
= 14 x (200/1000) = 2.8 μm

35. When a crown of mass 14.7 kg is submerged in water an accurate scale reads only 13.4 kg. The specific gravity of the material of the crown is :
a) 5.8 b) 8.6 c) 9.8 **d) 11.3**

Solution : -
The apparent weight of the submerged object W' equals its actual weight W (= mg) minus the buoyant force B.
W' = T = W - B =ρogV -ρwgV
where V is the volume of the object, ρo is the density of the object and ρw is the density of water.
∵B=W-W'=ρwgV
Hence, $\frac{W}{W-W'} = \frac{\rho_o gV}{V\ gV} = \frac{\rho_o}{\rho}$
∴ Specific gravity = $\frac{W}{W-W'} = \frac{14.}{14. - 13.4}$
=11.3
Thus, the specific gravity of the crown = 11.3 kg m^{-3}, which is different from that of gold.

36. Eight drops of a liquid of density p and each of radius a are falling through air with a constant velocity 3.75 cms^{-1}. When the eight drops coalesce to form a single drop, the terminal velocity of the new drop will be:
a) 1.5 x 10^{-2} ms^{-1} b) 2.4 x 10^{-2} ms^{-1} c) 0.75 x 10^{-2} ms^{-1} d) 25 x 10^{-2} ms^{-1} **e) 15 x 10^{-2} ms^{-1}**

Solution : -
Terminal velocity of a single drop,
v=3.75 cms^{-1}=3.75 x 10^{-2} ms^{-1}
Terminal velocity of the big drop,
V=$n^{2/3}$v =$(8)^{2/3}$ x 3.75 x 10^{-2}
=4 x 3.75 x 10^{-2} =15 x $10^{-2}$$ms^{-1}$.

37. (A) The apparent weight of a block of wood floating in water is equal to zero.
(R) The value of acceleration due to gravity (g) in water becomes zero.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

38. A body of density d_1 is counterpoised by Mg of weights of density d_2 in air of density d. Then, the true mass of the body is:

a) M b) $M(1-\frac{d}{d_2})$ c) $M(1-\frac{d}{d_1})$ **d)** $M(\frac{1-d/d_2}{1-d/d_1})$

Solution : -
Let M_0 = mass of body in vacuum
Weight of body in air = weight of standard weights in air

$\therefore M_o\, g-(\frac{o}{d_1})dg = Mg-\frac{}{d_2}dg$

or $M_o = \frac{(1-\frac{}{2})}{(1-\frac{}{1})}$

39. On a new scale of temperature (which is linear), a called the W scale, the freezing and boiling point of water are 39°W and 239°W respectively. What will be the temperature of 39° C celsius scale?

a) 78°W **b) 117°C** c) 200°C d) 139°W

Solution : -
W is the temperature on new scale corresponding to 39°Con °Cscale.
So, (C - 0)/(100 - 0) = (W - 39)/(239 - 39)
C/100 = (W - 39)/200
W = (C/100) x 200+ 39
= (39/100) x 200 + 39
= 78 + 39 = 117
So, temperature on new scale is 11rW corresponding to 39°C.

40. Coefficient of linear expansion of brass and steel rods are α_1 and α_2 Lengths of brass and steel rods are l_1 and l_2 respectively. If (l_2- l_1) is maintained same at all temperatures, which one of the following relations holds good?

a) $\alpha_1 l_2$ b) $\alpha_1 l_2 = a_2 l_2$ c) $a_2 l_2 = a_1 l_1$ **d)** $a_1 l_1 = a_2 l_2$

Solution : -
If a_1 is coefficient of linear expression of brass and $l_1$be its length, while α_2 is coefficient of linear expression of steel with 1_2 be its length, then
l'_2-l'_1 = l_2-l_2-l_1

$l_2\,(1+\alpha_2\Delta\ )-l_1\,(1+\alpha_1\Delta\ )=l_2-l_1$

Hence, $l_2\alpha_2 = l_1\alpha_1$

41. The viscosity of an ideal liquid is:

a) 1 b) 0.5 **c) zero** d) infinite

42. (A) The shape of an automobile is so designed that its front resembles the streamline pattern of the fluid through which it moves.
(R) The resistance offered by the fluid is maximum.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

43. (A) The viscosity of liquid increases rapidly with rise of temperature.
(R) Viscosity of a liquid is the property of the liquid by virtue of which it opposes the relative motion amongst its different layers.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

