SOF NATIONAL SCIENCE OLYMPIAD

Total Questions : 50   **Time : 1 hr.**

PATTERN & MARKING SCHEME			
Section	**(1) Physics & Chemistry**	**(2) Achievers Section**	**(3) Mathematics or Biology**
No. of Questions	25	5	20
Marks per Ques.	1	3	1

SYLLABUS

Section – 1 : *Physics* : Electricity and Magnetism, Electromagnetic Induction, Alternating current, Electromagnetic waves, Optics, Modern Physics, Semiconductor Electronics, Communication Systems.

Chemistry : Solid State, Solutions, Electrochemistry, Chemical Kinetics, Surface Chemistry, General Principles and Processes of Isolation of Elements, p-Block Elements (Group 15 to 18), d- & f-Block Elements, Coordination Compounds, Haloalkanes and Haloarenes, Alcohols, Phenols and Ethers, Aldehydes, Ketones and Carboxylic Acids, Amines, Biomolecules, Polymers, Chemistry in Everyday Life.

Section – 2 : Higher Order Thinking Questions - Syllabus as per Section – 1.

Section – 3 : Relations and Functions, Inverse Trigonometric Functions, Matrices and Determinants, Continuity and Differentiability, Application of Derivatives, Integrals, Application of Integrals, Differential Equations, Vector Algebra, Three Dimensional Geometry, Probability, Linear Programming. **OR**

Section – 3 : Reproduction, Genetics and Evolution, Biology in Human Welfare, Biotechnology, Ecology.

PHYSICS AND CHEMISTRY

1. A ray of light passes from vacuum into a medium of refractive index μ, the angle of incidence is found to be twice the angle of refraction. Then the angle of incidence is

(A) $\cos^{-1} (\mu/2)$ (B) $2\cos^{-1} (\mu/2)$

(C) $2\sin^{-1} \mu$ (D) $2\sin^{-1}(\mu/2)$

2. A capacitor of capacitance C_0 is charged to a potential V_0 and isolated. A small capacitor of capacitance C is then charged from C_0, discharged and charged again, the process being repeated n times. Due to this, potential of the larger capacitor is decreased to V. The value of C is

(A) $C_0\left[\dfrac{V_0}{V}\right]^{1/n}$ (B) $C_0\left[\left(\dfrac{V_0}{V}\right)^{1/n} - 1\right]$

(C) $C_0\left[\left(\dfrac{V_0}{V}\right) - 1\right]^{n}$ (D) $C_0\left[\left(\dfrac{V_0}{V}\right)^{n} - 1\right]$

3. A ray of light in a liquid of refractive index 1.4, approaches the boundary surface between the liquid and air at an angle of incidence whose sine is 0.8. Which of the following statements is correct about the behavior of the light ?

(A) It is impossible to predict the behavior of the light ray on the basis of the information supplied.

(B) The sine of the angle of refraction of the emergent ray will be less than 0.8.

(C) The ray will be internally reflected.

(D) The sine of the angle of refraction of the emergent ray will be greater than 0.8.

4. A metal X is prepared by the electrolysis of fused chlorides. It reacts with hydrogen to form a colourless solid from which hydrogen is released on treatment with water. The metal is
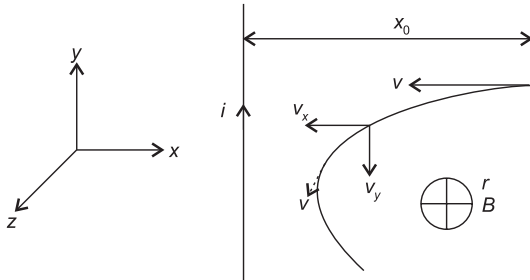
(A) Al   (B) Ca

(C) Cu   (D) Zn

5. A 0.008 M solution of M_2SO_4 is isotonic with a 0.02 M solution of glucose at the same temperature. The apparent degree of dissociation is

(A) 0.5   (B) 0.75

(C) 1   (D) 0.25

6. A compound 'X' when reacted with PCl_5 and then with NH_3 gives 'Y'. When 'Y' is treated with Br_2 and KOH, it produced 'Z'. 'Z' on treatment with $NaNO_2$ and HCl at 0°C and then on warming with water produced *ortho*-cresol. Compound 'X' is

(A) *o*-toluic acid   (B) *o*-chlorotoluene

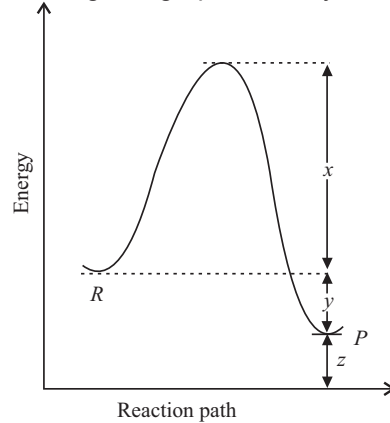(C) *o*-bromotoluene   (D) *m*-toluic acid.

