PHYSICS

BOOKS - JBD PUBLICATION

PROPERTIES OF BULK MATTER

Example

1. Will you prefer a thin or thick handle to carry you bag and why ?

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2. What is buoyant?

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3. If few drops of water are introduced in the barometer tube, what would be the effect on the barometric height?

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4. Why two holes are made to empty an oil tin?

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5. How would you know if the barometric tube contains air or not in the space avobe mercury column?

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6. How does a dental plate cling to the roof of mouth?

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7. A water drop and a mercury drop each of 1 mm radius are to be sprayed into one billion dros.Which is easier and why?

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8. Define Angle of contact.

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9. Why is that molecules of a liquid near the free surface possess extra energy?

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10. Straws are used to take soft drinks. Why?

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11. What is the work done in blowing a soap bubble of radius r ahnd surface tension S?

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12. Why should we wear cotton clothes in summer ?

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13. Water rises to a height of 9 cm in a capillary tube.To what height the water will rise in another capillary tube having dimeter $1/3$ of the first ?

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14. Why water does not come out of a dropper unless its rubber head is pressed hard?

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15. Define coefficient of viscosity. Give its unit.

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16. Name the cgs and SI unit of coefficient of viscosity .What is the relation between them?

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17. Define one decapoise.

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18. What is streamline?

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19. What is a tube of flow?

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20. Lubricant oil used in machines should be of high vescosity.Why?

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21. Define pressure energy.

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22. What is laminar flow?

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23. What is turblent flow?

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24. What is fluid friction?

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25. What is the physical significance of Reynolds number?

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26. The radius of ball A is twice of than of ball B.What wll be ratio of their terminal velocities in water?

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27. What is the main difference in the applicatoin of Poiseuille's equation and Stokes' law?

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28. What is terminal velocity?

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29. Water is slowly coming out from a vertical pipe.As the water descends after coming out,its area of cross-section redudes.Why?

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30. Out of friction force and viscous force,which depends on velocity?

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31. While watering a distant plant,a gardener partially closes the exit of the pipe by putting his finger on it.Why this results in the water streams going to a longer distance?

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32. What is vasculr flutter?

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33. What is thermal resistance of two rods placed in series ?

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34. What is temperature gradient?

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35. In what respect does heat radiation different from light?

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36. State Dulong-Petti's law.

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37. Why does the column of mereury first fall and then rise when a mercury in glass thermometer is put on a flame?

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38. Explain why a good conductor of heat is also a good conductor of electricity?

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39. Why the pipes carrying steam should have loops?

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40. Why does a solid expand on the basis of molecular theory?

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41. A brass disc fits tightly in a hole in a steel sheet.Explain whether there should be increase or decrease in the temperature to loosen the disc from the hole in the sheet?

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42. A block of wood is floating on water at $0^{\circ}C \rightarrow 8^{\circ}C$.How does the volume,v change with use in temperature?

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43. Explain how the high value of specific heat capacity of water helps in making the climate of the coastal regions moderate?

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44. Can water in a beaker be made to boil by placing it in a bath of water boiling at $100^{\circ} C$?

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45. Distinguish between convection and radiation.

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46. Write one difference between natural convection and forced convection.

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47. Why are small holes provided at the bottom of the chimney of the oil lamp?Explain.

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48. Out of two thermos flasks of same height and capacity but one having cylindrical and the other square cross-section ,which one is better?

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49. State Newton's law of cooling.

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50. Is the bulb of a thermometer made of diathermic or adiabatic wall?

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51. Why does a metal bar appear hotter than a wooden bar at the same temperature? Equivalently it also appears cooler than wooden bar if they are both colder than room temeperature.

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52. Calculate the temperature which has same numerical value on Celsius and Fahrenheit scale.

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53. These days people use steel utensils with copper bottom. This is supposed to be good for uniform heating of food. Explain this effect

using the fact that copper is the better conductor.

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54. One day in the morning, Ramesh filled up $\frac{1}{3}$ bucket of hot water from geyser, to take bath. Remaining 2.3 was to be filled by cold water (at room temperature) to bring mixture to a comfortable temperature. Suddenly Ramesh had to attend to something which would take some time say 5 - 10 minutes

before he could take bath. Now the he had two options:

(i) fill the remaining bucket completely by cold water and then attend to the work, (ii) first attend to the work and fill the remaining bucket just before taking bath. Which option do you think would have kept water warmer ? Explain.

