SET 1 **Code: KVS(DR)/2025/GP**

KENDRIYA VIDYALAYA SANGATHAN, DELHI REGION

Pre-Board-I Examination-2025-26

Class- XII **Subject: Mathematics (041)**

Time: 3 Hours **Maximum Marks: 80**

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 **[1x 20= 20]**

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

Q.N.	QUESTION
1.	Given that matrices A and B are 3xn and mx5 respectively, then the order of the matrix 5A+3B is a) m=n b) 3x5 c) 3x3 d) 5x5

1.	$\sin sin\left[\left(-\sqrt{3}\right)+\left(-\frac{\sqrt{3}}{2}\right)\right] = \ldots$ (a) 1 (b) -1 (c) 0 (d) 2
1.	For what value of x, is the matrix A = $[0\ 1\ -2\ -1\ 0\ 3x\ -3\ 0]$ singular ? (a) 1 (b) 3 (c) 2 (d) -2
1.	If the area of a triangle with vertices (-3, 0), (3, 0) and (0, k) is 9 sq units. Then the value of k will be (a)9 (b)3 (c)-9 (d)6
1.	The side of an equilateral triangle is increasing at the rate of 2 cm/sec. The rate at which area increases when the side is 10 is: (a) 10 cm^2/sec (b)$5\sqrt{3}$ cm^2/sec (c) $10\sqrt{3}$ cm^2/sec (d)10/3 cm^2/sec
1.	$\int_{-1}^{1} \log log\left(\frac{2+x}{2-x}\right) dx = \ldots$ (a) e (b) 0 (c) 1 (d) 2
1.	For the curve $\sqrt{x}+\sqrt{y}=1, \frac{dy}{dx}\ at\left(\frac{1}{4},\frac{1}{4}\right) is$ … (a) ½ (b) 1 (c) -1 (d) 2
1.	If A is a square matrix of order 3, with $\|A\| = 9$, then the value of $\|2\ .\ adj\ A\|$ (a) 648 (b) 54 (c) 72 (d) 108
1.	Given that A is a non-singular matrix of order 3 such that A^2 = 2A, then value of |2A| is: (a) 4 (b) 8 (c) 64 (d) 16
1.	At how many points the function $y = \cos cos\ x\ \ sinx$ is not differentiable. (a) One (b) Two (c) All (d) No
1.	Z = 3x-4y is the objective function. If (0,4) ,(12,6) and (0,0) are the corner points of the feasible region then Maximum value of Z is given by a) 0 b) 8 c) 12 d) -18
1.	$\int \frac{(10x^9+10^x 10)}{x^{10}+10^x} dx$ = …….

(a) $10^x - 10^x + c$ (b) $10^x + 10^x + c$

(c) $\left(10^x + x^{10}\right)^{-1} + c$ (d) $\log log\left(x^{10} + 10^x\right) + c$

1. If m and n are the order and degree of the differential equation respectively

$\left(\frac{d^2y}{dx^2}\right)^5 + 4\left(\frac{d^3y}{dx^3}\right) + y^3 = x^2 - 1$, then:

(a) m=3, n=1 (b) m=3, n=2

(c) m=3, n=5 (d) m=2, n=5

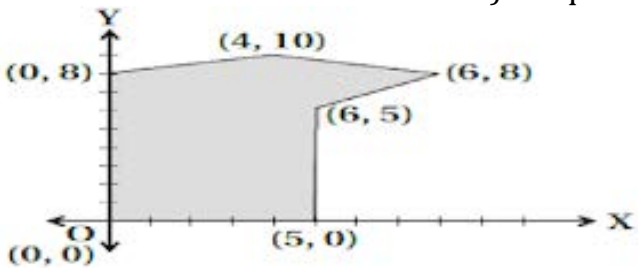
1. The angles which the vector $\vec{a} = \hat{i} - j + \sqrt{2}\,\hat{k}$ makes with the co – ordinate axes is:

(a) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{\pi}{4}$ (b) $0, 0, \frac{\pi}{4}$

(c) $\frac{\pi}{3}, \frac{\pi}{3}, \frac{\pi}{4}$ (d) $\frac{2\pi}{3}, \frac{\pi}{3}, \frac{\pi}{4}$

