

MGMs JUNIOR COLLEGE

Mathematics Department

Subject - Mathematics

Total Questions - 30

Total Marks - 60

Roll No.					

XII MATHS

07-Apr-2015

00:00 To 00:00

This is to certify that, the entry of Roll No. has been correctly written and verified.

CET

Candidate's Signature

Invigilator's Signature

Note :

- All Questions are compulsory
- Darken (●) the appropriate circle(○) of the most correct option/response with black ball point pen.

Matrices and Determinants

1) If x, y, z are integers in A.P., lying between 1 and 9, and $x51, y41$ and $z31$ are three-digit numbers, then the value of

$$\begin{vmatrix} 5 & 4 & 3 \\ x51 & y41 & z31 \\ x & y & z \end{vmatrix} \text{ is:}$$

- A) $x + y + z$ B) $x - y + z$
C) 0 D) None of these.

2) If $p = \begin{bmatrix} 1 & a & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{bmatrix}$ is the adjoint of 3×3 matrix A and $|A| = 4$

then a is equal to (JEE Main 2013)

- A) 11 B) 5 C) 0 D) 4

3) if $\omega \neq 1$ is the complex cube root of unity and matrix H

$$= \begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix} \text{ then } H^{70} \text{ is equal to :}$$

- A) 0 B) $-H$ C) H^2 D) H

4) If $A = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, then : $A^{-1}B =$

- A) $\begin{bmatrix} 3 & 1 \\ 5 & 0 \end{bmatrix}$ B) $\begin{bmatrix} 3 & 1 \\ -5 & 0 \end{bmatrix}$
C) $\begin{bmatrix} 3 & -1 \\ 5 & 0 \end{bmatrix}$ D) $\begin{bmatrix} 1 & 3 \\ 0 & -5 \end{bmatrix}$

5) The value of the determinant $\begin{vmatrix} a+pd & a+qd & a+rd \\ p & q & r \\ d & d & d \end{vmatrix}$ is

equal to :

- A) 0 B) -1
C) 1 D) $p + q + r$

6) If A is non-singular matrix of order n such that $|A| = d$ and $|\text{adj. } A| = d'$, then :

- A) $d d' = d^2$ B) $dd' = d^n$
C) $dd' = d^{n-1}$ D) $dd' = 1$

7) What is the value of x , if $\begin{vmatrix} 8 & -5 & 1 \\ 5 & x & 1 \\ 6 & 3 & 1 \end{vmatrix} = 2$?

- A) 4 B) 5 C) 8 D) 9

8) The value of a in order that $\begin{bmatrix} 2 & 3 & 5 \\ 1 & a & 2 \\ 0 & 1 & -1 \end{bmatrix}$ is singular is:

- A) -5/3 B) 5/3
C) 2 D) None of these.

9) If $D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and

$D' = \begin{vmatrix} a_1 + pb_1 & b_1 + qc_1 & c_1 + ra_1 \\ a_2 + pb_2 & b_2 + qc_2 & c_2 + ra_2 \\ a_3 + pb_3 & b_3 + qc_3 & c_3 + ra_3 \end{vmatrix}$ then

- A) $D' = D$
B) $D' = D(1 - pqr)$
C) $D' = D(1 + p + q + r)$
D) $D' = D(1 + pqr)$

10) Let $\Delta = \begin{vmatrix} a & a+b & a+b+c \\ 3a & 4a+3b & 5a+4b+3c \\ 6b & 9a+6b & 11a+9b+6c \end{vmatrix}$ where $a = i, b =$

$\omega, c = \omega^2$, then Δ is equal to :

- A) i B) $-\omega^2$ C) ω D) -i

11) If A, B are square matrices of order 3, then :

- A) $\text{adj.}(AB) = (\text{adj.} A)(\text{adj.} B)$
B) $(A+B)^{-1} = A^{-1} + B^{-1}$
C) $AB = O \Rightarrow |A| = 0$ or $|B| = 0$
D) $AB = O \Rightarrow |A| = 0$ and $|B| = 0$

12) Let m be a + ve integer and : $\Delta_r =$

$\begin{vmatrix} 2r-1 & {}^m C_r & 1 \\ m^2-1 & 2^m & m+1 \\ \sin^2(m^2) & \sin^2(m) & \sin^2(m+1) \end{vmatrix}$ where $0 \leq r \leq m$, then

the value of $\sum_{r=0}^n \Delta_r$ is given by

- A) 0 B) m^2-1
C) 2^m D) $2^m \cdot \sin^2(2^m)$

13) If $a \neq b \neq c$ such that $\begin{vmatrix} a^3-1 & b^3-1 & c^3-1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = 0$, then

- A) $ab + bc + ca = 0$ B) $a + b + c = 0$
C) $abc = 1$ D) $a + b + c = 1$

14) The multiplicative inverse of $f : A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is:

- A) $\begin{bmatrix} -\cos\theta & \sin\theta \\ -\sin\theta & -\cos\theta \end{bmatrix}$

B) $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

C) $\begin{bmatrix} -\cos\theta & -\sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

D) $\begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

15) If $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is a square root of $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then α, β and γ satisfy :

