Santosh Academia Talent Examination

(2025-26)

CLASS-XII (PCM) STUDYING

PAPER-1 SET CODE: [A]

Test ID: 735	Time: 1 Hour	Max. Marks: 120

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 NUMBER is printed on the left-hand top corner of the question paper and 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.

SECTION-I PHYSICS

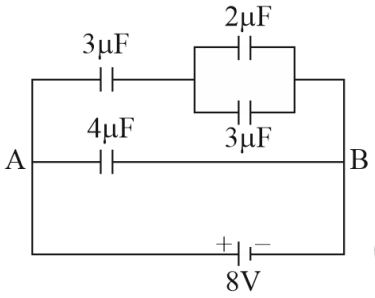
1. Two charged spheres having radii a and b are joined with a wire then the ratio of electric E_a / E_b on their surface is-

(a) a/b (b) b/a (c) a^2 / b^2 (d) b^2 / a^2

2. An alternating voltage is given by $e = e_1 \sin \omega t + e_2 \cos \omega t$. Then the root mean square value of voltage is given by

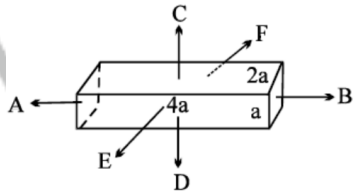
(a) $\sqrt{e_1^2 + e_2^2}$ (b) $\sqrt{e_1 e_2}$ (c) $\sqrt{\frac{e_1 e_2}{2}}$ (d) $\sqrt{\frac{e_1^2 + e_2^2}{2}}$

3. The charge on the condenser of capacitance 2μF in the following circuit will be-



(a) 4.5 μF (b) 6.0 μF (c) 7 μF (d) 30 μF

4. A conductor with rectangular cross section has dimensions $(a \times 2a \times 4a)$ as shown in figure. Resistance across AB is x, across CD is y and across EF is x. Then ?

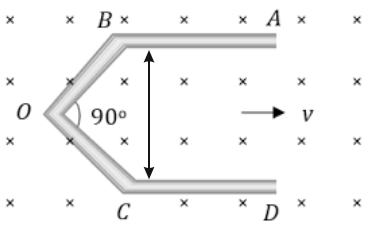


(a) $x = y = z$ (b) $x > y > z$ (c) $y > z > x$ (d) $x >: z > y$

5. Current passing through a coil is changing at the rate of 1.5 ampere per second. If it induces emf of 45 volt, then the self inductance of the coil will be

(a) 30 H (b) 67.5 H (c) 60 H (d) 33.3 H

6. A conductor ABOCD moves along its bisector with a velocity of 1 m/s through a perpendicular magnetic field of 1 wb/m^2, as shown in fig. If all the four sides are of 1m length each, then the induced emf between points A and D is



(a) 0 (b) 1.41 volt

(c) 0.71 volt (d) None of the above

SECTION-II CHEMISTRY

7. The density of a 10.0% by mass KCl solution in water is 1.06 g cm^{-3}. Its molarity is

(a) 1.489 M (b) 1.420 M (c) 1.420 mol kg^{-1} (d) 1.489 mol kg^{-1}

8. Which of the following is true?

(a) The ideal behavior of a liquid solution is due to the fact that the different molecules present in it do not interact with one another

(b) Henry's law deals with the variation of solubility of gas with temperature

(c) The volatile constituents of an ideal solution follow Raoult's law under all conditions

(d) The addition of a non-volatile solute to a volatile solvent decreases the boiling point of the solution

9. The specific conductivity of N/10 KCl solution at 20°C is 0.012 Ω^{-1} cm^{-1} and the resistance of the cell containing this solution at 20°C is 56Ω. The cell constant is

(a) 4.616 cm^{-1} (b) 0.672 cm^{-1} (c) 2.173 cm^{-1} (d) 3.324 cm^{-1}

10. For the reaction, A + 2B → Product, the differential rate equation is

(a) $-\frac{1}{2}\frac{d[A]}{dt}=\frac{-d[B]}{dt}=K[A][B]^2$ (b) $\frac{1}{2}\frac{d[A]}{dt}=\frac{d[B]}{dt}=K[A][B]^2$

(c) $\frac{-d[A]}{dt}=-\frac{1}{2}\frac{d[B]}{dt}=K[A][B]^2$ (d) $\frac{dA}{dt}=\frac{1}{2}\frac{d[B]}{dt}=K[A][B]^2$

11. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition element, which shows highest magnetic moment

(a) $3d^7$ (b) $3d^5$ (c) $3d^8$ (d) $3d^2$

12. Select bidentate or didentate ligand from the following

(a) CO (b) SCN^- (c) CH_3COO^- (d) $C_2O_4^{2-}$

13. The EAN of cobalt in the complex ion $[Co(en)_2Cl_2]^+$ is

(a) 27 (b) 36 (c) 33 (d) 35

SECTION-III MATHEMATICS

14. Let $a_1 = 1, a_2, a_3, a_4, \ldots\ldots$ be consecutive natural numbers

Then $\tan^{-1}\left(\frac{1}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{1}{1+a_2a_3}\right)+....+\tan^{-1}\left(\frac{1}{1+a_{2021}a_{2022}}\right)$ is equal to

(a) $\cot^{-1}(2022)-\frac{\pi}{4}$ (b) $\frac{\pi}{2}-\cot^{-1}(2022)$

(c) $\tan^{-1}(2022)-\frac{\pi}{4}$ (d) $\frac{\pi}{4}-\tan^{-1}(2022)$

15. Let $P=\begin{bmatrix}\frac{\sqrt{3}}{2} & \frac{1}{2}\\ -\frac{1}{2} & \frac{\sqrt{3}}{2}\end{bmatrix}$ $A=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$ and $Q=PAP^T$. If $P^T Q^{2007} P = \begin{bmatrix}a & b\\ c & d\end{bmatrix}$, then $2a+b-3c-4d$ equal to