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56. Distinguish between elasticity and plasticity.

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57. Define plasticity.

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58. Two wires are made of the same metal .The length of teh first wire is half that of the second wire and its diameter is double that of the second wire.If equal loads are applied on both wires,find the ratio of increase in their lengths.

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59. What is elastic hystersis?

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60. A beam is supported at two ends and loaded at the middle.What is the expression for teh depression produced at its cenrtre?

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61. A liquid surface is horizontal. why?

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62. Why do spring balances show wrong readings after they have been used for a long time?

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63. Can young's modulus of a solid be different for extension(tensile) and compressive stress?

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64. Why springs are made of steel and not of copper?

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65. A thick wire of density ρ and l is hung from a rigid support .Young's modulus of the material of wire is Y.What is the increases in length of the wire due to its own weight?

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66. Can a mountain have infinite height?Give reason.

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67. A steel wire of length 4.7 m and cross-sectional area $3.0 \times 10^{-5} m^2$ stretches by the same amount as a copper wire of length 3.5 m and cross-sectional area of $4.0 \times 10^{-5} M^2$ under a given load. What is the ratio of the Young's modulus of steel to that of copper?

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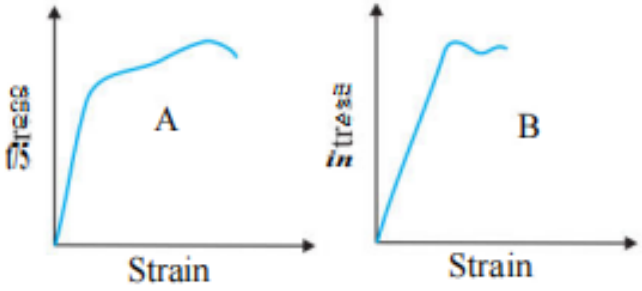
68. The stress-strain graphs for materials A and B are shown in Fig. 9.12.Tire graphs are drawn to the same scale. Which of the materials has the greater Young's modulus:



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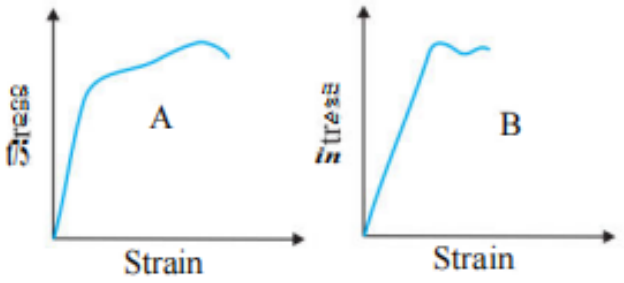
69. The stress-strain graphs for materials A and B are shown in Fig. 9.12.Tire graphs are drawn to the same scale) Which of the two is the stronger material?



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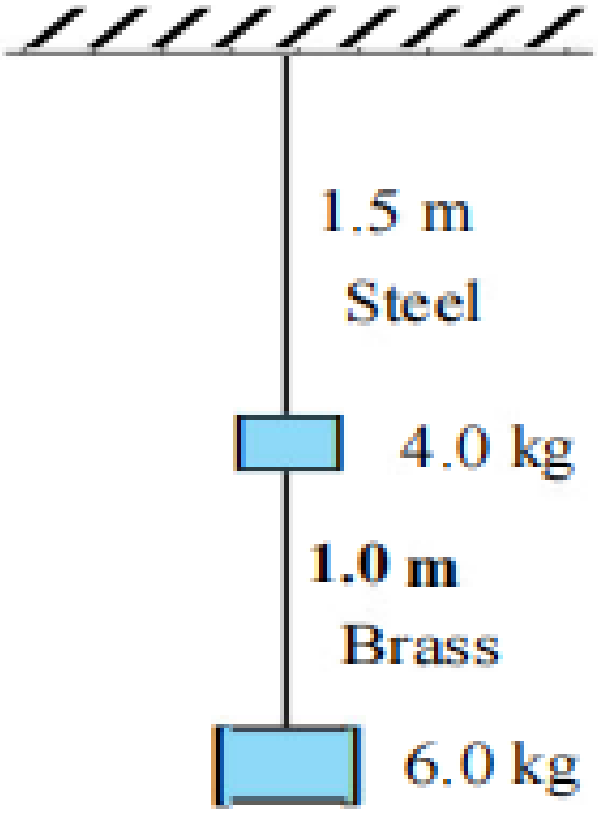
70. Two wires of diameter 0.25 cm, one made of steel and the other made of brass are

loaded as shown in Fig. 9.13. The unloaded length of steel wire is 1.5 m and that of brass wire is 1.0 m. Compute the elongations of the steel and the brass wires:



