IIT ASHRAM BRINGS...

Spread Your Wings

उड़ान

A QUEST FOR SCIENCE ASPIRANTS !

CLASS | **9**

SCIENCE APTITUTE TEST
(SAMPLE QUESTIONS PAPER)

Time : 1.30 : Hour.   **Maximum Marks : 220**

Please read the instructions carfully. You are allotted 15 minutes specifically for this purpose.

IMPORTANT INSTRUCTIONS

A.   **General:**

1. This booklet consists of 55 questions.
2. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers, and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. The answer sheet, a machine–readable Objective Response Sheet (OMR), is provided separately.
4. DO NOT TAMPER WITH / MUTILATE THE OMR OR THE BOOKLET.
5. Write Name and Address in capital letters of OMR sheet.
6. **Submit the OMR Sheet back to Invigilator after examination.**

B. Question paper format:

7. The question paper consists of **2 Sections.**
   SECTION - A : Mental Ability & Mathematics (25 Questions)
   SECTION - B : Physics, Chemistry & Biology (30 Questions)

C. Marking Scheme :

8. For each question in **Section A & B** you will be **awarded 4 marks** if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, **minus one (–1) mark** will be awarded.

IIT ASHRAM

UG–1 & 2, Concorde Complex, Above OBC Bank. R.C. Dutt Road., Alkapuri Vadodara-390007

SECTION A

(ON MENTAL ABILITY)
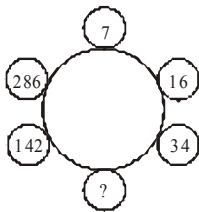
1. 17, 25, 37, 50, 65, 82, 101

   (a) 25　　　　　　　　　(b) 17

   (c) 101　　　　　　　　(d) 65

2. Choose the odd-one out:

   (a) 9　　　　　　　　　(b) 28

   (c) 217　　　　　　　　(d) 64

3. Find the missing term.

   (a) 72　　　　　　　　　(b) 70

   (c) 68　　　　　　　　　(d) 66

4. Find the missing term :

   B E I N T ?

   (a) R　　　　　　　　　(b) S

   (c) U　　　　　　　　　(d) Z

5. If FULFNHW is the code for CRICKET, then EULGH is the code for which word?

   (a) PRIDE　　　　　　　(b) BRIDE

   (c) BLADE　　　　　　　(d) BLIND

6. If the numbers from 5 to 85 which are exactly divisible by 5 are arranged in descending order, which would come at the eleventh place from the bottom?

   (a) 35　　　　　　　　　(b) 45

   (c) 50　　　　　　　　　(d) None

7. Five girls are standing facing to the west. Vinita is to the left of Rashmi. Gunjan is between Sweta and Arpana. Sweta is third from the right. Who is at the extreme left?

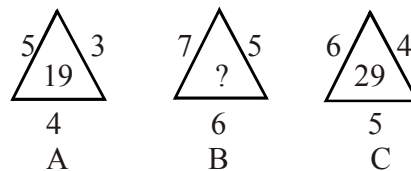   (a) Rashmi　　　　　　　(b) Sweta

   (c) Gunjan　　　　　　　(d) Arpana

8. If T means '–', R means '+' P means '×', M means '÷', S means '=', Q means '>' and N means '<', then which one of the answer is correct?

   (a) 5 P 6M 10 R 8 T 7 N 10 T 7

   (b) 2 R 6 T 8 P 3 Q 7 R 2 P 3

   (c) 35 M 5 T 2 R 12 N 6 P 3

   (d) 35 R 8 P 2 M 4 T 10 S 10 P 3 T 7

9. If '+' means 'divided by'; '–' means 'multiplied by'; '×' means 'minus' and '÷' means 'plus'; then 8 + 6 – 2 ÷ 4 × 4 = ?

