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

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*# See prospectus/website for details

1. You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET (OMR)**. **STUDENTS OF CLASS 1 & 2 HAVE TO UNDERLINE** THE CORRECT ANSWER IN THE QUESTION PAPER ITSELF. THEY ARE NOT REQUIRED TO USE THE RESPONSE SHEET (OMR). THEY HAVE TO FILL THEIR NAME, ROLL NUMBER, CLASS, SCHOOL NAME IN THE SPACE PROVIDED IN THE QUESTION PAPER.
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 except for classes 1 and 2.

**NATIONAL
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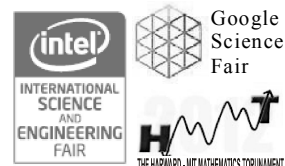
NIMO

**12
Class**

**A1
Paper
Code**

LEVEL - 1

Academic Partner — WWW.EDUSYS.IN



MENTAL ABILITY

1. In the following series which is the 8th letter to the right of 16th letter from the left?
ABCDEF GHIJKL MNOPQR STUVWXYZ
(1) K (2) Y
(3) X (4) W
2. How many such letter pairs are there in the word servant having the same number of letters left between them in the word as they have in the series?
(1) 2 (2) 3
(3) 4 (4) 5
3. If the numbers which are divisible by 4, from 4 to 84 are written in reverse order then which number will be at the 7th place?
(1) 60 (2) 28
(3) 20 (4) 32
4. A bus for Bombay leaves after every forty minutes from a bus stand. An enquiry clerk told a passenger that the bus had already left ten minutes ago and the next bus will leave at 10.45 am. At what time did the enquiry clerk give this

information to the passenger ?

- (1) 10.05 am (2) 9.55 am
(3) 10.35 am (4) 10.15 am
5. Two number A and B are such that the sum of 5% of A and 4% of B is two-third of the sum of 6% of A and 8% of B. Find the ratio of A:B.
(1) 2:3 (2) 1:1
(3) 3:4 (4) 4:3
 6. Kamini says, "Rajeev's grand father is the only son of my father". How is Kamini related to Rajeev ?
(1) Daughter (2) Sister
(3) Niece (4) Grand mother
 7. If STRAY is coded as TUSBZ then how will MOURN be coded ?
(1) LPVSO (2) NPVSO
(3) NVPSO (4) NPSVO
 8. If Rajdoot is coded as Car, Car as Aeroplane, Aeroplane as Train, Train as Bus, then by which vehicle can you reach your destination in least time ?
(1) Aeroplane (2) Train
(3) Car (4) Bus

9. MR, PO, SL, VI, ___ ?
 (1) YF (2) ZE
 (3) YD (4) ZF
10. Which term amongst the following is wrong ?
 5, 7, 11, 20, 35, 67
 (1) 11 (2) 20
 (3) 35 (4) 67

MATHEMATICS

11. Evaluate

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^n}$$

- (1) $\frac{n}{2^n}$ (2) $\frac{n-1}{2^{n+1}}$
 (3) $1 - \frac{1}{2^n}$ (4) None of these
12. If, ${}^{2n}C_3 : {}^nC_3 = 12:1$. Then the value of n is
 (1) 4 (2) 5
 (3) 6 (4) 3
13. The multiplicative inverse of $\sqrt{6} + 3i$ is

- (1) $\frac{\sqrt{6} - i}{15 - 5}$ (2) $\frac{\sqrt{6} - 3i}{\sqrt{15} - \sqrt{15}}$
 (3) $\frac{\sqrt{6} - 3i}{\sqrt{5} - \sqrt{5}}$ (4) $\frac{\sqrt{6} - 3i}{2 - \frac{3}{2}i}$

14. If $z = x - y$ and $z^{1/3} = p + iq$, then $\frac{p}{p^2 + q^2} - \frac{q}{p^2 + q^2}$ is equal to
 (1) 2 (2) -1
 (3) 1 (4) -2