7. A long straight wire carries a current i. A particle having a positive charge q and mass m, kept at distance x_0 from the wire is projected towards it with speed v as shown in the given figure. The closest distance of approach of charged particle to the wire is

(A) $x_{min} = x_0 e^{-2\pi mv/\mu_0 qi}$

(B) $x_{min} = x_0 e^{mv/\mu_0 qi}$

(C) $x_{min} = x_0 e^{-\pi mv/\mu_0 qi}$

(D) $x_{min} = x_0 e^{-mv/\mu_0 q2i}$

8. Observe the given graph carefully.

The activation energy of the backward reaction, heat of reaction and threshold energy of the reaction respectively are

(A) $x - y$; y and $x + y - z$

(B) $x + y + z$; $y + z$ and z

(C) $x + y$; y and $x + y + z$

(D) $x + y$; y and $x - y - z$.

MATHEMATICS

9. If $\sqrt{(1 - x^6)} + \sqrt{(1 - y^6)} = a(x^3 - y^3)$ and $\dfrac{dy}{dx} = f(x, y) \sqrt{\left(\dfrac{1 - y^6}{1 - x^6}\right)}$, then

(A) $f(x, y) = \dfrac{y}{x}$

(B) $f(x, y) = \dfrac{y^2}{x^2}$

(C) $f(x, y) = \dfrac{2y^2}{x^2}$

(D) $f(x, y) = \dfrac{x^2}{y^2}$

10. For non-zero vectors $\vec{a}, \vec{b}, \vec{c}$; $(\vec{a} \times \vec{b}) \cdot \vec{c} = |\vec{a}|\,|\vec{b}|\,|\vec{c}|$ holds iff

(A) $\vec{a} \cdot \vec{b} = 0, \vec{b} \cdot \vec{c} = 0$

(B) $\vec{b} \cdot \vec{c} = 0, \vec{c} \cdot \vec{a} = 0$

(C) $\vec{c} \cdot \vec{a} = 0, \vec{a} \cdot \vec{b} = 0$

(D) $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{c} = \vec{c} \cdot \vec{a} = 0$

BIOLOGY

9. The allele for pea comb (P) in chickens is completely dominant to the allele for single comb (p). The alleles for black feather colour (B), and white feather colour (B′) show codominance, so that BB′ individuals possess blue feathers. If chickens heterozygous for both pairs of genes are mated, what proportion of offspring are expected to be pea combed and white feathered?
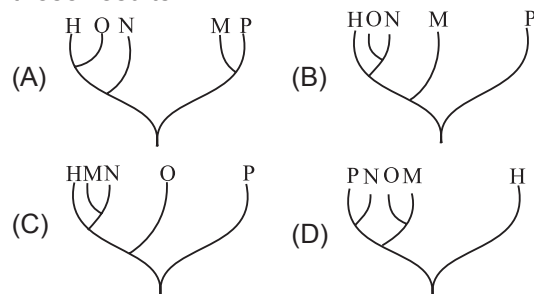
(A) 9/16   (B) 3/16

(C) 1/16   (D) 2/16

10. Human blood, when mixed with antibodies present in human blood, give maximum precipitation.
If another animal's blood is mixed with antibodies present in human blood, the percentage of

precipitation indicates evolutionary relationship with that animal. The following experimental results were obtained :

Species: Human (H) - 100%; M - 37%; N - 75%; O - 79%; P - 17%

Which phylogenetic tree would best represent these results?

(A)

(B)

(C)

(D)

How OlympiadHelper.com can help students scoring better in Olympiad examination?

