IIT ASHRAM BRINGS...

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उड़ान

A QUEST FOR SCIENCE ASPIRANTS !

CLASS **10**

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.

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

SECTION A

(ON MENTAL ABILITY)

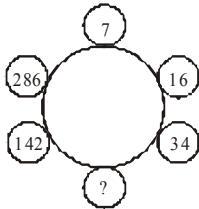1. If T means '–', R means '+' P means '×', M means '÷', S means '=', Q means '>' and N means '<', then which one of the answer is correct?

   (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

2. Choose the odd-one out:

   (a) 8791   (b) 1879

   (c) 8971   (d) 7619

3. Find the missing term.

   (a) 72   (b) 70

   (c) 68   (d) 66

4. In the following question you are give some letter which follow a set pattern. There are four/five answer choices chose the answer choice that can replace the '?' in the series.

   c x, f u, i r, ..., o l, r i

   (a) lo   (b) m n

   (c) n o   (d) o p

5. In a certain code language -

   '1 2 3' means 'hot filtered coffee'

   '3 5 6' means 'very hot day'

   and '5 8 9' means 'day and night'

   Which of the following numeral symbols stands for 'very' ?

   (a) 9   (b) 6

   (c) 8   (d) 2

6. In the following sequence of instructions, 1 stands for Run, 2 stands for Stop, 3 stands for Go, 4 stands for Sit and 5 stands for Wait. If the sequence were continued, which instruction will come next?

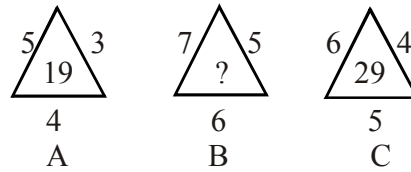   4 4 5 4 5 3 4 5 3 1 4 5 3 1 2 4 5 4 5 3 4 5 3

   (a) Wait   (b) Sit

   (c) Go   (d) Stop

7. Find the missing term :

   0, 2, 8, 14, (........), 34

   (a) 24   (b) 22

   (c) 20   (d) 18

8. Find the missing term

   (a) 25   (b) 37

   (c) 41   (d) 47

9. Which one word cannot be formed by using the letters of the given word?

   C O R R I G E N D U M

   (a) GENDER   (b) DRUM

   (c) MURDER   (d) DANGER

10. Rohan ranked eleventh from the top and twenty-seventh from the bottom among the students who passed the annual examinations in a class. If the number of students of students who failed in the exams.was 12, how many students did appear for the examinations?

    (a) 48   (b) 49
    (c) 50   (d) Can't be determined

11. In the figure given below O is the centre of the circle. Line AB intersects the circle only at point B, and line DC intersects the circle only at point C. if the circle has a radius of 2 cm, then AC is
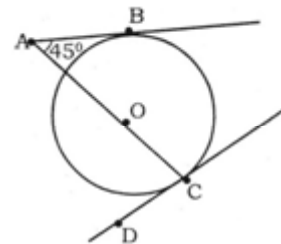

    (a) 4 cm   (b) 2 + $\sqrt{2}$ cm

    (c) 4 + $\sqrt{2}$ cm   (d) 2 + 2$\sqrt{2}$ cm

12. AB is a chord of a circle of radius 4.3 cm and P is a point on it which divides it into two parts in the ratio 7 : 10. If P is 2.7 cm distant from the centre O, the length of AB is

    (a) 5 cm   (b) 6.8 cm

    (c) 6.4 cm   (d) 6.1 cm

13. A circus tent is in the form of a cone over a cylinder. The diameter of the base is 9 m, the height of cylindrical part is 4.8 m and the total height of the tent is 10.8 m. the canvas required for the tent is

    (a) 24.184 sq m   (b) 2418.4 sq m
    (c) 241.84 sq m   (d) none

14. Find the remainder when $(2222^{5555} + 5555^{2222})/7$

    (a) 0   (b) 1
    (c) 2   (d) 3

15. ΔABC is an isosceles triangle in which $AB = AC$ and $BD \perp AC$. Then $2CD.AD = $ _____.

    (a) $BD^2 - CD^2$ (b) $CD^2 - BD^2$
    (c) $AB^2 - AC^2$ (d) $AC^2 - AB^2$

16. Find the number of zeros in the product: $1^1 \times 2^2 \times 3^3 \times 4^4 \times \ldots 98^{98} \times 99^{99} \times 100^{100}$

    (a) 1200   (b) 1300
    (c) 1153   (d) 1018

17. If x_1, x_2 are the roots of $ax^2 + bx + c = 0$, find the value of $(ax_1 + b)^{-3} + (ax_2 + b)^{-3}$

    (a) $\dfrac{a(a^2 - 3ab)}{a^3 b^3}$ (b) $\dfrac{b(b^2 - 3ac)}{a^3 b^3}$

    (c) $\dfrac{a(b^2 - 3ac)}{b^3 c^3}$ (d) $\dfrac{b(b^2 - 3ac)}{a^3 c^3}$

18. Find the number of irrational solution of the equation
    $$\sqrt{x^2 + \sqrt{x^2 + 11}} + \sqrt{x^2 - \sqrt{x^2 + 11}} = 4$$
    (a) 1   (b) 2
    (c) 3   (d) 4

