SCIENCE MOVEMENT

(An initiative of Subhadra Charitable Trust)

Set **A**

For Class X students (going to Class XI)

Time Allotted: 2 Hrs.

(SMAT)

Maximum Marks : **180**

> ➤ Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

> ➤ You are not allowed to leave the Examination Hall before the end of the test.

INSTRUCTIONS

A. General Instructions

1. This booklet is your Question paper containing **45 questions**.
   All questions are compulsory.
   Scientific aptitude (15Q), Mathematics (15Q), General Science (15Q)

2. **+4** for correct answer , No negative for Wrong attempted

3. 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.

4. Fill in the boxes provided below on this page and also write your
   Name & Enrollment No. In the space provided.

5. The answer sheet, a machine-readable (OMR), is provided separately.

6. **DO NOT TAMPER WITH/ MUTILATE THE OMR OR THE BOOKLET.**

7. Do not open the question-paper booklet before being instructed to do so by the invigilators.

B. Filling the OMR

8. On the Response sheet, write in Black Ball Point Pen, your name, your Enrollment No.and Name of the Centre. **Do not write these anywhere else.**

9. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.

10. Use Only **Black Ball Point Pen** to Darken the OMR Sheet

Name of the Candidate	_____
Father's Name	_____
Enrollment No.	☐☐☐☐☐☐☐☐☐☐☐

SCIENTIFIC APTITUDE

01. A sample space consists of the integers 1,2,3,4....... 100. The probability of choosing an integer k is proportional to Ink. The conditional probability of choosing the integer 2, given that an even integer is chosen is :

(A) $\dfrac{\ln 2}{50\ln 2 + \ln(50!)}$

(B) $\dfrac{\ln 2}{\ln 2 + \ln(50!)}$

(C) $\dfrac{\ln 2}{50\ln 2 + \ln(50)}$

(D) $\dfrac{\ln 2}{\ln 2 + \ln(50)}$

02. Horses X,Y and Z are entered into a three -horse race, If the odds against X winning are 3 to 1 and the odds against Y winning are 2 to 3 , then the odds against Z winning , is (assume no dead heat):

(A) 3 to 20

(B) 3 to 17

(C) 17 to 3

(D) 20 to 3

03. Mr. A forgot to write down a very important phone number, All he remembers is that it started with 713 and that the next set of 4 digits involved are 1,7 and 9 with one of these numbers appearing twice , He guesses a phone number and dials randomly. The odds in favour of dialing the correct telephone number is :

(A) 1:35

(B) 1:71

(C) 1:23

(D) 1:36

04. If $m^2 + m_1^2 + 2mm_1\cos\theta = 1 = n^2 + n_1^2 + 2nn_1\cos\theta$ and $mn + m_1 n_1 + (mn_1 + m_1 n)\cos\theta = 0$ then $(m^2 + n^2)\sin^2\theta =$

(A) 4

(B) 2

(C) 1

(D) 0

05. If $a = \cos\phi\cos\psi + \sin\phi\sin\psi\cos\delta, \ b = \cos\phi\sin\psi - \sin\phi\cos\psi\cos\delta$ and $c = \sin\phi\sin\delta,$ then $a^2 + b^2 + c^2 =$

(A) 0

(B) 1

(C) -1

(D) None of these

06. Which of the following chemical equations is an unbalanced one?

(A) $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

(B) $2C_4H_{10} + 12O_2 \rightarrow 8CO_2 + 10H_2O$

(C) $2Al + 6H_2O \rightarrow 2Al(OH)_3 + 3H_2$

(D) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

07. $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$ is an example of

(A) displacement reaction

(B) decomposition reaction

(C) double displacement reaction

(D) combination reaction

08. Which of the following reactions is not redox reaction as well as displacement reaction?

(A) $2HgCl_2 + SnCl_2 \rightarrow Hg_2Cl_2 + SnCl_4$

(B) $ZnO + C \rightarrow Zn + CO$

(C) $2AI + 6HCl \rightarrow 2AICl_3 + 3H_2$

(D) $H_2S + Cl_2 \rightarrow 2HCl + S$

09. Iron filings were added to solution of copper sulphate. After 10 minutes, it was observed that the blue colour of the solution changed and layer got deposited on iron filings. The colour of the solution and that of the layer would respectively be