1. The feasible solution for a LPP is shown in Figure Let $z = 3x - 4y$ be the objective function.

(Maximum value of z + Minimum value of z) is equal to



(a) 13

(b) 1

(c) –13

(d) –17

1. Direction ratios of the line which is perpendicular to the lines

$\frac{x-7}{2} = \frac{y+17}{-3} = \frac{z-6}{1}$ and $\frac{x-2}{1} = \frac{y+3}{2} = \frac{z-1}{-2}$

(a)(4, 5, 7) (b)(4, -5, 7) (c)(4,-5,-7) (d)(-4, 5, 7)

1. The x- coordinate of a point on the line joining the points Q(2, 2, 1) and R(5, 1, -2) is 4.Then its z – coordinate is

(a) 4 (b) -1 (c) 0 (d) 2

1. **If P(A|B) > P(A), then which of the following is correct :**

(a)P(B|A) < P(B) **(b) P(A ∩ B) < P(A) . P(B)**

(c) P(B|A) > P(B) **(d) P(B|A) = P(B)**

ASSERTION-REASON BASED QUESTIONS

(Question numbers 19 and 20 are Assertion-Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (a), (b), (c) and (d) as given below.)

(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.

Q.19. Assertion (A): The relation R in R defined as R = {(a, b): $a \leq b$} is not equivalence relation.
Reason (R): Since R is not reflexive but it is symmetric and transitive .

Q.20. Assertion (A): For 2 vectors $\vec{a}$ and $\vec{b}$, $|\vec{a} \times \vec{b}|^2 - |\vec{a}|^2 |\vec{b}|^2 = |\vec{a} . \vec{b}|^2$
Reason (R): $|\vec{a} \times \vec{b}| = |\vec{a}||\vec{b}| \sin\theta$ and $|\vec{a} . \vec{b}| = |\vec{a}||\vec{b}| \cos\theta$, θ is angle between vectors $\vec{a}$ and $\vec{b}$.

SECTION-B **[2x 5= 10]**

(This section comprises of 5 very short answer (VSA) type questions of 2 marks each.)
(Question 21 - Question 25):

Q.N.	QUESTION
21.	Using vectors find the value of k such that (k,-10,3), (1,-1,3) and (3,5,3) are collinear. **OR** The scalar product of the vector i + j+ k with the unit vector along the sum of the vectors 2i+4j-5k and λi+2j+3k is equal to 1. Find the value of λ.
22.	If $x = a(\theta - \sin\theta)$, $y = a(1 + \cos\theta)$, find $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$
23.	Consider f : $R_+ \rightarrow [-9, \infty)$ given by $f(x) = 5x^2 + 6x - 9$. Check whether is one-one and onto . **OR**

	Show that the relation R in the set {1, 2, 3} given by R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3)} is reflexive but neither symmetric nor transitive.
24.	**Discuss the continuity of the function f(x)** **where f(x) =** $\left\{ \frac{\lvert x \rvert}{x},\ if\ x \neq 0\ 0\ ,\ if\ x = 0 \right\}$
25.	Make a rough sketch of the region bounded by the curve $y = \cos\cos x$ between x = 0 , x = π and find its area by using integration.

SECTION-C **[3x 6= 18]**

(This section comprises of 6 short answer (SA) type questions of 3 marks each.) (Question 26 - Question 31):

Q.N.	QUESTION
26.	**Consider the experiment of tossing a coin. If the coin shows head, toss it again but if it shows tail, then throw a die. Find the conditional probability of the event that 'the die shows a number greater than 4' given that 'there is at least one tail'.** **OR** A man is known to speak the the truth 3 out of 5 times. He throws a die and reports that it is a number greater than 4. Find the probability that it is actually a number greater than 4.
27.	Solve the following LP graphically Maximize z = 20x + 10y such that x + 2y ≤ 28,3x + y ≤ 24, x ≥ 2 and x , y ≥0
28.	Find the equation of the line passing through the point (1,2,-4) and perpendicular to two lines $\frac{x-8}{3} = \frac{y+19}{-16} = \frac{z-10}{7}$; $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$
29.	Using Integration, Find the area of the region bounded by the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$. **OR** Using integration, find the area of the region enclosed by the line y=x+2, and the parabola $x^2 = y$ and the x-axis.
30.	Find the interval on which the function f(x)= $2x^3+9x^2+12x-1$ is decreasing . **OR** Find the absolute maximum value and the absolute minimum value of the following function in the given intervals: f(x)=4x-$\frac{1}{2}x^2$,x is in[-2,9/2]

31.	If $y = \sin\left(m\sin^{-1}x\right)$, prove that $\left(1-x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + m^2y = 0$ OR If $y = \left(\log_e x\right)^x + x^{\log_e x}$ find $\frac{dy}{dx}$.

