VIDYAPEETH
An IIT Alumni Body IIT Academy
Premier Institute For IIT JEE (Main & Advanced)/KVPY/OLYMPIAD/NTSE

VSAT
Vidyapeeth Scholarship Cum Admission Test

CODE - A

SAMPLE TEST PAPER

Time : 2 :30 hours. (Class IX) **Maximum Marks : 240**

Name : _____ **Roll No.:** ☐☐☐

INSTRUCTIONS

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.

[A] General :

1. Attempt ALL the questions. Answer have to be marked on the **OMR** sheets
2. This question paper contains **60 questions**.
3. The question paper consists of **Four Parts Mathematics (Q.No. 1 to 20), Physics (Q.No. 21 to 35), Chemistry (Q.No. 36 to 50), & Mental Ability (Q.No. 51 to 60)**
4. Blank spaces are provided at the bottom of each page for rough work. No additional sheets will be provided for rough work.
5. Blank paper, clipboard, log tabes, silde rules, calculators, cellular phones, pagers and electronic gadgets in any form are **NOT** allowed.
6. Do not Tamper / multilate the **OMR sheet** or this booklet.
7. Do not break the seals of the question-paper booklet before instructed to do so by the invigilator.
8. SUBMIT the OMR sheet to the invigilator after completing the test & take away the test paper with you.

[B] Filling of OMR Sheet :

9. In all the parts, each question will have 4 choices out of which **only one choice is correct**
10. Use only Black/Blue ball point pen for filling the OMR sheet.
11. On the OMR sheet, darken the appropriate bubble for each character of your name, Registration No., Phone No. etc.

[C] Marking Scheme :

12. For each right answer you will be **awarded 4 marks** if you darken the bubble corresponding to the corrrect answer and **zero marks** if no bubble is darkened. In case of bubbling of incorrect answer, **minus one (-1)** mark will be awarded.

Best of Luck

PART - I (MATHEMATICS)

(SINGLE CORRECT ANSWER TYPE)

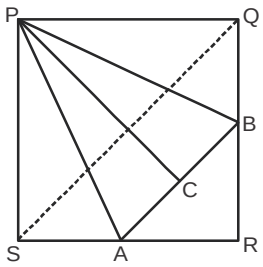
This section contains **(1-20) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.1 $f(x), g(x)$ are two polynomial with integer coefficient such that their H.C.F. is 1 and LCM is $(x^2-4)(x^4-1)$. If $f(x) = x^2 - 2x^2 - x + 2$, then $g(x)$ is :

(A) $x^3 - 2x^2 + x + 2$ (B) $x^3 - 2x^2 + x - 2$

(C) $x^3 + 2x^2 + x + 2$ (D) $x^3 - 2x^2 - x - 2$

Q.2 If PQRS is a square, $AB \| SQ$ and $AC = CB$, which one is true ?

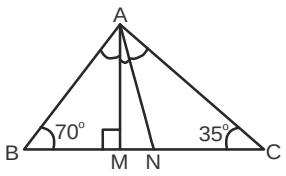


(A) $SA = BQ$ (B) PC is the bisector of $\angle SPQ$

(C) PC if produced will pass through R (D) All of these

Space for rough work

Q.3 In the adjoining figure $AM \perp BC$ and AN is the bisector of $\angle BAC$. If $\angle B = 70^o$ and $\angle C = 35^o$ then $\angle MAN$ is :



(A) 17.5^o (B) 27.5^o (C) 37.5^o (D) 47.5^o

Q.4 The ratio of marks obtained by Vindod and Basu is 6 : 5. If the combined average of their percentage is 68.75 and their sum of the marks is 275, find the total marks for which exam was conducted.

(A) 150 (B) 200 (C) 400 (D) None of these

Q.5 A cube with a side 1 m long has been cut into cubes of a side 1 dm each. All small cubes have been put one on top of the other, to form a vertical structure. What is the height of this structure ?