(A) yellow and green

(B) brown and blue

(C) red and greenish blue

(D) green and reddish brown

10. In anaerobic respiration –

(A) O_2 is given out

(B) CO_2 is given out

(C) CO_2 is taken in

(D) O_2 is taken in

11. The exchange of gases [O_2 and CO_2] in a mammal takes place in –

(A) Trachea

(B) Bronchi

(C) Bronchioles

(D) Alveoli

12. Find the missing number (s) :
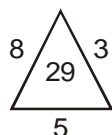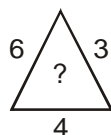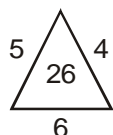
   (A) 32

   (B) 22

   (C) 18

   (D) 27

13. Karan was born on Saturday 22nd March 1982. On what day of the week was he 14 years 7 months and 8 days of age ?

   (A) Sunday

   (B) Tuesday

   (C) Wednesday

   (D) Monday

Directions (14 to 15) :

   Study the following information to answer the given questions.

   (i) Eight friends A, B, C, D, E, F, G and H are seated in a circle facing centre.

   (ii) D is between B and G and F is between A and H.

   (iii) E is second to the right of A.

14. Which of the following is A's position ?

   (A) Left of F

   (B) Right of F

   (C) Between E and F

   (D) Can't be determined

15. Which of the following is C's position ?

   (A) Between E and A

   (B) Between G and E

   (C) Second to the left of B

   (D) Can't be determined

MATHEMATICS

16. If $C^2 = 4d$ and the two equations $x^2 - ax + b = 0$ and $x^2 - cx + d = 0$ have one common root, then the value of $2(b+d)$ is equal to :

(A) $\dfrac{a}{c}$

(B) ac

(C) $2ac$

(D) $a + c$

17. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then the roots of the equation $ax^2 - bx(x-1) + c(x-1)^2 = 0$ in terms of α and β is : (where $a \neq 0$ and $a - b + c \neq 0$)

(A) $\dfrac{\alpha}{1-\alpha}, \dfrac{\beta}{1-\beta}$

(B) $\dfrac{1-\alpha}{\alpha}, \dfrac{1-\beta}{\beta}$

(C) $\dfrac{1+\alpha}{\alpha} \text{ and } \dfrac{1+\beta}{\beta}$

(D) $\dfrac{\alpha}{1+\alpha}, \dfrac{\beta}{1+\beta}$

18. If $\dfrac{1}{2}$ lies between the roots of the quadratic equation $6x^2 + 3\cos\theta.x - \sin^2\theta = 0$, then true set of values of θ in $\left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$ is equal to :

(A) $\left(\dfrac{5\pi}{6}, \dfrac{7\pi}{6}\right)$

(B) $\left(\dfrac{\pi}{2}, \dfrac{5\pi}{6}\right)$

(C) $\left(\dfrac{4\pi}{3}, \dfrac{5\pi}{3}\right)$

(D) $\left(\dfrac{2\pi}{3}, \dfrac{4\pi}{3}\right) - \{\pi\}$

19. The g.c.d of 28 and 49 can be expressed as linear combination as $28x + 49y$ then $(x,y) =$

    (A) $(1,1)$

    (B) $(1,-1)$

    (C) $(1,2)$

    (D) $(3,1)$

20. If m and n are positive integers , then the digit in the units place of $5^n + 6^m$ is always

    (A) $n + m$

    (B) 1

    (C) 6

    (D) 5

21. $\cos^2 1^0 + \cos^2 2^0 + \cos^2 3^0 + ... + \cos^2 90^0 =$

    (A) 0

    (B) 1

    (C) $\dfrac{89}{2}$

    (D) 459

22. If $x = a(\cosec\alpha + \cot\alpha)$ and $y = \dfrac{b(1 - \cos\alpha)}{\sin\alpha}$, then

    (A) $xy = ab$

    (B) $x^2 y^2 = ab$

    (C) $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$

    (D) $\dfrac{x^2}{a} + \dfrac{y^2}{b} = 1$

23. The area of a recangle is the same as that of a circle of radius $\sqrt{\dfrac{35}{11}}$ cm . If length of the rectangle exceed its breadth by 3 cm , the dimensions of the rectangle are

    (A) -5,2

    (B) 5,-2

    (C) $-5,-2$

    (D) 5,2

24. A and B are two fixed points in a plane. If P is a moving point in the plane such that $PA = PB$, then the

    (A) Locus of P is the line AB itself

    (B) Locus of P is a line parallel to AB

    (C) Point P always makes equilateral triangles with A,B

    (D) Triangle PAB is isoscles for all positions of P .