- A) $1 + \alpha^2 + \beta\gamma = 0$ B) $1 - \alpha^2 + \beta\gamma = 0$
C) $1 - \alpha^2 - \beta\gamma = 0$ D) $1 + \alpha^2 - \beta\gamma = 0$

16) The value of λ for which the system of equations : $x+y+z=6, x+2y+3z=10, x+4y+\lambda z=12$ has a unique solution is :

- A) $\lambda \neq -7$ B) $\lambda \neq 7$ C) $\lambda = 7$ D) $\lambda = -7$

17) If $p\lambda^4 + q\lambda^3 + r\lambda^2 + s\lambda + t = \begin{vmatrix} \lambda^3 + 3\lambda & \lambda - 1 & \lambda + 3 \\ \lambda + 1 & 2 - \lambda & \lambda - 3 \\ \lambda - 3 & \lambda + 4 & 3\lambda \end{vmatrix}$, then t

is equal to :

- A) 24 B) 23 C) 22 D) 21.

18) If $\sum_{n=1}^n \alpha_n = 2pn + q$ and $\alpha_1, \alpha_2, \alpha_3 \in \{1, 2, 3, \dots, 9\}$ and $25\alpha_1, 37\alpha_2, 49\alpha_3$ be three-digit numbers, then :

$\begin{vmatrix} \alpha_1 & \alpha_2 & \alpha_3 \\ 5 & 7 & 9 \\ 25\alpha_1 & 37\alpha_2 & 49\alpha_3 \end{vmatrix} =$

- A) $\alpha_1 + \alpha_2 + \alpha_3$ B) $\alpha_1 - \alpha_2 + \alpha_3$
C) 7 D) 0

19) If 1, ω, ω^2 are cube roots of unity, then : $\Delta =$

$\begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^{2n} & 1 & \omega^n \\ \omega^n & \omega^{2n} & 1 \end{vmatrix}$ is equal to : (A.I.E.E.E. 2003)

- A) 1 B) ω C) ω^2 D) 0

20) The value of the determinant:

$\begin{vmatrix} 1 & 1 & 1 \\ {}^m C_1 & {}^{m+1} C_1 & {}^{m+2} C_1 \\ {}^m C_2 & {}^{m+1} C_2 & {}^{m+2} C_2 \end{vmatrix}$ is equal to :

- A) 1 B) -1
C) 0 D) None of these.

21) The value of $\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix}$, ω being a cube root of

unity, is :

- A) 0 B) 1 C) ω^2 D) ω

22) The number of values of K for which the system of equation $(K+1)x+8y=4K$ and $K_x+(K+3)y=3K-1$ has infinitely many solutions is : [I.I.T (Screening) 2002]

- A) 0 B) 1 C) 2 D) infinite.

23) The value of the determinant :

$$\begin{vmatrix} 1 & \cos(\beta - \alpha) & \cos(\gamma - \alpha) \\ \cos(\alpha - \beta) & 1 & \cos(\gamma - \beta) \\ \cos(\alpha - \gamma) & \cos(\beta - \gamma) & 1 \end{vmatrix} \text{ is :}$$

- A) $4 \sin \alpha \sin \beta \sin \gamma$ B) $2 \cos \alpha \cos \beta \cos \gamma$
C) $4 \cos \alpha \cos \beta \cos \gamma$ D) None of these

24) If $A + B + C = \pi$, then the value of

$$\begin{vmatrix} \sin(A+B+C) & \sin B & \cos C \\ -\sin B & 0 & \tan A \\ \cos(A+B) & -\tan A & 0 \end{vmatrix} \text{ is equal to :}$$

- A) 0 B) 1
C) $2 \sin B \tan A \cos C$ D) None of these.

25) If A and B are square matrices of size $n \times n$ such that $A^2 - B^2 = (A - B)(A + B)$, then which of the following will be always true ? (A.I.E.E.E. 2006)

- A) $A=B$
B) $AB=BA$
C) Either A or B is a zero matrix
D) Either A or B is an identity matrix.

26) If $a \neq b \neq c$, one value of x which satisfies the equation

$$\det \begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix} = 0 \text{ is :}$$

- A) $x = a$ B) one C) two D) $x = 0$

27) If A and P are 3×3 matrices with integral entries such that $P'AP=A$, then $\det. P$ is :

- A) -1
B) 1
C) ± 1
D) ± 1 , provided A is non-singular.

28) The value of $\begin{vmatrix} p & 0 & 0 & 0 \\ a & q & 0 & 0 \\ b & c & r & 0 \\ d & e & f & s \end{vmatrix}$ is :

- A) $p + q + r + s$ B) 1
C) $ab + cd + ef$ D) $pqrs$.

29) Let $A = \begin{bmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$ The only correct statement

about the matrix A is : (A.I.E.E.E. 2004)

- A) A is a zero matrix
B) $A = (-1)I$, where I is a unit matrix
C) A^{-1} does not exist
D) $A^2=I$

30) If the system of the equations: $x - ky - z=0$, $kx - y - z=0$, $x+y - z=0$ has a non-zero solution, then the possible values of k are :

- A) -1, 2 B) 1, 2 C) 0, 1 D) -1, 1