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INTERNATIONAL OLYMPIAD ACADEMY

CSAR Learning Solutions Pvt. Ltd.

GRADE 12

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.

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SECTION – 1 (MAT)

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

Directions (1-2): Read the following information and answer the questions given below. Mohit lives 2km to the North of Aasif, who lives 2km to the north of Rohan. Aayush lives 2km to the South, who lives 4km to the East of Aasif.

1. What is the distance between Mohit and Rohan?

(a) 4km (b) 2km (c) 6km (d) 3km

2. What is the distance between Aayush and Rohan?

(a) 2km (b) 8km (c) 4km (d) 18km

Directions (3-4): Read the following information carefully and then answer the question based on that. There are five friends named A, B, C, D and E. Every one likes to play game. The name of games are tennis, hockey, football, baseball and cricket. All are standing in a queue and facing North but not necessarily in the same order.

- D doesn't like to play hockey and football but standing in the middle of queue.
- E likes to play tennis and standing in the right end.
- B is the neighbour of D and A and likes to play football.
- A likes base ball and standing in the left end of queue.

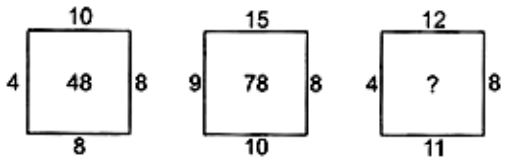
3. Who likes to play cricket?

(a) A (b) B (c) C (d) D

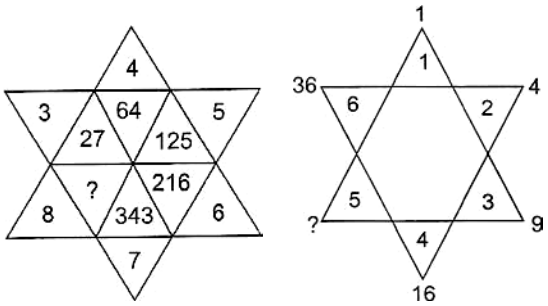
4. Who is second to the right of B?

(a) C (b) A (c) D (d) E directions

Direction (5-6): Insert the missing numerical value in the following questions.

5. 

(a) 88 (b) 100 (c) 32 (d) 132

6. 

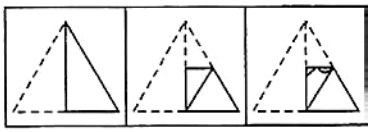
(a) 640 (b) 512 (c) 16 (d) 24

Direction(7): Complete the given series by choosing correct alternative.

7. 2,6, 12, 20, 30, 42, (__?__), 72

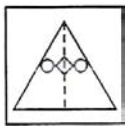
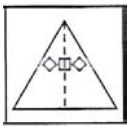
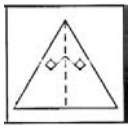
(a) 66 (b) 56 (c) 72 (d) 62

Direction(8): Select the answer from given alternatives, which would be most suitable when paper is unfolded.

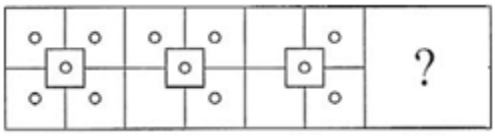


(x) (y) (z)

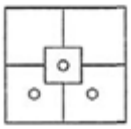
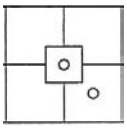
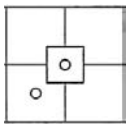
8. Problem Figures.

(a)  (b)  (c)  (d) 

Direction(9): Find the correct answer which completes the series.



9. Problem Figures.

(a)  (b)  (c)  (d) 

10. Find out the missing number in the following figure.

(a) 81 (b) 25 (c) 49 (d) None of these

11. Find out how many 2's in the given series?

24252627282930312120222368626272928210 2

(a) 17 (b) 16 (c) 18 (d) 15

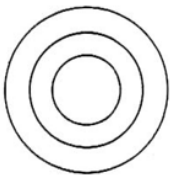
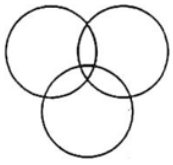
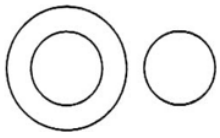
Direction (12): Read the information and answer the question given below. If A denotes addition, B denotes division, C denotes minus and D denotes multiplication.

12. 54 C 10 D 16 B 4 A 8

(a) 22 (b) 8 (c) 9 (d) 12

Direction (13): You have to choose from the four Venn-diagrams that best illustrates the relationship among three given classes or groups in the following question.