   (a) 12　　　　　　　　　(b) $\dfrac{8}{3}$

   (c) $-\dfrac{52}{9}$　　　　　　(d) $1\dfrac{1}{2}$

10. Find the missing term

   (a) 25　　　　　　　　　(b) 37

   (c) 41　　　　　　　　　(d) 47

11. Find the value of

   $$\frac{1}{1+x^{a-b}+x^{a-c}}+\frac{1}{1+x^{b-c}+x^{b-a}}+\frac{1}{1+x^{c-a}+x^{c-b}}$$

   (a) 0　　　　　　　　　(b) 1

   (c) – 1　　　　　　　　(d) 2

12. In quadratic polynomial $ax^2 + bx + c$, which when divided by $(x – 1)$, $(x – 2)$ and $(x – 3)$ leaves remainders of 11, 22, and 37 respectively then find $5a + 4b + 2c = $?

   (a) 35　　　　　　　　　(b) 36

   (c) 37　　　　　　　　　(d) 38

13. The sides of a triangle ABC are as shown in the given figure. Let D be any internal point of this triangle and let e, f, and g denote the distance between the point D and the sides of the triangle. The sum (5e + 12f + 13g) is equal to
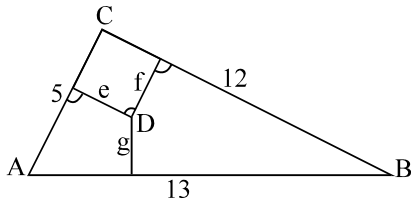
(a) 120   (b) 90

(c) 60   (d) 30

14. Three sides of a regular hexagon, no two of which share a vertex of the hexagon are exteded to form an equilateral triangle. The perimeter of the triangle thus formed is p times the perimeter of the original hexagon where p equals

(a) $\dfrac{1}{3}$ (b) $\dfrac{1}{2}$

(c) $\dfrac{3}{2}$ (d) $\dfrac{2}{3}$

15. Solution set of the

equation $3^{2x^2} - 2.3^{x^2+x+6} + 3^{2(x+6)} = 0$ is

(a) {–3, 2}   (b) {6, –1}

(c) {–2, 3}   (d) {1, – 6}

16. A minute hand of a table clock is 3 cms long. How far its tip move in 20 minutes

(a) 10 cms   (b) 9 cms

(c) 22 cms   (d) $\dfrac{44}{7}$ cms

17. A chord of length 10 cms subtends and angel of 120° at the centre of the circle. Calculate its shortest distance from centre.

(a) $\dfrac{3}{\sqrt{3}}$ cms   (b) $\dfrac{4}{\sqrt{3}}$ cms

(c) $\dfrac{5}{\sqrt{3}}$ cms   (d) $\dfrac{6}{\sqrt{3}}$ cms

18. An equilateral triangle is inscribed in a circle of radius 6 cms. Find its sides.

(a) $4\sqrt{3}$ cms   (b) 6cms

(c) 8cms   (d) 10cms

19. If $x = \dfrac{1}{2+\sqrt{3}}$, find the value of $x^3 - x^2 - 11x$

(a) -4   (b) -3

(c) -2   (d) -1

20. If $x = \dfrac{\sqrt{a+2b}+\sqrt{a-2b}}{\sqrt{a+2b}-\sqrt{a-2b}}$ find the value of

$\dfrac{x^2+1}{x}$

(a) $\dfrac{a}{b}$ (b) $\dfrac{b}{a}$

(c) $\dfrac{a}{2b}$ (d) $\dfrac{2a}{b}$

21. The ratio of the factorial of a number x to the square of the factorial of another number, which when increased by 50% gives the required number, is 1.25. Find the number x.(n factorial is 1.2.3…n)

(a) 6   (b) 5

(c) 9   (d) 11

22. Find the two numbers such that their sum, their product and the differences of their squares are equal.

(a) $\left(\dfrac{3+\sqrt{3}}{2}\right)$ and $\left(\dfrac{1+\sqrt{2}}{2}\right)$ or $\left(\dfrac{3+\sqrt{2}}{2}\right)$ and $\left(\dfrac{1+\sqrt{2}}{2}\right)$

(b) $\left(\dfrac{3+\sqrt{7}}{2}\right)$ and $\left(\dfrac{1+\sqrt{7}}{2}\right)$ or $\left(\dfrac{3+\sqrt{6}}{2}\right)$ and $\left(\dfrac{1-\sqrt{6}}{2}\right)$