25. ABC is a triangle . A line PQ intersects the sides AB and AC in points P and Q such that $\dfrac{AP}{PB} = \dfrac{AQ}{QC} = \dfrac{m}{n}$.

    m,n being positive integers, The line PQ will pass through the centre of gravity of the triangle if the value of m, n respectively is
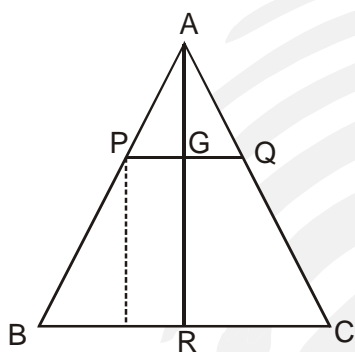

    (A) 2,3

    (B) 1,2

    (C) 1,3

    (D) 2,1

26. Sum to n terms of the series $\log m + \log m^2 / n + \log m^3 / n^2 + \log m^4 / n^3 \ldots$ is

    (A) $\log\left(\dfrac{m^{n+1}}{n^{n-1}}\right)^{\frac{n}{2}}$

    (B) $\log\left(\dfrac{n^{n-1}}{m^{n+1}}\right)^{\frac{n}{2}}$

    (C) $\log\left(\dfrac{m^n}{n^n}\right)^{\frac{n}{2}}$

   (D) $\log\left(\dfrac{m^{1-n}}{n^{1-m}}\right)^{\frac{n}{2}}$

27. How many zeroes will be there at the end of the expression $(2!)^{2!} + (4!)^{4!} + (8!)^{8!} + (9!)^{9!} + (10!)^{10!} + (11!)^{11!}$?

    (A) $(8!)^{8!} + (9!)^{9!} + (10!)^{10!} + (11!)^{11!}$

    (B) 10^{101}

    (C) $(0!)^{0!}$

    (D) None of these

28. Two solution of 90% and 97% purity are mixed resulting in 21 litres of mixture of 94% purity , How much is the quantity of the first solution in the resulting mixture ?

    (A) 15 litres

    (B) 12 litres

    (C) 9 liters

    (D) 6 litres

29. There are two kinds of alloys of tin and copper. The first alloy contains tin and copper such that 93.33% of it is tin. In the second alloy there is 86.66% tin. What weight of the first alloy should be mixed with some weight of the second alloy. So as to make a 50 kg mass containing 90% of tin ?

    (A) 15 kg

    (B) 30 kg

    (C) 20 kg

    (D) 25 kg

30. A solid is in the form of a cylinder with hemispherical ends . The total height of the solid is 19 cm and the diameter of the cylinder is 7 cm , Find the total surface area of the solid .
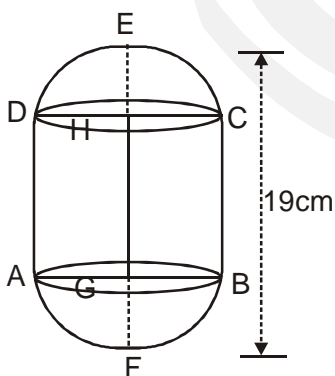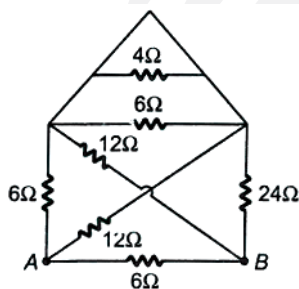

