

केन्द्रीय विद्यालय संगठन, कोलकाता सभाग

KENDRIYA VIDYALAYA SANGATHAN, KOLKATA REGION

सत्रांत परीक्षा /Session Ending Examination, 2025 – 26

कक्षा/CLASS :XI

अधिकतम अंक/MAX. MARKS: 80

समय/TIME: 3 HOURS

विषय/SUBJECT: MATHEMATICS

General Instructions:

Read the following instructions very carefully and strictly follow them:

1. This Question paper contains 38 questions. All questions are compulsory.
2. This Question paper is divided into five Sections - A, B, C, D and E.
3. In Section A, Questions no. 1 to 18 are multiple choice questions (MCQs) with only one correct option and Questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
4. In Section B, Questions no. 21 to 25 are Very Short Answer (VSA)-type questions, carrying 2 marks each.
5. In Section C, Questions no. 26 to 31 are Short Answer (SA)-type questions, carrying 3 marks each.
6. In Section D, Questions no. 32 to 35 are Long Answer (LA)-type questions, carrying 5 marks each.
7. In Section E, Questions no. 36 to 38 are Case study-based questions, carrying 4 marks each.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 3 questions in Section C, 2 questions in Section D and one subpart each in 2 questions of Section E.
9. Use of calculator is not allowed.

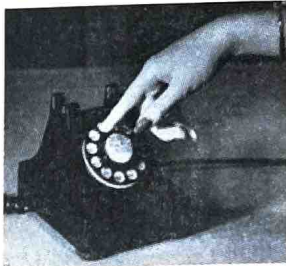
Q.No	Section A This section comprises of multiple-choice questions (MCQs) of 1 mark each. Select the correct option (Question 1 - Question 18)	Marks
1.	If A and B are two sets, then $A \cap (A \cup B)$ equals (a) A (b) B (c) ϕ (d) $A \cap B$	1
2.	The number of non-empty subsets of a set, containing n elements, is (a) n (b) n^2 (c) 2^n (d) $2^n - 1$	1
3.	Which of the following statement is false? (a) $A - B = A \cap B'$ (b) $A - B = A - (A \cap B)$ (c) $A - B = A - B'$ (d) $A - B = (A \cup B) - B$	1
4.	Let R be a relation on N defined by $R = \{(x, y) : x + 2y = 8, x, y \in N\}$. Then domain of R is (a) {2, 4, 8} (b) {2, 4, 6, 8} (c) {2, 4, 6} (d) {1, 2, 3, 4}	1
5.	If $f(x) = x^3 - \frac{1}{x^3}$, then $f(x) + f\left(\frac{1}{x}\right)$ is equal to (a) $2x^3$ (b) $\frac{2}{x^3}$ (c) 0 (d) 1	1
6.	If $f(x) = ax + b$, where a and b are integers, such that $f(-1) = -5$ and $f(3) = 3$, then a and b are equal to (a) -3, -1 (b) 2, -3 (c) 0, 2 (d) 2, 3	1
7.	The value of $\tan 1^\circ \cdot \tan 2^\circ \cdot \tan 3^\circ \dots \tan 89^\circ$ is (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) not defined	1
8.	Which of the following is not correct? (a) $\sin \theta = -\frac{1}{5}$ (b) $\cos \theta = 1$ (c) $\sec \theta = \frac{1}{2}$ (d) $\tan \theta = 20$	1


9.	The value of $\tan 75^\circ - \cot 75^\circ$ is (a) $2\sqrt{3}$ (b) 4 (c) 1 (d) 0	1
10.	If $-(x - 3) + 4 < 5 - 2x$, then x belongs to (a) $(-\infty, 2)$ (b) $(-\infty, -2)$ (c) $(2, \infty)$ (d) $(-2, \infty)$	1
11.	If $10 \leq -5(x - 2) < 20$, then x belongs to (a) $(-2, 0]$ (b) $(-2, 0)$ (c) $[-2, 0)$ (d) $[-2, 0]$	1
12.	The number of triangles that can be formed by choosing the vertices from 12 given points, out of which 7 are collinear, is (a) 155 (b) 175 (c) 185 (d) 195	1
13.	Conjugate of complex number $i^3 - 4$ is (a) $i^3 + 4$ (b) $4 - i$ (c) $-4 + i$ (d) $-4 - i$	1
14.	In a G.P, the 3rd is 24 and the 6th term is 192, then the 10th term is: (a) 1084 (b) 3290 (c) 3072 (d) 2340	1
15.	If the parabola $y^2 = 4ax$ passes through the point $P(3, 2)$, then the length of its latus rectum is (a) $1/3$ (b) $2/3$ (c) $4/3$ (d) 4	1
16.	The value of $(\sec x - \tan x)$ is (a) 0 (b) 1 (c) -1 (d) 2	1
17.	The value of $\frac{(1+x)^n - 1}{x}$ is (a) 1 (b) n (c) $-n$ (d) 0	1
18.	One card is drawn from a pack of 52 cards. The probability, that it is the card of king or spade, is (a) $4/13$ (b) $1/13$ (c) $1/26$ (d) $17/52$	1
	Assertion & Reason Type Questions: In the following questions (19 & 20), a statement of Assertion (A) is followed by a statement of Reason(R). Choose the correct answer out of the following choices. (a) Both (A) and (R) are true and (R) is the correct explanation of (A). (b) Both (A) and (R) are true but (R) is not the correct explanation of (A). (c) (A) is true but (R) is false. (d) (A) is false but(R) is true.	
19.	Assertion: If the third term of a G.P. is 4, then the product of its first five terms is 4^5 . Reason: Product of first five terms of a G.P. is given as $a(ar)(ar^2)(ar^3)(ar^4)$.	1
20.	Assertion: $\frac{\sin ax}{bx} = \frac{a}{b}$ Reason: $\frac{\sin ax}{\sin bx} = \frac{b}{a}$	1
Section B		
21.A	Find all pairs of consecutive even positive integers, both of which are larger than 8, such that their sum is less than 25.	2
21.B	Solve the following for real x $\frac{x-1}{3} + 4 < \frac{x-5}{5} - 2$	
22.	Find the point on y-axis which is equidistant from the point $A(3, 2, 2)$ and $B(5, 5, 4)$.	2
23.	Suppose $f(x) = \begin{cases} a + bx; & x < 1 \\ b - ax; & x > 1 \end{cases}$, $f(x) = f(1)$ what are possible values of a and b?	2
24.A	Find n, if: ${}^{2n-1}P_n : {}^{2n+1}P_{n-1} = 22:7$	2
24.B	OR	

	Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.	
25.	A and B are two events such that $P(A) = 0.54$, $P(B) = 0.69$ and $P(A \cap B) = 0.35$, then find $P(\text{neither A nor B})$	2
Section C		
26.	Let A and B be sets. If $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ for some set X, then show that $A = B$	3
27.A	Prove the following identity: $\tan 13A - \tan 7A - \tan 6A = \tan 13A \tan 7A \tan 6A$	3
27.B	OR Find the value of $\tan \frac{\pi}{8}$	
28.A	Let $A = \{1, 2, 3, 4, 5, 6\}$. Let R be a relation on A defined by $R = \{(a, b) : b \text{ is exactly divisible by } a; a, b \in A\}$, then (i) Write R in roster form. (ii) Find the domain of R. (iii) Find the range of R.	3
28.B	OR Find domain and range of real function $f(x) = \frac{ax+b}{bx-a}$.	
29.A	Find the modulus and conjugate of a complex number $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$	3
29.B	OR If $x + iy = \sqrt{\frac{a+ib}{c+id}}$, prove that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$	
30.	Using binomial theorem, evaluate the following $(\sqrt{2} + 1)^4 + (\sqrt{2} - 1)^4$	3
31.A	Find the derivative of $f(x) = \sin x^2$ by first principle.	3
31.B	OR Find the derivatives of following functions with respect to x (i) $(ax + b)^n \cdot (cx + d)^m$ (ii) $\frac{\sin \sin x + \cos \cos x}{\sin \sin x - \cos \cos x}$	
Section D		
32.A	If $\sin \sin x = -\frac{5}{13}$, x lies in III quadrant, find the values of $\sin \frac{x}{2}$, $\cos \cos \frac{x}{2}$ and $\tan \frac{x}{2}$.	5
32.B	OR If $\sin \sin x + \sin \sin y = \sqrt{3}(\cos \cos y - \cos \cos x)$, then prove that $\sin \sin 3x + \sin \sin 3y = 0$.	
33.A	Let S be the sum, P the product and R the reciprocals of n terms in a G.P. Prove that $P^2 R^n = S^n$.	5
33.B	OR If a, b, c and d are different real numbers such that $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) \leq 0$, then show that a, b, c and d are in G.P.	
34.A	Show that the area of the triangle formed by the lines $y = m_1x + c_1$, $y = m_2x + c_2$ and $x = 0$ is $\frac{(c_1 - c_2)^2}{2 m_1 - m_2 }$.	5
34.B	OR Find the image of the point (3, 8) with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.	

35.	Find the mean, variance and standard deviation of the following distribution:									5
	Height in cms	70-75	75-80	80-85	85-90	90-95	95-100	100-105	105-110	
No. of children	3	4	7	7	15	9	6	6	3	

Section E

36.	<p>In a certain city, all telephone numbers have 6 digits. There are 3 telephone operator companies in the city to provide services. Each operator is allotted one specific non-zero digit to be used as first digit of the phone number of its company.</p> <p>Based on above information, answer the following questions</p> <p>(i) How many different phone numbers are available for each company?</p> <p>(ii) How many different phone numbers are there in all in the city?</p> <p>(iii) How many different phone numbers are there in the city if digits are not repeated?</p>		

37.	<p>Two students, Anil and Vijay, appeared in a highly competitive examination. Anil has been preparing part-time while managing a job, which has left him with limited preparation time. On the other hand, Vijay, though dedicated, has struggled with certain key concepts.</p> <p>Based on their preparation and past performance, the probability that Anil will qualify the examination is estimated to be 0.05, and the probability that Vijay will qualify is estimated at 0.10. Additionally, the probability that both students will qualify together, due to their independent preparation and individual strengths, is calculated as 0.02.</p>		

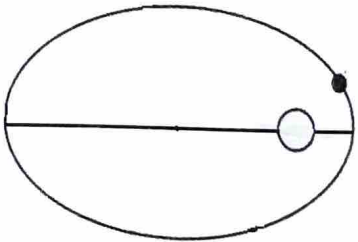
(a) Find the probability that at least one of them will qualify the exam.

(b) Find the probability that at least one of them will not qualify the exam.

(c) Find the probability that both Anil and Vijay will not qualify the exam.

OR

Find the probability that only one of them will qualify the exam.

38.	<p>A satellite is moving around the earth in the elliptic orbit, such that the earth is at one focus of the ellipse. The minimum and maximum distances of the satellite from the earth are 2000 km and 8000 km respectively.</p> <p>Based on above information, answer the following questions</p> <p>(i) Find the distance of the earth from the centre of the elliptic orbit.</p> <p>(ii) Find the equation of the elliptic orbit, when center is at origin and focus is in x-axis.</p>		<p>and</p> <p>the</p>
