108 If A is orthogonal matrix of order 3 then det (adj2A) =

1) 4 2) 16 3) 27 4) 64

109. If A is non singular matrix such that $A^2 = A^{-1}$ then adj A =

1) A 2) A^{-1} 3) A^3 4) $(A^{-1})^2$

110. If I is a (9 x 9) unit matrix, then rank (I) =

1) 0 2) 3 3) 6 4) 9

111. If A is non Singular and (A-2I) (A-4I) =0 then $\frac{1}{6}A + \frac{4}{3}A^{-1}$ =

1) I 2) 0 3) 2I 4) 6I

112. If A is non Singular and (A+I) (A-3I) =0 then $3A^{-1}-A+3I$ =

1) I 2) 0 3) 2I 4) 6I

113. If $A=\begin{pmatrix} 0 & 1 & -1 \\ 2 & 1 & 3 \\ 3 & 2 & 1 \end{pmatrix}$ then $[A\,(\text{Adj }A)\,A^{-1}]A$ =

1) $\begin{pmatrix} 6 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 6 \end{pmatrix}$ 2) $\begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix}$

3) $\begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix}$ 4) I

Solutions of Equations :

Consistency & In Consistency:

114. The system of equations which can be solved by matrix inversion method have

1) unique solution 2) no solution

3) infinitely many solutions 4) two solutions

115. The equations $x+3y-4z=\lambda x$

$x-3y+5z=\lambda y$

$3x+y+0=\lambda z$

are solvable if λ =

1) 0 2) 1,-1 3) 0,-1 4) 0,1

116. If the equations

$x+y-3z=0$,

$(1+\lambda)x+(2+\lambda)y-8z=0$

$x-(1+\lambda)y+(2+\lambda)z=0$

are consistent then the values of λ are

1) 1, 5/3 2) -1,5/3 3) 1,-5/3 4) -1,-3

117. The value of K so that the system of equations $x+ky+3z=0, 3x+ky-2z=0, 2x+3y-4z=0$ is consistent is

1) 33/2 2) -33/2 3) 0 4) 4

118. If x, y, z are not all zero and if the equations $ax+by+cz=0, bx+cy+az=0. cx+ay+bz=0$ then $x^3 : y^3 : z^3$ =

1) 1 : 2 : 3 2) 1 : 1 : 1

3) 1 : 3 : 2 4) 2 : 3 : 1

119. If the equations $(x-a)(y-b)=ab$

$(x-b)(y-c)=bc$

$(x-c)(y-a)=ca$

are consistent then a relation among a,b,c is

1) a=b=c 2) a+b+c = 0

3) $a^2+b^2+c^2 = 1$ 4) a+b+c=1

120. The equations x + y - 2z = 0, 2x - 3y - z = 0 x - 5y + 4z = k are consistent if k =

1) 1 2) -1

3) can be any real number 4) -2

121. If the equations

$(b+c)x+(c+a)y+(a+b)z=0$;

$cx+ay+bz=0$; $ax+by+cz=0$

are consistent then a relation among a, b, c is

1) a = b = c = 0 2) a = 2b = 3c

3) a = b = c 4) a + b + c = 0

122. If the equations $x+3y-4z=ax$;

$x-3y+5z=ay$; $3x+y=az$ *have* a non-trivial solution then the values of a are

1) 1,0 2) 1,2 3) -1,0 4) -1,2

123. If x = cy + bz, y = az + cx, z = bx + ay are consistent then ....

1) $a^2 + b^2 + c^2 + 2abc = 1$

2) a + b + c + 2abc = 0

3) $a^2 + b^2 + c^2 - 2abc = 0$

4) a + b + c - 2abc = 0

124. By eliminating a, b, c from

$x=\frac{a}{b-c}, y=\frac{b}{c-a}, z=\frac{c}{a-b}$ then

1) $\begin{vmatrix} 1 & -x & x \\ y & 1 & -y \\ z & -z & -1 \end{vmatrix}=0$ 2) $\begin{vmatrix} 1 & x & x \\ y & 1 & -y \\ z & -z & -1 \end{vmatrix}=0$

3) $\begin{vmatrix} 1 & -x & x \\ y & 1 & y \\ z & -z & -1 \end{vmatrix}=0$ 4) $\begin{vmatrix} 1 & -x & x \\ y & 1 & -y \\ z & z & -1 \end{vmatrix}=0$

125. If $x+y+z=1$, $ax+by+cz=k$, $a^2x+b^2y+c^2z=k^2$ has unique solution then $x=$ ....

1) $\frac{(k-b)(c-k)}{(a-b)(c-a)}$ 2) $\frac{(k-c)(a-k)}{(b-c)(c-a)}$

3) $\frac{(k-a)(b-k)}{(b-c)(c-a)}$ 4) $(k-a)(k-b)(k-c)$

126. If $u = ax + by + xz$, $v = ay + bz + cx$, $w = az + bx + cy$ then $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} . \begin{vmatrix} x & y & z \\ y & z & x \\ z & x & y \end{vmatrix}$

1) $u^3 + v^3 + w^3 - 3uvw$
2) $3uvw - u^3 - v^3 - w^3$
3) $u + v + w$
4) $u^2 + v^2 + w^2 - uv - vw - wu$

KEY

1) 1	2)2	3)1	4)2	5)1
6)3	7) 4	8)3	9)1	10)2
11)4	12)1	13) 1	14)3	15)1
16)1	17)2	18)1	19)1	20)2
21)2	22)2	23)1	24)3	25)3
26)4	27)2	28)4	29)4	30)2
31) 3	32)1	33)3	34)3	35)3
36)2	37) 4	38)3	39)3	40)3
41)1	42)2	43) 1	44)3	45)2
46)3	47)4	48)4	49) 2	50)4
51)1	52)2	53)1	54)1	55)2
56)1	57)4	58)1	59)1	60)3
61)1	62)1	63)3	64)1	65)4
66) 4	67)3	68)1	69)1	70)3
71)1	72) 1	73)3	74)4	75)4
76)2	77)2	78)2	79)3	80)1
81)1	82) 3	83)2	84)2	85)1
86)2	87)3	88) 1	89)3	90)1
91)2	92)3	93)2	94)2	95)2
96)2	97)1	98)1	99)1	100)3
101)4	102)1	103)3	104)2	105)4
106) 2	107)4	108)4	109)2	110)4
111)1	112)1	113)1	114)1	115) 3
116)3	117)1	118)2	119)1	120)3
121)3	122)3	123)1	124)1	125)1
126)1				

HINTS

2. $A^{26} = i^{26} I = -I$

5. $A^2 = \lambda I$ equating 1st row x 1st column elements on both sides

7. Skew-symmetric matrix of odd order, its determinant is zero

9. $A^3 = 36A$

10. $(A+B)^2 = A^2 + B^2 \Rightarrow AB = -BA$
Equate the corresponding elements

13. By verification

14. $(AB)^T = B^T A^T$

15. $(B-KI)(A-KI) = BA - BK - AK + K^2 I = AB - (A+B)K + K^2 I$
Therefore (i) option

