केन्द्रीय विद्यालय संगठन, बेंगलूरु संभाग
KENDRIYA VIDYALAYA SANGATHAN , BENGALURU REGION
प्रथम प्री-बोर्ड परीक्षा (2025-26)
FIRST PRE BOARD EXAMINATION (2025-26)

CLASS:XII MAX MARKS:80
SUBJECT : MATHEMATICS TIME : 3 HRS

General Instructions :

Read the following instructions very carefully and strictly follow them:

(i) This Question paper contains 38 questions. All questions are compulsory.

(ii) This Question paper is divided into five Sections - A, B, C, D and E.

(iii) In Section A, Questions no. 1 to 18 are multiple choice questions (MCQs) and Questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.

(iv) In Section B, Questions no. 21 to 25 are Very Short Answer (VSA)-type questions, carrying 2 marks each.

(v) In Section C, Questions no. 26 to 31 are Short Answer (SA)-type questions, carrying 3 marks each.

(vi) In Section D, Questions no. 32 to 35 are Long Answer (LA)-type questions, carrying 5 marks each.

(vii) In Section E, Questions no. 36 to 38 are Case study-based questions, carrying 4 marks each.

(viii) 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.

(ix) Use of calculators is not allowed

SECTION-A [1× 20= 20]

(This section comprises of multiple choice questions (MCQs) of 1 mark each) Select the correct option (Question 1 - Question 18):

1.	The principal value of $sin^{-1}\left[sin\left(\frac{3\pi}{5}\right)\right]$` (a) $\frac{3\pi}{5}$ (b) $\frac{2\pi}{5}$ (iii) $\frac{-2\pi}{5}$ (d) $\frac{\pi}{5}$
2	A and B are two matrices such that $AB = A \; and \; BA = B$ then B^2 is (a) A (b) B (c) 0 (d) I
3	$A = \begin{bmatrix}1 & 1\\1 & 1\end{bmatrix}$, then A^{10} is (a) 10A (b)9A (c) 2^9A (d)2^{10}A
4	If $\begin{bmatrix}1 & 0 & 0\\0 & 1 & 0\\0 & 0 & 1\end{bmatrix}\begin{bmatrix}x\\-y\\z\end{bmatrix} = \begin{bmatrix}1\\2\\1\end{bmatrix}$, then value of $x + 2y + 3z$ is (a) 1 (b) 2 (c) 0 (d) -1
5	If A is a square matrix of order 3 such that $\|A\| = -5$, then value of $\|-A\|$ is (a) 125 (b) - 125 (c) 5 (d) – 5

6	If $\begin{vmatrix} 1-x & 2 & 3 \\ 0 & x & 0 \\ 0 & 0 & x \end{vmatrix}$ =0, then its roots are a) 0 (b) 1 (c) 0,1 (d) $0,1,-1$
7	If y = ae^{mx} + be^{-mx} , then $\frac{d^2y}{dx^2}$ is (a) m^2y (b) $-m^2y$ (c) my (d) –my
8	If x = t^2 y= t^3 then $\frac{d^2y}{dx^2}$ is equal to (a) $\frac{3}{2}$ (b) $\frac{3}{4t}$ (c) $\frac{3}{2t}$ (d) $\frac{3t}{2}$
9	The total revenue in Rupees received from the sale of x units of a product is given by R(x) = $3x^2+36x+5$. The marginal revenue, when $x = 15$ is: (a) 116 b) 96 c) 90 d) 126
10	Integrating factor of the differential equation $\frac{dy}{dx} = \frac{cosy}{1-xsiny}$ is (a) $cosy$ (b) $-secy$ (c) $secy$ (d) $tany$
11	$\int \frac{1}{x-\sqrt{x}}$ dx = (a) 2 log $\sqrt{x}$ + C (b) log ($\sqrt{x}$ - 1) + C (c) 2 log ($\sqrt{x}$ - 1) + C (d) None of the above
12	If $\frac{d}{dx}$ (f(x)) = logx , then f(x) equals : $a)\frac{1}{x}$ +C b) x (logx + x)+C c) x (log x -1) +C d) - $\frac{1}{x}$ +C
13	What is the angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$? (a) 0° (b). 30° (c). 45° (d) 90°
14	Equation of a line passing through $(0, 1, 2)$ and equally inclined to co-ordinate axes is given by : (a)x = y −1 = z − 2 (b) x = y = z (c) x = y + 1 = z + 2 (d) x – 1 = y + 2 = z + 3
15	The value of $(\hat{\imath} \times \hat{\jmath}).\hat{k} + \hat{\imath}.\hat{\jmath} - \hat{k}.(\hat{\jmath} \times \hat{\imath})$ is a) 0 b) 1 c) -1 d) 2
16	Which of the points A(80,10), B(20,20), C(60,60) D(20,25) lie in the feasible region of the constraints given below : $x+5y \le 200,\ 2x+3y \le 134,\ x \ge 0,\ y \ge 0$ (a) Points A,B and C only (b) Points B,C and D only (c) only points A and D (d) only points B and D
17	The objective function $Z = ax + by$ of an LPP has maximum value 42 at (4,6) and minimum value 19 at (3,2). Which of the following is true? (a) a = 9, b = 1 (b) a = 5, b = 2 (c) a = 3, b = 5 (d) a = 5, b = 3
18	If A and B are two independent events such that P(A)=1/2 and P(B)=1/4, then **P(B'/A)** is (a) 1/4 (b) 3/4 (c) 1/8 (d) 1
19	Assertion (A): Principal value of $cos^{-1} cos\left(\frac{7\pi}{6}\right)$ $is\ \frac{5\pi}{6}$ Reason (R): Range of principal branch of $\cos^{-1}$ is [0, π] and $\cos^{-1}(\cos x)$= x if x∈ [0, π].
20	Assertion (A):. $(\vec{a}+\vec{b}).(\vec{a}+\vec{b}) = \lvert\vec{a}\rvert^2 + \lvert\vec{b}\rvert^2$,if and only if $\vec{a},\vec{b}$ are perpendicular, $\vec{a} \neq 0, \vec{b} \neq 0$.

