



**Santosh Academia Talent Examination  
(2024-25)  
CLASS-XII (PCM) STUDYING  
SAMPLE PAPER**

**Max. Marks: 120**

**Time: 1 Hour**

***IMPORTANT INSTRUCTIONS:***

***GENERAL***

1. This booklet is your Question Paper.
2. The Test ID is printed on the left-hand top corner of this sheet. If not, contact the invigilator for change of question paper.
3. Use the Optical Mark Recognition (OMR) sheet provided separately for answering the questions. **DO NOT FILL** till you are told to do so.
4. The test paper SET CODE is printed on the Right-hand top corner of the question paper. Ensure that you fill this in OMR as that on the question paper booklet.
5. Blank spaces are provided within this booklet for rough work. No additional rough sheet will be provided.
6. You are **ALLOWED** to take away the Question Paper at the end of the examination.

***QUESTION PAPER FORMAT***

7. This Paper contains **30** questions in total.

***Section-I: Question Number 1 to 6 belongs to Physics.***

***Section-II: Question Number 7 to 13 belongs to Chemistry.***

***Section-III: Question Number 14 to 20 belongs to Mathematics.***

***Section-IV: Question Number 21 to 30 belongs to Mental Ability.***

***MARKING SCHEME:***

8. Each question carries 4 marks. For each correct response, the candidate will get 4 marks.
9. There is a negative marking of -1 mark for incorrect response for section I, II and III. No marks will be deducted for unmarked questions.
10. There is no negative marking for incorrect response or unmarked questions for Section IV.



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### SECTION-I PHYSICS

- A soap bubble is given a negative charge, then its radius
  - Decreases
  - Increases
  - Remains unchanged
  - Nothing can be predicted as information is insufficient
- Two equally charged identical metal spheres A and B repel each other with a force F. Another identical uncharged sphere C is touched to A and then placed midway between A and B. The net force on C is in the direction
  - F towards A
  - F towards B
  - 2F towards A
  - 2F towards B
- A parallel plate air capacitor with no dielectric between the plates is connected to the constant voltage source. How would capacitance and charge change if dielectric of dielectric constant  $K=2$  is inserted between the plates.  $C_0$  and  $Q_0$  are the capacitance and charge of the capacitor before the introduction of the dielectric.
  - $C=C_0/2$  ;  $Q=2Q_0$
  - $C=2C_0$  ;  $Q=Q_0/2$
  - $C=C_0/2$  ;  $Q=Q_0/2$
  - $C=2C_0$  ;  $Q=2Q_0$
- A proton moves horizontally towards a vertical conductor carrying a current upwards. It will be deflected
  - to the left
  - to the right
  - upwards
  - downwards
- A closely wound solenoid of 800 turns and area of cross section  $2.5 \times 10^{-4} \text{m}^2$  carries a current of 3.0A. What is its associated magnetic moment?
  - $0.5 \text{Am}^2$
  - $0.6 \text{Am}^2$
  - $0.5 \text{Am}$
  - $0.6 \text{Am}^2$
- Proton, deuteron and alpha particle are moving perpendicular to B then find the ratio of their radii if they are moving with same Kinetic Energy.
  - $1 : \sqrt{2} : 1$
  - $\sqrt{2} : \sqrt{2} : 1$
  - $1 : \sqrt{2} : \sqrt{2}$
  - $2 : \sqrt{2} : 1$

### SECTION-II CHEMISTRY

- In which mode of expression, the concentration of a solution remains independent of temperature?
  - Molarity
  - Normality
  - Formality
  - Molality
- A binary solution contains 4 mol of A and 6 mol of B. Its vapour pressure is found to be 460 mm Hg. To this solution, when 10 mol of B is added, its vapour pressure becomes 480 mm Hg. The vapour pressure of pure A and pure B, respectively are
  - 300 mm Hg, 600 mm Hg
  - 400 mm Hg, 500 mm Hg
  - 300 mm Hg, 500 mm Hg
  - 400 mm Hg, 600 mm Hg
- A 0.004 M solution of  $\text{K}_2\text{SO}_4$  is isotonic with a 0.010 M solution of glucose at the same temperature. The apparent percent degree of dissociation of  $\text{K}_2\text{SO}_4$  is
  - 25%
  - 50%
  - 75%
  - 100%
- Electronic configuration of a transition element X in +3 oxidation state is  $[\text{Ar}] 3d^5$ . What is its atomic number?
  - 25
  - 26
  - 27
  - 24