20. $A^3 = \begin{bmatrix} 0 & 0 & x^3 \\ 0 & x^3 & 0 \\ x^3 & 0 & 0 \end{bmatrix}$

21. $A = \begin{bmatrix} 0 & 0 & x \\ 0 & x & 0 \\ x & 0 & 0 \end{bmatrix} \Rightarrow A^{100} = \begin{bmatrix} x^{100} & 0 & 0 \\ 0 & x^{100} & 0 \\ x & 0 & x^{100} \end{bmatrix}$

23. $A - B = \left(\frac{P+P^T}{2}\right) - \left(\frac{P-P^T}{2}\right) = P^T$

24. Give values of i and j $\Rightarrow A^T = -A$

27. $A^2 = A \Rightarrow |A|^2 = |A| \Rightarrow |A| = 0 \text{ or } 1$
But $|A| \neq 1 \Rightarrow A$ is singular

36. Put a=b=0
44. Put n = 1 and verify

49. Put x = 1

50. $|A|$ of degree 4

51. Take x = -1; expand, By verification, answer is 1

58. Apply $R_1 - R_2$, $R_3 - R_2$

59. $x = a \Rightarrow R_1, R_2$ are in the same proportion
$x = b \Rightarrow R_2, R_3$ are in the same propotion

65. Put x = 0, matrix is skew - symmetric

68. Apply $R_2 - R_1 - R_3$

69. Apply $R_2 - R_1,\ R_3 - R_1$

70. Take p = 1, q = 2, r = 3 and verify the options

84. 2(1-5k) + (5k+1) 2 + 3(4k -2) = 0

12k =2 $\Rightarrow$ k = 1/6

85. $|A| =$

$-\frac{1}{2}(a+b+c)\ \{(a-b)^2+(b-c)^2+(c-a)^2\} = 0$

$(\Theta\ a \neq b \neq c)$

86. Same as above

87. $|A| = \pm 1; |B| = 0 \Rightarrow |AB| = 0$

88. $C_1 \to C_1 + C_2 + C_3,\ \alpha + \beta + \gamma = 0$

89. put x=0

90. $A^6 = \begin{bmatrix} \cos 6\theta & \sin 6\theta \\ \sin 6\theta & \cos 6\theta \end{bmatrix}$

91. sum of the squares of elements in a row = 1

94. Det A = 40, a_{11} of A^2 = 1+ 6 + 12 = 19

therefore $\frac{19-23}{40} = \frac{-4}{40}$ and co-factor a_{11} of A is -4

95. $AB = BA \Rightarrow (AB)^{-1} = (BA)^{-1}$

$\Rightarrow B^{-1}A^{-1} = A^{-1}B^{-1}$

97. det $(4A^{-1}) = 4^2$ det A^{-1} = 16 det A

99. $P^{-1} = \frac{1}{\det A} adjA = \frac{1}{x}[\ ]$

100. $A^{-1} = A^T$ (Orthogonal Matrix)

104. $|AdjA| = |A|^{n-1}$

105. $AdjI = I$

106. $adj(KA) = K^2(adjA)$

107. $|adj(2A)| = |4adj(A)| = 4^3|adj\ A|$

108 $4^3|A|^2 = 64 \times 1 = 64$

109. $A^2 = A^{-1} \Rightarrow A^3 = I \Rightarrow |A| = 1$

$(adj\ A) = |A|A^{-1} = A^{-1}$

110. Rank of I_n = n

115. $\begin{vmatrix} 1-\lambda & 3 & -4 \\ 1 & -3-\lambda & 5 \\ 3 & 1 & -\lambda \end{vmatrix} = 0$ on expanding

$-\lambda(\lambda+1)^2 = 0$

$\lambda = 0, -1$

117. $\begin{vmatrix} 1 & k & 3 \\ 3 & k & -2 \\ 2 & 3 & -4 \end{vmatrix} = 0$

$K = (33)/2$

118. $ax + by + cz = 0 \qquad bx + cy + az = 0$

$bx + cy + az = 0 \qquad cx + ay + bz = 0$

$cx + ay + bz = 0$

$ax + by + cz = 0$

$\frac{x}{ab-c^2} = \frac{y}{bc-a^2} = \frac{z}{ac-b^2} \qquad (1)$

$\frac{x}{bc-a^2} = \frac{y}{ac-b^2} = \frac{z}{ab-c^2} \qquad (2)$

$\frac{x}{ac-a^2} = \frac{y}{ab-c^2} = \frac{z}{bc-a^2} \qquad (3)$

from (1), (2), (3)

$\frac{x^3}{(\ )} = \frac{y^3}{(\ )} = \frac{z^3}{(\ )} \Rightarrow x^3 : y^3 : z^3 = 1:1:1$

121. $\begin{vmatrix} b+c & c+a & a+b \\ c & a & b \\ a & b & c \end{vmatrix} = 0 \Rightarrow a = b = c$

LEVEL 3

1. $If\ A\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix} = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_1 \\ a_3 & b_3 & c_3 \end{bmatrix}$ then the 1st row elements of A are

1) a_1x, b_1y, c_1z 2) a_1x, b_1x, c_1x

3) $\frac{a_1}{x}, \frac{b_1}{y}, \frac{c_1}{z}$ 4) $\frac{a_1}{x}, \frac{b_1}{x}, \frac{c_1}{x}$

2. If A is idempotent matrix and A+B = I, then B is

1) nipotent matrix 2) idempotant mattrix

3) involutary matrix 4) orthogonal matrix

3. If $l_1^2+m_1^2+n_1^2=1,\ l_2^2+m_2^2+n_2^2=1,$ $l_3^2+m_3^2+n_3^2=1$ and $l_1l_2+m_1m_2+n_1n_2=0, l_2l_3+m_2m_3+n_2n_3=0$ $l_3l_1+m_3m_1+n_2n_1=0$, then $\begin{vmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ l_3 & m_3 & n_3 \end{vmatrix}=$

1) 0 2) ± 1 3) ± 2 4) 3

4. If $f(x)=\begin{vmatrix} \cos x & x & 1 \\ 2\sin x & x^2 & 2x \\ \tan x & x & 1 \end{vmatrix}$ then $\underset{x\to 0}{Lt}\frac{f(x)}{x}=$

1) 0 2) -1 3) -2 4) 2

5. The determinant of $\begin{vmatrix} 1 & 1 & 1 \\ \alpha^2 & \beta^2 & \gamma^2 \\ -\alpha^2 & \beta^2 & \gamma^2 \end{vmatrix}$ is divisible by

1) $\beta-\gamma$ 2) $\alpha+\beta$ 3) $\beta\gamma$ 4) β/γ

6. $\begin{vmatrix} ka & k^2+a^2 & 1 \\ kb & k^2+b^2 & 1 \\ kc & k^2+c^2 & 1 \end{vmatrix}$

1) $k(a+b)(b+c)(c+a)$
2) $k(a-b)(b-c)(c-a)$
3) $k^2(a-b)(b-c)(c-a)$
4) $-k(a-b)(b-c)(c-a)$

