www.mathstimes.com|HSC(+2) Mathematics|10 Marks Not asked Board Exam Questions|(MARCH 06 – OCTOBER 17)|

(1) APPLICATION OF MATRICES AND DETERMINANTS (14)

EXERCISE 1.1

(3) Find the adjoint of the matrix $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ and verify the result $A\ (\text{adj } A) = (\text{adj } A)\ A = |A|\ I$.

(6) Find the inverse of the matrix $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ and verify that $A^3 = A^{-1}$.

(7) Show that the adjoint of $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ is $3A^T$.

(9) If $A = \frac{1}{3}\begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$, prove that $A^{-1} = A^T$.

EXERCISE 1.2

(4) Solve by matrix inversion method eachof the following system of linear equations:

$2x - y + z = 7,\ 3x + y - 5z = 13,\ x + y + z = 5$.

EXERCISE 1.4

(4) Solve the following non-homogeneous system of linear equations determinant method:

$x + y + z = 4;\ x - y + z = 2;\ 2x + y - z = 1$

(6) Solve the following non-homogeneous system of linear equations determinant method:

$3x + y - z = 2;\ 2x - y + 2z = 6;\ 2x + y - 2z = -2$

(7) Solve the following non-homogeneous system of linear equations determinant method:

$x + 2y + z = 6;\ 3x + 3y - z = 3;\ 2x + y - 2z = -3$

Example 1.4 : If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$,verify $A\ (adj\ A) = (adj\ A)\ A = |A|\ I_3$

Example 1.18: Solve the following non-homogeneous equations of three unknowns.

(2) $x + y + 2z = 6\ ;\ 3x + y - z = 2;\ 4x + 2y + z = 8$

Example 1.21: **Solve :** $x + y + 2z = 0\ ;\ 3x + 2y + z = 0\ ;\ 2x + y - z = 0$

Example 1.23 : Examine the consistency of the equations. $2x - 3y + 7z = 5,\ 3x + y - 3z = 13,\ 2x + 19y - 47z = 32$

Example 1.25: Verify whether the given system of equations is consistent. If it is consistent, solve them:

$x - y + z = 5,\ -x + y - z = -5,\ 2x - 2y + 2z = 10$

Example 1.27: Solve the following homogeneous linear equations. $x + 2y - 5z = 0,\quad 3x + 4y + 6z = 0,\quad x + y + z = 0$

(2) VECTOR ALGEBRA (0)

(3) COMPLEX NUMBERS (1)

EXERCISE 3.2-(8) (v) If P represents the variable complex number z. Find the locus of P, if $\arg\left(\frac{z-1}{z+3}\right)=\frac{\pi}{2}$

(4) ANALYTICAL GEOMETRY (1)

EXERCISE 4.2-(6) (ii) Find the eccentricity, centre, foci, vertices of the ellipse $x^2+4y^2-8x-16y-68=0$ and draw the diagram.

(5) DIFFERENTIAL CALCULUS APPLICATION – (10)

EXERCISE 5.1

Example 5.14 : Find the equations of tangent and normal to the curve $16x^2+9y^2=144$ at (x_1, y_1) where $x_1=2$ and $y_1>0$.

Example 5.15 : Find the equations of the tangent and normal to the ellipse $x = a\cos\theta,\ y = b\sin\theta$ at the point $\theta=\frac{\pi}{4}$.

Example 5.35 : Evaluate : $\lim_{x\to 0+} x^{\sin x}$

EXERCISE 5.9

(3) Find the local maximum and minimum values of the following functions:

(iii) x^4-6x^2 (iv) $(x^2-1)^3$ (v) $\sin^2\theta\ [0, \pi]$ (vi) $t+\cos t$

Example 5.52 : A farmer has 2400 feet of fencing and want to fence of a rectangular field that borders a straight river. He needs no fence along the river. What ar the dimensions of the field that has the largest area?

Example 5.63 : Discuss the curve $y=x^4-4x^3$ with respect to concavity and points of inflection.

EXERCISE 5.11

(5) Find the intervals of concavity and the points of inflection of the function $f(\theta)=\sin 2\theta$ in $(0, \pi)$

(6) DIFFERENTIAL CALCULUS APPLICATION - II (1)

Example 6.18 : If $w=u^2e^v$ where $u=\frac{x}{y}$ and $v=y\log x$, find $\frac{\partial w}{\partial x}$ and $\frac{\partial w}{\partial y}$

(7) INTEGRAL CALCULUS (3)

Example 7.26 : Find the area between the line $y=x+1$ and the curve $y=x^2-1$.

Example 7.28 : Find the area of the region enclosed by $y^2=x$ and $y=x-2$

Example 7.32 : Find the area of the curve $y^2=(x-5)^2(x-6)$ (i) between x = 5 and x = 6 (ii) between x = 6 and x = 7

(8) DIFFERENTIAL EQUATIONS (3)

Example 8.13 : Solve : $(2\sqrt{xy}-x)\,dy+y\,dx=0$ **EXERCISE 8.4 Solve :** (7) $dx+xdy=e^{-y}\sec^2 ydy$

Example 8.38 : A drug is excreted in a patients urine. The urine is monitored continuously using a catheter. A patient is administered 10 mg of drug at time t = 0 , which is excreted at a Rate of $-3t^{1/2}$ mg/h.

(i) What is the general equation for the amount of drug in the patient at time t > 0 ?

(ii) When will the patient be drug free?

(9) DISCRETE MATHEMATICS (1)

Example 9.22 : Show that the set $G=\{a+b\sqrt{2}\ /\ a, b\in Q\}$ is an infinite abelian group with respect to addition.

(10) PBOBABILITY DISTRIBUTIONS

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