(A) 100 m (B) 1 km (C) 10 km (D) 1000 km

Q.6 $\sqrt{1+\sqrt{1+\sqrt{1+.....}}}$ is :

(A) equal 1 (B) lies between 0 and 1

(C) lies between 1 and 2 (D) is greater than 2

Q.7 A metallic sphere of radius 10.5 cm is melted and then recast into small cones each of radius 3.5 cm and height 3 cm. The number of such cones is :

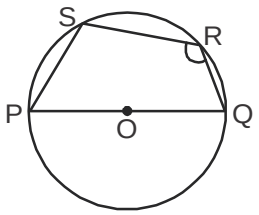
(A) 63 (B) 126 (C) 21 (D) 130

Space for rough work

Q.8 If $x+y=a$ and $xy=b$ then the value of $\frac{1}{x^3}+\frac{1}{y^3}$ is equal to :

(A) a^3-3ab (B) $\frac{a^3-3ab}{b^3}$ (C) $\frac{a^3+3ab}{b^3}$ (D) a^3+3ab

Q.9 In the given figure, POQ is a diameter of a circle with centre O, $SR = RQ$ and PQRS is cyclic quadrilateral. If $\angle R = 138^o$, find $\angle PSR$:



(A) 115^o (B) 111^o (C) 119^o (D) 121^o

Q.10 If V is the volume of a cuboid of dimensions a, b and c and 'S' is the surface area, then the relation betwen them is

(A) $\frac{1}{V}=\frac{2}{S}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ (B) $\frac{1}{S}=\frac{2}{V}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

(C) $\frac{2}{S}=\frac{1}{S}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ (D) $\frac{2}{S}=\frac{1}{V}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

Space for rough work

Q.11 If $\frac{p}{q} = \left(\frac{2}{3}\right)^2 \div \left(\frac{6}{7}\right)^0$ then the value of $\left(\frac{q}{p}\right)^2$

(A) $\frac{16}{81}$ (B) $\frac{4}{9}$ (C) $\frac{2}{3}$ (D) $\frac{81}{16}$

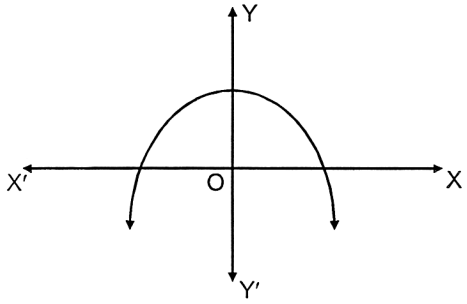
Q.12 If $\sqrt{14 + 6\sqrt{5}} = a + \sqrt{b}$, then find value of $a + b$.

(A) $3 + \sqrt{5}$ (B) $3\sqrt{5}$ (C) 8 (D) $5\sqrt{5}$

Comprehension (Q. No. 13 to Q.No. 14)

Zero of a polynomial is that value of x for which the value of the polynomial becomes zero. Number of zeroes of any polynomial is equal to the degree of the polynomial. The zeroes may be real (equal or unequal) or unreal.

Q.13 According to the adjoining graph, the product of the zeroes of the polynomial will be



(A) positive

(B) negative

(C) zero

(D) cannot be determined

Q.14 The ratio of sum of zeroes and product of zeroes of polynomial $2(x-1)(x-3)$ is

(A) $\frac{3}{4}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$

Space for rough work

Q.15 $1, -2, 3, -4, 5, -6, \ldots\ldots n(-1)^{n+1}$ consider the sequence. What is the average of the first 300 terms of the sequence :

(A) -1 (B) 0.5 (C) 0 (D) -0.5

Q.16 The points $(0, -1), (-2, 3), (6, 7)$ and $(8, 3)$ are

(A) Collinear

(B) Vertices of a parallelogram which is not a rectangle

(C) Vertices of a rectangle, which is not a square

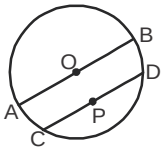
(D) None of these

Q.17 $\dfrac{(125)^n \times 5^2 \times \left(5^{-\frac{n}{2}}\right)^3 - (5^n)^{3/2}}{5^{3m} \times 2^3 \times 3} = \dfrac{1}{125}$ then which of the following is true

(A) $2m - n + 2 = 0$ (B) $n - 2m - 2 = 0$

(C) $2m + n - 2 = 0$ (D) $n - 2m + 2 = 0$

Q.18 The centre of a circle is at O. AB and CD are two chords of length d and ℓ respectively. If P is the mid point of CD, then the length OP is .....