Solution : -

Assertion is false but reason is true.
The viscosity of liquid decreases rapidly with rise of temperature.
The variation of viscosity of liquidwith temperature is given by
$\eta_t = \eta_0/(1+\alpha t+\beta t^2)$
where, η_t and η_0 are the coefficient of viscosities at t^0C and 0^0C respectively and α and β are constants. Whereas the viscosity of all gases increases with increase in temperature ($\eta \propto \quad \overline{T}$).
For example, in case of water, the viscosity at 50°C is found to be half of its value at 10°C.In case of castor oil, the viscosity at 20°C is about (2/5)th of its value at 10°C.

44. A wooden block is floating in a liquid. 50% of its volume is inside the liquid when the vessel is stationary. Percentage of volume immersed when the vessel moves upwards with an acceleration a = g/2 is:
a) 75% b) 25% **c) 50%** d) 33.33%

Solution : -

When the vessel is stationary,
Weight = Upthrust
i.e.., $V\rho_w g$ = Vi ρLg
ρw = density of wood
ρL = density of liquid
or $\frac{V}{V} = \frac{\rho}{\rho_L}$ ....(i)
When the vessel moves upwards,
Upthrust - weight = mass x acceleration
or $\rho L(g+\frac{g}{2}) - \quad \rho \quad g = \frac{V\rho \;\; g}{2}$
or $\frac{V}{V} = \frac{\rho}{\rho_L}$ ....(ii)
From eqns. (i) and (ii), $\frac{V}{V} = \frac{V}{V}$
i. e. , percentage of volume inside the liquid remain same.

45. (A) Falling raindrops acquire a terminal velocity.
(R) A constant force in the direction of motion and a velocity dependent force opposite to the direction of motion, always result in the acquisition of terminal velocity.
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

46. A silver ingot weighing 2.1 kg is held by a string so as to be completely immersed in a liquid of relative density 0.8. The relative density of silver is 10.5. The tension in the string (in kg-wt) is:
a) 1.6 **b) 1.94** c) 3.1 d) 5.25

47. As a bubble comes from the bottom of a lake to the top, its radius:
a) increases b) decreases c) does not change d) becomes zero

Solution : -

We know that fluids move from higher pressure to lower pressure and in a fluid pressure increases with depth; so pressure at top (= Po) is lesser than at the bottom (Po + hρg) and so the air bubble will move from bottom to top (it cannot move sideways as the pressure at same level in a fluid is same). Furthermore, in coming from bottom to top, pressure decreases; so in accordance with Boyle's law, i. e., PV = constant, volume will increase, i. e., bubble will grow in size.

48. (A) The blood pressure in humans is greater at the feet that at the brain.
(R) Pressure of liquid at any point is proportional to height, density of liquid and acceleration due to gravity.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.   d) If both assertion and reason are false.

e) If assertion is false but reason is true.

Solution : -

Both assertion and reason are true and reason is the correct explanation of assertion.
The height of the blood column in the human body is more at feet than at the brain [∴ P = hρg]. That is why, the blood exerts more pressure at the feet than at the brain.

49. An empty balloon weighs 1g. The balloon is filled with water to the neck and tied with a massless thread. The weight of balloon along with water is 101 g. The balloon filled with water is weighed when fully immersed. Then, its weight in water is:

a) 1 g   b) 101 g   c) 201 g   d) 51 g

50. Three liquids of densities PI' Pz and P3 (with PI>PZ>P3)' having the same value of surface tension Trise to the same height in three identical capillaries. The angles of contact 91, 92 and 93 obey:

a) $\pi/2 > \theta_1 > \theta_2 > \theta_3 \geq 0$ **b) $0 < \theta_1 < \theta_2 < \theta_3 < \pi/2$**   c) $\pi/2 < \theta_1 < \theta_2 < \theta_3 < \pi/2$

d) $\pi > \theta_1 > \theta_2 > \theta_3 < \pi/2$

Solution : -

Since,

h = 2 x T cos θ/rpg

As r∝cosθ,since T, hand r being constants, so

ρ θ

$\theta_1 < \theta_2 < \theta_3$ [a $\rho_1 > \rho_2 > \rho_3$]

It shows 0 $\theta_1 < \theta_2 < \theta_3$