(a) 2006 (b) 2004 (c) 2005 (d) 2007

16. Let A and B be two square matrices of order 3 such that $|A|=3$ and $|B|=2$. Then $\left|A^T A(\text{adj}(2A))^{-1}(\text{adj}(4B))(\text{adj}(AB))^{-1}AA^T\right|$ is equal to

(a) 108 (b) 32 (c) 64 (d) 81

17. Let $f: R\to R$ be a function given by

$$f(x)=\begin{cases}\frac{1-\cos 2x}{x^2} & x<0\\ \alpha & x=0\\ \frac{\beta\sqrt{1-\cos x}}{x} & x>0\end{cases}$$

Where $\alpha\ \beta \in R$. If f is continuous at x = 0 then $\alpha^2+\beta^2$ is equal to

(a) 3 (b) 6 (c) 12 (d) 48

18. For the function

$f(x)= \sin x + 3x - \frac{2}{\pi}(x^2+x)$ where $x\in\left[0,\frac{\pi}{2}\right]$

consider the following two statements:

(I) f is increasing in $\left(0,\frac{\pi}{2}\right)$

(II) f' is decreasing in $\left(0,\frac{\pi}{2}\right)$

Between the above two statements

(a) neither (I) nor (II) is true (b) Only (II) is true

(c) both (I) and (II) are true (d) only (I) is true

19. Let $f(x)=\int\frac{2x}{(x^2+1)(x^2+3)}dx$. If $f(3)=\frac{1}{2}(\log_e 5-\log_e 6)$ then f (4) is equal to

(a) $\log_e 17-\log_e 18$ (b) $\log_e 19-\log_e 20$

(c) $\frac{1}{2}(\log_e 19-\log_e 17)$ (d) $\frac{1}{2}(\log_e 17-\log_e 19)$

20. The area (in sq. units) of the region described by $\{(x,y): y^2\le 2x \text{ and } y\ge 4x-1\}$ is

(a) $\frac{11}{12}$ (b) $\frac{11}{32}$ (c) $\frac{9}{32}$ (d) $\frac{8}{9}$

SECTION-IV MENTAL ABILITY

21. ***Direction:*** Study the following information carefully and answer the question given below:

Point C is 15 m in the east of point F. Point A is 10 m west of point B which is 15 m north of point H. Point D is 15 west of point E. Point B is 15 m south of point C. Point E is 5 m east of point H. Point G is 15 m north of point A.

In which direction and at what distance is point G from point C?

(a) 10 m east (b) 5 m, east (c) 10 m, west (d) 5 m, west

22. ***Direction:*** Study the following information carefully and answer the questions given below

There are seven persons i.e. A, B, C, D, E, F and G. They all belongs to the different cities i.e. Kolkata, Mumbai, Chennai, Pune, Lucknow, Ahmadabad and Delhi but not necessarily in the same order. D belongs to Pune. Neither A nor F belongs to Kolkata. B belongs to Ahmedabad. C does not belong to Kolkata and Lucknow. G belongs to Mumbai. A does not belongs to Lucknow and Chennai.

Who among the following belongs to Kolkata?

(a) A (b) D (c) F (d) None of these

23. ***Direction:*** Study the following information carefully and answer the question given below

There are six persons who all are of different height. A is taller than C and D but shorter than E. The one who is third shortest is 102cm in height. B is taller than A. E is not the tallest. The one who is second tallest is 119cm in height. Neither A nor C is the third shortest person among all. C is not the shortest among all. F is taller than D.

Who among the following is the second tallest?

(a) F (b) E (c) A (d) C

24. ***Direction:*** What will come in the place of question (?) mark in the following number series

1, 6, 25, 76, 153, ?

(a) 152 (b) 154 (c) 153 (d) 155

25. Ratio of present ages of two persons A and B is 3 : 2 and after four years ratio of their age (B : A) become 7:10. Then find the present age of B?

(a) 20 years (b) 18 years (c) 24 years (d) 36 years

26. ***Direction:*** Study the following information carefully and answer the question given below

There are seven members in a family of three generation. A is mother of P. P is brother of G. K is married to G. S is aunt of M. K is child of L. S is sister of K. If L is married to J, then how J is related to G?

(a) Grand-daughter (b) Grand-son

(c) Son-in-law (d) Can't be determined

27. If in a certain code language, FEVERISH is coded as 29 and COUNSEL is coded as 98, then how will MUTATED be coded as in the same code language?

(a) 48 (b) 80 (c) 92 (d) 84

28. Two statements are given, followed by two conclusions numbered I and II. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements

Statements:

Some Pans are Bottles.

All Bottles are Mugs.

Conclusions:

I. All Mugs are Bottles.
II. Some Mugs are Pan

(a) Neither conclusion I nor II follows.
(b) Only conclusion I follows
(c) Only conclusion II follows
(d) Both conclusions I and II follow.

29. Which two digits can be interchanged so as to balance the given equation?

$87 \times 2 - 65 + 182 \div 38 = 155$

(a) 2 and 8 (b) 5 and 7 (c) 6 and 2 (d) 8 and 6

30. Select the option that represents the letters that, when sequentially placed from left to right in the blanks below, will complete the letter series.

_ F O _ L L W F _ O O L _W F F _ O _ L _

(a) F O F L O L W
(b) F F L L O O W
(c) F F O L L O L
(d) F O W L L F W

ROUGH WORK