(c) $\left(\dfrac{3-\sqrt{5}}{2}\right)$ and $\left(\dfrac{1-\sqrt{5}}{2}\right)$ or $\left(\dfrac{3+\sqrt{5}}{2}\right)$ and $\left(\dfrac{1+\sqrt{5}}{2}\right)$

(d) none of these

23. The remainder when $10^{10} + 10^{100} + \ldots + 10^{10000000000}$ is divided by 7 is

(a) 0   (b) 1

(c) 2   (d) 5

24. LCM of $\dfrac{2}{3}$ and $\dfrac{4}{5}$

(a) $\dfrac{2}{3}$ (b) $\dfrac{4}{5}$ (c) $\dfrac{2}{15}$ (d) $\dfrac{15}{4}$
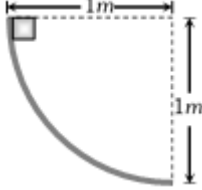
25. In the given figure, then sum of all the angle is equal to K right angles, then K is equal to
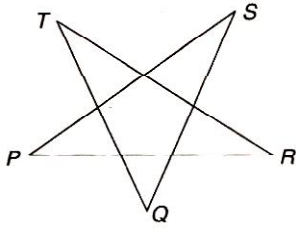
    (a) 10   (b) 12

    (c) 14   (d) 16

SECTION B

(ON MATHEMATICS)

1. Ultrasonic, Infrasonic and audible waves travel through a medium with speeds V_u, V_i and V_a respectively, then

    (a) V_u, V_i and V_a are nearly equal

    (b) $V_u \geq V_a \geq V_i$

    (c) $V_u \leq V_a \leq V_i$

    (d) $V_a \leq V_u$ and $V_u \approx V_i$

2. The distance between two consecutive crests in a wave train produced in a string is 5 cm. If 2 complete waves pass through any point per second, the velocity of the wave is

    (a) 10 cm/sec   (b) 2.5 cm/sec

    (c) 5 cm/sec   (d) 15 cm/sec

3. A tank 5 m high is half filled with water and then is filled to the top with oil of density 0.85 g/cm^3. The pressure at the bottom of the tank, due to these liquids is

    (a) 1.85 g/cm^2 (b) 89.25 g/cm^2

    (c) 462.5 g/cm^2 (d) 500 g/cm^2

4. A wooden block of volume 1000 cm^3 is suspended from a spring balance. It weighs 12 N in air. It is suspended in water such that half of the block is below the surface of water. The reading of the spring balance is

    (a) 10 N (b) 9 N

    (c) 8 N (d) 7 N

5. A body of mass 2 kg slides down a curved track which is quadrant of a circle of radius 1 $metre$. All the surfaces are frictionless. If the body starts from rest, its speed at the bottom of the track is

    (a) 4.43 m/sec (b) 2 m/sec

    (c) 0.5 m/sec (d) 19.6 m/sec

6. The kinetic energy of a body decreases by 36%. The decrease in its momentum is

    (a) 36%   (b) 20%

    (c) 8%   (d) 6%

7. A body has speed V, $2V$ and $3V$ in first 1/3 of distance S, seconds 1/3 of S and third 1/3 of S respectively. Its average speed will be

    (a) V (b) $2V$

    (c) $\dfrac{18}{11}V$ (d) $\dfrac{11}{18}V$

8. Two trains one of length 100 m and another of length 125 m, are moving in mutually opposite directions along parallel lines, meet each other, each with speed 10m/s. If their acceleration are 0.3m/s^2 and 0.2m/s^2 respectively, then the time they take to pass each other will be

    (a) 5 s   (b) 10 s

    (c) 15 s   (d) 20 s

9. A balloon rises from rest with a constant acceleration g/8 . A stone is released from it when it has risen to height h. The time taken by the stone to reach the ground is

    (a) $4\sqrt{\dfrac{h}{g}}$ (b) $2\sqrt{\dfrac{h}{g}}$

    (c) $\sqrt{\dfrac{2h}{g}}$ (d) $\sqrt{\dfrac{g}{h}}$

10. How far does sound travel in air when a tuning fork of frequency 250 Hz completes 50 vibrations? The speed of sound in air is 340 m/s.