SECTION-D
[5x4= 20]

(This section comprises of 4 long answer (LA) type questions of 5 marks each.) (Question 32 - Question 35):

Q.N.	QUESTION
32.	If $A = [2\ 2\ -4\ -4\ 2\ -4\ 2\ -1\ 5]$ and $B = [1\ -1\ 0\ 2\ 3\ 4\ 0\ 1\ 2]$, then find BA and use this to solve the system of equations: y + 2z = 7, x – y = 3 and 2x + 3y + 4z = 17.
33.	$Evaluate: \int \frac{(3sin\emptyset - 2)cos\emptyset}{(5 - \emptyset - 4sin\emptyset)} d\emptyset$ **OR** $: \int \sqrt{x^2 + 2x + 5}dx$ Evaluate
34.	Find the particular solution of the given differential equation : $\frac{dy}{dx} + yCotx = 2x + x^2 Cotx$ given that y = 0 when x = $\frac{\pi}{2}$ OR Solve the following Homogeneous differential equation ; $2xy\,dy = (x^2 + y^2)\,dx$
35.	Find the shortest distance between the following lines : $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$

SECTION-E **[4x3= 12]**

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

(Question 36 - Question 38):

Case Study-1

Q.36. Aman and Ramesh were playing Ludo at home during Autumn break. While rolling the dice, Aman's sister Lata observed and noted the possible outcomes of the throw every time belongs to set {1,2,3,4,5,6}.Let A be the set of players while B be the set of all possible outcomes. Let A={A,R},B={1,2,3,4,5,6}.Using the information given above, answer the following:

(i) Let R:B$\rightarrow$B be defined by R ={(x,y): y = x^2} , Then check whether R is symmetric relation.

(ii) Let R : B$\rightarrow$B be defined by R={(1,2)(2,2)(1,3)(3,4)(3,1))(4,3)(5,5)}.Then check whether R is a reflexive relation.

(iii) Let R :B$\rightarrow$B be defined by R={(2,1)(1,2)(2,2)(3,3)(4,4)(5,5)(6,6)},then check whether R is an equivalence relation.

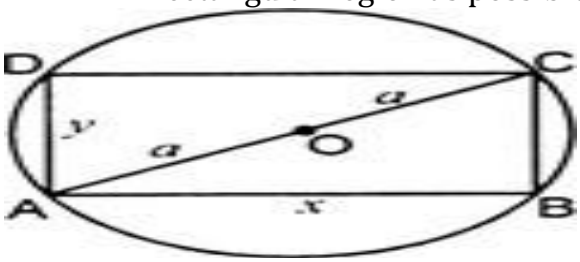
OR

Lata wants to know the number of relations possible from A to B .How many relations are possible?

Case Study-2

Q.37 Read the following text carefully and answer the questions that follow:

In Kendriya Vidyalaya , A gardener wants to construct a rectangular bed of garden in a circular patch of land. He takes the maximum perimeter of the rectangular region as possible. (Refer to the images given below for calculations)



i. Find the perimeter of rectangle in terms of any one side and radius of circle. (1)

ii. Find critical points to maximize the perimeter of rectangle? (1)

iii. Check for maximum or minimum value of perimeter at critical point. (2)

OR

If a rectangle of the maximum perimeter which can be inscribed in a circle of radius 10 cm is square, then the perimeter of region. (2)

Case Study-3

Q.38 Read the following passage and then answer the questions given below.

There are two anti craft guns, named as A and B. The probabilities that the shell fired from them hits an airplane are 0.3 and 0.2 respectively. Both of them fired one shell at an airplane at the same time.

(i) What is the probability that the shell fired from exactly one of them hit the plane?

(ii) If it is known that the shell fired from exactly one of them hit the plane, then what is the probability that it was fired from B?