15. There are 20 people who work in an office together. Four of these people are selected to go to the same conference together. How many such selections are possible?
 (1) 116280 (2) 4845
 (3) 80 (4) None of these
16. A 7 card hand is chosen from a standard 52 card deck. How many of these will have four spades and three hearts?
 (1) 29, 446, 560 (2) 204, 490
 (3) 1001 (4) None of these

17. If the second term in the expansion $\left(\sqrt[13]{a + \frac{a}{\sqrt{a^{-1}}}}\right)^n$ is

$$14a^{5/2}, \text{ then } \frac{{}^nC_3}{{}^nC_2} \text{ is equal to :}$$

- (1) 4 (2) 3
 (3) 12 (4) 6

18. In the binomial expansion of $(a - b)^n$, $n \geq 5$, the sum of 5th and 6th terms is zero, then a/b equals.

- (1) $\frac{n-5}{6}$ (2) $\frac{n-4}{5}$
 (3) $\frac{5}{n-4}$ (4) $\frac{6}{n-5}$

19. We are told that in a random experiment there are five possible outcomes. Which of the following statement is true ?

- (1) If, after 20 trials, one outcome has not been observed then the probability that it will occur in the next trial is increased
 (2) If, after 20 trials, one outcome has been observed more after than the others, then the probability that it will occur in the next trial is unchanged.
 (3) If, after 20 trials, one outcome has not been observed then the probability that it will occur in the next trial is unchanged.
 (4) If the outcomes are equally likely then the trials are independent

20. The probability that A speaks truth is 4/5, while this probability for B is 3/4. The probability that they contradict each other when asked to speak on a fact is .

- (1) 7/20 (2) 1/5
 (3) 3/20 (4) 4/5

21. If a function f is defined as $f(x) = x^2$, then

$$\frac{f(1.1) - f(1)}{(1.1) - 1} \text{ is equal to}$$

- (1) $\frac{3.1}{2}$ (2) 5.11
 (3) 10.01 (4) 2.1

22. A real valued function $f(x)$ satisfies the functional equation $f(x - y) = f(x)f(y) - f(a - x)f(a + y)$ where a is a given constant and $f(0) = 1$. $f(2a - x)$ is equal to

- (1) $f(x)$ (2) $-f(x)$
 (3) $f(-x)$ (4) $f(a) + (a - x)$

23. A coin is tossed 6 times. What is the probability of exactly 2 heads occurring in the 6 tosses?

- (1) $\left(\frac{6}{2}\right) \left(\frac{1}{2}\right)^6$ (2) $\left(\frac{1}{2}\right)^6$
 (3) ${}^6C_2 \left(\frac{1}{2}\right)$ (4) $\left(\frac{6}{2}\right) \left(\frac{1}{3}\right)^6$

24. What is the value of $\binom{n}{r}$ with $n = 7$ and $r = 2$?

- (1) 2520 (2) 42
(3) 21 (4) 84

25. $\lim_{x \rightarrow 0} \frac{e^{x^2} - \cos x}{x^2}$

- (1) $\frac{3}{2}$ (2) $\frac{1}{2}$
(3) $\frac{2}{3}$ (4) None of these

26. $\lim_{x \rightarrow 0} \frac{1 - \cos 8x}{1 - \cos 6x}$ is equal to :

- (1) 15/23 (2) 64/25
(3) 5/8 (4) 64/36

27. For what value of n , $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ be the geometric mean between a and b ?

- (1) $n = \frac{-1}{2}$ (2) $n = 1$
(3) $n = 4$ (4) $n = \frac{7}{2}$

28. The value of $2^{1/4} \cdot 4^{1/8} \cdot 8^{1/16} \cdot 16^{1/32} \dots$ is

- (1) $\frac{5}{2}$ (2) $\frac{3}{2}$
(3) 2 (4) 1

29. Find the coordinates of the foot of perpendicular from the point $(-1, 3)$ to the line $3x - 4y - 16 = 0$.

- (1) $(\frac{7}{28}, \frac{-29}{25})$ (2) $(\frac{68}{25}, \frac{-49}{25})$
(3) $(\frac{4}{17}, \frac{8}{17})$ (4) $(0, 0)$

