STAR OLYMPIAD FOUNDATION

SAMPLE PAPER

INTERNATIONAL SCIENCE OLYMPIAD- CLASS XII

PHYSICS

1. Gravitational and electrostatic forces are ..... in nature. They both have ..... dependence on distance and differ mainly in the proportionality constants.

   (A) Dissipative, direct (B) dissipative, inverse

   (C) conservative, inverse-square (D) conservative, square

   Answer: (C)

   conservative, inverse-square.

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2. If V is applied potential difference in forward bias and V_0 is barrier potential of a p, n junction, then effective barrier height under forward bias is

   (A) $V - V_0$ (B) $V_0 - V$ (C) $V_0 + V$ (D) V_0

   Answer: (B)

   Effective potential difference will decrease in forward bias i.e. $V_0 - V$.

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CHEMISTRY

3. KCl cannot be used as a salt-bridge for the cell

   $Cu(s) \mid CUSO_4(aq) \mid AgNO_3(aq) \mid Ag(s)$

   Because

   (A) $CuCl_2$ gets precipitated (B) Cl_2 gas is evolved

   (C) AgCl gets precipitated (D) None of the above

   Answer: (C)

   KCl reacts with $AgNO_3$ to form a ppt. of AgCl.

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4. When ethyl alcohol and KI reacted in the presence of Na_2CO_3, yellow crystals of ..... are formed

   (A) CHI_3 (B) CH_3I (C) CH_2I_2 (D) C_2H_5I

   Answer: (A)

   $$CH_3CH_2OH + KI \xrightarrow{Na_2CO_3} CHI_3$$

   Iodoform (yellow crystals)

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BIOLOGY

5. During meiosis, a microspore mother cell has 24 bivalents, the number of chromosomes in its pollen grain will be

   (A) 12 (B) 24 (C) 6 (D) 18

   Answer: (B)

   During meiosis, a microspore mother cell has 24 bivalents, the number of chromosomes in its pollen grain will be 24.

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6. Action of enzyme E, prevent recircularisation of vector plasmid without insertion of foreign DNA. E is

   (A) DNA (B) reverse transcriptase (C) terminal transferase (D) alkaline phosphatase.

   Answer: (D)

   Action of enzyme E, prevent recircularisation of vector plasmid without insertion of foreign DNA. E is alkaline phosphatase.

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(OR)

MATHS

5. If $f(x) = \frac{\sin([x]\pi)}{x^2+x+1}$, where [·] denotes the greatest integer function, then

   (A) f is one-one (B) f is not one-one and non-constant

   (C) f is a constant function (D) None of the above

   Answer: (C)

   $\because \sin([x]\pi) = 0 \implies f(x) = 0, \forall\, x \in R \implies f(x)$ is many one function and a constant function.

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6. The degree of the differential equation

$\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right) + 1 = 0$ is

   (B) 3 (B) 2 (C) 1 (D) None of these

   Answer: (D)

   The given differential equation is not a polynomial equation in $\frac{dy}{dx}$.

   Therefore, its degree is not defined.