OlympiadHelper.com is the most trusted and comprehensive Olympiad exam diagnostic and preparation tool. It provides an objective, in-depth practice platform to the students preparing for various Olympiad examinations. Our assessments bring to light the strengths and weaknesses of a student on the five-core subject English, Science, Mathematics, Computer Skills and General Knowledge. Our "Online Test Series" is designed to handle most of the school level competitive / Olympiad / diagnostic exams; such as

Science Olympiad Foundation
National Cyber Olympiad (NCO), National Science Olympiad (NSO), International Mathematics Olympiad (IMO), International English Olympiad (IEO), International Sports & Knowledge Olympiad (ISKO) exams, conducted by Science Olympiad Foundation (SOF)

Educational Initiatives
ASSET – Mathematics, ASSET – Science and ASSET – English exams, conducted by Educational Initiatives

Macmillan Education
IAIS-Mathematics, IAIS-Science, IAIS-English and IAIS - Digital Technology (formerly IAIS-Computer) exams, conducted by Macmillan Education in partnership with Educational Assessment

Silver Zone
International Informatics Olympiad (iIO), International Olympiad of Science (iOS), International Olympiad of Mathematics (iOM), International Olympiad of English Language (iOEL), SKGKO and iTHO exams, conducted by Silver Zone

and many other similar examinations.

We are
The Most Trusted Olympiad Diagnostic and Preparation Tool

Subscribe Now

Use coupon **"Test20"** to get 20% discount on Subscription

Most of the Olympiad exams are conducted on the similar syllabus that kids are studying at school. It means that they do not require additional reference books for the preparation of these exams. However, at the same time questions asked in these exams are quite different than what kids learn in the school. Questions are trickier and conceptual.

To excel in 'Olympiad Exams', it is essential for the students to understand the exam pattern, evaluate and prepare themselves on the Olympiad standard questions.

Following are the few impressive features that make "OlympiadHelper.com" the most comprehensive and trusted tool for Olympiad Exam

Get 50 Chapter-wise 20 Sample and 3 Mock Tests in each of the following subjects

- Cyber/Computer
- Science
- Mathematics
- English
- General Knowledge

Subscribe Now

1. Comprehensive Dashboard: Monitor your overall Olympiad preparation progress from a single screen. This screen is very useful for parents. It gives a complete detail about how the kid is using the Tool. It gives details such as till now how many tests they have completed, when was the last time they have completed their chapter-wise, sample, mock or review tests and what was their performance in the last test. Just one glance and you will get a complete understanding on the status of kids preparation.

2. Chapter-wise Tests: Currently, the biggest problem to the students appearing in Olympiad Exams is that; exams are conducted in the mid-session. This gives no time to students for preparation. With "Chapter-wise Test Generation" feature students can start their Olympiad Exam preparation as soon as they complete their first chapter. You will get an option of generating 50 chapter-wise tests in each subscribed subject.

3. Selection of Exam Patterns: To provide our learners; more realistic feel while taking a practice test, we provide an option to select Exam pattern. It also means that you DO NOT NEED to buy a separate package for the same subject of different exams.

4. Sample Tests: 20 Full-length Tests with an option to select exam patterns from All-Inclusive, SOF, SilverZone, IAIS and ASSET

5. Mock Tests: 3 Full-length Tests with an option to select exam patterns from All-Inclusive, SOF, SilverZone, IAIS and ASSET

6. Review Tests: A revolutionary new feature allows kids to attempt only those questions which they have marked wrong. When exams are nearby, this feature becomes very useful while revising the subject.

7. Descriptive Answers: Detailed answers are given to all difficult questions.

8. Mark Question for Review: Have doubts in a question and want to discuss with your parent/teacher? This feature can be very useful.

9. Feedback Option: You will find a link to send feedback/doubts about the question at the bottom of each question. In case you are not satisfied with the question/answer or answer description, you can communicate the same to us, using the link. Our team will get back to you with explanation / resolution / details with 48 hrs.

See Free DEMO Test

10. Detailed Strength and Weakness Report: After each test, the student will get a detailed diagnostic report that contains student's performance break-up at the chapter level.

Use coupon "Test20" to get 20% discount on Subscription

11. Percentile Score: At the end of each mock test, kids are presented with the percentile score. If your percentile score is 86, this means 86% of all the kids who appeared in the same exam have scored either less than or equals to your marks. However, it also means that 14% of the kids have scored more than your marks. This feature helps the kids to evaluate their preparation.

12. Time Tracking: Monitor time spent on a question as well as on a test paper.

13. Reset Test: Facility to re-appear in Chapter-wise / Sample tests.

14. User-Notes: Option to maintain customised notes; On question, on chapter, on subject or in general

Visit www.OlympiadHelper.com for more information.