7. If α,β are the roots of $\begin{vmatrix} x & 1 & 2 \\ 0 & 1 & 1 \\ 1 & x & 2 \end{vmatrix}=0$ then $\alpha^n+\beta^n=$

1) 0 2) 1 3) 2 4) 2n

8. If n is even and $A^n=A^{-1}$, then $(\text{adj } A)^{-1}=$

1) A 2) A^2
3) A^T 4) does not exist

9. If A, B, C are the angles of a ΔABC, then $\begin{vmatrix} \sin^2 A & \cot A & 1 \\ \sin^2 B & \cot B & 1 \\ \sin^2 C & \cot C & 1 \end{vmatrix}=$

1) $\frac{a^2+b^2+c^2}{4\Delta}$ 2) $\frac{a^2+b^2+c^2}{4R^2\Delta}$
3) $\frac{a^2+b^2+c^2}{16R^2\Delta}$ 4) 0

10. If $r^2=a^2+b^2+c^2$; $S^2=ab+bc+ca$ then $\begin{vmatrix} r^2 & s^2 & s^2 \\ s^2 & r^2 & s^2 \\ s^2 & s^2 & r^2 \end{vmatrix}=$

1) $3abc-a^3-b^3-c^3$ 2) $a^3+b^3+c^3+3abc$
3) $(3abc-a^3-b^3-c^3)^2$ 4) 0

11. The value of $\begin{bmatrix} Cos(\theta+\alpha) & Sin(\theta+\alpha & 1 \\ Cos(\theta+\beta) & Sin(\theta+\beta) & 1 \\ Cos(\theta+v) & Sin(\theta+v) & 1 \end{bmatrix}$

1) depends on θ 2) independent of θ
3) always θ 4) cannot be determined

12. The value of $\begin{vmatrix} 1 & \sin x & \cos x \\ 1 & \sin y & \cos y \\ 1 & \sin z & \cos z \end{vmatrix}=$

1) $4\sin\left(\frac{x-y}{2}\right)\sin\left(\frac{y-z}{2}\right)\sin\left(\frac{z-x}{2}\right)$

2) $4\sin\left(\frac{x-y}{2}\right)\sin\left(\frac{z-x}{2}\right)\sin\left(\frac{z-y}{2}\right)$

3) 0 4) 4 sinx sin y sin z

13. If $a=\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}$ then $\begin{vmatrix} 1 & 1 & 1 \\ 1 & a & a^2 \\ 1 & a^2 & a \end{vmatrix}=$

1) purely real 2) purely imaginary
3) complex number 4) rational

14. If If $a = \cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}$ then

$$\begin{vmatrix} 1 & 1 & a \\ 1 & 1 & a^2 \\ a^2 & a & 1 \end{vmatrix} =$$

1) purely real 2) purely imaginry
3) complex number 4) irrational

15. If 2S = a+b+c then

$$\begin{vmatrix} a^2 & (s-a)^2 & (s-a)^2 \\ (s-b)^2 & b^2 & (s-b)^2 \\ (s-c)^2 & (s-c)^2 & c^2 \end{vmatrix} =$$

1) 2s (s-a) (s-b) (s-c) 2) $2s^3$ (s-a) (s-b) (s-c)
3) $2s^2$ (s-a) (s-b) (s-c) 4) none

16. If $f_r(x)$; $g_r(x)$; $h_r(x)$; r = 1.2.3 are polynomials in x such that $f_r(a) = g_r(a) = h_r(a)$ r = 1,2,3 and ifs

$$f(x)=\begin{vmatrix} f_1(x) & f_2(x) & f_3(x) \\ g_1(x) & g_2(x) & g_3(x) \\ h_1(x) & h_2(x) & h_3(x) \end{vmatrix} \text{ then}$$

$f^1(x)$ at x = a is
1) 0 2) 1 3) 2 4) 3

17. $$\begin{vmatrix} a & b-c & c+b \\ a+c & b & c-a \\ a-b & b+a & c \end{vmatrix} =$$

1) (abc) $(a^2+b^2+c^2)$ 2) (a+b+c) $(a^2+b^2+c^2)$
3) $(a+b+c)^2$ $(a^2+b^2+c^2)$ 4) abc

18. If a,b,c are all different and if

$$\begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix} = 0$$ then the non-zero values of x are

1) $\pm\sqrt{ab+bc+ca}$ 2) $\pm\sqrt{ab+bc-ca}$
3) $\pm\sqrt{bc+ca-ab}$ 4) abc

19. $$\begin{vmatrix} a+b+nc & (n-1)a & (n-1)b \\ (n-1)c & b+c+na & (n-1)b \\ (n-1)c & (n-1)a & (c+a+nb) \end{vmatrix} =$$

1) $n(a+b+c)^2$ 2) $n(a+b+c)^3$
3) n^3 (a+b+c) 4) n^2 $(a+b+c)^2$

20. The value of $\begin{vmatrix} x & a & a \\ a & x & a \\ a & a & x \end{vmatrix}$ is

1) (x+2a) $(x-a)^2$ 2) (x-2a) $(x-a)^3$
3) $(x+2a)^2$ (x-a) 4) (x-2a) (x-a)

21. $$\begin{vmatrix} b+c & c+a & a+b \\ q+r & r+p & p+q \\ y+z & z+x & x+y \end{vmatrix} =$$

1) $2\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$ 2) $\begin{vmatrix} p & q & r \\ a & b & c \\ x & y & z \end{vmatrix}$

3) $\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$ 4) $\begin{vmatrix} p & q & r \\ a & b & c \\ x & y & z \end{vmatrix}$

22. If a+b+c = 0and if $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$

then the non-zero root of this equation is

1) $\sqrt{(a^2+b^2+c^2+ab+bc+ca}$
2) $\sqrt{(a^2+b^2+c^2-ab-bc-ca}$
3) $\sqrt{(a^2+b^2+c^2}$ 4) $\sqrt{(ab+bc+ca)}$

23. The value of $\begin{vmatrix} 1 & \cos\alpha-\sin\alpha & \cos\alpha+\sin\alpha \\ 1 & \cos\beta-\sin\beta & \cos\beta+\sin\beta \\ 1 & \cos\gamma-\sin\gamma & \cos\gamma+\sin\gamma \end{vmatrix}$

1) $2\begin{vmatrix} 1 & \cos\alpha & \sin\alpha \\ 1 & \cos\beta & \sin\beta \\ 1 & \cos\gamma & \sin\gamma \end{vmatrix}$ 2) $3\begin{vmatrix} 1 & \cos\alpha & \sin\alpha \\ 1 & \cos\beta & \sin\beta \\ 1 & \cos\gamma & \sin\gamma \end{vmatrix}$

3 $\begin{vmatrix} \cos\alpha & \cos\beta & 1 \\ \cos\beta & \cos\gamma & 1 \\ \cos\gamma & \cos\alpha & 1 \end{vmatrix}$ 4) $\begin{vmatrix} 1 & \cos\alpha & \sin\alpha \\ 1 & \cos\beta & \sin\beta \\ 1 & \cos\gamma & \sin\gamma \end{vmatrix}$

24. $A=\begin{bmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{bmatrix}$ then $|A|=$

1) abc 2) abc-1 3) abc+1 4) 0

25. If $f(x)=\det\begin{bmatrix} x^n & \sin x & \cos x \\ \angle n & \sin\left(\frac{n\pi}{2}\right) & \cos\left(\frac{n\pi}{2}\right) \\ a & a^2 & a^3 \end{bmatrix}$ the value of $\frac{d^n}{dx^n}(f(x))$ at $x=0$ is

1) -1 2) 0 3) 1 4) a^6

26. Let A_1, B_1, C_1 etc., be the cofactors of a_1, b_1, c_1 etc., and let

$P=\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix} Q=\begin{bmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{bmatrix}$

Det PQ^T == (det P) ^{K} then k = ...