	Reason (R): $\vec{a}+\vec{b}=\vec{b}+\vec{a}$

SECTION-B [2x 5= 10]

[This section comprises of 5 very short answer (VSA) type questions of 2 marks each]

21	a) Find the value of: $tan^{-1}\left[2\,sin(\,2\,cos^{-1}\left(\frac{\sqrt{3}}{2}\right))\right]$ OR b) Find the value of $sin^{-1}\left(\frac{-1}{2}\right)+2\,cos^{-1}\left(\frac{-1}{2}\right)+tan^{-1}(1)$
22	If $cos\,y = x\,cos\,(a+y)$, Prove that $\frac{dy}{dx}=\frac{cos^2(a+y)}{\sin a}$
23	(a) Evaluate $\int\frac{2+Sin2x}{1+Cos2x}\,e^x\,.dx$ (OR) (b) Find the area bounded by y = x , the x axis and the ordinate $x=-1\,,x=2$
24	Find the value(s) of 'λ', if the function f(x) $=\begin{cases}\sin^2(\lambda x)/x^2, & \text{if } x\neq 0\\ 1 & ,if\ x=0\end{cases}$ is continuous at x = 0.
25	If the vectors $\vec{a}\ and\ \vec{b}$ are such that $\lvert\vec{a}\rvert=3,\lvert\vec{b}\rvert=\frac{2}{3}$ and $\vec{a}\times\vec{b}$ is unit vector then find the angle between $\vec{a}\ and\ \vec{b}$

SECTION-C [3x6=18]

[This section comprises of short answer (SA) type questions of 3 marks each]

26	(a) If y= $\sin^{-1}x$, prove that (1-x^2) $\frac{d^2y}{dx^2}$ -x $\frac{dy}{dx}$ =0 (OR) (b) Differentiate the function f(x) = $sin^{-1}\,(\frac{2^{x+1}}{1+4^x})$ with respect to x.
27	Find the intervals in which the function $f(x)=2x^3-9x^2+12x+15$ is strictly increasing
28	(a) Using integration, find the area of the region bounded by the curve y = $\sqrt{4-x^2}$, the lines x= - $\sqrt{2}$ and x =$\sqrt{3}$ and the x-axis (OR) (b) Sketch the graph of y = $\lvert x+3\rvert$ and using integration find the area of the region enclosed by the curve , x-axis , between x = -6 and x= 0,.
29	(a)Find the point on the line $\frac{2+x}{3}=\frac{1+y}{2}=\frac{z-3}{2}$ at a distance of $3\sqrt{2}$ from the point P (1, 2, 3). (OR) (b) Find the vector equation of a line passing through the point (1, 2, -4) and perpendicular to two lines L_1: $\frac{x-8}{3}=\frac{y+19}{-16}=\frac{z-10}{7}$ and L_2: $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$
30	Maximize Z = 600x + 400y Subject to x+ 2y ≤ 12 , 2x + y ≤ 12 , x + 1.25y ≥ 5 , x ≥0 ,y ≥ 0

31	A and B are two candidates seeking admission in a college. The probability that A is selected is 0.7 and the probability that exactly one of them selected is 0.6. Find the probability that B is selected.

