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ICO	NISO	NIMO	NBTO	IEO	IGO	BIFO	NIPO
INTERNATIONAL CYBER OLYMPIAD	NATIONAL INTERACTIVE SCIENCE OLYMPIAD	NATIONAL INTERACTIVE MATH OLYMPIAD	NATIONAL BIOTECHNOLOGY OLYMPIAD	INTERNATIONAL ENGLISH OLYMPIAD	INTERNATIONAL G.K. OLYMPIAD	BSE INTERNATIONAL FINANCE OLYMPIAD	NATIONAL IIT-PMT OLYMPIAD

Level - 1 : All Level-1 successful* participants will get certificate, apititude report and online subscription, and school toppers will be eligible for school hero medals.

Level - 2 : School toppers* will be selected for level-2-National level - online computer based interactive test held at exam centres all over India. Besides selection for level-3, winner will get merit certificate, medals, educational CDs, laptop, scholarship and other prizes. There is no level 2 in Art, Cricket, Cyber, NIPO and Biotech.

Level - 3 : Toppers will qualify# for level 3-International level-where you will compete with students globally. Get selected for EHFs International Olympiad training camp. Only Indian organization giving students exposure to global competitions. Represent India & win laurels. Guidance by top scientists. Prizes ranges from cash (millions of $), gadgets, foreign trips, publicity, fame, scholarships, Internships, conference participation and more.

* # See prospectus/website for details

EHF

NATIONAL INTERACTIVE MATHS OLYMPIAD

NIMO

11 Class

B1 Paper Code

LEVEL - 1

1. **You are allowed additional 10 minutes to fill the required details in the RESPONSE SHEET (OMR).**
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 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. Which group of letters is different from others ?

(1) CBAED

(2) IJHGK

(3) TVWYZ

(4) None of these

2. Neha used to board the train from Metro Station A for going to her office. Since Station A is a terminus. she had no problem in getting a seat. Ever since she shifted to Locality B she finds it difficult to get a seat, as by the time the train reaches Locality B it becomes crowded. Find the statement among the alternatives which must be true as per the given information.

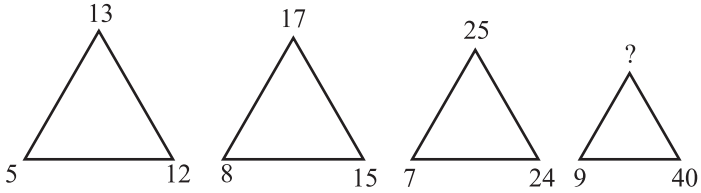
(1) Neha would prefer to take a bus rather than the metro

(2) Neha's travel to office has become less comfortable ever since she has shifted.

(3) Neha would look for a job close to her home.

(4) None of these

3. Find the number in the position of '?'.



(1) 41

(2) 45

(3) 50

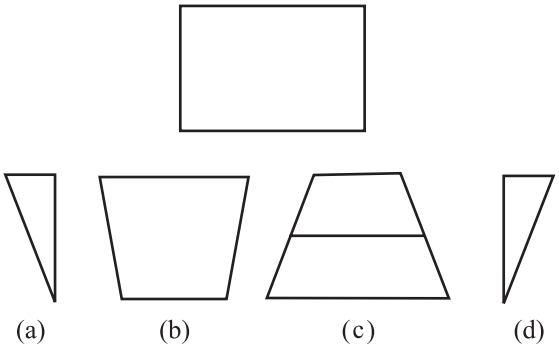
(4) None of these

4. Find the next number in the sequence 0, 2, 24,252, _____ .

(1) 620 (2) 1040

(3) 3120 (4) None of these

5. Identify which among the pieces given below will not be required to complete the pattern.



(1) a
(2) b
(3) c
(4) None of these

6. Rahul reads $\frac{4}{9}$ of a book on the first day and after reading $\frac{2}{5}$ of the remainder on the next day, he finds 50 pages still left to be read. Numbers of pages of the book is:
(1) 150
(2) 180
(3) 200
(4) None of these