1) 0 2) 1 3) 2 4) 3

27. $\begin{vmatrix} 1 & a & a^2 \\ \cos(n-1)x & \cos nx & \cos(n+1)x \\ \sin(n-1)x & \sin nx & \sin(n+1)x \end{vmatrix}$ =k sinx

then k =

1) $1 + a^2 - 2a$ 2) $1 - a^2 - 2a$

3) $1 + a^2 + 2a\cos x$ 4) $1 + a^2 - 2a\cos x$

28. y = sin x, $y_n=\frac{d^n(\sin x)}{dx^n}$ then $\begin{vmatrix} y & y_1 & y_2 \\ y_3 & y_4 & y_5 \\ y_6 & y_7 & y_8 \end{vmatrix}$ =....

1) -sin x 2) 0 3) sin x 4) cos x

29. y = cosx $y_n=\frac{d^n(\cos x)}{dx^n}$ then $\begin{vmatrix} y_4 & y_5 & y_6 \\ y_7 & y_8 & y_9 \\ y_{10} & y_{11} & y_{12} \end{vmatrix}$ =....

1) 0 2) -cosx 3) cosx 4) sin x

30. If the equations $ax+hy+gz=0$, $hx+by+fz=0$, $gx+fy+cz=\lambda z$ are solvable then the value λ is

1) 0 2) $\frac{abc+2gfh-af^2-bg^2-ch^2}{ab-h^2}$

3) $abc+2fgh-af^2-bg^2-ch^2$

4) $\frac{af^2+bg^2+ch^2-abc-2fgh}{ab-h^2}$

31. If $f(x)=\begin{vmatrix} 1+\sin^2 x & \cos^2 x & 4\sin 2x \\ \sin^2 x & 1+\cos^2 x & 4\sin 2x \\ \sin^2 x & \cos^2 x & 1+4\sin 2x \end{vmatrix}$

then the maximum value of f(x) is

1) 2 2) 4 3) 6 4) 8

32. $a\neq p, b\neq q, c\neq r$ and $\begin{vmatrix} p & b & c \\ a & q & c \\ a & b & r \end{vmatrix}=0$ then

the value of $\frac{p}{p-a}+\frac{q}{q-b}+\frac{r}{r-c}=$

1) 1 2) 2 3) 3 4) c

33. If $a_1, a_2, ... a_n ....$ are in G.P. and $a_i>0$ for each i, then the value of

$\begin{vmatrix} \log a_n & \log a_{n+2} & \log a_{n+4} \\ \log a_{n+6} & \log a_{n+8} & \log a_{n+10} \\ \log a_{n+12} & \log a_{n+14} & \log a_{n+16} \end{vmatrix}=$

1) 0 2) $\log a_{n+16}$

3) $\log a_n$ 4) $\log a_{n+16} - \log a_n$

34. $\begin{vmatrix} a & a+b & a+b+c \\ 3a & 4a+3b & 5a+4b+3c \\ 6a & 9a+6b & 11a+9b+6c \end{vmatrix}=$

1) $-c^3$ 2) $-b^3$ 3) $-a^3$ 4) 0

35. If $f(x)=\begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & (x+1)x(x-1) \end{vmatrix}$

then f(100) =

1) 0 2) 1 3) 100 4) -100

36. If A is a singular matrix of order (nxn), then rank (A) is,

1) 0 2) $\leq n$ 3) <n 4) =n

37. If A is a non-singular matrix of order (nxn), then rank (A) is,

1) 1 2) n 3) >n 4) <n

38. If the elements of a row of a marix are in proportion with the elements of all other rows of the matrix, then the rank of the matrix is

1) 1 2) 2 3) 3 4) 4

39. If $A=\begin{bmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{bmatrix}$ and rank (A) < 3, then

the $\bar{a}=(a_1,a_2,a_3);\bar{b}=(b_1,b_2,b_3);$

$\bar{c}=(c_1,c_2,c_3)$ are

1) non-coplanar 2) coplanar
3) collinear 4) cannot be said

40. If the points $(x_1,y_1);(x_2,y_2);(x_3,y_3)$ are collinear and $A=\begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$ then the rank (A) is

1) =3 2) < 3 3) > 3 4) > 4

41. If $A_{3\times3}.X_{3\times1}=D_{3\times1}$ is a consistent system of equations having unique solution then rank(A)

1) 3 2) 2 3) 1 4) 0

42. If $A_{3\times3}.X_{3\times1}=D_{3\times1}$ has infinite solutions, then rank (A) is

1) =3 2) <3 3) >3 4) >4

43. $A_{3\times3}$ is a non zero nilpotent matrix then Rank of A

1) 1 2)2 3) 3 4) 0

44. If $f(x)=\begin{vmatrix} \cos^2 x & \cos x\sin x & -\sin x \\ \cos x\sin x & \sin^2 x & \cos x \\ \sin x & -\cos x & 0 \end{vmatrix}$

then $f\left(\frac{\pi}{12}\right)=$

1) 0 2) 1 3) -1 4) 2

45. $\begin{vmatrix} 2 & a+b+c+d & ab+cd \\ a+b+c+d & 2(a+b)(c+d) & ab(c+d)+cd(a+b) \\ ab+cd & ab(c+d)+cd(a+b) & 2abcd \end{vmatrix}$

1)abcd 2)0
3)a+b+c+d 4)1

46. $\begin{vmatrix} 2a_1b_1 & a_1b_2+a_2b_1 & a_1b_3+a_3b_1 \\ a_1b_2+a_2b_1 & 2a_2b_2 & a_2b_3+a_3b_2 \\ a_1b_3+a_3b_1 & a_3b_2+b_3a_2 & 2a_3b_3 \end{vmatrix}$

1) 0 2) 1
3) $a_1b_1a_2b_2$ 4) $a_1b_1+a_2b_2$

47. Let three digit numbers A28, 3 B9, 62C where A,B,C are integers between 0 and 9 be divisible by a fixed Integer K then

$\begin{vmatrix} A & 3 & 6 \\ 8 & 9 & C \\ 2 & B & 2 \end{vmatrix}$ is divisible by