    (a) 1.36 metre   (b) 50 metre

    (c) 0.74 metre   (d) 68 metre

11. Which of the following compound in which cation and anion has same no. of electrons?

(a) CaO   (b) MgS

(c) MgO   (d) $MgCl_2$

12. Find the total number of atoms present in 0.9g water

(a) $\dfrac{18}{0.9} \times N_A$ (b) $\dfrac{0.9}{18} \times N_A \times 2$

(c) $\dfrac{0.9}{18} \times N_A \times 2$ (d) $\dfrac{0.9}{18} \times N_A$

13. Which of the following contains the least number of molecules?

(a) 16 g carbon dioxide (CO_2)

(b) 8 g of oxygen (O_2)

(c) 4 g of nitrogen (N_2)

(d) 2 g of hydrogen (H_2)

14. The mixture of sand and iodine can be separated by

(a) crystallisation

(b) sublimation

(c) distillation

(d) fractional distilhtion

15. Which of the following contains only one element.

(a) Marble   (b) diamond

(c) glass   (d) sand

16. Two elements X and Y have atomic weights of 14 and 16. They form a series of compounds A, B, C, D and E in which for the same amount of element X, Y is present in the ratio $1 : 2 : 3 : 4 : 5$. If the compound A has 28 parts by weight of X and 16 parts by weight of Y, then the compound of C will have 28 parts weight of X and

(a) 32 parts by weight of Y

(b) 48 parts by weight of Y

(c) 64 parts by weight of Y

(d) 80 parts by weight of Y

17. Which species contains more protons than electrons?

(a) Sodium atom   (b) Sulphide ion

(c) Sulphur atom   (d) Sodium ion

18. Formula of chloride of a metal M is MCl_3. Formula of its phosphate is

(a) $M(PO_4)_2$ (b) M_3PO_4

(c) MPO_4 (d) M_2PO_4

19. In which of the following reactions there is no change in valency

(a) $4KClO_3 \rightarrow 3KClO_4 + KCl$

(b) $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$

(c) $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

(d) $2BaO + O_2 \rightarrow 2BaO_2$

20. Which of the following mixtures are homogenous ?

(a) Oil and water

(b) Brass

(c) Kerosene and petrol

(d) Sugar and water

(e) Water and acetone

(g) Ammonia and water

(h) Sulphuric acid and water

(a) b,c,d,g,h   (b) c,d,f

(c) b,e,g,h   (d) c,d,e.h

21. Which of the following pteridophytes is known as 'Horse-tail' ?

(a) Rhynia   (b) Selaginella

(c) Equisetum   (d) None of these

22. A plant bearing two types of spores is termed as —

(a) Heterospory   (b) Seed habit

(c) Homospory   (d) All of these

23. In Pinus present only —

(a) Male cone

(b) Female cone

(c) Male and female cones

(d) All of these

24. Number of cotyledons found in the embryo of gram is—

(a) 4 　　　　　　　　(b) 2

(c) 3 　　　　　　　　(d) 1

25. Bryophytes are—

(a) Aquatic 　　　　　(b) Terrestrial

(c) Amphibious 　　　(d) None of these

26. Which gland is known as master gland.

(a) Liver 　　　　　　(b) Thyroid

(c) Pituitary 　　　　(d) Pineal

27. A bryophyte differes from pteridophyte in—

(a) Archegonia

(b) Lack of vascular tissue

(c) Independent gametophyte

(d) None of these

28. Acid rain is mainly a mixture of—

(a) Sulphuric acid and nitric acid

(b) Hexane and methane

(c) Acetic acid and bromine

(d) Ascorbic acid and citric acid

29. Ribosomes are sites for—

(a) Protein synthesis

(b) Photosynthesis

(c) Fat synthesis

(d) Respiration

30 Pyramid of energy is—

(a) Always inverted

(b) Always upright

(c) Sometimes inverted and sometimes upright

(d) None of these