30. Write $\frac{\sec^2(x)}{\cot(x)}$ entirely in terms of $\sin(x)$ and $\cos(x)$

- (1) $\frac{\sin(x)}{\cos^3(x)}$ (2) $\frac{\sin(x)}{\cos(x)}$
(3) $\frac{1}{\sin(x)\cos(x)}$ (4) $\frac{\cos(x)}{\sin(x)}$

31. At what point is the unit circle intersected by an angle of 315° (Suppose that the angle is measured counter clockwise from the positive x -axis)

- (1) $\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}$ (2) $-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}$
(3) $\frac{\sqrt{3}}{2}, -\frac{1}{2}$ (4) $\frac{1}{2}, -\frac{\sqrt{3}}{2}$

32. The value of the integral $\int \frac{\cos^3 x + \cos^5 x}{\sin^2 x + \sin^4 x} dx$ is

- (1) $\sin x - 6 \tan^{-1}(\sin x) + c$
(2) $\sin x - 2(\sin x)^{-1} + c$
(3) $\sin x - 2(\sin x)^{-1} - 6 \tan^{-1}(\sin x) + c$
(4) $\sin x - 2(\sin x)^{-1} + 5 \tan^{-1}(\sin x) + c$

33. The area of ellipse $\frac{x^2}{4^2} + \frac{y^2}{9^2} = 1$ is

- (1) $\frac{\pi ab}{4}$ (2) $\pi(a+b)$
(3) $\frac{\pi^2(a^2 + b^2)}{4}$ (4) 36π

34. The points with position vectors

$60\hat{i} + 3\hat{j}$, $40\hat{i} + 2\hat{j}$, $a\hat{i} - 2\hat{j}$ are collinear if

- (1) $a = -40$ (2) $a = 40$
(3) $a = 20$ (4) None of these.

35. The coordinates of the points which trisect the line segment joining the points $P(4, 2, -6)$ and $Q(10, -16, 6)$

- (1) $(1, -4, -3)$, $(4, -6, 1)$
(2) $(6, -4, -2)$, $(8, -10, 2)$
(3) $(2, -2, 0)$, $(1, 5, 7)$
(4) $(0, 0, 1)$, $(7, 0, 5)$

36. The radius of the circle passing through the foci of the

ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having its centre at $(0, 3)$ is

- (1) 4 (2) 3
(3) $\sqrt{\frac{1}{2}}$ (4) $\frac{7}{2}$

37. A triangle is formed by the lines joining the vertex of the parabola $x^2 = 12y$, to the ends of its latus rectum. The area of the triangle is

- (1) 18 sq. units
(2) 25 sq. units
(3) 17 sq. units
(4) 34 sq. units

38. If x and y are two uncorrelated variables and if $u = x + y$ and $v = x - y$, then $r(u, v)$ is equal to

- (1) $\frac{\sigma_x \sigma_y}{\sigma_x^2 \sigma_y^2}$ (2) $\frac{\sigma_x^2 + \sigma_y^2}{\sigma_x \sigma_y}$
 (3) $\frac{\sigma_x^2 - \sigma_y^2}{\sigma_x^2 + \sigma_y^2}$ (4) $\frac{\sigma_x^2 + \sigma_y^2}{\sigma_x^2 - \sigma_y^2}$

39. The equation of the sphere concentric with the sphere $x^2 + y^2 + z^2 - 4x - 2y - 6z - 7 = 0$ and passing through $(0, 0, 0)$ is

- (1) $x^2 + y^2 + z^2 - 4x - 2y - 6z = 0$ (2) $x^2 + y^2 + z^2 = 0$
 (3) $x^2 + y^2 + z^2 - 4x - 2y = 0$ (4) None of these