1) K^2 2) K (k+1)
3) K 4) K+2

48. $\begin{vmatrix} x^2-2x+3 & 7x+2 & x+4 \\ 2x+7 & x^2-x+2 & 3x \\ 3 & 2x-1 & x^2-4x+7 \end{vmatrix}=$

$ax^6+bx^5+cx^4+dx^3+ex^2+fx+g$, then g=

1) 0 2)1 3)108 4)-108

49. If x, y, z are positive integers, then

$\begin{vmatrix} x_{c_r} & x_{c_{r+1}} & x_{c_{r+2}} \\ y_{c_r} & y_{c_{r+1}} & y_{c_{r+2}} \\ z_{c_r} & z_{c_{r+1}} & z_{c_{r+2}} \end{vmatrix} - \begin{vmatrix} x_{c_r} & (x+1)_{c_{r+1}} & (x+2)_{c_{r+2}} \\ y_{c_r} & (y+1)_{c_{r+1}} & (y+2)_{c_{r+2}} \\ z_{c_r} & (z+1)_{c_{r+1}} & (z+2)_{c_{r+2}} \end{vmatrix}$

1)0 2)2^r
3) $(x+y+z)_{c_r}$ 4) $(x+y+z)_{c_{r+2}}$

50. Let $\Delta=\begin{vmatrix} a & a+b & a+b+c \\ 3a & 4a+3b & 5a+4b+3c \\ 6a & 9a+6b & 11a+9b+6c \end{vmatrix}$

where

a=i, b=ω and c=ω^2 then $\Delta=$

1) ω 2) $-\omega^2$ 3) i 4) -i

51. Let $\Delta = \begin{vmatrix} 3-2x & 3+2x & 3+2x \\ 3+2x & 3-2x & 3+2x \\ 3+2x & 3+2x & 3-2x \end{vmatrix}$ and 'K'is a factor of Δ then K=

1) x^3 or 2x-9 2) x or2x+9
3) x^2 or 2x+9 4) x or 3x+2

52. If the equations ax+hy+g=0, hx+by+f=0, gx+fy+c=k are consitent then

k= $\frac{1}{\lambda}\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$ where λ is equal to

1) h^2-ab 2) ab-h^2
3) h^2+ab 4) g^2-ac

53. There are n real values of λ for which equations (a-λ) x+by+cz=0, bx+(c-λ)y+az=0, cx+ay+(b-λ)=0 are simultaneously true, then 'n' is equal to

1) 2 2) 3 3) 4 4) 5

54. The Rank of $\begin{bmatrix} 1 & 2 & 3 & 1 \\ 2 & 4 & 6 & 2 \\ 1 & 2 & 3 & 2 \end{bmatrix}$ is

1) 1 2) 2 3) 0 4) 3

KEY

1) 3	2)2	3)2	4)1	5)1
6)2	7) 3	8)1	9)4	10)3
11)2	12)2	13) 2	14)1	15)2
16)1	17)2	18)2	19) 2	20)1
21)1	22)2	23)1	24)4	25) 2
26)4	27)4	28)2	29)1	30)2
31) 3	32) 2	33) 1	34) 3	35) 1
36) 3	37) 2	38) 1	39) 2	40) 2
41) 1	42) 2	43)1	44)2	45)2
46)1	47)3	48)4	49)1	50)3
51)3	52)2	53)2	54)2	

HINTS

1. Verify with the options
2. If 'A' is idempotent, I - A is also idempotent
3. Matrix is orthogonal value of determinant is ± 1
4. $R_1 \to R_1 - R_3$
5. $\beta = \gamma \Rightarrow D = 0$

   $\beta - \gamma$ *is root*

   $\Rightarrow$ D is divisible by $\beta - \gamma$
6. split into two determinants
7. $\begin{vmatrix} x & 1 & 2 \\ 0 & 1 & 1 \\ 1 & x & 2 \end{vmatrix} = (x-1)^2 = 0$

   $\alpha = \beta = 1 \Rightarrow \alpha^n + \beta^n = 2$
8. $(adjA)^{-1} = \frac{A}{|A|} = A$

   $\left(\Theta\ A^2 = A^{-1} \Rightarrow |A|^2 = \frac{1}{|A|} \Rightarrow |A| = 1\right)$
9. Expand along 1^{st} column

   $\frac{1}{\sin A \sin B \sin C}\sum \sin^3 A \sin(B-C) = 0$
10. $\begin{vmatrix} r^2 - s^2 & s^2 - r^2 & 0 \\ s^2 & r^2 & s^2 \\ 0 & s^2 - r^2 & r^2 - s^2 \end{vmatrix}$

    $= (r^2 - s^2)^2 \begin{vmatrix} 1 & -1 & 0 \\ s^2 & r^2 & s^2 \\ 0 & -1 & 1 \end{vmatrix}$

    $(r^2-s^2)^2(r^2+2s^2) = (a+b+c)^2(a^2+b^2+c^2-ab-bc-ca)^2$
11. Put $\lambda = 0 = \beta = \gamma$

13. $a = w^2 = \Delta = \begin{vmatrix} 3 & 0 & 0 \\ 1 & a & a^2 \\ 1 & a^2 & a \end{vmatrix} == 3(a^2 - a)$

18. $\Delta = (x-a)(x-c)(x+b) + (x-b)(x+a)(x+c)$
    $= 2\left[x^3 + x(ac - ab - bc)\right]$

24. $|A|$ is of degree 7

25. Differentiate 1st row n times

31. $\begin{vmatrix} 1+a_1 & a_2 & a_3 \\ a_1 & 1+a_2 & a_3 \\ a_1 & a_2 & 1+a_3 \end{vmatrix} = 1+a_1+a_2+a_3 \Rightarrow 2+\sin^2\theta \in [2,6]$

32. $R_1 - R_2; R_3 - R_1$

33. Rows are in A.P. since the given elements are in G.P.

34. $R_2 - 3R_1; R_3 - 6R_1$

35. $C_3 - (C_1 + C_2)$

37. Rank of non singular matrix of order n is n.

38. All determinants of order greater than 1 are zeros.

39. $|A| = 0$

40. $|A| = 0$

41. $|A| \neq 0$

42. $|A| = 0$

LEVEL-IV

NEW PATTERN QUESTIONS

1. A=$\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ then

1) A is singular matrix
II) $A^{-1}=A^T$
III) A is symmetric matrix
IV) $A^{-1}= -A$

1) only I and II 2) only II and III
3) only II 4) only IV

2. If AB=A, BA=B and
I) $A^2B=A^2$ II) ABA=A, BAB=B
III) $A^2=A$, $B^2 = B$
Then which of the above statements is / are correct
1) All the three I, II and III
2) only I and II
3) only II and III
4) only I and III

3. Let $A_\alpha = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$

I) $A_\alpha B_\beta = A_{\alpha+\beta}$ II) $A_\alpha B_\beta = A_{\alpha\beta}$
III) $(A_\alpha)^{-1} = -A\alpha$ IV) $(A_\alpha)^{-1} = A_{-\alpha}$
Then which of the above statements is / are correct
1) only II and III 2) Only II and IV
3) only I and III 4) only I and IV

