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INTERNATIONAL CYBER OLYMPIAD	NATIONAL INTERACTIVE SCIENCE OLYMPIAD	NATIONAL INTERACTIVE MATHS OLYMPIAD	NATIONAL BIOTECHNOLOGY OLYMPIAD	INTERNATIONAL ENGLISH OLYMPIAD	INTERNATIONAL G.K. OLYMPIAD

Level - 1 : Level-1 winners will get certificate, apititude report, medals for the school toppers and online subscription.

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Prizes ranges from cash (millions of $), gadgets, foreign trips, publicity, fame, scholarships, Internships, conference participation and more.

NATIONAL INTERACTIVE MATHS OLYMPIAD

NIMO

12 Class **A1 Paper Code**

LEVEL - 1

1. You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET.**
2. The question paper is made as per syllabus guidelines & pattern given in the information Booklet. The Question Paper for Classes 1 to 6 contains 25 Questions each to be answered in 40 minutes. The Question paper for classes 7 to 12 contains 50 Questions each to be answered in 60 minutes. All questions are compulsory. Further instructions are given in the instruction letter to the coordinator teacher.
3. Use the response sheet to mark your responses by darkening the required circle. The response sheet has to be returned to the foundation, duly filled in. The student can retain the Question Paper.

MENTAL ABILITY

1. A 270 metres long train running at the speed of 120 kmph crosses another train running in opposite direction at the speed of 80 kmph in 9 seconds. What is the length of the other train?

(1) 260 m (2) 230 m
(3) 240 m (4) None of these

2. 66 cm^3 of silver is drawn into a wire 1mm in diameter. The length of the wire will be?

(1) 84 m (2) 90 m
(3) 168 m (4) None of these

3. If TAP is coded as SZO, then how is FREEZE coded ?

(1) EQDDYD (2) ESDFYF
(3) EQDFYG (4) None of these

4. Much is related to Many in the same way as Measure is related to ____

(1) Weigh (2) Count
(3) Calculate (4) None of these

5. In a certain code language, 'Mink Yang Pe' means 'Fruits are ripe', 'Pe Lao May Mink' means 'Oranges are not ripe' and 'May Pe Nue Mink' means 'Mangoes are not ripe'. Which word in that language means 'Mangoes'?

(1) May (2) Nue
(3) Pe (4) None of these

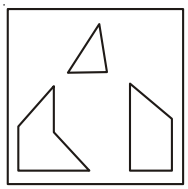
6. A watch reads 4.30. If the minute hand points East, in which direction will the hour hand point ?

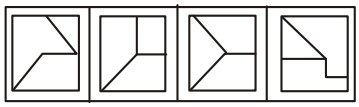
(1) North (2) North-West
(3) North-East (4) None of these

7. A, P, Q, Y, S & Z are sitting in a row. S and Z are in the centre, A and P are at the ends, Q is sitting to the left of A. Who is to the right of P?

(1) A (2) Y
(3) S (4) None of these

8. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).


(X)


(1) (2) (3) (4)

(1) 1 (2) 2

(3) 3 (4) None of these

9. Tanya is older than Eric. Mohit is older than Tanya. Eric is older than Mohit. If the first two statements are true, then the third statement is

(1) True (2) False

(3) Uncertain (4) None of these

10. Find out the alternative figure which contains figure (X) as its part.

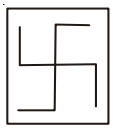
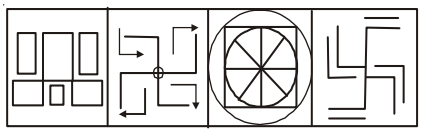


Figure (X)


(1) (2) (3) (4)

(1) 1 (2) 2

(3) 3 (4) None of these

MATHEMATICS

11. The first term of a G.P. is 1. The sum of the third and fifth terms is 90. Find the common ratio of the G.P.

(1) ± 3 (2) ± 2

(3) ± 4 (4) None of these

12. Let A (6,4) and B (12, 14) be two given points. Find the slope of a line perpendicular to AB.

(1) $5/3$ (2) $-3/5$

(3) $5/2$ (4) None of these

13. Let A = {a, b, {c, d} , e}. Which of the following statement is false?

(1) $\{c, d\} \subset A$ (2) $\{c, d\} \in A$

(3) $\{\{c, d\}\} \subset A$ (4) None of these

14. Let A and B be two sets such that : n (A) = 20, $n(A \cup B) = 42$ and $n(A \cap B) = 4$. Find n(B).

(1) 23 (2) 25

(3) 26 (4) None of these

15. If z, z_1, z_2 are complex numbers, then which one of them is incorrect?

(1) $\overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$ (2) $\overline{z_1 z_2} = \overline{z_1}\,\overline{z_2}$