13. Tennis, Cricket, Games

(a)  (b)  (c)  (d) 

14. If $\frac{11y}{10}-\frac{9y}{10}=1$, then find the value of y.

(a) 18 (b) 16 (c) 4 (d) 5

15. Market price of an article is Rs.720 and actual price is Rs. 550.80 after two successive discounts. First is 10%, what is the second discount?

(a) 16% (b) 20% (c) 15% (d) 18%

SECTION – 2 (CHEMISTRY)

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

16. Which method of purification is represented by the following equations

$$\underset{\text{(Impure)}}{Ti+2I_2} \xrightarrow{523K} TiI_4 \xrightarrow{1700K} \underset{\text{(pure)}}{Ti+2I_2}$$

(a) Cupellation (b) Poling (c) Van Arkel method (d) Zone refining

17. A fire work gave brick red colour. It probably contained a salt of

(a) Ca (b) K (c) Ba (d) Mg

18. About H_2SO_4 which of the following statements is incorrect?

(a) It acts as a reducing agent (b) It acts as an oxidizing agent

(c) It acts as dehydrating agent (d) It is highly viscous

19. The property of halogen acids that is indicated incorrect is

(a) HF > HCl > HBr > HI.... acidic strength (b) HI > HBr > HCl > HF .... reducing strength

(c) HI > HBr > HCl > HF .... bond length (d) HF > HCl > HBr > HI.... thermal stability

20. Which of the following will be the major product when 3-phenylpropene reacts with HBr

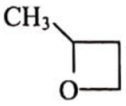
(a) $C_6H_5CH_2CHBrCH_3$ (b) $C_6H_5CHBrCHCH_2$

(c) $C_6H_5CH_2CH_2CH_2Br$ (d) $C_6H_5CHBrCH_2CH_3$

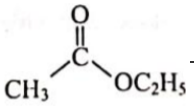
21. The major product formed in the reaction is

$$CH_3CHClCH_2CH_2OH \xrightarrow[\text{heat}]{KOH/H_2O}$$

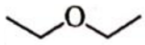
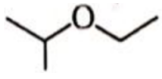
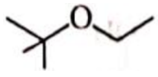
(a) $CH_3CH=CHCH_2OH$ (b) $CH_2=CHCH_2CH_2OH$

(c)  (d) $CH_3CHCH_2CH_2OH$

22. Consider the following sequence of reactions.

 $\xrightarrow[H_2O]{CH_3MgI(excess)}$ A $\xrightarrow{Na}$ B $\xrightarrow{CH_3CH_2Br}$ C

The final product (C) is-

(a)  (b)  (c)  (d) 

23. For the redox reaction, $MnO_4^- + C_2O_4^{-2} + H^+ \longrightarrow Mn^{+2} + CO_2 + H_2O$

The correct coefficient of reactants $MnO_4^-, C_2O_4^{-2}, H^+$ for the balanced reaction are respectively:

(a) 2, 5, 16 (b) 16, 3, 12 (c) 15, 16, 12 (d) 2, 16, 5

24. The density of gas A is twice that to B. At the same temperature the molecular weight of gas B is twice that of A. The ratio of pressure of gas A and B will be:

(a) 1: 6 (b) 1: 1 (c) 4: 1 (d) 1: 4

25. I_2/I^- (0.1 M) half-cell is connected to a $H^+(aq)$ / H_2(1bar) / Pt half-cell and e. m. f. is found to be 0.7714 V. If $E^0_{I_2/I^-} = 0.535V$, find the pH of H^+ / H_2 half-cell.

(a) 1 (b) 3 (c) 5 (d) 7

SECTION – 3 (PHYSICS)

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

26. A body is projected up from the surface of the earth with a velocity equal to $\frac{3}{4}$ th of its escape velocity. If R be the radius of the earth, the height it reaches is

(a) $\frac{3R}{10}$ (b) $\frac{9R}{7}$ (c) $\frac{8R}{5}$ (d) $\frac{9R}{5}$

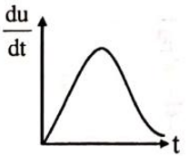
27. The equation of SHM of a particle is given as $2\frac{d^2x}{dt^2} + 32x = 0$ where x is the displacement from the position. The period of its oscillation (in second) is.

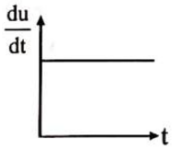
(a) 4 (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{2\sqrt{2}}$ (d) 2π

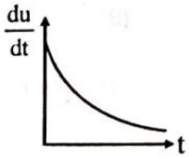
28. A long straight wire carrying a current of 30A is placed in an external uniform magnetic field of induction 4×10^{-4} T. The magnetic field is acting parallel to the direction of current. The magnitude of the resultant magnetic induction in tesla at a point 2.0 cm away from the wire is.