4. If A=$\begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$

I) $A^n=A$ for all n ε N II) $A^3=I$
III) $A^{-1}=A^2$
Then which of the above statements is / are correct
1) All the three I, II and III
2) only I and II
3) only II and III
4) only I

5. If A=$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$(where bc $\neq$ 0) satisfies the equation $x^2+k=0$
I) a+d=0 II) ad=bc
III)K=-$|A|$ IV) K=$|A|$
1) only I and iii 2) only II and III
3) only II and IV 4) only I and IV

6. which of the following operation does not alter the determinant. Then which of the above statements is / are true.
I) $R_3=R_3-5R_1$ II) $R_1=5R_3+R_1$
III) Inter change of 2rows
IV) Inter change of rows with columns
1) Only I and II 2) Only II and III
3) only I, II & IV 4) Only I, III and IV

7. Let P and Q be 2×2 matrices. Consider the statements.

I) PQ=0 $\Rightarrow$ P=0 or Q=0 or both

II) $PQ=I_2 \Rightarrow P=Q^{-1}$

III) $(P+Q)^2=P^2+2PQ+Q^2$

1) I and II are false but III is true

2) I and III false and II is true

3) All are false

4) All are true

8. I. Of A,B,C are anyles of angle and

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+\sin A & 1+\sin B & 1+\sin C \\ \sin A+\sin^2 A & \sin B+\sin^2 B & \sin C+\sin^2 C \end{vmatrix}=0$$ then

triangle is isosceles

II. If $a=1+2+4+---$ upto n terms

$b=1+3+9+---$ up to n terms

$c=1+5+25+----$ up to n terms

then $\Delta=\begin{vmatrix} a & 2b & 4c \\ 2 & 2 & 2 \\ 2^n & 3^n & 5^n \end{vmatrix}=0$

1) I ,II both are true

2) only I is true

3) only II is true

4) neither I nor II is true

9. If $\begin{bmatrix} b & c & bL+C \\ c & d & cL+d \\ bL+c & cL+d & aL^3-cL \end{bmatrix}=0$

I) b,c,d in A.P. II) b,c,d, in G.P.

III) b,c,d, in H.P.

IV) L is root of $ax^3+bx^2+cx+d=0$

1) only I, IV 2) only II, IV

3) only III, IV 4) only IV

10. Suppose x,y,z are positive integers $\Delta \neq 1$

If $\Delta=\begin{bmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \sin(x+y) & -\cos(x+y) & \sin^2 z \end{bmatrix}$

then

I) Independent of x II) Independent of y

III) Independent of z

The which of the above statement is / are correct

1) only I and II 2) only II and III

3) only I and III 4) all the three I,II,III

11. If $A=\begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$, $KA=\begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$ then arrange the values of k,a,b, in ascending order

1) k, a, b 2) b, a, k 3) a, k, b 4) b, k, a

12. Arrange the following matrices in ascending order of their determinant values.

A) $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & cos\theta \end{bmatrix}$ B) $\begin{bmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{bmatrix}$

C) $A(\text{adj } A)=\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$ then $|A|$

D) $\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$

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

3) D,C,B,A 4)C,D,B,A

13. If A is a 3×3 non singular matrix and

$|adjA|=|A|^x$

$|adj(adjA)|=|A|^y$, $|A^{-1}|=|A|^z$, then the values of x, y, z, in descending order.

1) X,Y,Z 2)Z,Y,X 3)Z,X,Y 4)Y,X,Z

14. A : A,B are two matrices then AB need not be equal to BA

R : Matrix multiplication is associative

The correct answer is

1) Both A and R are true R is correct explanation to A

2) Both A and R are true but R is not correct explanation to A

3) A is true R is false

4) A is false R is true

15) A : $\begin{vmatrix} 0 & p-e & e-r \\ e-p & 0 & r-p \\ r-e & p-r & 0 \end{vmatrix}=0$

R : The determinant of a skew symmetric matrix is zero

The correct answer is

1) Both A and R are true R is correct explanation to A
2) Both A and R are true but R is not correct explanation to A
3) A is true R is false
4) A is false R is true

16) A: If A=$\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$;B=$\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$ then AB=0

R: If AB=0 $\Rightarrow$ A or B need not be null matrices

The correct answer is

1) Both A and R are true R is correct explanation to A
2) Both A and R are true but R is not correct explanation to A
3) A is true R is false
4) A is false R is true

17. A: The number of values of k for which the equations.

$(k+1)x+8y=4k$ and kx+(k+3)y=3 k-1

has infinitely many solution is 1

R : Two linear equations, $a_1x+b_1y+c_1=0$, $a_2x+b_2y+c_2=0$ has infinite numbers solution if

det $\begin{bmatrix} a_1 & b_1 \\ a_2 & b_2 \end{bmatrix}=0$

The correct answer is

1) Both A and R are true R is correct explanation to A
2) Both A and R are true but R is not correct explanation to A
3) A is true R is false
4) A is false R is true

18. A: If A=$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ and AB=AC $\Rightarrow$ B=C

R: A=$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ is a symmetric matrix

The correct answer is

1) Both A and R are true R is correct explanation to A
2) Both A and R are true but R is not correct explanation to A
3) A is true R is false
4) A is false R is true.

19. A : AB=A, and BA=B $\Rightarrow$ $A^n+B^n=A+B$

R : AB=A, and BA=B $\Rightarrow$ A and B are idempotent

The correct answer is

1) Both A and R are true R is correct explanation to A
2) Both A and R are true but R is not correct explanation to A
3) A is true R is false
4) A is false R is true

20. A: If Matrix P=$\begin{bmatrix} 1 & 2 & -1 \\ 1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$ then

det[adj (adj P)]=12^4

R: A is square matrix of order n×n then

det Adj (Adj A) = $|A|^{(n-1)^2}$

The correct answer is

1) Both A and R are true R is correct explanation to A
2) Both A and R are true but R is not correct explanation to A
3) A is true R is false
4) A is false R is true

21. If a, b, c, d denote the determinants of matrices A, B, C, D where

A=$\begin{bmatrix} 0 & x-y & x-z \\ y-x & 0 & y-z \\ z-x & z-y & 0 \end{bmatrix}$

$B=\begin{bmatrix}1&1&1\\2&3&4\\4&9&16\end{bmatrix}$ $C=\begin{bmatrix}0&0&2\\0&5&0\\7&0&0\end{bmatrix}$

$D=\begin{bmatrix}1&1&1\\1&2&8\\1&3&27\end{bmatrix}$

Then the ascending order of a, b, c, d

1. a b c d 2) c a d b
3) c a b d 4) a c d b

22. S_1 : For a 3×3 square matrix A if adj(adj A) = (det A) A then det (adj A) = $(\det A)^2$
S_2 : For a 3×3 square matrix a if det (2A) = 8.det A then det adj(2A) =8adjA
1) Only S_1 is true 2) only S_2 is true
3) both S_1 and S_2 are true 4) Neither S_1 nor S_2 is true

