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SAMPLE PAPER PRE BOARD EXAMINATION (2025-26)
Class: XII
SUBJECT MATHEMATICS

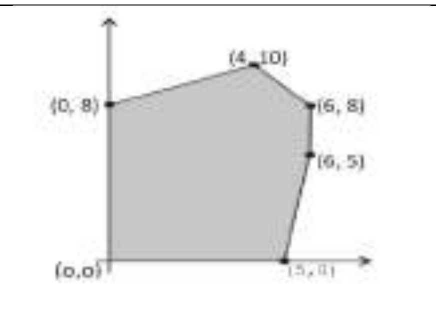
Time: 03 Hours M. M.: 80

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 case based integrated units of assessment of (4 marks each) with sub parts.

SECTION-A

Q. No.	Questions (Multiple Choice Questions) Each question carries 1 mark.	Marks
1	The number of all possible matrices of order 3 x 3 with each entry 0 or 1 is: (a) 27 (b) 18 (c) 81 (d) 512	1
2	If A = $[a_{ij}]$ is a symmetric matrix of order n, then (a) $a_{ij} = \frac{1}{a_{ij}}$ for all i,j (c) $a_{ij} = a_{ij}$ for all i,j (b) $a_{ij} \neq 0$ for all i,j (d) $a_{ij} = 0$ for all i,j	1
3	Let A be a non-singular square matrix of order 3 x 3. Then |adj A| is equal to (a) $\|A\|$ (b) $\|A\|^2$ (c) $\|A\|^3$ (d) $3\|A\|$	1
4	The area of a triangle with vertices (-3, 0), (3, 0) and (0, k) is 9 sq. units. The value of k will be (a) 9 (b) 3 (c) – 9 (d) 6	1
5	If A and B are invertible matrices, then which of the following is not correct? (a) adj A = $\|A\|.A^{-1}$ (c) $(AB)^{-1} = B^{-1} A^{-1}$ (b) $\det(A)^{-1} = [\det (A)]^{-1}$ (d) $(A + B)^{-1} = B^{-1} + A^{-1}$	1
6	The function f(x) = [x], where [x] denotes the greatest integer function, is continuous at (a) 4 (b) – 2 (c) 1 (d) 1.5	1
7	Differentiation of $(tan^{-1} x)^2$ is (a) $\frac{1}{\sqrt{1+x^2}}$ (c) x$\sqrt{1+x^2}$ (b) $\frac{2tan^{-1} x}{1+x^2}$ (d) $\frac{1}{\sqrt{1+x^2}}$	1

8	The rate of change of the area of a circle with respect to its radius r at r = 6 cm is (a) 10 π (c) 8 π (b) 12 π (d) 11 π	1
9	On which of the following intervals is the function f given by f(x) = x^{100} + sinx -1 decreasing? (a) (0,1) (c) $(0, \frac{\pi}{2})$ (b) $(\frac{\pi}{2}, \pi)$ (d) None of these	1
10	$\int e^{x}$(sec x + tan x) is equal to (a) e^x cos x + c (c) e^x sin x + c (b) e^x sec x + c (d) e^x tan x + c	1
11	The value of $\int_{-a}^{a} sin^3 x \, dx$ is equal to (a) a (c) 1 (b) a/3 (d) 0	1
12	The degree of the differential equation $\left(\frac{d^2y}{dx^3}\right)^3 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right) + 1 = 0$ is (a) 3 (c) 1 (b) 2 (d) Not defined	1
13	A homogeneous differential equation of the from $\frac{dy}{dx} = h\left(\frac{x}{y}\right)$ can be solved by making the substitution. (a) y = vx (c) x = vy (b) v = yx (d) x = v	1
14	If $\vec{a}$ is a nonzero vector of magnitude 'a' and λ a nonzero scalar, then $\lambda\vec{a}$ is unit vector if (a) λ = 1 (c) a = |λ| (b) λ = -1 (d) a = $\frac{1}{\|\lambda\|}$	1
15	The coordinates of the foot of the perpendicular drawn from the point (2,5,7) on the x-axis are given by (a) (2,0,0) (c) (0,0,7) (b) (0,5,0) (d) (0,5,7)	1
16	The feasible solution for a LPP is shown in given figure. Let Z=3x-4y be the objective function. Minimum of Z occurs at (a) (0,0) (b) (0,8) (c) (5,0) (d) (4,10)  	1
17	Region represented by x $\geq 0, y \geq 0$ is: (a) First quadrant (c) Third quadrant (b) Second quadrant (d) Fourth quadrant	1