(A) $\sqrt{d^2 + l^2}$ (B) $\sqrt{d^2 - l^2}$

(C) $\frac{1}{2}\sqrt{d^2 + l^2}$ (D) $\frac{1}{2}\sqrt{d^2 - l^2}$

Space for rough work

Q.19 If the perimeter of a rectangle is 'p' and its diagonal is 'd', then the difference between the length & width of the rectangle is :

(A) $\sqrt{\frac{8d^2 - p^2}{4}}$ (B) $\sqrt{\frac{8d^2 + p^2}{4}}$ (C) $\sqrt{\frac{6d^2 - p^2}{4}}$ (D) $\sqrt{\frac{6d^2 + p^2}{4}}$

Q.20 If the polynomial $f(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$, find $k + a$.

(A) 5 (B) 0 (C) 10 (D) -10

Space for rough work

PART - II (PHYSICS)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(21-35) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.21 Two trains are each 50 m long moving parallel towards each other with same speed of 10 m/s. After how much time will they pass each other ?

(A) 5 sec (B) 4 sec (C) 2 sec (D) 6 sec

Q.22 According to Hooke's law of elasticity, if stress is increased, then the ratio of stress to strain :

(A) becomes zero (B) remains constant

(C) decreases (D) increases

Q.23 Power of a moving body is stored in the form of :

(A) Work and distance (B) force and distance

(C) force and velocity (D) force and time

Q.24 The S.I. unit of linear (α), superficial (β) and cubical (γ) expansion coefficient are respectively :

(A) per ^{o}C, per $^{o}C^{2}$, per $^{o}C^{3}$ (B) all are dimensionless

(C) all has same unit of per ^{o}C (D) all has same unit of per K

Space for rough work

Q.25 A sonar echo takes 4.4s to return from a submarine. If the speed of sound in water is $1500\ ms^{-1}$, then the distance of submarine from the sonar is :

(A) 1500 m (B) 3000 m (C) 3300 m (D) 3600 m

Q.26 A piece of ice of mass 40 g is added to 200 g of water at 50^oC. Calculate the final temperature of water when all the ice has melted.

Specific heat capacity of water $=4200\,J\,kg^{-1}K^{-1}$, and specific latgent heat of fusion of ice $= 336\times10^3\ J\ kg^{-1}$.

(A) 28.33^oC (B) 35.33^oC (C) 0^oC (D) None of these

Q.27 A particles covers half of the circle of radius r. Then the displacement and distance of the particle are respectively

(A) $2\pi r, 0$ (B) $2r, \pi r$ (C) $\frac{\pi r}{2}, 2r$ (D) $\pi r, r$

Q.28 Electron volt is a unit of

(A) Potential difference (B) charge

(C) energy (D) capacity

Q.29 A force of 20 N acts on a body and the body moves through 1 m at an angle of 45^o to the direction of force. The work done by the force is :

(A) $10\sqrt{2}\,J$ (B) $\frac{10}{\sqrt{2}}J$ (C) $-10\sqrt{2}\,J$ (D) $-\frac{10}{\sqrt{2}}J$

Space for rough work

Q.30 Which is not a unit of energy

(A) Watt second (B) kilo watt hour (C) watt (D) joule

Q.31 A body of mass 1 kg is kept at rest. A constant force of 6.0 N acting on it, the time taken by the body to move through a distance of 12 m

(A) 2 sec. (B) 3 sec. (C) 5 sec. (D) 5 sec.

Q.32 Two point masses each equal to 1 kg attract one another with a force of 10^{-10} N. The distance between the two point masses is (Take $G = 6.4 \times 10^{-11}$ MKS units)

(A) 8 cm (B) 0.8 cm (C) 80 cm (D) 0.08 cm

Q.33 A wave of frequency 1000 Hz travels between X and Y, a distance of 600 m in 2 sec. How many wavelengths are there in disatnce XY

(A) 3.3 (B) 300 (C) 180 (D) 2000

Q.34 A body of mass 1 kg has kinetic energy 1 J when its speed is

(A) 0.45 m/s (B) 1 m/s (C) 1.4 m/s (D) 4.4 m/s

Q.35 Ultrasonic, infrasonic and audible waves travel

through a medium with speeds v_u, v_i and v_a respectively, then :

(A) $v_u < v_i < v_a$ (B) $v_u > v_i > v_a$ (C) $v_u = v_i = v_a$ (D) $v_i < v_a < v_u$

Space for rough work

PART - III (CHEMISTRY)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(36-50) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.36 When magnesium is burnt in air, the product formed is

(A) magnesium oxide only (B) magnesium nitride only

(C) Both (D) None of these

Q.37 Calculate the weight of a mixture which contains 3.0×10^{22} atoms of helium and 6.0×10^{23} molecules of oxygen :

(A) 32.2 g (B) 40.3 g (C) 31.4 g (D) 30.3 g

Q.38 The heat energy is required to change the state of a substance causes

(A) rise in temperature

(B) no rise in its temperature

(C) separation of forces of attraction between the particles

(D) Both (2) and (3)

Q.39 In a chemical reaction, A combines with B to form AB with C to form A_2C. What would be obtained if B and C combine together ?

