

STAR OLYMPIAD FOUNDATION
INTERNATIONAL SCIENCE OLYMPIAD- CLASS XII
Sample Paper 2023-2024

PHYSICS

1. Choose the wrong statements from the following. The force experienced by a charged particle moving with a velocity v in an electric field E is zero if
 - (A) $v = 0$
 - (B) v is parallel to E
 - (C) v is anti parallel to E
 - (D) All of these
2. A parallel plate capacitor is charged and the battery used for charging is then disconnected. What happens if the plates of the capacitor are moved further apart by means of insulating handles?
 - (A) The voltage across the plates increases.
 - (B) The charge on the capacitor increases.
 - (C) The value of capacitor increases.
 - (D) The electrostatic energy stored in the capacitor decreases.
3. The image obtained with a convex lens is erect and its length is four times the length of the object. If the focal length of the lens is 20 cm, calculate the object and image distance.
 - (A) + 10 m, + 20 m
 - (B) - 15 cm, - 60 cm
 - (C) - 10 m, + 40 m
 - (D) + 12 cm, - 24 cm.

CHEMISTRY

1. Which of the following ions is most effective in the coagulation of an arsenious sulphide sol?
 - (A) K^+
 - (B) Mg^{2+}
 - (C) Al^{3+}
 - (D) Ca^{2+}
2. What are proteins?
 - (A) Condensation polymers of α - amino acids.
 - (B) Condensation polymers of β - amino acids.
 - (C) Condensation polymers of α - hydroxy acids.
 - (D) Condensation polymers of β - hydroxy acids.
3. To what does the molecular weight of benzoic acid in benzene as determined by depression in freezing point method correspond?
 - (A) Ionization of benzoic acid.
 - (B) Dimerization of benzoic acid.

- (C) Isomer of benzoic acid.
(D) Solvation of benzoic acid.

MATHS

1. If $\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$, then find the value of $\begin{vmatrix} 2a_1 + 3b_1 + 4c_1 & b_1 & c_1 \\ 2a_2 + 3b_2 + 4c_2 & b_2 & c_2 \\ 2a_3 + 3b_3 + 4c_3 & b_3 & c_3 \end{vmatrix}$

- (A) Δ (B) 2Δ (C) $\frac{1}{2}\Delta$ (D) $(2 \times 3 \times 4)\Delta$

2. A cylindrical gas container is closed at the top and opens at the bottom. If the iron plate of the top is $\frac{5}{4}$ times as thick as the plate forming the cylindrical sides, the ratio of the radius to the height of the cylinder using minimum material for the same capacity is:

- (A) $\frac{4}{1}$ (B) $\frac{1}{5}$ (C) $\frac{4}{5}$ (D) $\frac{20}{1}$

3. If the system of linear equations $x + ky + 3z = 0$ $3x + ky - 2z = 0$ $2x + 4y - 3z = 0$ has a non-zero solution (x, y, z) then $\frac{xy}{y^2}$ is equal to

- (A) -10 (B) 10 (C) -30 (D) 30

[OR]

BIOLOGY

1. Biological Oxygen Demand (BOD) is a measure of

- (a) Industrial wastes poured into water bodies
(b) Extent to which water is polluted with organic compound
(c) Amount of carbon monoxide inseparably combined with hemoglobin
(d) Amount of oxygen needed by green plants during night

2. Inhibition of secretion of which of the following hormones is necessary for disintegration of corpus luteum?

- (A) Progesterone (B) LH (C) LTH (D) FSH

3. Mosses and ferns are found in moist and shady places because both

- (A) Require presence of water for fertilization.
(B) Do not need sunlight for photosynthesis.
(C) Depend for their nutrition on micro-organisms which can survive only at low temperature
(D) Cannot compete with sun-loving plants