11. Which of the following ions show higher spin only magnetic moment value?
- (i)  $Ti^{3+}$                       (ii)  $Mn^{2+}$                       (iii)  $Fe^{2+}$                       (iv)  $Co^{3+}$   
 (a) i, ii                      (b) ii, iii                      (c) iii, iv                      (d) i, iv
12. The standard electrode potentials of the two-half cell are given below
- $Ni^{2+} + 2e^- \rightarrow Ni; \quad E^\circ = -0.25 \text{ V}$   
 $Zn^{2+} + 2e^- \rightarrow Zn; \quad E^\circ = -0.77 \text{ V}$
- The emf of cell formed by combining the two half cells would be
- (a)  $-1.02 \text{ volt}$                       (b)  $+0.52 \text{ volt}$                       (c)  $+1.02 \text{ volt}$                       (d)  $-0.52 \text{ volt}$
13. Which of the following complex is anion
- (a) Fluoro pentaammine cobalt (III)                      (b) Trioxalato ferrate (III)  
 (c) Penta Carbonyl iron (0)                      (d) Dichloro diammine platinum

### SECTION-III MATHEMATICS

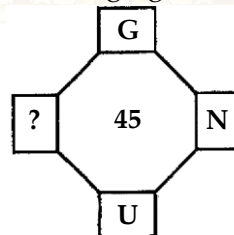
14. Let  $S = \{x \in [-6,3] - \{-2,2\} : \frac{|x+3|-1}{|x|-2} \geq 0\}$  and  $T = \{x \in \mathbb{Z} : x^2 - 7|x| + 9 \leq 0\}$ . Then the number of elements in  $S \cap T$  is :
- (a) 7                      (b) 5                      (c) 4                      (d) 3
15. If  $x + iy = \sqrt{\frac{a+ib}{c+id}}$ , then  $(x^2 + y^2)^2$  is equal to
- (a)  $\frac{a^2-b^2}{c^2+d^2}$                       (b)  $\frac{a^2+b^2}{c^2+d^2}$                       (c)  $\frac{(a-b)(c-d)}{(a+b)(c+d)}$                       (d)  $\frac{a^2-b^2}{c^2-d^2}$
16. If  $\alpha, \beta$  are roots of the equation  $x^2 - p(x+1) - q = 0$ , then the value of  $\frac{\alpha^2+2\alpha+1}{\alpha^2+2\alpha+q} + \frac{\beta^2+2\beta+1}{\beta^2+2\beta+q}$  is
- (a) 0                      (b) 2                      (c) 1                      (d) -1
17. Let  $t_r$  denotes the  $r^{\text{th}}$  term of an A.P. Also suppose that  $t_m = \frac{1}{n}$  and  $t_n = \frac{1}{m}$ , ( $m \neq n$ ), for some positive integers  $m$  and  $n$ , then which of the following is necessarily a root of the equation
- $$(l + m - 2n)x^2 + (m + n - 2l)x + (n + l - 2m) = 0?$$
- (a)  $t_n$                       (b)  $t_m$                       (c)  $t_{m+n}$                       (d)  $t_{mn}$
18. Suppose  $A_1, A_2, \dots, A_{30}$  are thirty sets each with five elements and  $B_1, B_2, \dots, B_n$  are 'n' sets each with three elements  
 Let  $\cup_{i=1}^{30} A_i = \cup_{j=1}^n B_j = S$
- Assume that each element of  $S$  belongs to exactly ten of  $A_i$ 's and exactly 9 of  $B_j$ 's, then the value of  $n$  is
- (a) 90                      (b) 15                      (c) 9                      (d) 45
19. If  $|z_1| = 1, |z_2| = 2, |z_3| = 3$  and  $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$ , then the value of  $|z_1 + z_2 + z_3|$  is
- (a) 3                      (b) 4                      (c) 8                      (d) 2



20. If  $3^{50}(x + iy) = \left(\frac{3}{2} + \frac{i\sqrt{3}}{2}\right)^{100} \forall x, y \in R$ , then ordered pair  $(x, y)$  is given by
- (a)  $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$       (b)  $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$       (c)  $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$       (d)  $\left(-\frac{3}{2}, -\frac{1}{2}\right)$

**SECTION-IV MENTAL ABILITY**

21. Which group of letter is different from others?  
 (a) LAZO      (b) HCXS      (c) GHIJ      (d) FEVU
22. If in a certain code language 'POEM' is written as 'OQNPDFLN', how would 'WIND' be written as same code?  
 (a) VXHIJMOCE      (b) ECDGFJLA      (c) LMNOPABC      (d) ECOMJHXV
23. Some words are translated from an artificial language below  
 'goh rat pee' is 'my school bag'.  
 'nie jee goh' is 'black colour bag'  
 'pee jee goh' is 'my black bag'  
 Which word could possibly mean 'colour'?
- (a) Pee      (b) Nie      (c) Jee      (d) Goh
24. Find the missing character in the following figure.



