

NEW STANDARD ACADEMY

Marks: 60

Date : 17-11-25

CLASS : 11TH

Time: 3 hours.

PHYSICS

1. A thin circular ring of radius 20 mm and mass 7×10^{-4} kg is pulled vertically from the surface of water using a sensitive spring of force constant 0.7 N m^{-1} . The spring is in air and an extension of 3.4 cm is produced in it when the ring just gets free from the surface of water. Find the surface tension of water.
2. At high temperature, when glass melts, it has a tendency to change shape into a sphere. Surface tension of glass at 650°C is 0.3 N m^{-1} . At this temperature, if glass changes from a cylinder of length 100 mm and radius $10 \mu\text{m}$, into a sphere, find the energy released.
3. A mercury drop of radius 5 mm falls from a certain height h on a flat surface and splits up into 10^6 drops each of equal radius. If whole of energy acquired during fall of drop changes into the surface energy of droplets, find the height h through which the mercury drop falls. Given density of mercury = 13600 kg m^{-3} and surface tension $\sigma = 0.465 \text{ N m}^{-1}$.
4. If excess of pressure inside soap bubble is balanced by oil column of height 2 mm, then find the surface tension of oil. Given radius of bubble = 1 cm and density = 0.8 g cm^{-3} .
5. A long cylindrical glass vessel has a small hole of radius r at its bottom. Find the depth to which the vessel can be lowered vertically in the deep water bath without any water entering into it. Take the surface tension of water as σ .
6. Water rises to a height of 4 cm in a capillary tube. when the same capillary

tube is dipped in mercury, the level of mercury depresses through 3 cm. Compare the surface tensions of water and mercury, if the relative density of mercury is 13.6 and the ratio of the cosine of angles of contact of mercury and water is $-\frac{1}{\sqrt{2}}$.

7. A container has a length of one meter. It is filled with three immiscible liquids A, B and C of densities 1000 kg m^{-3} , 1100 kg m^{-3} and 900 kg m^{-3} respectively. If the liquids A and B have heights 0.3 m and 0.2 m respectively, find the pressure acting on the base of container. Given the atmospheric pressure is $1.13 \times 10^5 \text{ N m}^{-2}$.
8. A water tank of square cross-section ($l \times l$) is filled with water up to a height h . What is the thrust at (i) bottom face of tank (ii) vertical face?
9. One limb of a U-tube has a diameter of 10 mm whereas the other limb has a diameter of 2 mm. Water is poured into the tube and both limbs are kept open to atmosphere. What is the difference in water level in the two limbs ?
Given: surface tension of water = $7 \times 10^{-2} \text{ N m}^{-1}$, density = 1000 kg m^{-3} angle of contact = 0 and $g = 9.8 \text{ m s}^{-2}$.
10. Water rises in a capillary tube to a height of 3 cm. In another capillary tube of same material and of radius half of the previous capillary tube, how much will be the capillary rise? If the first capillary tube is inclined at an angle of 45° with the vertical, up to what length of the tube will water rise in the second tube?

CHEMISTRY

1. Identify the species undergoing oxidation and reduction:
(a) $2\text{HgO} \xrightarrow{\text{heat}} 2\text{Hg} + \text{O}_2$
(b) $2\text{H}_2\text{S} + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 2\text{S}$
2. Using electron transfer concept identify the oxidizing and reducing agents
(a) $2\text{FeCl}_2 + \text{H}_2\text{S} \rightarrow 2\text{FeCl}_3 + 2\text{HCl} + \text{S}$

- (b) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
- O.N. of S in $\text{Na}_2\text{S}_2\text{O}_3$
 - Oxidation number of Fe in $\text{K}_3[\text{Fe}(\text{CN})_6]$.
 - Oxidation number of Ba in BaO_2 .
 - Oxidation number of Cr in $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$.
 - Oxidation number of S in $\text{H}_2\text{S}_2\text{O}_7$
 - Using Stock notation represent the following Compounds: Tl_2O , FeO ,
 - $\text{FeCl}_3 + \text{H}_2\text{S} \rightarrow \text{FeCl}_2 + \text{HCl} + \text{S}$
 - Complete and balance the redox reaction $\text{HNO}_3 + \text{I}_2 \rightarrow \text{HIO}_3 + \text{NO}_2$

BIOLOGY

- Describe selective reabsorption with examples.
- Explain tubular secretion and give its significance.
- Differentiate between ammonotelic, ureotelic and uricotelic organisms.
- Explain the structure of a nephron in brief.
- What is osmoregulation? How do kidneys help in osmoregulation?
- What is the role of ADH in urine formation?
- What are kidney stones? Mention their causes.
- Describe the role of vasa recta in urine concentration.
- What is counter-current mechanism? Why is it important?
- Explain micturition reflex.

MATH'S

- Find the equation of the circle with centre $(-a, -b)$ and radius $\sqrt{a^2 + b^2}$
- Find the equation of the circle passing through the points $(2, 3)$ and $(-1, 1)$ and whose centre is on the line $x - 3y - 11 = 0$.
- Find the equation of the circle whose centre is $(1, -3)$ and which touches the line $2x - y - 4 = 0$
- If the line $x + 2by + 7 = 0$ is a diameter of the circle $x^2 + y^2 - 6x + 2y = 0$ then $b = ?$
- The equation of the circle which touches x-axis and whose centre is $(1, 2)$ is
- If one end of a diameter of the circle $x^2 + y^2 - 4x - 6y + 11 = 0$ be $(3, 4)$, then the other end is
- The equation of circle concentric with the circle $x^2 + y^2 - 4x - 6y - 3 = 0$ and touching y-axis, is
- A circle has radius 3 units and its centre lies on the line $y = x - 1$ Then the equation

of this circle if it passes through point $(7, 3)$, is

- A straight line moves such that the algebraic sum of the perpendicular drawn to it from two fixed points is equal to $2k$. Then the straight line always touches a fixed circle of radius
- $2x + y = 0$ is the equation of a diameter of the circle which touches the lines $4x - 3y + 10 = 0$ and $4x - 3y - 30 = 0$ The centre and radius of the circle are