23. S_1 : If $A=\begin{bmatrix}a&O&O\\O&b&O\\O&O&c\end{bmatrix}$

then $A^{-1}=\begin{bmatrix}1/a&O&O\\O&1\backslash b&O\\O&O&1\backslash c\end{bmatrix}$

S_2 : If $A=\begin{bmatrix}O&O&a\\O&b&O\\c&O&O\end{bmatrix}$

then $A^{-1}=\begin{bmatrix}O&O&1/a\\O&1/b&O\\1/c&O&O\end{bmatrix}$

1) only S_1 is true 2) only S_2 is true
3) both S_1 and S_2 are true
4) Neither S_1 nor S_2

24. **List - I** **List - II**

$A=\begin{bmatrix}1&\omega&\omega^2\\\omega&\omega^2&1\\\omega^2&1&\omega\end{bmatrix}$ 1) Symmetric Matrix

ω is complex cube root of 1

$B=\begin{bmatrix}2&-2&-4\\-1&3&4\\1&-2&-3\end{bmatrix}$ 2) Skew symmetric

$C=\begin{bmatrix}a&h&g\\h&b&f\\g&f&c\end{bmatrix}$ 3) Nil potent Matrix

$D=\begin{bmatrix}O&c&-b\\-c&O&a\\b&-a&O\end{bmatrix}$ 4) Singular Matrix

5) Idempotent Matrix

Match of list-I from list - I

	A	B	C	D
1.	4	3	1	2
2.	4	3	2	5
3.	4	5	2	3
4.	4	5	1	2

25. A) Tr(A)=8, Tr(B)=6 $\Rightarrow$ Tr(A-2B)=

B) If $A=\begin{bmatrix}1^2&2^2&3^2\\2^2&3^2&4^2\\3^2&4^2&5^2\end{bmatrix}$ then |adj A|=

C) If A+B+C= π then

$\begin{vmatrix}Sin(A+B+C)&SinB&CosC\\-SinB&O&\tan A\\Cos(A+B)&\tan(B+C)&O\end{vmatrix}=$

D) If $A=\begin{bmatrix}1&2\\3&1\end{bmatrix}$ and $B=\begin{bmatrix}1&0\\2&0\end{bmatrix}$ then $|A^2+2B|$=

The correct order of A,B,C,D

1. A<B<C<D 2.A<C<D<B
3. A<D<C<B 4. A<D<B<C

26. Observe the following lists :

List - I	List - II
A) If A is a singular matrix then adj A is	1) $(\det A)^{n-1}$
B) If A is a square matrix then detA=	2) an idempotent matrix
C) If $A^2=A$ then A is	3) Singular
D) If A is square matrix of type n then det (adj A) =	4) $\det A^T$
	5) a nil potent matrix

The correct match for list - I from list - II is

	A	B	C	D
1.	2	3	1	5
2.	3	4	2	1
3.	4	3	2	5
4.	1	2	3	4

27. If $A = [a_{ij}]$ is a square matrix such that

List - I	List - II
A. $a_{ij} = 1$ if i=j, $= O$ if $i \neq j$	1. symmetricmatrix
B. $a_{ij} = O$ if $i \neq j$	2. skew symmetric matrix
C. $a_{ij} = O$ if i>j	3. unit matrix
D. $a_{ij} = i^2-j^2 \; \forall$ i, j	4. diagonal matrix
	5. upper triangular matrix

Correct match of List-I from List-II

	A	B	C	D
1.	3	4	5	1
2.	3	4	5	2
3.	3	5	4	2
4.	1	5	3	2

28. A is a square matrix

List - I	List - II
A. $AA^T=I$	1. A is involutory
B. $A^2=I$	2. A is idempotent
C. $A^2=O$	3. A is orthogonal
D. $A^2=A$	4. A is nilpotent
	5. A is singular

Correct match of List-I from List-II

	A	B	C	D
1.	1	3	4	5
2.	3	1	4	2
3.	2	3	4	5
4.	1	5	3	2

29. Assertion 'A' : The factors of

$$\begin{vmatrix} a^n & a^{n+1} & a^{n+2} \\ b^n & b^{n+1} & b^{n+2} \\ c^n & c^{n+1} & c^{n+2} \end{vmatrix}$$ are (a-b), (b-c), (c-a)

Reason 'R' : Taking the value of n=1 then the value of the above determinant (abc) (a-b) (b-c) (c-a)

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not correct explanation of A.
3. A is true but R is false.
4. A is false, R is true.

30. i) If the inverse of matrix A exist. Then matrix A is non singular.

ii) If a square, non-singular matrix A statisfies $A^2-A+2I=0$ then $A^{-1}=\frac{1}{2}(I+A)$.

Which of the following statement is correct.

1. Only i 2. Only ii
3. Both i and ii 4. Neither i nor ii

31. i. Trace of the matrix is called sum of the elements in a principle diagonal of the square matrix.

ii. The trace of the matrix $\begin{bmatrix} 8 & 7 & 2 \\ 5 & 8 & 2 \\ 7 & 2 & 8 \end{bmatrix}$ is 24

Which of the following statement is correct.

1. Only i 2. Only ii
3. Both i and ii 4. Neither i nor ii

32. i. $\begin{vmatrix} x+2 & \omega & \omega^2 \\ \omega & x+1+\omega^2 & 1 \\ \omega^2 & 1 & x+1+\omega \end{vmatrix} = 0$ if x=-1

ii. $A = \begin{vmatrix} \cos x & \sin x \\ \sin x & \cos x \end{vmatrix}$ then maximum value of A is one

Which of the following statement is correct.

1. Only i 2. Only ii
3. Both i and ii 4. Neither i nor ii

	A	B	C	D
1.	IV	II	I	III
2.	II	IV	III	IV
3.	III	I	II	IV
4.	I	II	III	IV

33. **List I** **List II**

A. $\begin{vmatrix} -2 & 2 & 2 \\ 2 & -2 & 2 \\ 2 & 2 & -2 \end{vmatrix} =$ I. $\begin{pmatrix} 2 & 5 \\ 5 & 8 \end{pmatrix}$

B. $A=\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $A^{-1}=$ II. A^T

C. $A=\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then $A+A^T=$ III. $\begin{bmatrix} 5 & 4 \\ -4 & 1 \end{bmatrix}$

D. $A=\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, IV. 32

$A^2=A+B$ then B=

Match the following

	A	B	C	D
1.	IV	II	I	III
2.	II	IV	III	IV
3.	III	I	II	IV
4.	I	II	III	IV

34. If A is a $n \times n$ non singular matrix

	List 1		List 2
A.	$(AB)^{-1}$	1.	adj A
B.	$\lvert A \rvert A^{-1}$	II.	A^{n-1}
C.	$\lvert adjA \rvert$	III.	$B^{-1}A^{-1}$
D.	$(k\,A)^n$	IV.	$k^n A^n$