40. The latus rectum of the hyperbola

$$9x^2 - 16y^2 + 72x - 32y - 16 = 0 \text{ is}$$

- (1) $\frac{9}{2}$ (2) $\frac{-9}{2}$
 (3) $\frac{32}{3}$ (4) $\frac{-32}{3}$

INTERACTIVE SECTION

41. Which relations below are functions?

Relation 1: $\{(-1, 2), (-4, 5), (1, 2), (8, -15)\}$

Relation 2: $\{(13, 14), (13, 5), (16, 17), (18, 13)\}$

Relation 3: $\{(3, 90), (4, 54), (6, 71), (8, 90)\}$

- (1) Relation 1 and 2 (2) Relation 1 and 3
 (3) Relation 2 and 3 (4) Only relation 1

42. Find $\int \frac{2x+3}{\sqrt{x+1}} dx$

- (1) $\frac{4}{3}(x+1)^{3/2} + 2(x+1)^{1/2} + c$
 (2) $\frac{4}{2}(x+1)^{1/2} + 2(x+1)^2 + c$
 (3) $4(x+1)^{3/2} + 2(x+1)^{1/2} + c$
 (4) None of these

43. Find $\int \tan^4 \theta d\theta$

- (1) $I = \frac{1}{3} \tan^3 \theta - \tan \theta + \theta + c$
 (2) $I = \frac{1}{2} \tan^3 \theta - \tan \theta + \theta + c$
 (3) $I = \frac{1}{3} \tan \theta - \tan^2 \theta + \theta + c$
 (4) None of these

44. The first three of four given numbers are in GP and their last three are in AP with common difference 6. If first and fourth numbers are equal then the first number is ?

- (1) 2 (2) 8
 (3) 6 (4) None of these

45. The mean and variance of random variable X having a binomial distribution are 4 and 2 respectively, then $P(x = 1)$ is?

- (1) $1/16$ (2) $1/8$
 (3) $1/4$ (4) $1/32$

46. Which one is not periodic

- (1) $|\sin 3x| + \sin^2 x$ (2) $\cos \sqrt{x} + \cos^2 x$
 (3) $\cos 4x + \tan^2 x$ (4) $\cos 2x + \sin x$

47. What is the inverse of the matrix ?

$$\begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$$

- (1) $\begin{bmatrix} \cos \theta & -\sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$ (2) $\begin{bmatrix} -\sin \theta & -\cos \theta \\ \cos \theta & \sin \theta \end{bmatrix}$
 (3) $\begin{bmatrix} -\cos \theta & \sin \theta \\ -\sin \theta & -\cos \theta \end{bmatrix}$ (4) None of these

48. What is the distance between the parallel planes

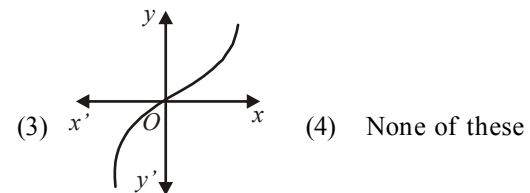
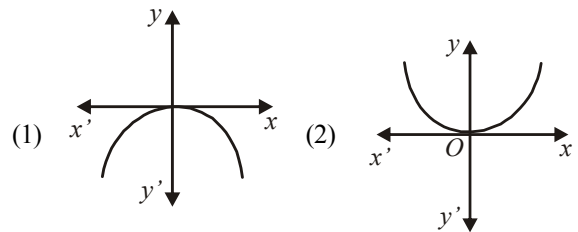
$$2x - y + 3z = 4 \text{ and } 2x - y + 3z = 18 ?$$

- (1) $\sqrt{14}$ (2) $\sqrt{15}$
 (3) $\sqrt{12}$ (4) None of these

49. Two dice are thrown. Find the probability of getting an odd number on the first die and a multiple of 3 on the other.

- (1) $3/4$ (2) $1/6$
 (3) $7/6$ (4) 0

50. Which one of the following represents a graph of even function?



END OF THE EXAM