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71. The edge of an aluminium cube is 10 cm long. One face of the cube isfirmly fixed to a vertical wall. A mass of 100 kg is then attached to the opposite face of the cube. The shear modulus of aluminium is 25 GPa. What is the vertical deflection of this face?

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72. Four identical hollow cylindrical columns of mild steel support a big structure of mass

50,000 kg. The inner and outer radii of each column are 30 and 60 cm respectively. Assuming the load distribution to be uniform, calculate the compressional strain of each column.

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73. A piece of copper having a rectangular cross-section of $15.2mm \times 19.1mm$ is pulled in tension with 44,500 N force, producing only

elastic deformation. Calculate the resulting strain?

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74. A steel cable with a radius of 1.5 cm supports a chairlift at a ski area. If the maximum stress is not to exceed $10^8 Nm^{-2}$, what is the maximum load the cable can support ?

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75. A 14.5 kg mass, fastened to the end of a steel wire of unstretched length 1.0 m, is whirled in a vertical circle with an angular velocity of 2 rev/s at the bottom of the circle. The cross-sectional area of the wire is 0.065 cm^2. Calculate the elongation of the wire when the mass is at the lowest point of its path.

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76. Compute the bulk modulus of water from the following data: Initial volume = 100.0 litre, Pressure increase = 100.0 atm (1 atm = 1.013×10^5 Pa). Final volume = 100.5 litre. Compare the bulk modulus of water with that of air (at constant temperature). Explain in simple terms why the ratio is so large.

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77. A metallic wire is stretched by suspending a weight from it.If l is teh longitudinal strain and Y is the Young's Modulus,show that elastic potentially enrgy per unit volume is given by $\frac{1}{2}Yl^2$.

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78. A stell wire of length 4 m ,is stretched through 2 mm „.The corss - sectional area of the wire is $2.0mm^2$ .If young's modulus of

steel si $2.0 \times 10^{11} N/^2$ find

the energy density of the wire

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79. A stell wire of length 4 m ,is stretched through 2 mm „.The corss - sectional area of the wire is $2.0mm^2$ .If young's modulus of steel si $2.0 \times 10^{11} N/^2$ find

The elastic potential energy stored in the wire.

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80. What is more elastic : water or air, why?

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81. What kind of elasticity is used in

suspensin bride

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82. What kind of elasticity is used in

an automobile tyre

Watch Video Solution

83. What kind of elasticity is used in a water lift pump

Watch Video Solution

84. What kind of elasticity is used in rubber heelss

Watch Video Solution

85. What kind of elasticity is used in a coil spring?

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86. A wire of length l and cross selection area a is made of material of Young's modulus Y.If the wire is stretched by an amount x,find the work done.

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87. Steel is more elastic than rubber. Explain why?

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88. A metallic wire is stretched by suspending a weight from it.If l is teh longitudinal strain and Y is the Young's Modulus,show that elastic potentially enrgy per unit volume is given by $\frac{1}{2}Yl^2$.

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89. Elasticity is said to be internal property of matter.Explain.

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90. A cable is replaced by another of the same length and material but of twice diameter. How does this affect elongation under a given load?

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91. A cable is replaced by another of the same length and material but of twice diameter. How many times will be the maximum load supported by the latter as compared to the former?

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92. An elastic wire is cut to half its original length. How would it affect the maximum load that the wire can support?

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93. Define modulus of rigidity. Give its units and dimensions.

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94. Define Young's modulus of elasticitiy. normal stress and longitudinal strain. Give unit of each of them. Derive an expression for the elastic potential energy of a wire, when stretched.

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95. Give molecular theory to explain surface tension.

