SCIENCE OLYMPIAD FOUNDATION

SAMPLE PAPER SYLLABUS 2023-24

IMO

CLASS 11

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 : Sets, Relations and Functions, Principle of Mathematical Induction, Logarithms, Complex Numbers & Quadratic Equations, Linear Inequations, Sequences and Series, Trigonometry, Straight Lines, Conic Sections, Permutations and Combinations, Binomial Theorem, Statistics, Mathematical Reasoning, Limits and Derivatives, Probability, Introduction to 3-D Geometry.

OR

Section – 2 : Numbers, Quantification, Numerical Applications, Sets, Relations and Functions, Sequences and Series, Permutations and Combinations, Mathematical Reasoning, Limits, Continuity and Differentiability, Probability, Descriptive Statistics, Basics of Financial Mathematics, Straight Lines, Circles.

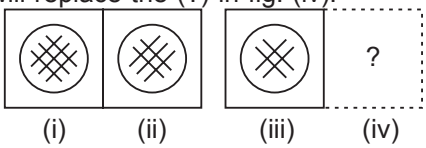
Section – 3 : The syllabus of this section will be based on the syllabus of Quantitative Aptitude.

Section – 4 : Sets, Relations and Functions, Sequences and Series, Permutations and Combinations, Limits and Derivatives, Straight Lines, Circles, Probability.

LOGICAL REASONING

1. Mohit and Kunal are good in Hockey and Volleyball. Sachin and Mohit are good in Hockey and Baseball. Gaurav and Kunal are good in Cricket and Volleyball. Sachin, Gaurav and Rohit are good in Football and Baseball.
Who is good in Baseball, Cricket, Volleyball and Football?
(A) Sachin (B) Kunal
(C) Gaurav (D) Mohit

2. There is a certain relationship between fig. (i) and (ii). Establish the same relationship between fig. (iii) and (iv) by selecting a suitable figure from the options which will replace the (?) in fig. (iv).



(A)  (B) 

(C)  (D) 

3. Select a figure from the options which satisfies the same conditions of placement of the dots as in Fig.(X).

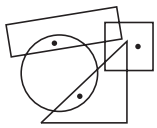
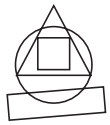
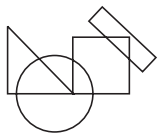
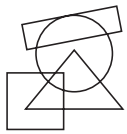
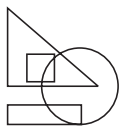


Fig. (X)

(A)  (B) 

(C)  (D) 

MATHEMATICAL REASONING

4. The value of the expression $3(\sin\theta - \cos\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4(\sin^6\theta + \cos^6\theta)$ is
(A) 11
(B) 12
(C) 13
(D) 0

5. Equation of a circle which passes through (3, 6) and touches the axes is _____.
(A) $x^2 + y^2 + 6x + 6y + 3 = 0$
(B) $x^2 + y^2 - 6x - 6y - 9 = 0$
(C) $x^2 + y^2 - 6x - 6y + 9 = 0$
(D) None of these

6. If $\frac{(a+ib)^2}{a-ib} - \frac{(a-ib)^2}{a+ib} = x+iy$, then the value of x is

(A) 0

(B) $\frac{6a^2b}{(a^2+b^2)^2}$

(C) $\frac{-2b^3}{(a^2+b^2)^2}$

(D) None of these

APPLIED MATHEMATICS

4. For a positively skewed distribution, mean is always

(A) Less than the median

(B) Less than the mode

(C) Greater than the mode

(D) Difficult to tell

5. Find the value of $\frac{1}{\log_3 84} + \frac{1}{\log_4 84} + \frac{1}{\log_7 84}$.

(A) 4 (B) 7

(C) 3 (D) 1

6. If three dice are thrown together, then the probability that the sum of the numbers appearing on them is 13, is

(A) $\frac{21}{216}$

(B) $\frac{5}{216}$

(C) $\frac{11}{216}$

(D) $\frac{11}{432}$

EVERYDAY MATHEMATICS

7. Rajan got married 8 years ago. His present age is $\frac{6}{5}$ times his age at the time of his marriage. Rajan's sister was 10 years younger to him at the time of his marriage. The present age of Rajan's sister is

(A) 32 years (B) 36 years

(C) 38 years (D) 40 years

8. A toothed wheel of diameter 50 cm is attached to a smaller wheel of diameter 30 cm. How many revolutions will the smaller wheel make when the larger one makes 15 revolutions?

(A) 18

(B) 20

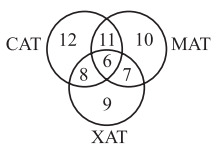
(C) 25

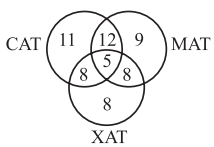
(D) 30

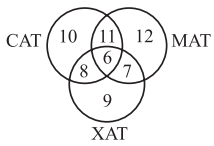
ACHIEVERS SECTION

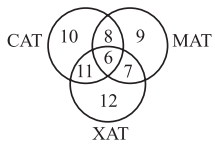
9. Which of the following Venn diagrams represent the given conditions?

A survey was conducted at a coaching institute and it was found that there were 34 students who appeared in MAT. There were 37 students who appeared in CAT of which 17 students appeared in MAT. 30 students appeared in XAT of which 13 students appeared in MAT. Of the XAT applicants (*i.e.*, appeared students) 14 appeared in CAT and 6 appeared in all three.

(A) 

(B) 

(C) 

(D) 

10. Consider the following statements:

Statement-1 : Three non-zero real numbers a, b, c are in G.P., if $b^2 = ac$.

Statement-2 : If the quadratic equation $(a^2 + b^2)x^2 - 2(ab + bc)x + (b^2 + c^2) = 0$ has equal roots, then a, b, c are in G.P., a, b, c being non-zero real numbers.

Which of the following options is correct?

(A) Statement-1 is true but Statement-2 is false.

(B) Statement-1 is false but Statement-2 is true.

(C) Both Statement-1 and Statement-2 are false.

(D) Both Statement-1 and Statement-2 are true.

ANSWERS

IMO – 1. (C) 2. (C) 3. (C)

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

(APPLIED MATHEMATICS) 4. (C) 5. (D) 6. (A)

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