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INTERNATIONAL OLYMPIAD ACADEMY

CSAR Learning Solutions Pvt. Ltd.

GRADE 11

Scholars Super-30 : IIT-JEE

Sample Admission Test Paper

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Roll No.: | | | | | | | | | | | | | | | |

Student's Name: | |

MAXIMUM TIME: 90 MINUTES **MAXIMUM MARKS: 45**

INSTRUCTIONS

1. Please **DO NOT OPEN** the contest booklet until the proctor has given permission to start.
2. There are 45 questions in this paper.
3. There are four Sections in this paper. **Section-1 (MAT):**15 Objective Type Questions. **Section-2 (CHEMISTRY):**10 Objective Type Questions. **Section-3 (PHYSICS):**10 Objective Type Questions.**Section-4 (MATHEMATICS):**10 Objective Type Questions.
3. All questions are compulsory.
4. No electronic devices capable of storing and displaying visual information are allowed during the exam.
5. Use of **calculator** is strictly prohibited in the exam.
6. Fill your **Name, Roll No., Grade and School Name** in the answer sheet.

INFORMATION CENTRE : TKC CAMPUS, GOROIMARI, SOLAGAON, TEZPUR, ASSAM – 784104
Corporate Office: 120, Tower-A, Logix Technova, Sector-132 , Noida - 201305
Registered Office: A-409, Durga Vihar, East of Sainik Farms, New Delhi-110080
Phone: 0120-46533945, Mobile: +91 9910024030, +91 8368118421
Email: info@scholarsindia.co.in, **Website:** scholarsindia.co.in

SECTION – 1 (MAT)

CHOOSE THE CORRECT ANSWER **[15x1=15]**

1. In a certain code, 'PLEADING' is written as 'CHMOQMFB'. How is 'SHOULDER' written in that code?

   (a) KCDQTIPV (b) QDCKVPIT

   (c) KCDQTIPV (d) TIPVQDCK

2. Which group of letters is different from others?

   (a) PBQTX (b) DRYSN

   (c) MEWGN (d) CGHKV

3. In 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.

   __bbca__bcca__ac__a__cb

   (a) abcba (b) acbab

   (c) bacab (d) bcaab

4. Find the next number in the sequence.

   30, 120, 350, 720, __?__

   (a) 1150 (b) 1300

   (c) 1200 (d) 1342

Directions (Q.Nos.5–9): Read the following information carefully and answer the questions given below.

A, B, C, D, E, F and G are sitting around a circle facing at the centre having dinner not necessarily in same order. E is neighbour of A and D.G is not between F and C. F is to the immediate right of A.

5. Whichofthefollowingdoesnothavethepairofpersonssittingadjacenttoeachother?

   (a) BA (b) CB (c) DE (d) GD

6. Which of the following pairs has the second person sitting immediately to the right of the first?

   (a) AB (b) CB (c) EA (d) GC

7. What is the position of F?

   (a)Third to the left of C (b) Second to the right of C

   (c) To the immediate left of A (d) None of the above

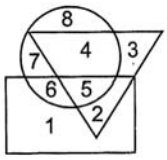
8. Who are the neighbours of B?

   (a) A and B (b) C and D (c) F and C (d) None of these

9. Which of the following persons are sitting adjacent to each other from left to right in the order as shown?

   (a) BGC (b) FBC (c) CDG (d) EDG

10. In the figure, triangle represents doctors, the circle represents players and rectangle represents artists.

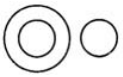


Then, which number represents doctors who are neither players nor artists?

(a) 2 (b) 3

(c) 4 (d) 5

11. Which of the following diagram set indicate the relation between citizen, educated and men?

(a)  (b) 

(c)  (d) 

12. Question given below has a problem and two Statements I and II. Decide, if the information given in the statements is sufficient to answer the problem. Among Maddy, Nittu, Dev, Pinku and Kunal, who earns more than only the least earner among them

Statements I. Nittuearns more than Maddy and Pinkubut less than only Dev.

Statements II. Maddy earns more than Pinku who earns less than Kunal.