(A) B_2C (B) BC (C) BC_2 (D) B_3C

Q.40 Which metal oxide shows amphoteric nature ?

(A) Calcium (B) Zinc (C) Magnesium (D) Bothe (1) and (3)

Space for rough work

Q.41 Calaculate the final mass percentage of the solution obtained by mixing of 200 gm of 30% mass/mass solution and 300 gm of 20% mass/mass solution ?

(A) 24 % (B) 25 % (C) 26 % (D) 27 %

Q.42 Choose the correct option :

Statement - I : It is difficult to cook food at hill.

Statement - II : The boiling point of water increases at hill.

(A) Statement I and II are correct and statement II is the correct explanation of statement I

(B) Statement I and II are incorrect.

(C) Statement I is correct but statement II is incorrect.

(D) Statement I is incorrect but statement II is correct.

Q.43 A chemical equation is balanced in accordance with the law of

(A) conservation of mass. (B) multiple proportion.

(C) constant proportion. (D) reciprocal proportion.

Q.44 What is wrong about canal rays ?

(A) Their e/m ratio is constant.

(B) They are deflected by electrical and magnetic fields.

(C) The are produced by ionisation of molecules of the residual gas.

(D) They do not originate from the anode.

Space for rough work

Comprehension (Q. No. 45 to Q. 47)

The term mole was introduced by Ostwald in 1896. A mole (mol) is defined as the number of atoms in 12.01g of carbon-12. The number of atoms in 12g of carbon-12 has been found experimentally to be 6.02×10^{23}. The number is also known as Avogadro's number named in honour of Amedeo Avogadro. A mole of oxygen atoms contains 6.02×10^{23} oxygen atoms and a mole of oxygen molecules contains 6.02×10^{23} oxygen molecules. Therefore, a mole of oxygen molecules is equal to two moles of oxygen atoms, i.e., $2 \times 6.02 \times 10^{23}$ oxygen atoms.

The mass of one mole atoms of any element is exactly equal to the atomic mass in grams (gram-atomic mass of gram atom) of that element. Similarly, the mass of 6.02×10^{23} molecules (1 mole) of a substance is equal to its molecular mass in grams or gram-molecular mass or gram molecule.

It has also been established by Avogadro's hypothesis that one gram-molecular mass of any gaseous substance occupies a volume of 22.4 litres at NTP. Thus, one mole, i.e., 6.02×10^{23} molecules of any Therefore, number of mole of substance

$$= \frac{\text{Mass of substance in gram}}{\text{Mass of one mole of the substance in gram}}$$

$$\text{Further, Number of moles} = \frac{\text{No. of particles}}{6.02 \times 10^{23}}$$

The molecular formula of a substance may be determined from the empirical formula if the molecular mass of the substance is known. The molecular formula is always a simple multiple of empirical formula and the value of simple multiple is obtained by dividing molecular mass with empiricla formula mass. Hence, empirical formula of a compound can be defined as the simplest whole number ratio formula of the compound.

Space for rough work

Consider the following table for compound 'X':

Element	Percentage	Atomic Mass	Relative No. of atoms	Simplest ratio
Carbon	66.67%	12	$\frac{66.67}{12} = 5.55$	$\frac{5.55}{1.85} = 3$
Hydrogen	7.4%	1	$\frac{7.4}{1} = 7.4$	$\frac{7.4}{1.85} = 4$
Nitrogen	25.9%	14	$\frac{25.9}{14} = 1.85$	$\frac{1.85}{1.85} = 1$

Now based on the data given above, answer the following questions.

