Answers

1) a) Place the Spherometer on a Glass pad and when the Points of the Screw and legs are adjusted to be on the same plane,Zero mark will be on one line

b) i) Placing the Spherometer on a glass Pad and adjusting the points of Screw and Legs to be on one plane, and noting the reading.

ii) Placing the piece of Metal between the Legs ,and adjusting the Screw Point to touch the adjoining surface, and recording the reading.

c) Yes. The piece should be of the size so that it can be inserted between the Legs of the Spherometer.

d) Micrometer Screw Gauge.

e) Vernier Caliper

f) i) smallest measurement 0.01g

ii) Maximum mass 311g

iii) Reading 3.27 g

iv) percentage error= $\frac{0.01}{3.27}$ **x 100%**

g) I) Procedure 1: noting down the reading on the measuring Beaker relevant to the volume up to the free surface of Water.

Proceedure 2:immersing the piece of metal fully under Water, noting down the readings between the Water surfaces and finding the difference between these readings.

ii) By substituting Density = Mass /Volume

$$\rho = \frac{3.27\ x\ 10^{-3}}{1.2\ x\ 10^{-6}} = 2725 \text{ Kg m}^{-3}$$

2) a) i) Vapor Generator
ii) Vapor Trap
iii) Calorimeter
iv) Thermometer

b)

Error	Method of elimination
Water mixing with Vapor	Using of Vapor Trap
Heat loss to the environment	Cooling the Water by 5°C below room temperature,commencing the experiment and collecting Vapor only up to increase in temperature by 5°C

c) 1.mass 0f Calorimeter +Stirrer (m_1)

2. mass of Water + Calorimeter + Stirrer (m_2)

3. Initial temperature of Water (θ_1)

d) 1 maximum temperature of the system (θ_2)

2. Final mass of the System after dissolution of Vapor(m_3)

e) i) Amount of energy that should be supplied only for the complete vaporization of a unit mass of a liquid at boiling point.

ii) $(m_3 - m\ \ 2)$**L +**$(m_3\text{-}m_2)c_w$

x (100 -θ_2**) =**

$[m_1c_s + (m_2 - m_1)c_w]$

x ($\theta_2 - \theta_1$**)**

f) i) mass of the vapor collected

ii) Since it is of a small amount it should be measured perfectly.

g) i) by $\Delta W = P$ x ΔV

ΔW **= 1.0 x 10^5 x (1671 -1) x 10^{-6} = 167J**

ii) by ΔQ =mL

ΔQ **= 994 x 1 x 10^{-6} x 2.26 x 10^6 = 2246.4 J**

by $\Delta Q = \Delta U + \Delta$W increase in internal energy

$\Delta U = \Delta Q - \Delta$ **W**

= 2246.4 -167

= 2079.4 J

iii) This energy is spent in breaching the Molecule attractive Force.

3) a) i) The Fluid should flow under a stream line and steady Flow.

ii) The fluid should be homogeneous

iii) Since a Pressure is applied cross sectional area of the Pipe/Tube should not vary.

b) Cannot apply. Human Blood is not homogeneous. When a Pressure is exerted cross sectional area of the Blood Vessels will vary.

c) Initially it should be cleaned with NaOH followed with HNO_3 and finally with distilled Water.

d) To prevent Water particles accelerating under gravity. Thereby a streamline flow could be easily established.

e) i) Constant Pressure Vessel

ii) When the Tap is open, lifting the constant pressure vessel and by varying the vertical height between the surface of Water and the capillary tube.

iii) Pressure difference =

$\Delta P = H_0 + h\rho g - H_0 = h\rho g$

and through this Pressure gradient is

$P = \frac{\Delta p}{l} = \frac{h\rho g}{l}$

here h- height of the free surface of water,ρ-density of water g - gravitational acceleration,l- length of pipe.

f) Collecting the water that flows through the capillary tube within a particular time, and measuring the volume with a measuring jar and dividing it by the relevant time.

g) i) By $\frac{V}{t} = \left(\frac{k}{\eta}\right)$**p, becomes** $\frac{V}{t} = \left(\frac{k}{\eta}\right)\frac{h\rho g}{l}$

and will be $\frac{V}{t} = \left(\frac{k\rho g}{\eta l}\right)$ **h .As per this the graph h against** $\frac{V}{t}$ **can be drawn.**

ii) 1) On the graph the following coordinates can be chosen.(6,0.4) and (54,3.6) .Then the gradient will be as shown below.

$m = \frac{(36.4-0.4)}{(54-6)}$ **= 0.067 x 10^{-4} m^2 s^{-1}**

2) while Gradient of the graph is

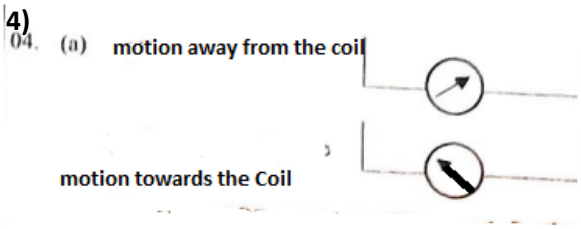
$m = \frac{k\rho g}{\eta l}$ **and** $\eta = \frac{k\rho g}{ml}$ **then**

$$\eta = \frac{1.72\ x10^{-13}\ X\ 1000\ X\ 10}{0.067\ X\ 10^{-4}\ X\ 34.5\ X\ 10^{-2}}$$

= 7.44 x 10^{-4} Kg m^{-1} S^{-1}

h) Since Glycerin does not flow freely it cannot be used

4)



b) i) Law of Fared and of lens regarding induction of Electro Magnet

ii) In such a way as to cause the opposition action to the action which led to it

c) 1) Increasing the speed of motion of the Rod Magnet

2) To utilize a Rod magnet of higher intensity

3) Increasing the number of windings/ Diameter of the coil

d) i) Demonstration of the workings of a Transformer

ii) Usage of a Plug Key, thereupon a steady current flow takes place in the primary coil, and the deflection on the Galvanometer will be more Stable.

iii) When the Switch is connected there will be a deflection initially on G_2 and will disappear. When the Switch is connected, while a magnetic field not available previously will be created, and will create magnetic field rays on the adjoining Coil. Then the action of magnetic induction will take place and a current flow will be induced. Since the magnetic field will be constant afterwards, initial current flow will reduce gradually.

e) while $\frac{V_1}{V_2} = \frac{N_1}{N_2}$ and since there is no loss of energy either P_1=P_2 or V_1I_1 =V_2I_2 Since $\frac{V_1}{V_2}$ = $\frac{I_1}{I_2}$ then it should be $\frac{N_1}{N_2}$=$\frac{I_1}{I_2}$ then from $\frac{25}{50}$ = $\frac{I_2}{50}$ I_2 =250mA

f) i) Since it has higher permeability, the magnetic flux on the Primary coil is fully combined to the Secondary coil

ii) 1) Jule heating

2) Formation of eddy current