BOAR D TEST SERIES

For

XII EXAM. 2013

MATHEMATICS

Matrices ; Determinant; Maxima & Minima tangent and Normal

Time Allowed : 2 Hours Maximum Marks: 50

Important Instruction

(i) There are 3 section in this paper.

(ii) In the beginning of each question, the number of parts to be attempted is early mentioned.

(iii) Marks allotted to the question are indicated against them.

Name of the Candidate : ....

Father,s Name : ....

SAXENA INSTITUTE

Block No 14 Sanjay Place Agra

Ph. 9045047070; 8791689794

TARGET MATHEMATICS
THE EXCELLENCE KEY
BY MANISH SAXENA

SECTION – A

1. For what value of a, $\begin{bmatrix} 2a & -1 \\ -8 & 3 \end{bmatrix}$ is a singular matrix?

2. Find the equation of tangent to the curve $\sqrt{x}+\sqrt{y}=a$ at the point $\left(\frac{a^2}{4},\frac{a^2}{4}\right)$

3. If $A\begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$ and B=$\begin{bmatrix} -2 & -1 & -4 \end{bmatrix}$ find AB.

4. If A is a matrix of order 3 and $|A|$ = 8 then find the value of $|AdjA|$.

5. Without expanding evaluate the determinant $\begin{vmatrix} 41 & 1 & 5 \\ 79 & 7 & 9 \\ 29 & 5 & 3 \end{vmatrix}$.

SECTION – B

6. Prove that $\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ac & bc & c^2+1 \end{vmatrix} = 1+a^2+b^2+c^2$

7. Find the points on the curve $9y^2 = x^3$ where normal to the curve makes equal intercepts with the axes.

8. Show that Matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ show that : $A^2 - 4A - 5I_3 = 0$ and hence find A^{-1}.

9. Show that the semi vertical angle of a cone of given total surface area and maximum volume is $Sin^{-1}\frac{1}{3}$

10. Prove that $\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 4+3p+2q \\ 3 & 6+3p & 10+6p+3q \end{vmatrix} = 1$

11. Using elementary operations, find the inverse of matrix $A = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$

SECTION – C

12. Determine the product $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}\begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ and use it solve the system of equations: x – y + z = 4; x – 2y – 2z = 9 and 2x + y + 3z = 1.

OR

Using elementary transformations, find the inverse of the matrix : $\begin{pmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{pmatrix}$

13. If the length of the trapezium, other than base is equal to 10 cm each, then find the area of trapezium when it is maximum.

OR

Show that the altitude of the right circular cone of maximum volume that can be inscribed in a sphere of radius r is $\frac{4r}{3}$.

14. Show that $\begin{vmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+a & -c+b & 3c \end{vmatrix} 3(a+b+c)(ab+bc+ca)$

BOAR D TEST SERIES

For

XII EXAM. 2013

MATHEMATICS

Matrices ; Determinant; Maxima & Minima tangent and Normal

Time Allowed : 2 Hours Maximum Marks: 50

Important Instruction

(i) There are 3 section in this paper.

(ii) In the beginning of each question, the number of parts to be attempted is early mentioned.

(iii) Marks allotted to the question are indicated against them.

Name of the Candidate : ……………………………

Father,s Name : ……………………………………..

SAXENA INSTITUTE

Block No 14 Sanjay Place Agra

Ph. 9045047070; 8791689794

SECTION – A

1. If $A=\begin{bmatrix} k & 0 & 0 \\ 0 & k & 0 \\ 0 & 0 & k \end{bmatrix}$, where k is non-zero real number, then without actually evaluating adjA. Find the value of $|adj(A)|$.

2. Without expanding, find the value of the determinant $\begin{vmatrix} 0 & q-r & r-s \\ r-q & 0 & p-q \\ s-r & q-p & 0 \end{vmatrix}$

3. Find matrix X such that it satisfies the equation $A-2B+X=0$, give that $A=\begin{bmatrix} 5 & 3 \\ -3 & 1 \end{bmatrix}$ and $B=\begin{bmatrix} 0 & -2 \\ 3 & 1 \end{bmatrix}$.

4. Prove that the tangent to the curve $y=x^3+9$ at the points $(-1,5)$ and $(1,-1)$ are parallel.

5. If A is an invertible matrix of order 3 and $|A|=3$ then find the value of $|Adj(A)|$

SECTION – B

6. If ω is the cube root of unity, evaluate the given determinant $A=\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$

7. Prove that $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3$

8. Find the equation of the tangent to the curve given by $x = a\sin^3 t$ and $y = b\cos^3 t$ at a point $t = \frac{\pi}{2}$

9. Using elementary transformation, find inverse of the matrix $A = \begin{pmatrix} 4 & 1 \\ 3 & 5 \end{pmatrix}$.

10. Find the points on the curve $x^2 + y^2 - 2x - 3 = 0$ at which the tangents are parallel to x axis.

11. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, verify $A^2 - 5A + 7I = 0$ hence find A^{-1}.