Q.45 The empirical formula of the compound 'X' (as per given data) is

(A) $C_{12}H_{16}N_4$ (B) $C_6H_8N_2$ (C) C_3H_4N (D) $C_3H_4N_2$

Q.46 If the molecular mass of the compound 'X' is found to be 108 g/mol, them its molecular formula is :

(A) $C_{12}H_{16}N_4$ (B) $C_9H_{12}N_3$ (C) $C_6H_6N_2$ (D) $C_6H_8N_2$

Q.47 Calculate the total number of atomes present in 54 g of the compound 'X' (N_A = avogadro's number)

(A) N_A (B) 16 N_A (C) 0.5 N_A (D) 8 N_A

Q.48 Specific gravity of substance is

(A) density of substance relative to density of air.

(B) density of substance relative to density of water.

(C) density of substance relative to density of hydrogen

(D) All of these

Space for rough work

Q.49 Pick the true statement :

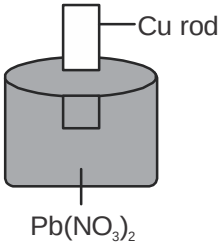
(A) Compounds may be made up from only one element, mixtures are always made up from at least two elements.

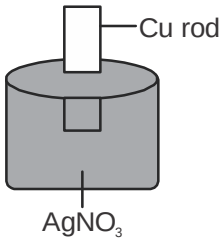
(B) Compounds are made up from at least one element, mixtures may be made up of more elements, mixtures may be made up of more elements.

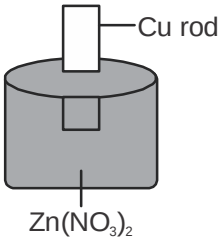
(C) Compounds and mixtures may be made up of only one element.

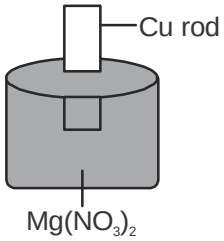
(D) Compounds and mixtures are always made up of at least two elements.

Q.50 Four colourless salt solutions are placed in separate containers and copper rod is dipped in each. In which container solution turns blue ?

(A) 

(B) 

(C) 

(D) 

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PART - IV (MENTAL ABILITY)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(51-60) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.51 Deepa's school is to the West of her hostel while her office is to the North-West of the Hostel and the market is to the South East of her school. If the distance between her school and market, hostel and market, office and school and office and hostel are equal, then in which direction is the office with respect to her school ?

(A) South-West (B) North-West

(C) South-East (D) North-East

Q.52 If CURVE is written as XFIEV, what stands for THEORY ?

(A) MUTPGK (B) GSVLIB (C) GKPQUM (D) GKNSPF

Q.53 In a row of boys, Mukesh is 8^{th} from the right and Suresh is 8^{th} from rthe left. When Mukesh and Suresh interchange their positions, Suresh becomes 16^{th} from the left. What will be Mukesh's new position from the right?

(A) 15 (B) 16 (C) 17 (D) 18

Q.54 Find the missing term (?)

10,47,232,1157,5782, ?

(A) 27641 (B) 28907 (C) 28903 (D) 27689

Space for rough work

Q.55 A cube painted red on two adjacent faces and pink on the faces opposite to the orange faces and violet on the remaining faces is cut into sixty-four smaller cubes of equal size. How many cubes have less than three but atleast one face painted ?

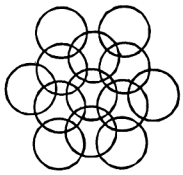
(A) 8 (B) 24 (C) 28 (D) 48

Q.56 Choose the missing terms out of the given alternatives.

Z, Y, X, U, T, S, P, O, N, K, ?, ?

(A) HG (B) GF (C) IH (D) JI

Q.57 How many circles are there in the adjoining figure ?



(A) 13 (B) 16 (C) 15 (D) 10

Q.58 Who was the leader of Jacobins?

(A) Robespierre (B) Rousseau

(C) Locke (D) Montesquieu

Space for rough work

Q.59 Which of the following will be the value of the expression : $\frac{(6+6+6+6)\div 6}{4+4+4+4\div 4}$

(A) 1 (B) $\frac{3}{2}$ (C) $\frac{4}{13}$ (D) $3\frac{6}{13}$

Q.60 Find the missing character (?)

4	1	11	11	3
3	3	1	6	5
9	2	9	4	2
6	4	8	9	3
5	1	?	4	1

(A) 6 (B) 7 (C) 8 (D) 9

Space for rough work