7. Tick odd one out:
8, 27,64, 100, 125, 216, 343
(1) 27
(2) 100
(3) 125
(4) None of these

8. Find at what time between 8 and 9 O'clock will the hands of a clock be in the same straight line but not together.
(1) $50\frac{10}{11}$ min. past 8
(2) $10\frac{10}{11}$ min. past 8
(3) $60\frac{10}{11}$ min. past 8
(4) None of these

9. In a 100 metres race, A runs at 6 km per hour. If A gives B a start of 4 metres and still beats him by 12 seconds, what is the speed of B?
(1) 4.8 m/sec
(2) 4.8 km/hr
(3) 6 km/ hr
(4) None of these

10. If the following letter sequence, some of the letters are missing. These are given in order as one of the alternatives below. Choose the correct alternative.
αβ _____ αα ββββ _____ ααα _____ ββ
(1) αββα
(2) βαβα
(3) αααβ
(4) None of these

MATHEMATICS

11. In a triangle ABC, AD is the median A to BC, then its length is equal to?
(1) $\frac{1}{2}\sqrt{2(b^2+c^2)-a^2}$
(2) $\sqrt{b^2+c^2-\frac{a^2}{2}}$
(3) $\sqrt{\frac{b^2+c^2-a^2}{2}}$
(4) None of these

12. If in a triangle A, B, C,
$a\cos\left(\frac{c}{2}\right)+\text{c}\cos^2\left(\frac{\text{A}}{2}\right)=\frac{3b}{2}$, then the sides a, b and c
(1) Satisfy $a + b = c$
(2) Are in A.P
(3) Are in G.P
(4) None of these

13. The first two term of a G P add up to 12. The sum of third and 4th term is 48. If the terms of the geometric progress are alternately positive and negative, then first term is:
(1) 12
(2) 4
(3) –12
(4) None of these

14. If $n(A) = 3$ and $n(B) = 6$ and $A \subseteq B$, then the number of elements in $A \cup B$ is equal to

(1) 3

(2) 9

(3) 6

(4) None of these

15. 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

16. 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

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

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

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

(3) $\frac{7\pi}{12}$ cm

(4) None of these

18. Which one of them is even function ?

(1) Sine

(2) Tangent

(3) Secant

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

(1) 21

(2) 22

(3) 23

(4) None of these

21. 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

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

(1) 52

(2) 25

(3) 24

(4) None of these

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

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

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

(3) b (4) None of these

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

(1) x^1

(2) x^2

(3) 1

(4) None of these

25. 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

26. Evaluate: $\text{Sin}\frac{7\pi}{12}\text{Cos}\frac{\pi}{4}-\text{Cos}\frac{7\pi}{12}\text{Sin}\frac{\pi}{4}$

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

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

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

(4) None of these

27. 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

28. 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

29. 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

30. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$, than the value of $\theta + \phi$ is

(1) $\frac{\pi}{6}$ (2) π

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

31. The value of $\cos 12° + \cos 84° + \cos 156° + \cos 132°$ is

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

(2) 1

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

(4) None of these

32. The position vectors of two points A and B are $i + j - k$ and $2i - j + k$ respectively. Then $|AB| =$.

(1) 2

(2) 4

(3) 3

(4) None of these

33. If the position vectors of the vertices of a triangle be $6i + 4j + 5k$, $4i + 5j + 6k$ and $5i + 6j + 4k$ then the triangle is

