STAR OLYMPIAD FOUNDATION

SAMPLE PAPER

INTERNATIONAL SCIENCE OLYMPIAD- CLASS XI

PHYSICS

1. The power of a wind mill having blade area equal to A and wind velocity equal to v is

   (A) $\frac{A\rho v^3}{2}$ (B) $\frac{A\rho v^2}{2}$ (C) $\frac{A\rho v}{2}$ (D) $A\rho v^3$

   Answer: (A)

   Mass of the air flowing out of windmill per second = $A\rho v$ (where, ρ is density of air)

   Kinetic energy per second = $\frac{1}{2}$ x $A\rho v$ x v^2 = $\frac{1}{2}$ $A\rho v^3$.

   This will be the power of the windmill.

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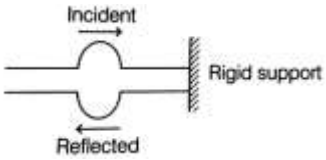
2. The reflected wave is shown in the figure



   The change in phase of reflected wave is

   (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) π (D) 2π

   Answer: (C)

   After reflection of wave from a rigid support, it suffers a phase change of π.

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CHEMISTRY

3. The types of bond present in $CuSO_4.5H_2O$ are only

   (A) electrovalent and covalent (B) electrovalent and coordinate

   (C) electrovalent, covalent and coordinate covalent (D) covalent and coordinate covalent

   Answer: (C)

   $CuSO_4.5H_2O$ contains all the three given types of bond.

   (i) Electrovalent (ionic interaction between Cu^+ and SO_4^{2-})

   (ii) Covalent (with SO_4^{2-})

   (iii) Co-ordinate (H_2O molecules to Cu^{2+})

4. Which of the following series contains only five-membered aromatic heterocyclic compounds?

(A) Thiophene, oxetane, piperidene (B) Tetrahydrofuran, pyrrolidene, pyrrole

(C) Naphthalene, cyclopentene, tropolone (D) Furan, pyrrole, thiophene

Answer: (D)

Furan, pyrrole, thiophene are all five membered aromatic heterocyclic compounds.

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BIOLOGY

5. Which of the following shape is not shown by bacteria ?

(A) Bacillus (B) Pyramidal (C) Cocci (D) Vibrio

Answer: (B)

Based on shapes, Bacteria are grouped under four categories that includes : the spherical Coccus, the rod-shaped Baccilus, the comma-shaped Vibrium and the spiral *Spirillum.*

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6. Frog is divided into how many parts ?

(A) 1 (B) 2 (C) 3 (D) 4

Answer: (B)

The body of frog is divided into 2 parts that includes a head and a trunk. Neck and tail are not present.

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(Or)

MATHS

5. The letter of the word 'KANPUR' are taken four at a time and arranged in all possible ways. The number of arrangements which begin with 'K' and ends with 'R' is

(A) 20 (B) 18 (C) 14 (D) 12

Answer: (D)

Given, letter = 6

Letter to be selected = 4

Out of 4 places every word starts with 'K' and ends with 'R'.

∴ 2 letters are already selected.

Number of required arrangements = permutation of 2 letters out of 4 remaining letters

$= {}^4P_2 = 4 \times 3 = 12.$

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6. The probability that 13^{th} day of a randomly chosen month is a Friday , is

(B) $\frac{1}{12}$ (B) $\frac{1}{7}$ (C) $\frac{1}{84}$ (D) None of these

Answer: (C)

Probability of selecting a month = $\frac{1}{12}$

13^{th} day of a randomly selected month is Friday if its first day is Sunday.

So, probability of this event = $\frac{1}{7}$

∴ Required probability = $\frac{1}{12} \times \frac{1}{7} = \frac{1}{84}$.