INDIAN SCHOOL MUSCAT
SENIOR SECTION
DEPARTMENT OF PHYSICS
CLASS XI

CLASS-XI **UNIT- VII PROPERTIES OF BULK MATTER** **WORK SHEET-7**

SECTION-A : CONCEPTUAL & APPLICATION TYPE QUESTIONS

1. ELASTICITY

1. Stress and pressure are both forces per unit area. Then in what respect does stress differ from pressure?
2. What does the shape of stress Vs strain graph give?
3. Why are springs made of steel and not copper?
4. A wire is cut to half its original length (a) How would it affect the increase in length under a given load? (b) How does it affect the maximum load it can support without exceeding the elastic limit?
5. If 'S' is stress and 'Y' is young's modulus of the material of a wire, what is the energy stored in wire per unit volume in terms of 'S' and 'Y'?
6. Why the bridges are declared unsafe after long use?
7. Why is the longer side of cross-section of girder used as depth?
8. Represent graphically the variation of extension with load in an elastic body. On the graph mark: (a) Hooke's law region (b) Elastic limit (c) Yield point. (d) Breaking point

2. FLUIDS

1. Why is it difficult to stop bleeding from a cut in human body at high altitudes?
2. A barometer kept in an elevator accelerating upwards reads 76cm of Hg. What will be the possible air pressure inside the elevator?
3. What is the net weight of a body when it falls with terminal velocity through a viscous medium?
4. Why it is dangerous to stand near the edge of the platform when a fast train is crossing it.
5. When air is blown between two balls suspended close to each other, they are attracted towards each other. Why?

3. SURFACE TENSION

1. Why does the free surface a liquid behave like an elastic stretched membrane?
2. Oil is sprinkled on sea waves to calm them. Why?
3. What happens to the surface tension when some impurity is mixed in liquid?
4. How does the angle of contact of a liquid depends on temperature?
5. How does the ploughing of fields help in preservation of moisture in the soil?

4. THERMAL PROPERTIES OF MATTER

1. Why a small gap is left between the iron rails of railway tracks?
2. Pendulum clocks generally run fast in winter and slow in summer. Why?
3. Explain why a beaker filled with water at $4^{o}C$ overflows if temperature is decreased or increased.
4. Why is water used as an effective coolant.
5. What kind of thermal conductivity and specific heat requirements would you specify for cooking utensils?
6. Stainless steel cooking pans are preferred with extra copper bottom. Why?
7. Explain how the loss of heat due to three modes of heat transfer is minimized in a thermos flask.

SECTION-B- NUMERICAL QUESTIONS

1. A uniform wire of steel of length 2.5 m and density 8.0 g/cm^3 weighs 50g. When stretched by a force of 10 kgf, the length increases by 2mm. Calculate Young's modulus of steel.
2. The breaking stress of a material is $10^8 Nm^{-2}$. Find the greatest length of a wire that could hang vertically without breaking. Density of material= $3000 kgm^{-3}$.
3. A spherical ball contracts in volume by 0.01%, when subjected to uniform normal pressure of 100 atmospheres. Calculate the bulk modulus of the material.
4. A metallic cube who's each side is 10cm is subjected to a shearing force of 100kgf. The top face is displaced through 0.25cm with respect to bottom. Calculate the shearing stress, strain and shear modulus.
5. A steel wire of 4.0m is stretched through 2.0mm. The cross-sectional area of the wire is $2.0mm^2$. If Y of steel is $2.0x10^{11} Nm^{-2}$, find (i) the energy density of the wire & (ii) the elastic potential energy stored in the wire.
6. To lift an automobile of 2000kg, a hydraulic pump with a larger piston $900cm^2$ in area is employed. Calculate the force that must be applied to pump a small piston of area $10cm^2$ to accomplish this task.

7. A flat square plate of side 20 cm moves over another similar plate with a thin layer of 0.4 cm of a liquid between them. If a force of one kg-wt moves one of the plates uniformly with a velocity of 1m/s, calculate the coefficient of viscosity of the liquid.
8. An iron ball of radius 0.3cm falls through a column of oil of density 0.94gcm^{-3}. It is found to attain a terminal velocity of 0.5 cm/s. Determine the coefficient of viscosity of the oil. Given that density of iron is 7.8 gcm^{-3}.
9. Eight rain drops of radius 1mm each falling down with terminal velocity of 5 m/s coalesce to form a bigger drop. Find the terminal velocity of the bigger drop.
10. The cylindrical tube of a spray pump has a cross-section of 8.0 cm^2, one end of which has 40 fine holes each of diameter 1.0 mm. If the liquid flow inside the tube is 1.5 m/min . What is the speed of ejection of the liquid through the holes?
11. Water is flowing through a horizontal pipe of varying cross-section. If the pressure of water equals 2cm of Hg where velocity of flow is 32 cm/s, what is pressure at another point where the velocity of flow is 40 cm/s?
12. Water flows out of a small hole in the wall of a large tank near its bottom. What is speed of efflux of water when the height of water level in the tank is 5.0 m?
13. A mercury drop of radius 1.0 cm is sprayed into 10^6 droplets of equal size. Calculate the energy expanded. Surface tension of mercury= 32x10^{-2}N/m.
14. What should be the pressure inside a small air bubble of 0.1mm radius, situated just below the surface? Surface tension of water=7.2x10^{-2}N/m and atmospheric pressure=1.013x10^5 Nm^{-2}.
15. A capillary tube whose inside radius is 0.5 mm is dipped in water of surface tension 75 dyne/cm. To what height is the water raised by the capillary action above the normal level? What is the weight of water raised?
16. Railway lines are laid with gaps to allow for expansion. If the gap between steel rails 66 m long be 3.63 cm at 10^{0}C, then at what temperature will the lines just touch? Coefficient of linear expansion of steel=11x10^{-60}C^{-1}.
17. A lead bullet weighing 20 g and moving with a velocity of 100 m/s comes to rest in a fixed block of wood. Calculate the heat developed and the rise in temperature of bullet assuming that the half of the heat is absorbed by the bullet. The specific heat of lead is 0.03 cal / g^{0}C.
18. How much work in joule is done in producing heat necessary to convert 10g of ice at -5^{0}C into steam at 100^{0}C ? Given specific heat of ice=0.5 cal/ g^{0}C, latent heat of steam=540 cal/g
19. When 0.15 kg of ice of 0^{0}C is mixed with 0.30 kg of water at 50^{0}C in a container, the resulting temperature is 6.7^{0}C. Calculate the heat of fusion of ice. Specific heat capacity of water= 4186 J/kg K.

20. The length of a rod of aluminum is 1.0 meter & its area of cross-section is 5.0 cm^2.Its one end is kept at 250^0C& the other end at 50^0C. How much heat will flow in the rod in 5 minutes? K for Al= $2.0x10^{-1}$ KJ/m s^0C.
21. A 10 cm thick slab of surface area 0.36 m^2 is placed on a hot surface at constant temperature of 100^0C. A block of ice at 0^0C is placed on the upper surface of the slab. In half an hour, 2.4 kg of ice melts. Find the thermal conductivity of material of slab. The latent heat of fusion of ice is $3.35x10^5$ J/kg.