(1) Right angled

(2) Equilateral

(3) Isosceles

(4) None of these

34. The value of $(z + 3)(\bar{z} + 3)$ is equivalent to

(1) $|z + 3|^2$

(2) $|z - 3|$

(3) $z^2 + 3$

(4) None of these

35. The real value of θ for which the expression $\frac{1 + i\cos\theta}{1 - 2i\cos\theta}$ is a real number is:

(1) $n\pi + \frac{\pi}{4}$

(2) $n\pi + (-1)^4 \frac{\pi}{4}$

(3) $2n\pi \pm \frac{\pi}{2}$

(4) None of these

36. In a non-leap year, the probability of having 53 Tuesdays or 53 Wednesdays is

(1) $\frac{1}{7}$ (2) $\frac{2}{7}$

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

37. Without repetition of the digits, four digit numbers are formed with the digits 0, 2, 3, 5.

The probability of such a number divisible by 5 is

(1) $\frac{1}{5}$

(2) $\frac{4}{5}$

(3) $\frac{5}{9}$

(4) None of these

38. If ${}^{n}C_{12} = {}^{n}C_{8}$ then n is equal to

(1) 20

(2) 12

(3) 6

(4) None of these

39. Everybody in a room shakes hands with everybody else. The total number of hand shakes is 66. The number of persons in the room is

(1) 11

(2) 12

(3) 13

(4) None of these

40. The standard deviation of the data 6, 5, 9, 13, 12, 8, 10 is

(1) $\sqrt{\frac{52}{7}}$

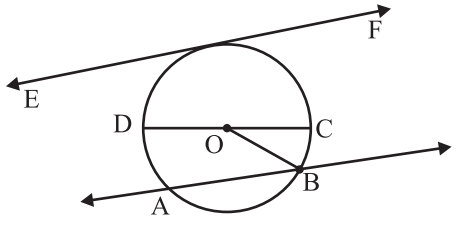
(2) $\frac{52}{7}$

(3) $\sqrt{6}$

(4) None of these

INTERACTIVE SECTION

41. Identify the tangent.



(1) DC

(2) OB

(3) EF

(4) None of these

42. Given the relation A = {(5, 2), (7, 4), (9, 10), (x, 5)}. Which of the following values for x will make relation A a function?

(1) 9

(2) 7

(3) 4

(4) None of these

43. The heights of all the students in grade 10 are arranged from least to greatest. Which statistical measure separates the top half of this set of data from the bottom half?

(1) Mean

(2) Median

(3) Average

(4) None of these

44. The formula for potential energy is P = mgh, where P is potential energy, m is mass, g is gravity, and h is height. Which expression can be used to represent g?

(1) $p - m - h$

(2) $\frac{P}{m} - h$

(3) $\frac{P}{mh}$

(4) None of these

45. The operation element @ is determined by the following table. What is the identity element of this operation?

@	a	b	c
a	a	b	c
b	b	c	a
c	c	a	b

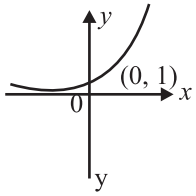
(1) a, only

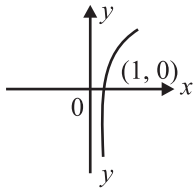
(2) b, only

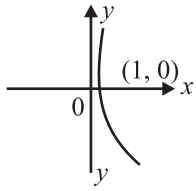
(3) c

(4) None of these

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

(1) 

(2) 

(3) 

(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. 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

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:

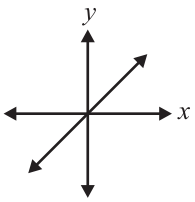
(1) $x^2 + y^2 - ax = 0$

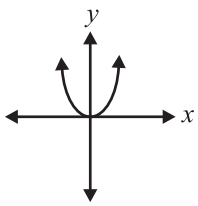
(2) $x^2 + y^2 + ax = 0$

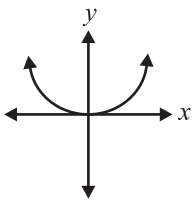
(3) $x^2 + y^2 + ay = 0$

(4) None of these

50. Which graph represents a linear function?

(1) 

(2) 

(3) 

(4) None of these

END OF THE EXAM