19. If $a > b > 0$ are two real numbers, the value of,
    $$\sqrt{ab+(a-b)\sqrt{ab+(a-b)\sqrt{ab+(a-b)\sqrt{ab+\ldots\ldots}}}}$$
    is:

    (a) independent of b
    (b) independent of a
    (c) independent of both a & b
    (d) dependent on both a & b

20. A rail road curve is to be laid out on a circle. If the track is to change direction by 28^0 in a distance of 44 meters then the radius of the curve is _____. [use $\pi = 22/7$]

    (a) 85 m   (b) 95 m
    (c) 80 m   (d) 90 m

21. If a and b are unequal and $x^2 + ax + b$ and $x^2 + bx + a$ have a common factor find the value of $a + b$

    (a) -1   (b) -2
    (c) 0   (d) 1

22. A play field is 100m by 60 m, has a foot path all round it on the outside. What is width of the path if its area be $\dfrac{3}{5}$ of the area of the field?

    (a) 35 m   (b) 15 m
    (c) 10 m   (d) 50 m

23. If $lmn = 1$, find the value of $\dfrac{1}{1+l+m^{-1}} + \dfrac{1}{1+m+n^{-1}} + \dfrac{1}{1+n+l^{-1}}$

    (a) even number   (b) odd number
    (c) prime number
    (d) even & prime number

24. 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
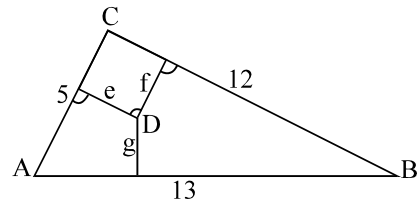

    (a) 120   (b) 90
    (c) 60   (d) 30

25. If $\sqrt{\dfrac{1-\sin A}{1+\sin A}} + \dfrac{\sin A}{\cos A} = \dfrac{1}{\cos A}$, for all permissible values of A, then A belongs to

    (a) I, II Quadrant
    (b) I, III Quadrant
   (c) II,III Quadrant
    (d) I, IV Quadrant

SECTION B

(ON MATHEMATICS)

1. Following figure shows the multiple reflections of a light ray along a glass corridor where the walls are either parallel or perpendicular to one another. If the angle of incidence at point P is 30°, what are the angles of reflection of the light ray at points Q, R, S and T respectively
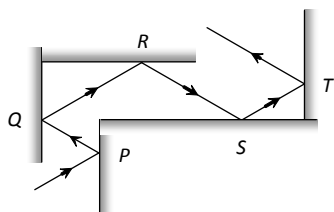
    (a) 30°, 30°, 30°, 30° (b) 30°, 60°, 30°, 60°
    (c) 30°, 60°, 60°, 30° (d) 60°, 60°, 60°, 60°

2. Two thin lenses, when in contact, produce a combination of power + 10 D. When they are 0.25 m apart, the power reduces to + $6D$. The focal lengths of the lenses (in m) are
    (a) 0.125 and 0.5   (b) 0.125 and 0.125
    (c) 0.5 and 0.75   (d) 0.125 and 0.75

3. A ray of light makes an angle of 10° with the horizontal above it and strikes a plane mirror which is inclined at an angle θ to the horizontal. The angle θ for which the reflected ray becomes vertical is
    (a) 40°   (b) 50°
    (c) 80°   (d) 100°

4. A thin rod of 5cm length is kept along the axis of a concave mirror of 10cm focal length such that its image is real and magnified and one end touches the rod. Its magnification will be
    (a) 1   (b) 2
    (c) 3   (d) 4

5. A permanent magnet
    (a) Attracts all substances
    (b) Attracts only magnetic substances
    (c) Attracts magnetic substances and repels all non-magnetic substances
    (d) Attracts non-magnetic substances and repels magnetic substances

6. The incorrect statement regarding the lines of force of the magnetic field B is
    (a) Magnetic intensity is a measure of lines of force passing through unit area held normal to it
    (b) Magnetic lines of force form a close curve
    (c) Inside a magnet, its magnetic lines of force move from north pole of a magnet towards its south pole
    (d) Due to a magnet magnetic lines of force never cut each other

7. A voltmeter of resistance 1000 Ω is connected across a resistance of 500 Ω in the given circuit. What will be the reading of voltmeter
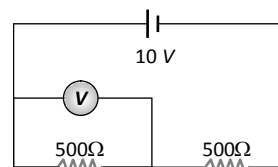
    (a) 1 V (b) 2 V
    (c) 6 V (d) 4 V