    (A) 398 . 75 cm^2

    (B) 418 cm^2

    (C) 444 cm^2

    (D) 412 cm^2

GENERAL SCIENCE

31. In the given circuit, the value of i is:
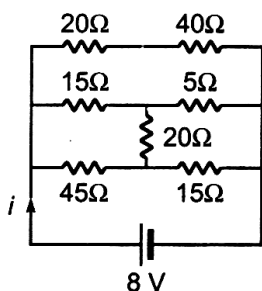
(A) 0.10 A

(B) 0.20 A

(C) 0.40 A

(D) 0.6 A

32. In the circuit shown in fig. equivalent resistance between points A and B is :

(A) 2.4 Ω

(B) 6.2 Ω

(C) 4 Ω

(D) 8 Ω

33. A straight wire is carrying an electric current:

(A) there are no magnetic lines of force near the wire

(B) there are lines of force and they are circular lines encircling the wire

(C) the lines of force are straight lines parallel to the wire and in the same direction as the current

(D) the lines of force are straight lines parallel to the wire in the direction opposite to the current

34. Which of the following cannot be deflected by a magnetic field ?

(A) Alpha rays

(B) Beta rays

(C) Gamma rays

(D) Cosmic rays

35. Which of the following when in motion cannot be deflected by the magnetic field ?

    (A) Electron

    (B) Proton

    (C) Neutron

    (D) Ions

36. Which of the displacement-time graphs is impossible?
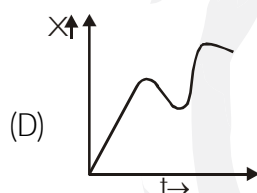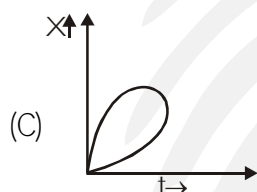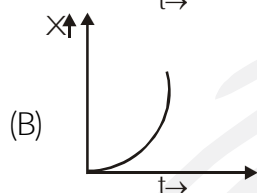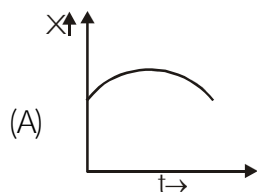
37. Malachite is an ore of

    (A) iron

    (B) copper

    (C) mercury

    (D) zinc

38. Which is not the correct statement ?

    (A) Cassiterite, Chromite and pitchblends are concentrated by hydraulic washing.

    (B) Pure Al_2O_3 is obtained from the bauixite ore by leaching in the Baeyer's process.

    (C) Sulphide ore is concentrated by calcination method.

    (D) Roasting can convert sulphide into oxide or sulphate and part of sulphide may also act as a reducing agent.

39. Gravity separation method is based upon

    (A) preferential washing of ores and gangue particles

    (B) difference in densities of ore particles and impurities

    (C) difference in chemical properties of ore particles and impurities

    (D) None of these

40. Acetic acid was added to a solid X kept in a test tube. A colourless and adourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that

(A) Solid X is sodium hydroxide and the gas evolved is CO_2

(B) Solid X is sodium bicarbonate and the gas evolved is CO_2

(C) Solid X is sodium acetate and the gas evolved is CO_2

(D) Solid X is sodium chloride and the gas evolved is CO_2

41. Sodium is a -

(A) Silver white and very soft metal

(B) Colourless and hard metal

(C) Silvery white and very hard metal

(D) Colourless and very soft metal

42. Pacemaker is situated in heart :

(A) In the wall of right atrium

(B) On the interauricular septum

(C) On interventicular septum

(D) In the wall of left atrium

43. Grey matter of the brain contains :-

(A) cell bodies

(B) cell bodies with processes

(C) cell bodies with processes and a large number of synapses

(D) sensory and motor nerve cells

44. An edible fungus is :-

(A) Aspergillus

(B) Ustilago

(C) Polyporus

(D) Morchella

45. Phycoerythrin is found in :-

(A) Fucus

(B) Sargassum

(C) Oedogonium

(D) Polysiphonia

✳ ✳ ✳

SCIENCE MOVEMENT APTITUDE TEST (SMAT)

For Class X students (going to Class XI)

ANSWER KEY

01.	A		24.	D
02.	C		25.	D
03.	A		26.	A
04.	C		27.	C
05.	B		28.	C
06.	B		29.	D
07.	A		30.	C
08.	C		31.	D
09.	D		32.	C
10.	B		33.	B
11.	D		34.	C
12.	B		35.	C
13.	D		36.	C
14.	B		37.	B
15.	A		38.	C
16.	B		39.	B
17.	D		40.	B
18.	D		41.	A
19.	B		42.	A
20.	B		43.	C
21.	C		44.	D
22.	B		45.	D
23.	D			