(a) Data in Statement I alone is sufficient

(b) Data in Statement II alone is sufficient

(c) Data in both statements together is sufficient

(d) Data in both statements together is not sufficient

13. In question, the five letters represent five different digits. What are the actual figures? If there is no zero?

LMNK + MKNL = NNMA

(a) L=4, M=6, N=2, K=3, A=7 (c) L=4, M=2, N=6, K=3, A=7

(b) L=6, M=5, N=2, K=8, A=7 (d) L=6, M=4, N=7, K=9, A=2

14. Find the missing term in the series.

2, 4, 2, 6, 3, 12, ___?____, 40

(a) 8 (b) 6

(c) 11 (d) 5

15. In a group of cows and hens, the numbers of legs are 14 more than twice the number of heads. The number of cows is

(a) 5 (b) 7

(c) 10 (d) 12

SECTION – 2 (CHEMISTRY)

CHOOSE THE CORRECT ANSWER **[10 x 1=10]**

16. In compound A, 1.00 g of nitrogen unites with 0.57 g of oxygen. In compound B, 2.00 g of nitrogen combines with 2.24g of oxygen. In compound C, 3.00 g of nitrogen combines with 5.11g of oxygen. These results obey the following law

(a) law of constant proportion (b) law of multiple proportion

(c) law of reciprocal proportion (d) law of constant proportion

17. 10^{21} molecules are removed from 200 mg of CO_2. The moles of CO_2 left are

(a) 2.88×10^{-3} (b) 28.8×10^{-3} (c) 288×10^{-3} (d) 28.8×10^{3}

18. What volume of hydrogen gas, at 273 K and 1 atm. pressure will be consumed in obtaining 21.6 g of elemental boron (atomic mass = 10.8) from the reduction of boron trichloride by hydrogen ?

(a) 67.2L (b) 44.8L (c) 22.4L (d) 89.6L

19. Number of g of oxygen in 32.2 g $Na_2SO_4.10H_2O$ is

(a) 20.8 (b) 2.24 (c) 22.4 (d) 2.08

20. 6.02×10^{20} molecules of urea are present in 100 ml of its solution. The concentration of urea solution is

(a) 0.02M (b) 0.01M (c) 0.001M (d) 0.1 M

(Avogadro constant, $N_A = 6.02 \times 10^{23}$ mol^{-1})

21. In PO_4^{3-} ion the formal charge on the oxygen atom of P – O bond is

(a) +1 (b) –1 (c) –0.75 (d) +0.75

22. Which molecule/ion out of the following does not contain unpaired electron(s)?

(a) N_2^+ (b) O_2 (c) O_2^{2-} (d) B_2

23. Which of the following pairs of ions are isoelectronic andisostructural?

(a) ClO_3^-, CO_3^{2-} (b) SO_3^{2-}, NO_3^- (c) ClO_3^-, SO_3^{2-} (d) CO_3^{2-}, SO_3^{2-}

24. Which of the following is correct increasing order of lone pair of electrons on the central atom?

(a) $IF_7 < IF_5 < ClF_3 < XeF_2$ (b) $IF_7 < XeF_2 < ClF_2 < IF_5$

(c) $IF_7 < ClF_3 < XeF_2 < IF_5$ (d) $IF_7 < XeF_2 < IF_5 < ClF_3$

25. Consider the molecules CH_4, NH_3 and H_2O. Which of thegiven statements is false?

(a) The H–C–H bond angle in CH_4, the H–N–H bond angle in NH_3, and the H–O–H bond angle in H_2O are all greater than 90°

(b) The H–O–H bond angle in H_2O is larger than the H–C–H bond angle in CH_4.

(c) The H–O–H bond angle in H_2O is smaller than the H–N–H bond angle in NH_3.

(d) The H–C–H bond angle in CH_4 is larger than the H–N–H bond angle in NH_3.

SECTION – 3 (PHYSICS)

CHOOSE THE CORRECT ANSWER **[10 x 1=10]**

26. A vehicle travels half the distance with speed V_1 and the other half with speed V_2, then itsaverage speed is :

(a) $\frac{V_1+V_2}{2}$ (b) $\frac{2V_1+V_2}{V_1+V_2}$

(c) $\frac{2V_1V_2}{V_1+V_2}$ (d) $\frac{2(V_1+V_2)}{V_1V_2}$

27. Three different objects of masses m_1, m_2 and $m_3$are allowed to fall from rest and from the samepoint O along three different frictionless paths.The speeds of the three objects on reaching theground will be in the ratio of

(a) $m_1 : m_2 : m_3$ (b) $m_1 : 2m_2 : 3m_3$

(c) 1:1:1 (d) $\frac{1}{m_1}:\frac{1}{m_2}:\frac{1}{m_3}$

28. A coin is placed on a rotating disc and isstationary w.r.t. the disc, then the direction offriction is

(a) along the direction of motion of the coinw.r.t. ground

(b) opposite to the direction of motion of thecoin w.r.t. ground

(c) towards the centre of the disc

(d) away from the centre of the disc

29. A lift is coming from 8th floor and is just aboutto reach 4th floor. Taking ground floor as originand positive direction upwards for all quantities,which one of the following is correct?

(a) $X < 0, v < 0, a > 0$ (b) $X > 0, v < 0, a < 0$

(c) $X > 0, v < 0, a > 0$ (d) $X > 0, v > 0, a < 0$.