(3) $\left(\overline{\frac{z_1}{z_2}}\right) = \frac{\overline{z_1}}{z_2}$, $z_2 \neq 0$ (4) None of these

16. Find the length of an arc of a circle of radius 5cm subtending a central angle measuring 15°.

(1) $\frac{6\pi}{12}$cm (2) $\frac{5\pi}{12}$cm

(3) $\frac{7\pi}{12}$cm (4) None of these

17. Which one of them is even function ?

(1) Sine (2) Tangent

(3) Secant (4) None of these

18. Find the conjugate of $\frac{1}{3+4i}$

(1) $\frac{3}{25} - \frac{4}{25}i$ (2) $\frac{4}{25} - \frac{3}{25}i$

(3) $\frac{25}{4} + \frac{3}{25}i$ (4) None of these

19. In how many ways can six persons be seated in a row?

(1) 620 (2) 720

(3) 320 (4) None of these

20. Find the 4th term from the end in the expansion of $\left(\frac{4x}{5} - \frac{5}{2x}\right)^9$?

(1) $\frac{10500}{x^3}$ (2) $\frac{105}{x^3}$

(3) $\frac{1050}{x^3}$ (4) None of these

21. Which term of the A.P. 84, 80, 76, ... is O ?

(1) 21 (2) 22

(3) 23 (4) None of these

22. The perpendicular distance of a line from the origin is 5 units and its slope is -1. Find the equation of the line?

(1) $x + y - 5\sqrt{2} = 0$ (2) $x - y - 5\sqrt{2} = 0$

(3) $x + y + 2\sqrt{2} = 0$ (4) None of these

23. If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, find the determinant of the matrix $A^2 - 2A$

(1) 52 (2) 25

(3) 24 (4) None of these

24. If any two rows or columns of a matrix are identical, then value of its determinant is

(1) 0 (2) 1

(3) 2 (4) None of these

25. If $n \in Q$, then $\lim_{x \to a} \frac{x^n - a^n}{x - a}$

(1) na^n (2) a^{n-1}

(3) na^{n-1} (4) None of these

26. Find the value of n such that $\frac{{}^{n}p_4}{{}^{n-1}p_4} = \frac{5}{3}, n > 4$

(1) n = 9 (2) n = 10

(3) n = 12 (4) None of these

27. Evaluate $\lim_{x \to 0} \frac{\sin ax}{\sin bx}$?

(1) $\frac{b}{a}$ (2) $\frac{a}{b}$

(3) b (4) None of these

28. A square matrix is invertible if it is ___

(1) Singular (2) Non-singular

(3) Both (4) None of these

29. If one-fifth of one-third of one-half of a number is 15, find the number.

(1) 450 (2) 250

(3) 350 (4) None of these

30. Find the value of $\left[x^{b+c}\right]^{b-c} \left[x^{c+a}\right]^{c-a} \left[x^{a+b}\right]^{a-b}$

(1) x^1 (2) x^2

(3) 1 (4) None of these

31. How many words can be formed with the letters of the word "EQUATION" ?

(1) 40320 (2) 40220

(3) 40321 (4) None of these

32. A dice is thrown. What is the probability that the number shown on the dice is not divisible by 3 ?

(1) $\frac{2}{3}$ (2) $\frac{3}{2}$

(3) $\frac{3}{4}$ (4) None of these

33. Evaluate : $\sin\frac{7\pi}{12} \cos\frac{\pi}{4} - \cos\frac{7\pi}{12} \sin\frac{\pi}{4}$

(1) $\frac{2}{\sqrt{3}}$ (2) $\frac{\sqrt{3}}{2}$

(3) $\frac{3}{2}$ (4) None of these

34. Let f $(x) = x^2$ and g(x) = $2x + 1$ be two real valued functions. Find f (g) (x).

(1) $2x^3 + x^2$ (2) $2x^2 + x$

(3) $x^3 + x$ (4) None of these

35. Solve the equation $2\cos^2 x + 3\sin x = 0$

(1) $x = n\pi + (-1)^n \frac{7\pi}{6}$ (2) $x = (-1)^n \frac{7\pi}{6}$

(3) $x = n\pi + (-1)^n \frac{6\pi}{5}$ (4) None of these

36. Find the sum of the series $1 + 2 + 2^2 + 2^3 + ...+ 2^n$.

(1) 2^n (2) $(2^n - 1)$

(3) $2^n + 1$ (4) None of these

37. $\frac{1}{1 + x^{(b-a)} + x^{(c-a)}} + \frac{1}{1 + x^{(a-b)} + x^{(c-b)}} +$