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96. Why water gets depressed in a glass tube whose inner surface is coated with wax?

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97. What is the effect of solute on the surface tension of liquid?

Watch Video Solution

98. How is the rise of a liquid affected if the top of the capillary tube is closed?

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99. Why it is easer to wash clothes in hot water soap solution?

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100. What are drops and bubbles?

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101. State Archimedes' principle.

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102. Write short note on hydraulie brakes.

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103. Define thrust and pressure. Give their units. Show that when a liquid is in equilibrium, forces acting on the liquid must be perpendicular to its free surface.

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104. Write short note on viscosity.

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105. Define cause of viscosity.

Watch Video Solution

106. Write short note on terminal velocity.

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107. Define a ping-pong ball in an air jet.

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108. What is Stokes' law? Derive the relation by method of dimensions.

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109. Write Bunsen burner.

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110. 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 in fig.A liquid with a film thickness of 0.30 mm is placed between the block and the table.When released,the block moves ot the right with a constant speed of $00.085ms^{-1}$.Find the coefficient of viscosity of the liquid.

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111. Write force required to maintain laminar or streamline flow.

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112. What do you understand by Reynold's number?

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113. The flow rate of water from a tap of diameter 1.25 cm is $0.48L/\min$. The coefficient of viscosity of water is $10^{-3}Pa-s$. After sometime, the flow rate is increased to $3L/\min$. Characterise the flow for both the flow rates.

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114. 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 $227^{\circ}C$? Coefficient of linear expansion of copper $= 1.70 \times 10^{5}$ ^ ∘ C^{-1}.

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115. The coefficient of volume expansion of glycerine is 49×10^{-5} ^ ∘ C^{-1}. What is the fractional change in its density for $30^{\circ}C$ rise in temperature?

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116. A body cools from $80^\circ C$ to $50^\circ C$ in 5 minuts. Calculate the time it takes to cool from $60^\circ C$ to $30^\circ C$. The temperature of surrounding is $20^\circ C$.

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117. 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 $227^\circ C$? Coefficient of

linear expansion of copper $= 1.70 \times 10^{5}$ ^ $\circ C^{-1}$.

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118. Explain why is freezer portion on the upper side of a refrigerator and not at the bottom?

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119. Distinguish between convection and radiation.

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120. A steel tape 1 metre long is correctly calibrated for temperature of $27.0^{\circ}C$. The length of a steel rod measured by this tape is found to be 63.0 cm on a h ot day when the temperature is $45^{\circ}C$. What is the actual length of the steel rod on that day? What is

the length of the same steel rod on a day when the temperature is $27.0^{\circ}C$? Coefficient of linear expansion of steel $= 1.20 \times 10^{-5} C^{-1}$.

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121. Pendulum clocks may run slow in summer and fast in winter .Why?

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122. The triple points of neon and carbon dioxide are $24.57k$ and $216.55K$ respectivley. Express these temperatures on the Celsius and Fahrenheit scales.

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123. The electrical resistance in ohms of any specimen of material varies with temperature according to the approximate law.

$R - R_0\left[1 + 5 \times 10^{-3}(T - T_0)\right]$ The

resistance is 101.6Ω at triple point of water and 165.5 at normal meting point of head (600.5K). What is the temperature when the resistance is 123.4Ω?

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124. How can you describe bulk modulus of elasticity(B).

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125. State Hooke's law.

Watch Video Solution

126. Define stress and strain. What are the units in which these quantities are measured?

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127. Write about stress.

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128. What do you understand by heart failure and heart attack?

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129. 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 in fig.A liquid with a film thickness of 0.30 mm is placed between the

block and the table.When released,the block moves ot the right with a constant speed of $00.085ms^{-1}$.Find the coefficient of viscosity of the liquid.

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130. What is dynamics lift?

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131. Determine excess of pressure in side soap solution bubble.

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132. Give derivation of ascent formula.

Watch Video Solution

133. What is turblent flow?

Watch Video Solution

134. Give some practicle applications of Bernoulli's theorem.

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135. What is dynamics lift?

Watch Video Solution

136. Define coefficient of linear expansion of a solid.

Watch Video Solution

137. Write Stefan's law.

Watch Video Solution

138. What is the principle of calorimetery?

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139. Write short note on specific heat capacity.

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