SECTION-D **[5x4=20]**

[This section comprises of long answer type questions (LA) of 5 marks each]

32	If A=$\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$. find the product AB and use it to solve the following system of equations : x + 3z = 9 , -x + 2y – 2z = 4 and 2x – 3y + 4z = -3 .
33	(a)Evaluate $\int_0^{\pi} \log(1 + \cos x)dx$ (OR) (b) Evaluate $\int \frac{3x+5}{x^3 - x^2 - x + 1} dx$
34	(a) Solve the differential equation $x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$. (OR) (b) Solve the differential equation: $(x + y + 1)\frac{dy}{dx}$=1.
35	(a) Show that the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-4}{5} = \frac{y-1}{2} = z$ intersect. Also find their point of intersection. (OR) (b) Find the image of a point P (1, 6, 3) with respect to the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$

Section-E **[3x4=12]**

[This section comprises of 3 case-study/passage based questions of 4 marks each with sub part. The first two case study questions have three sub parts (i),(ii),(iii) of marks 1,1,2 respectively. The third case study question has two parts of 2 marks each]

36	 Vani and Mani are playing Ludo at home while it was raining outside.While rolling the dice Vani's brother Varun observed and noted the possible outcomes of the throw every time belongs to the set {1,2,3,4,5,6}.Let A be the set of players while B be the set of all possible outcomes. A= {Vani, Mani}, B= {1, 2, 3, 4, 5, 6}.

Answer the following questions:

a) Let $R: B \to B$,be defined by $R = \{(x, y): y \text{ is divisible by } x\}$.Verify that whether R is reflexive, symmetric and transitive. (2marks)

b) Is it possible to define an onto function from A to B? Justify. (1mark)

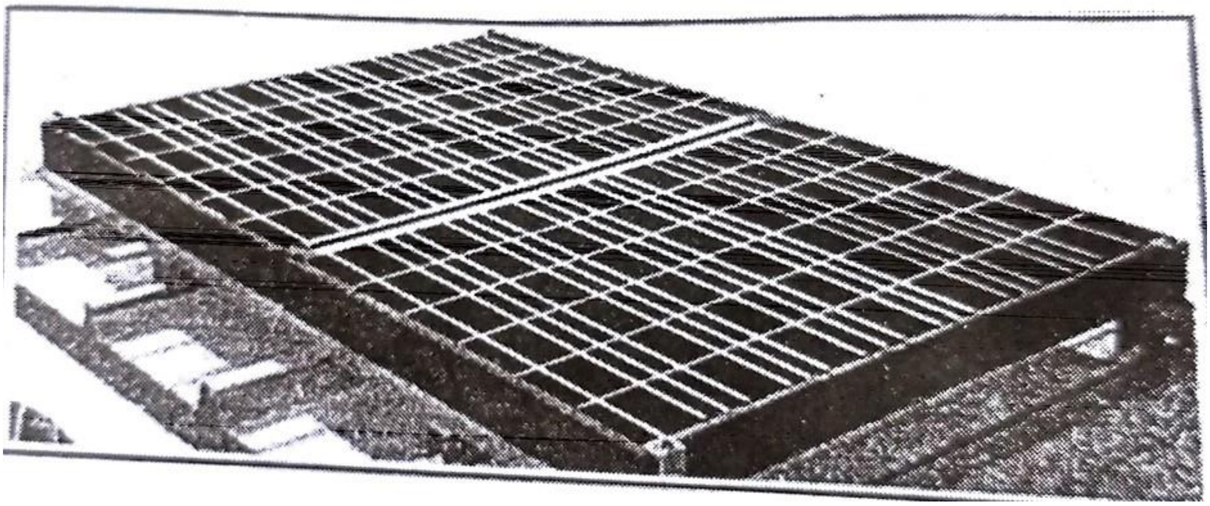
c) Which kind of relation is R defined on B given by

R={(1,2),(2,2),(1,3),(3,4),(3,1),(4,3),(5,5)}? (1mark)

Or

Find the number of possible relations from A to B.

37 A technical company is designing a rectangular solar panel installation on a roof using 300 metres of boundary material. The design includes a partition running parallel to one of the sides dividing the area (roof) into two sections.



Let the length of the side perpendicular to the partition be x metres and width parallel to the partition be y metres.

Based on this information, answer the following questions:

(i) Write the equation for the total boundary material used in the boundary and parallel to the partition in terms of x and y. (1mark)

(ii) Write the area of the solar panel as a function of x. (1mark)

(iii) (a) Find the critical points of the area function. Use second derivative test to determine critical points at the maximum area. Also, find the maximum area. (2marks)

OR

(iii) (b) Using first derivative test, calculate the maximum area the company can enclose with the 300 metres of boundary material, considering the parallel partition.

38

A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by cab, metro, bike or by other means of transport are respectively 3/10, 1/5, 1/10 and 2/5. The probabilities that he will be late are 1/4, 1/3, 1/12 and 1/10 if he comes by cab, metro, bike and other means of transport respectively.

(a) What is the probability that the doctor arrived late? (2 Marks)

(b) When the doctor arrives late, what is the probability that he comes by metro? (2 Marks)

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