8. The energy required to accelerate a car from 10 m/s to 20 m/s is how many times the energy required to accelerate the car from rest to 10 m/s
    (a) Equal   (b) 4 times
    (c) 2 times   (d) 3 times

9. A bomb of mass $3m$ kg explodes into two pieces of mass m kg and $2m$ kg. If the velocity of m kg mass is 16 m/s, the total kinetic energy released in the explosion is
    (a) 192 mJ (b) 96 mJ
    (c) 384 mJ (d) 768 mJ

10. A pond of depth 20 cm is filled with water of refractive index 4/3. The apparent depth of the tank when viewed normally is
    (a) 15 cm   (b) 16 cm
    (c) 18 cm   (d) 20 cm

11. Oxygen reacts with metal to form
    (a) Acidic oxide
    (b) basic oxide or amphoteric oxide
    (c) Amphoteric oxide
    (d) Neutral oxide

12. Isotopes differ in the
    (a) Number of neutrons
    (b) Number of protons
    (c) Way their atoms are arranged
    (d) Number of electrons

13. Iron is galvanized when it is dipped in
    (a) Molten zinc   (b) Molten copper
    (c) Molten carbon (d) Molten gold

14. $P_4 + 6Cl_2 \rightarrow$
    (a) $2 \, P_2Cl_6$　　　　　(b) $4 \, PCl_3$
    (c) PCl_6　　　　　　　(d) P_2Cl_5

15. Which of the following elements exhibit variable valency
    (a) Aluminum　　　(b) Lead
    (c) Zinc　　　　　　(d) Hydrogen

16. 12 gm of Mg will react completely with dilute hydrochloric acid to give
    (a) One mole of H_2

    (b) $\frac{1}{2}$ mole of H_2

    (c) $\frac{2}{3}$ mole of O_2

    (d) Both $\frac{1}{2}$ mole of H_2 & $\frac{1}{2}$ mole of O_2

17. Give the number of electrons present in the outermost shell of atoms of each of the following elements.
    (i) Helium (ii) Magnesium (iii) Sulphur
    (a) i - 2, ii - 3, iii - 4　(b) i - 1, ii - 4, iii - 6
    (c) i - 2, ii - 2, iii - 6　(d) i - 3, ii - 4, iii - 5

18. How many number of moles are present in 34 g of NH_3?
    (a) 2 moles　　　　(b) 3 moles
    (c) 4 moles　　　　(d) 1 mole

19. An element has electronic configuration 2,8,6. Predict their period and group .
    (a) Period = 3rd, group = 16
    (b) Period = 5th, group = 1
    (c) Period = 3rd, group = 10
    (d) Period = 4th, group = 12

20. Ionic compounds
    (a) have bonds which are directional.
    (b) conduct electricity in solid state.
    (c) do not conduct electricity in molten state.
    (d) are generally more soluble in polar solvents than in non polar solvents.

21. The receptors for bitter taste are located at which part of tongue?
    (a) Base of tongue
    (b) Tip of tongue
    (c) Posterior median part of the tongue
    (d) The edges of tongue

22. How do marine animals survive in water without air contact?
    (a) They do not require any oxygen
    (b) They take oxygen from water
    (c) They only produce oxygen in their body
    (d) They get oxygen from water plants

23. Pituitary has been described as the master gland and its hormones govern other endocrine glands. But which of the following glands does not come under its influence?
    (a) Thyroid gland　　(b) Adrenal gland
    (c) Gonads　　　　　(d) Pancreas

24. Which of the following is the cause of suffering of aged people from joint pains?
    (a) Overproduction of synovial fluids
    (b) Drying up of synovial fluids
    (c) Presence of more osteocytes
    (d) Absence of osteocytes

25. The vitamin which is generally excreted by humans in urine is
    (a) vitamin A　　　(b) vitamin D
    (c) vitamin C　　　(d) vitamin E

26. The largest amount of physical and chemical molecules present in the cells is
    (a) carbohydrates
    (b) proteins
    (c) lipids
    (d) nucleic acids

27. The female gametophyte of angiosperm is mostly
    (a) seven-celled　　(b) eight-celled
    (c) eleven-celled　　(d) twenty-celled

28. "Consider the following cell organelles of the organisms

    I.   Mitochondria

    II. Chloroplasts

    III. Endoplasmic reticulum

    Which of the ones given above is/are semi-autonomous organelle(s)?"

    (a) All of these   (b) I and II

    (c) II and III   (d) Only II

29. Kidney stones are mainly formed by which of the following compound

    (a) Sodium chloride

    (b) Silicates

    (c) Calcium bicarbonate

    (d) Calcium oxalate

30. Which of the following techniques can be used to establish the paternity of a child?

    (a) Protein analysis

    (b) Chromosome counting

    (c) Quantitative analysis of DNA

    (d) DNA finger printing