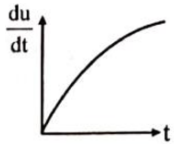
(a) 10^{-4} (b) 3×10^{-4} (c) 5×10^{-4} (d) 6×10^{-4}

29. Rate of increment of energy in an inductor with time in series L.R circuit getting charge with battery of e.m.f. E is best represented by: [inductor has initially zero current]

(a) 

(b) 

(c) 

(d) 

30. In series LCR circuit voltage drop across resistance is 8 volt, across capacitor is 12 volt and across inductor is 6 volt. Then:

(a)Voltage of the source will be leading current in the circuit

(b) Voltage drop across each element will be less than the applied voltage

(c) Power factor of circuit will be 4/3

(d) None of these

31. A gas is found to obey the law P^2V = Constant the initial temperature and volume are T_0 and V_0. If the gas expands to volume $2V_0$, its final temperature becomes-

(a) $\sqrt{2}\ T_0$ (b) $2T_0$ (c) $T_0/2$ (d) $T_0/\sqrt{2}$

32. Three objects colored black, grey and white are thrown into a furnace in a dark room where each of them attains a temperature of 2000^0 C. Which object will glow with the highest brightness

(a) White object (b) Black object

(c) All glow with same brightness (d) Grey object

33. Main scale of a vernier caliper has 100 division in 5cm. Its vernier scale has 25 divisions in one cm. The least count is -

(a) 0.01cm (b) 0.005cm (c) 0.01mm (d) None of these

34. In a semiconductor diode, the barrier potential offers opposition to only-

(a) Majority carriers in both regions

(b) Minority carriers in both regions

(c) Free electrons in the n-region

(d) Holes in the p-region

35. A Progressive wave y= A sin (kx-ωt) is reflected by a rigid wall at x=0. Then the reflected wave can be represented by-

(a) Y = A sin (kx+ωt) (b) Y = Acos (kx+ωt) (c) Y = –Asin (kx-ωt) (d) Y = –Asin (kx+ωt)

SECTION – 4 (MATHEMATICS)

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

36. In a ΔABC, let $\angle C = 90^0$. If r is the in-radius and R is the circum-radius of the triangle, then 2(r + R)=

(a) a + b (b) b + c (c) c + a (d) a + b + c

37. If two tangents drawn from the point $p(\alpha, \beta)$ to the parabola $y^2 = 4x$ be such that the slope of one tangent is double of the other then

(a) $9\beta = 2\alpha^2$ (b) $9\alpha = 2\beta^2$ (c) $2\alpha = 9\beta^2$ (d) None of these

38. How many integer solutions exist for x, if $\frac{2x^2+2x-30}{x^2+x-12} > 3$?

(a) 1 (b) 2

(c) 3 (d) No integer solution exists

39. If truth values of p and q are T, F then truth value of $-p \rightarrow (p \wedge -q)$ is

(a) T (b) F (c) cannot say (d) Not possible

40. The value of $\sum_{r=0}^{40} r.{}^{40}C_r.{}^{30}C_r$

(a) $40.{}^{69}C_{29}$ (b) $40.{}^{70}C_{30}$ (c) ${}^{69}C_{29}$ (d) ${}^{70}C_{30}$

41. A natural number is chosen at random from the first 100 natural numbers. Then the probability that $\left(x+\frac{100}{x}\right)>50$

(a) $\frac{1}{10}$ (b) $\frac{11}{50}$ (c) $\frac{11}{20}$ (d) None

42. Four boys picked 30 apples. The number of ways in which they can be divided among them if all the apples are identical, is

(a) 5630 (b) 4260 (c) 5456 (d) None

43. If $2^{(\log_2 3)^x}=3^{(\log_3 2)^x}$ then the value of x is equal to

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{3}$ (d) $\frac{1}{6}$

44. If α, β are the roots of $ax^2 + bx + c = 0$ and $\alpha + \beta, \alpha^2 + \beta^2, \alpha^3 + \beta^3$ are in G.P., where $\Delta = b^2 - 4ac$, then

(a) $\Delta \neq 0$ (b) $b\Delta = 0$ (c) $cb \neq 0$ (d) $c\Delta = 0$

45. If $\left|\frac{z-25}{z-1}\right|=5$, the value of $|z|$ is

(a) 3 (b) 4 (c) 5 (d) 6

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