- (a) A      (b) D      (c) B      (d) C
25. Find the next number in the given sequence.  
 1000, 100, 729, 81, 512, 64, 343, ?  
 (a) 25      (b) 49      (c) 64      (d) 36
26. Find out the number in the position of 'question mark'.

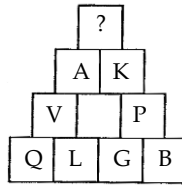
A <sub>2</sub>	C <sub>4</sub>	E <sub>6</sub>
G <sub>3</sub>	I <sub>5</sub>	?
M <sub>5</sub>	O <sub>9</sub>	Q <sub>14</sub>

- (a) K<sub>5</sub>      (b) K<sub>12</sub>      (c) K<sub>7</sub>      (d) K<sub>8</sub>
27. Find the next number in the series.  
 1, 2, 6, 15, 31, 56, 92, ?  
 (a) 49      (b) 56      (c) 92      (d) 141

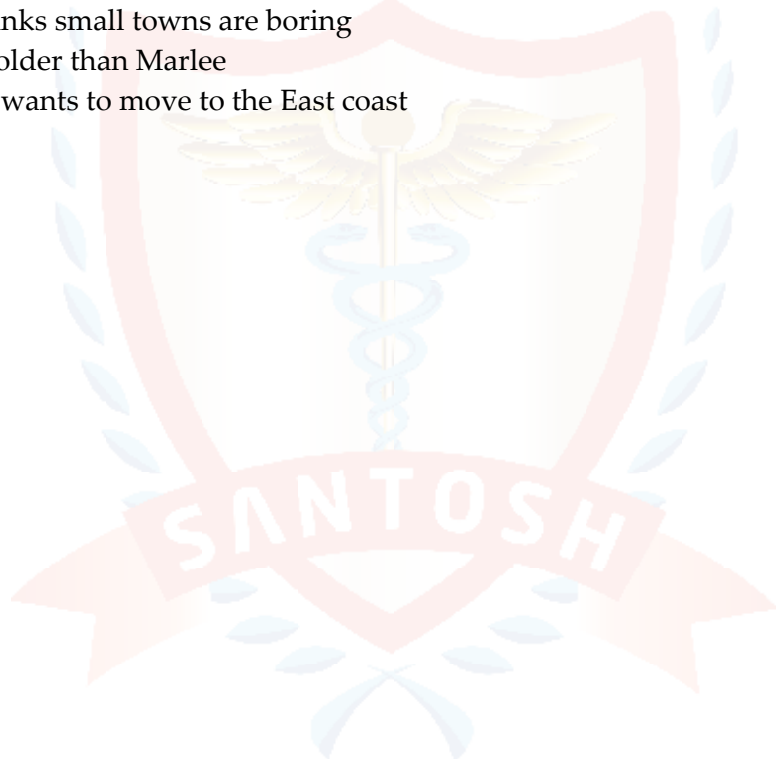




28. Which number will replace the question mark?



- (a) G                      (b) H                      (c) F                      (d) E
29. In the question, if  $5 + 3 + 2 = 30$  and  $4 + 7 + 5 = 140$ , then how  $13 + 5 + 2 = ?$
- (a) 130                      (b) 140                      (c) 135                      (d) 125
30. Sara lives in a large city on the East coast. Her younger cousin Marlee lives in the Midwest in a small town with fewer than 1000 residents. Marlee has visited Sara several times during the past 5 yrs. In the same period of time, Sara has visited Marlee only once. Find the correct statement from given alternatives, according to the passage.
- (a) Marlee likes Sari better than Sara likes Marlee  
(b) Sara thinks small towns are boring  
(c) Sara is older than Marlee  
(d) Marlee wants to move to the East coast





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## ROUGH WORK

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