$\frac{1}{1 + x^{(b-c)} + {}^{(a-c)}} = ?$

(1) 2 (2) 1

(3) 4 (4) None of these

38. Find the adjoint of $\begin{bmatrix} 1 & \tan\alpha/2 \\ -\tan\alpha/2 & 1 \end{bmatrix}$

(1) $\begin{bmatrix} 1 & -\tan\alpha/2 \\ \tan\alpha/2 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} \tan\alpha/2 & 1 \\ 1 & -\tan\alpha/2 \end{bmatrix}$

(3) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (4) None of these

39. Which one is wrong ?

(1) $\cos\left(\cos^{-1}x\right) = x$, if $-1 \le x \le 1$

(2) $\cos^{-1}(-x) = \pi - \cos^{-1} x$ for all $x \in [-1, 1]$

(3) $\cos^{-1}\left(\frac{1}{x}\right) = \sec^{-1} x$ for all $x \in [-\infty, 1] \cup [1, \infty]$

(4) None of these

40. What is the eccentricity of the curve $4x^2 + y^2 = 100$?

(1) $\frac{2}{\sqrt{3}}$ (2) $\frac{\sqrt{3}}{2}$

(3) $\frac{2}{3}$ (4) None of these

ETG INTERACTIVE SECTION

41. $\sin^{-1}\left[\frac{2a}{1+a}\right]+\sin^{-1}\left[\frac{2b}{1+b^2}\right]=2\tan^{-1}x$ then x is equal to

(1) $\frac{a+b}{1-ab}$ (2) $\frac{a-b}{1+ab}$

(3) $\frac{b}{1+ab}$ (4) None of these

42. If a + b + c = 0, then determinant

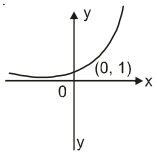
$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$$

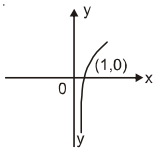
is equal to : -

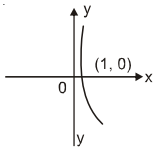
(1) 0 (2) 1

(3) 2 (4) None of these

43. Graph of logarithmic function $\log_a x (a>1)$ is

(1) 

(2) 

(3) 

(4) None of these

44. A function is matched against an interval where it is supposed to be increasing. Which of the following pairs is incorrectly matched?

	Interval	**Function**
(1)	$(-\infty,-4)$	x^3+6x^2+6
(2)	$[2,\infty)$	$2x^3-3x^2-12x+6$
(3)	$(-\infty,1/3)$	$3x^2-2x+1$
(4)	None of these	

45. Statement - 1 : $\sum_{r=0}^{n}(r+1)^n C_r=(n+2)2^{n-1}$.

Statement - 2 : $\sum_{r=0}^{n}(r+1)^n C_r x^r=(1+x)^n+nx(1+x)^{n-1}$.

(1) Statement -1 is true, statement - 2 is true, statement - 2 is not a correct explanation for statement -1.

(2) Statement - 1 is true, statement - 2 is true, statement - 2 is a correct explanation for statement -1.

(3) Statement - 1 is true, statement - 2 is false.

(4) None of these

46. Divide ₹600 among A, B and so that ₹40 more than $\frac{2}{5}$th of A's share, ₹20 more than $\frac{2}{7}$th of B's share and ₹10 more than $\frac{9}{17}$th of C's share, may all be equal. What is A's share ?

(1) ₹160 (2) ₹150

(3) ₹140 (4) None of these

47. The points A (4, 5, 1), B (0, -1, -1), C (3, 9, 4) and D (- 4, 4, 4) are

(1) Collinear (2) Coplanar

(3) Non - coplanar (4) None of these

48. The solution of the differential equation : -

$\sec^2 x \tan y \, dx + \sec^2 y \tan x \, dy = 0$ is

(1) $\tan y \tan x = c$ (2) $\frac{\tan y}{\tan x}=c$

(3) $\frac{\tan^2 x}{\tan y}=c$ (4) None of these

49. A variable chord is drawn through the origin to the circle $x^2+y^2-2ax=0$. The locus of the centre of the circle drawn on this chord as diameter is :

(1) $x^2+y^2-ax=0$ (2) $x^2+y^2+ax=0$

(3) $x^2+y^2+ay=0$ (4) None of these

50. Let R be the real line. Consider the following subsets of the plane $R \times R$:

S = {(x, y) : y = x + 1 and 0 < x < 2}

T = {(x, y): x – y is an integer}

Which one of the following is true?

(1) S is an equivalence relation on R but T is not refractive

(2) T is an equivalence relation on R but S is not refractive.

(3) Neither S not T is an equivalence relation on R

(4) None of these

END OF THE EXAM