SOF OLYMPIADS

CLASS 12

SAMPLE PAPER 2025-26

IMO

SOF INTERNATIONAL MATHEMATICS OLYMPIAD

Total Questions : 50 | Time : 1 hr.

PATTERN & MARKING SCHEME

Section	(1) Logical Reasoning	(2) Mathematical Reasoning or Applied Mathematics	(3) Everyday Mathematics	(4) Achievers Section
No. of Questions	15	20	10	5
Marks per Ques.	1	1	1	3

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

Section – 2 : 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 – 2 : Numbers, Quantification, Numerical Applications, Solutions of Simultaneous Linear Equations, Matrices, Determinants, Application of Derivatives, Integration, Application of Integrations, Differential Equations, Probability, Inferential Statistics, Index numbers, Time-based data, Financial Mathematics, Linear Programming.

Section – 3 : The syllabus of this section will be based on the syllabus of Quantitative Aptitude.

Section – 4 : Matrices, Determinants, Application of Derivatives, Integration, Application of Integrations, Differential Equations, Linear Programming, Probability.

LOGICAL REASONING

1. In the following equation, two signs and two numbers need to be interchanged to make it correct. Select the correct interchange of signs and numbers from the given options.

$$1050 \times 60 \div 7 + 13 - 50 = 100$$

(A) ÷, × and 7, 50
(B) ×, – and 60, 7
(C) ×, ÷ and 60, 50
(D) +, ÷ and 50, 13

2. Select the odd one out.

(A) 
(B) 
(C) 
(D) 

3. A number arrangement machine when given an input of numbers, rearranges them following a particular rule in each step. The following is an illustration of input and steps of rearrangement.

Input :	25	280	345	36	93	147	550
Step-I :	550	280	345	36	93	147	25
Step-II :	550	345	280	93	147	36	25
Step-III :	550	345	280	147	93	36	25

What will be the third step for the following input?

Input :	113	18	48	225	462	175	288
(A)	462	288	48	225	113	175	18
(B)	462	288	225	175	113	48	18
(C)	462	225	288	48	113	175	18
(D)	462	288	225	48	113	175	18

MATHEMATICAL REASONING

4. If A is skew-symmetric matrix of order 2 and B, C are matrices $\begin{bmatrix} 1 & 4 \\ 2 & 9 \end{bmatrix}$ and $\begin{bmatrix} 9 & -4 \\ -2 & 1 \end{bmatrix}$ respectively, then $A^3BC + A^5(B^2C^2) + A^7(B^3C^3) + \ldots\ldots + A^{2^n+1}B^nC^n$ is

(A) A skew-symmetric matrix

(B) A symmetric matrix

(C) An identity matrix

(D) None of these

5. Solve the differential equation $(x + y)dy + (x - y)dx = 0$, given that $y = 1$ when $x = 1$.

(A) $\log(x+y)+\frac{\pi}{2}=\log 2$

(B) $\log y^2+\tan^{-1}\left(\frac{y}{x}\right)=\log 2$

(C) $\log(x^2+y^2)+2\tan^{-1}\left(\frac{y}{x}\right)=\frac{\pi}{2}+\log 2$

(D) $\log x^2+2\tan^{-1}\left(\frac{y}{x}\right)=\frac{\pi}{2}$

6. It has been found that if A and B play a game 12 times, A wins 6 times, B wins 4 times and they draw twice. A and B take part in a series of 3 games. The probability that they will win alternately is

(A) $\frac{5}{72}$ (B) $\frac{5}{36}$

(C) $\frac{19}{27}$ (D) None of these

APPLIED MATHEMATICS

4. The following table gives information regarding weekly income of labourers working at a dam site:

Income (in ₹)	600-700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300
Number of labourers	40	68	86	120	90	40	26

Estimate the quartile deviation.

(A) 115.87 (B) 231.77

(C) 7.99 (D) 8.88

5. For a Poisson's distribution, $3P(X = 2) = P(X = 4)$. Find $P(X = 3)$. (Use : $e^{-6} = 0.00248$)

(A) 0.07297 (B) 0.08928

(C) 0.06261 (D) 0.0216

6. The amount of money today which is equal to series of payments in future is

(A) Nominal value of annuity (B) Present value of annuity

(C) Future value of annuity (D) None of these

EVERYDAY MATHEMATICS

7. In a class, 25% of the students get a scholarship. There are 40 girls and 50% of them get a scholarship. If the girls constitute 25% of the strength of the class, then find the percentage of boys who get a scholarship.

(A) 15% (B) 25%

(C) 20% (D) None of these

8. A man 2 metres tall walks away from a lamp post 5 metres height at the rate of 4.8 km/hr. The rate of increase of the length of his shadow, is

(A) 1.6 km/hr (B) 6.3 km/hr

(C) 5 km/hr (D) 3.2 km/hr

ACHIEVERS SECTION

9. Read the given statements carefully and select the correct option.

Statement-I : The degree and order of the differential equation $\left(1+\left(\frac{dy}{dx}\right)^3\right)^{\frac{7}{3}} = 7\frac{d^2y}{dx^2}$ respectively are 3 and 2.

Statement-II : If $x^3dy + xydx = x^2dy + 2ydx$, $y(2) = e$, then $y(-1) = \frac{4}{e}$.

(A) Both Statement-I and Statement-II are true.

(B) Both Statement-I and Statement-II are false.

(C) Statement-I is true but Statement-II is false.

(D) Statement-I is false but Statement-II is true.

10. Solve the following and select the correct option.

(i) If the function $f(x) = 2x^2 - kx + 5$ is increasing on [1, 2], then k lies in the interval

(ii) The interval in which the function $y = x^3 + 5x^2 - 1$ is decreasing, is

	(i)	**(ii)**
(A)	$(-\infty, 4)$	$(0, 10)$
(B)	$(4, \infty)$	$\left(\frac{-10}{3}, 0\right)$
(C)	$(-\infty, 4)$	$\left(\frac{-10}{3}, 0\right)$

(D) None of these

ANSWER KEY

1. (C) 2. (C) 3. (B)

MATHEMATICAL REASONING 4. (A) 5. (C) 6. (B)

APPLIED MATHEMATICS 4. (A) 5. (B) 6. (B)

7. (D) 8. (D) 9. (C) 10. (C)