SECTION – C

12. If $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$ find A^{-1} hence solve the following system of equations x + 2y – 3z = – 4; $2x + 3y + 2z = 2$ and $3x - 3y - 4z = 11$.

13. Find the equation of tangent and normal to the curve $y = \frac{x-7}{(x-2)(x-3)}$ at the point where it cut the X axis.

OR

In a activity organized in the school, Rohan was given the task to put the slogan Sytyamev Jayte on a trapezium shaped card sheet. If the length of three sides of trapezium other than base are equal 10 cm each. Find the area of the trapezium when it is maximum. Explain the meaning of Satyamev Jayte.

14. Using elementary row transformation find the inverse of the following matrix $\begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

OR

Prove that :

$$\begin{vmatrix} a & b & ax+by \\ b & c & bx+cy \\ ax+by & bx+cy & 0 \end{vmatrix} = (b^2 - ac)(ax^2 + 2bxy + cy^2)$$

BOARD

TEST SERIES

For

XII EXAM. 2013

MATHEMATICS

Matrices ; Determinant; Maxima & Minima tangent and Normal

Time Allowed : 2 Hours Maximum Marks: 50

Important Instruction

(iv) There are 3 section in this paper.

(v) In the beginning of each question, the number of parts to be attempted is early mentioned.

(vi) Marks allotted to the question are indicated against them.

Name of the Candidate : ……………………………

Father,s Name : ……………………………………..

SAXENA INSTITUTE

Block No 14 Sanjay Place Agra

Ph. 9045047070; 8791689794

SECTION – A

1. If $\begin{bmatrix} x+y & 1 \\ 2y & 5 \end{bmatrix} = \begin{bmatrix} 7 & 1 \\ 4 & 5 \end{bmatrix}$ find the value of x.

2. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ find $A + A'$

3. For what value of x, the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular?

4. Find the slope of tangent to the curve $y = 3x^4 - 4x$ at x = 1.

5. If A is an invertible matrix of order 3 and $|A| = 6$ then find the value of $|Adj(A)|$

SECTION – B

6. Prove using properties of determinants

$$\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix} = 2(x+y+z)^3$$

7. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, find the value of $A^2 - 3A + 2I$.

8. Find A^{-1} by using ERT for matrix $A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$

9. Find the equation of the tangent to the curve given by $x = a\sin^3 t$ and $y = b\cos^3 t$ at a point $t = \frac{\pi}{4}$

10. For the following matrices A and B , verifying that $[AB]' = B'A'$; $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$ and B = $\begin{bmatrix} -1 & 2 & 1 \end{bmatrix}$

11. Find the points on the curve $x^2 + y^2 - 2x - 3 = 0$ at which the tangents are parallel to x axis.

12. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, verify $A^2 - 5A + 7I = 0$ hence find A^{-1} .

SECTION – C

13. Solve the following system of equations x + 2y – 3z = – 4; $2x + 3y + 2z = 2$ and $3x - 3y - 4z = 11$.

14. Find the equation of tangent and normal to the curve $y = \frac{x-7}{(x-2)(x-3)}$ at the point where it cut the X axis.

OR

A given quantity of metal is to be cast into a half cylinder with a rectangular base and semi-circular ends. Show that in order that total surface area is minimum, the ratio of length of the cylinder to the diameter of its semi-circular ends is π : (π + 2).

15. Using elementary row transformation find the inverse of the following matrix $\begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

OR

Prove that :

$$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

1 Find the equation of the ellipse with foci $(\pm 5, 0)$ and $x = \dfrac{36}{5}$ as one directrix.

2 Find the lengths and equation of major and minor axes, centre, eccentricity, foci, equation of directrices, vertices and length of L.R of the ellipse $\dfrac{x^2}{225} + \dfrac{y^2}{289} = 1$.

3 Find the centre, the length of the axes, eccentricity and the foci of the ellipse $12x^2 + 4y^2 + 24x - 16y + 25 = 0$.

4 Find the equation of ellipse having centre at the point $(2,-3)$ one focus at $(3,-3)$ and one vertex at $(4,-3)$.

5 A rod of length 15 cm rests in between two coordinates axes in su