18	If A and B are two events such that P(A)+P(B) – P(A and B) =P(A), then (a) P(B/A) = 1 (c) P(A/B) = 0 (b) P(A/B) = 1 (d) P(B/A) = 0	1
	ASSERTION-REASION BASED QUESTIONS In the following question, 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 and 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 (A):** The Principal value of $cot^{-1}\ (-\sqrt{3}) + tan^{-1}(1) + sec^{-1}$ $(2/\sqrt{3})$ is equal to $\frac{5\pi}{4}$. **Reason (R):** Domain of cot^{-1} x and sin^{-1} x are respectively $(0, \pi)$ and $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	1
20	**Assertion (A):** The following straight lines are perpendicular to each other. $\frac{x+1}{2} = \frac{y-2}{5} = \frac{z+3}{4}\ and\ \frac{1-x}{-1} = \frac{y+2}{2} = \frac{3-z}{3}$ **Reason (R):** Let line L-1 passes through the point $(x_{1,}\ y_{1,} z_1)$ and parallel to the vector whose direction ratios are $a_1, b_{1\ and}\ c_1$ and let line L-2 passes through the point (x_2, y_2, z_2) and parallel to the vector whose direction ratios are a_2, b_2, c_2. Then the lines L-1 and L-2 are perpendicular if $a_1.a_2 + b_1.b_2 + c_1.c_2 = 0$.	1
	SECTION-B This section comprises of very short answer type questions (VSA) of 2 marks each	
21	Check whether the relation R in the set R of real numbers, defined as R={(a,b):a $\leq b^2$} is transitive.	2
22	Find $\frac{dy}{dx}$ of the function $y^x = x^y$. **OR** Find the value of k so that the function f is continuous at the indicated point $f(x) = \begin{cases} kx + 5, & if\ x\ \leq 2 \\ x - 1, & if\ x > 2 \end{cases}$ atx = 2	2
23	Evaluate: $\int x/(x+1)(x+2)$ dx	2
24	Find the area of the region in the first quadrant enclosed by x-axis, line x = $\sqrt{3}y$ and the circle $x^2 + y^2 = 4$. **OR** Find the area of the region bounded by the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$.	2
25	If $\vec{a}.\vec{b}.\vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$, find the value of $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a}$.	2

	SECTION-C This section comprises of short answer type questions (SA) of 3 marks each	
26	If y = $(tan^{-1}x)^2$, show that (1 + x^2)^2 y_2+ (2x) (1 + x^2) $y_1 = 2$	3
27	Evaluate: $\int(sinx\ sin2x\ sin3x)$ dx **OR** Evaluate $\int_{-5}^{5}\lvert x+2\rvert\,dx$	3
28	Find the area of the region bounded by the curve y = sin x between x = 0 and x = 2 π.	3
29	Solve the differential equation (1+x^2) $\frac{dy}{dx}$ + y = $e^{\tan^{-1}x}$. **OR** Find the general solution of ($e^x.e^{-x}$) dy - ($e^x.e^{-x}$) dx = 0.	3
30	Solve the following Linear Programming Problem graphically Maximize and Minimize z = x + 2y subject to the constraints: $x+2y \geq 100,\quad 2x-y \leq 0,\quad 2x+y \leq 200,\quad x \geq 0,\ y \geq 0.$	3
31	Two numbers are selected at random (without replacement) from the first six positive integers. Let X denote the larger of the two numbers obtained. Find E(X). **OR** The random variable X can take only the values 0,1,2,3. Given that P (x = 0) P = (x = 1)= p and P (X = 2) = P(X = 3) such the *Σ pi xi = 2 Σ pi xi.* Find the value of p.	3
	SECTION-D This section comprises of long answer type questions (LA) of 5 marks each	
32	Show that the function f: R→R defined by f(x) =$\frac{x}{x^2+1'}$, ∀ x∈ R is neither one-one nor onto. **OR** Let f: W→W be defined by: f(n) = {$n-1, if\ n$ is odd n + 1, if n is even. Show that f is one-one onto.	5
33	If A = $\begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$ find A^{-1}. Using A^{-1} Solve the following system of equations by matrix method. 2x – 3y + 5z = 11; 3x + 2y – 4z = -5; x + y – 2z = -3	5
34	Evaluate: $\int_0^{\pi}\frac{x}{1+\sin x}$ dx **OR** Evaluate: $\int_0^{\frac{\pi}{2}}\frac{sin^2x}{\sin x+\cos x}$ dx.	5

35	Find the shortest distance between the lines $\vec{r} = (\hat{\imath} + 2\hat{\jmath} + 3\hat{k}) + \alpha(\hat{\imath} - \hat{\jmath} + \hat{k})$ and $\vec{r} = (2\hat{\imath} - \hat{\jmath} - \hat{k}) + \mu(2\hat{\imath} + \hat{\jmath} + 2\hat{k})$ OR Find the cartesian equation of the line which passes through the point (-2, 4, -5) and parallel to the line given by $\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6}$.	5

SECTION-E

Section E comprises of 3 case based questions with two sub parts. First case study questions have three sub parts of marks 1,1,2 respectively. The second and third case study has two sub parts with 2 marks each.

36	Read the following text and answer the following questions, on the basis of the same: The relation between the heights of the plant (y in cm) with respect to exposure to sunlight is governed by the equation y = 4x - $\frac{1}{2}$ x^2 where x is the number of days exposed to sunlight. i. Find the rate of growth of the plant with respect to sunlight. ii. Is this function satisfy the condition of second order derivative? iii. What is the number of days it will take for the plant to grow to the maximum height? OR What is the maximum height of the plant?	 1 1 2
37	One day, a sangeet Mahotsav is to be organised in an open area of Rajasthan. In recent years, it has rained only 6 days each year. Also, it is given that when it actually rains, the weatherman correctly forecasts rain 80% of the time. When it does not rain, he incorrectly forecasts rain 20% of the time. If leap year is considered, then answer the following questions. i. Find the probability that the weatherman predict rain. ii. Find the probability that it will rain on the chosen day, if weatherman predict rain for that day.	 2 2
38	Megha wants to prepare a handmade giftbox for her friend's birthday at home. Fr making the lower part of box, she takes a square piece of cardboard of side 20 cm. Based on the above information, answer the following: If x can be the length of each side of the square cardboard which is to be cut off from corners of the square piece of side 20 cm. i. What should be the side of square to be cut off so that volume of the box is maximum? ii. The maximum value of the volume?	 2 2