30. If the velocity of a particle is $v = At + Bt^2$, whereA and B are constants, then the distance travelledby it between 1s and 2s is:

(a) $\frac{3}{2}A+4B$ (b) 3A + 7B (c) $\frac{3}{2}A+\frac{7}{3}B$ (d) $\frac{A}{2}+\frac{B}{3}$

31. The magnitude of work done by a force:

(a) depends on frame of reference

(b) does not depend on frame of reference

(c) cannot be calculated in non–inertial frames.

(d) both (a) and (b)

32. A position dependent force, $F = (7 – 2x + 3x^2)$ Nacts on a small body of mass 2 kg and displacesit from x = 0 to x = 5 m. Work done in joule is

(a) 35 (b) 70 (c) 135 (d) 270

33. Work done by a conservative force is positive if

(a) P.E. of the body increases (b) P.E. of the body decreases

(c) K.E. of the body increases (d) K.E. of the body decreases

34. A car is moving in a circular horizontal track ofradius 10 m with a constant speed of 10 m/s. Abob is suspended from the roof of the car by alight wire of length 1.0 m. The angle made by thewire with the vertical is

(a) 0° (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$

35. At a metro station, a girl walks up a stationaryescalator in time t_1. If she remains stationary onthe escalator, then the escalatortake her up intime t_2. The time taken by her to walk up on the moving escalator will be

(a) $(t_1 + t_2)/2$ (b) $t_1 t_2 / (t_2 - t_1)$ (c) $t_1t_2 / (t_2 + t_1)$ (d) $t_1 - t_2$

SECTION – 4 (MATHEMATICS)

CHOOSE THE CORRECT ANSWER **[10 x 1 =10]**

36. Two positive numbers have their HCF as 12 and their product as 6336. The number of pairs possible for the numbers, is

(a) 2 (b) 3 (c) 4 (d) 5

37. When 2^{256} is divided by 17 the remainder would be

(a) 1 (b) 16 (c) 14 (d) None of these

38. If P = (2)(4)(6)...(20) and Q = (1)(3)(5)...(19), then the HCF of P and Q is

(a) $(3^3)(5)(7)$ (b) $(3^4)(5)$ (c) $(3^4)(5^2)(7)$ (d) $(3^3)(5^2)$

39. If α and β are the zeroes of the quadratic polynomial $f(x) = ax^2 + bx + c$, then the value of $\alpha^4 + \beta^4$ is

(a) $\frac{(b^2-2ac)^2+a^2c^2}{a^4}$ (b) $\frac{(b^2+2ac)^2-a^2c^2}{a^4}$ (c) $\frac{(b^2-2ac)^2-2a^2c^2}{a^4}$ (d) $\frac{(b^2+2ac)^2+2a^2c^2}{a^4}$

40. If the square of difference of the zeroes of the quadratic polynomial $x^2 + px + 45$ is equal to 144, then the value of p is

(a) ± 9 (b) ± 12 (c) ± 15 (d) ± 18

41. The value of x, for which the polynomials $x^2 - 1$ and $x^2 - 2x+1$ vanish simultaneously, is

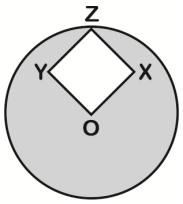
(a) 2 (b) –2 (c) –1 (d) 1

42. The reflection of the line $2y - 5x - 7 = 0$ on y-axis is

(a) $y = -\frac{5}{2}x + \frac{7}{2}$ (b) $y = \frac{5}{2}x + \frac{7}{2}$

(c) $y = \frac{5}{2}x - \frac{7}{2}$ (d) $y = -\frac{5}{2}x - \frac{7}{2}$

43. In the diagram, O is the centre of the circle and OXYZ is a square with the vertex Y on the circumference. The area of square is p cm^2. Then the area of shaded region is



(a) $p(2\pi - 1)\ cm^2$ (b) $p(4\pi - 1)\ cm^2$

(c) $\pi(2p - 1)\ cm^2$ (d) $\pi(4p - 1)\ cm^2$

44. A vessel contain a mixture of 24 L milk and 6 L water and second vessel contains a mixture of 15 L milk and 10 L water, then how much mixture of milk and water should be taken from the first and the second vessel separately and kept in a third vessel so that the third vessel may contain mixture of 25 L milk and 10 L water.

(a)15 L and 15 L (b) 20 L and 10 L (c) 20 L and 15 L (d) None of these

45. Each root of $x^2 - bx + c = 0$ is decreased by 2. The resulting equation is $x^2 - 2x + 1 = 0$, then

(a) b=6,c=9 (b) b=3,c=5 (c) b=2,c=–1 (d) b=–4,c=3

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