Where k is a scalar

	A	B	C	D
1.	I	II	III	IV
2.	III	I	II	IV
3.	I	III	II	IV
4.	II	III	IV	I

35. The ranks of the matrices in decending order

A. $\begin{bmatrix} 1 & 4 & -1 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$ B. $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

1) A,B,C 2) A,C,B
3) B,C,A 4) C,A,B

36. If $A=\begin{bmatrix} 1 & 5 & -6 \\ -8 & 0 & 4 \\ 3 & -7 & 2 \end{bmatrix}$ then the cofactors of the elements 3,-7, 2 are p,q,r respectively their ascending order is

1) q,p,r 2) q,r,p
3) p,q,r, 4) r,p,q

KEY

1) 3	2) 1	3)4	4)3	5)1
6)3	7)2	8)4	9)2	10)4
11)4	12)2	13)4	14)2	15)3
16)1	17)3	18)2	19)1	20)1
21)3	22)1	23)1	24)4	25)2
26)2	27)2	28)2	29)1	30)1
31)3	32)3	33)1	34)2	35)2
36)1				

Level-V

Comprehensive Questions

I. If A is symmetric matrix such that $A^2 = A$ then A is called Idempotent matrix ; if $A^n = 0$ for any least positive integer $'n'$ then A is called nilpotent matrix of index ‘n. If $A^2 = I$ then it is called involutory matrix and $AA^T = A^T A = I$ it is called orthogonal matrix and Trace of square matrix is sum of the elements of the principal diagonal of it

1. If $BA = A$ and $AB = B$ then $BA\,BA\,BA\,BA =$

1) A^T 2) A 3) B 4) A^{-1}

2. $A=\begin{pmatrix} 0 & 0 \\ 1 & 1 \end{pmatrix}$ then

$A + A^2 + A^3 + - - - - + A^{2006} =$

1) Null matrix 2) unit matrix

3) $\begin{pmatrix} 0 & 0 \\ 1 & 1 \end{pmatrix}$ 4) $\begin{pmatrix} 0 & 0 \\ 2006 & 2006 \end{pmatrix}$

3) $A=\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \Rightarrow$ then $AA^T =$ _______

1) A 2) Unit matrix 3) A^T 4) 0

4) $A=\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$ then the Trace of matrix $\left\{A^2+A^4+A^6+---A^{2006}\right\}=$

1) 0 2) 1 3) -1 4) 2006

II. A,B two square matries of same order then $|AB|=|A||B|$, If D is skew-symmetric matrix of odd order then It's determinent is 'zero'.

'Q' is skew symetric matrix of even order, all elements of it are integers then It's determinent is a perfect square.

1. If A and B are two square matrices of same ordersuch that $|A|=3$ & $|B|=5$ then $\left|A^3B^2\right|=$

1) 675 2) 225 3) 15 4) 81

2. If A is square matrix such that $A^T=-A$ of order 2005×2005 then $|A|=$ ___

1) $(2005)^2$ 2) $(2005)^{2005}$

3) 1 4) 0

3. If B is a square matrix with all it elements are positive integers such that $B=-B^T$ and order of 'B' is 10×10 then it's determinant value can be

1) 10 2) 25 3) 37 4) 45

4. 'C' is a square matrix such that $C^n=$ null matrix where $n\in N$ then $\det\left(C^3\right)=$ ____

1) 0 2) n 3) 1 4) $n+3$ I

Key

I	1) 2	2) 4	3) 2	4) 1
II	1) 1	2) 4	3) 2	4) 1

PREVIOUS EAMCET QUESTIONS

Eamcet 2005

1. m $\begin{bmatrix}-3 & 4\end{bmatrix}$ + n $\begin{bmatrix}4 & -3\end{bmatrix}=\begin{bmatrix}10 & -11\end{bmatrix}$ $\Rightarrow 3m+7n=$

1) 3 2) 5 3) 10 4)1

2. Adj $\begin{bmatrix}1 & 0 & 2\\-1 & 1 & -2\\0 & 2 & 1\end{bmatrix}=\begin{bmatrix}5 & a & -2\\1 & 1 & 0\\-2 & -2 & b\end{bmatrix}\Rightarrow\begin{bmatrix}a & b\end{bmatrix}=$

1) $\begin{bmatrix}-4 & 1\end{bmatrix}$ 2) $\begin{bmatrix}-4 & -1\end{bmatrix}$

3) $\begin{bmatrix}4 & 1\end{bmatrix}$ 4) $\begin{bmatrix}4 & -1\end{bmatrix}$

3) A= $\begin{bmatrix}-1 & 0\\0 & 2\end{bmatrix}\Rightarrow A^3-A^2=$

1) 2A 2) 2I 3) A 4) I

Eamcet :2004

4. Match the following elements of $\begin{bmatrix}1 & -1 & 0\\0 & 4 & 2\\3 & -4 & 6\end{bmatrix}$ with their cofactors and choose the correct answer

Element	Cofactor
I. -1	a) -2
II. 1	b) 32
III. 3	c) 4
IV. 6	d) 6
	e) -6

1) b, d, a, c 2) b, d, c, a

3) d, b, a, c 4) d, a, b, c

5. det $\begin{bmatrix}1990 & 1991 & 1992\\1991 & 1992 & 1993\\1992 & 1993 & 1994\end{bmatrix}=$

1)1992 2)1993 3) 1994 4) 0

6. The rank of $\begin{bmatrix}1 & -1 & 1\\1 & 1 & -1\\-1 & 1 & 1\end{bmatrix}$ is :

1) 0 2)1 3)2 4) 3

Eamcet :2003

7. If p+q+r=0 and $\begin{vmatrix}pa & qb & rc\\qc & ra & pb\\rb & pc & qa\end{vmatrix}=$

$k\begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$ then k =

1) 0 2) abc 3) pqr 4)a+b+c

8. If $\begin{vmatrix} Cos(A+B) & -Sin(A+B) & Cos2B \\ SinA & CosA & SinB \\ -CosA & SinA & CosB \end{vmatrix}=0$

then B=

1)$(2n+1)\frac{\pi}{2}$ 2)$n\pi$

3) $(2n+1)\pi$ 4) $2n\pi$

9. The number of solutions of the system equations 2x+y-z=7, x-3y+3z=1, x+4y-3z=5 is.....

1)3 2)2 3)1 4)0

2002

10. If A, B are square matrices of order 3, A is non-singular and AB = 0, then B is a

1) Null Matrix 2) Non-singular Matrix

3) Singular Matrix 4) Unit Matrix

11. If $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$ then, det A =

1) 2 2) 3 3) 4 4) 5

12. If $x^2 + y^2 + z^2 \neq 0$, x = cy + bz, y = az + cx, and z = bx + ay, then $a^2 + b^2 + c^2 + 2abc$ =

1) 2 2) a + b + c

3) 1 4) ab + bc + ca

Eamcet 2001

13. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, then $(B^{-1}A^{-1})^{-1} =$

1) $\begin{bmatrix} 2 & -2 \\ 2 & 3 \end{bmatrix}$ 2) $\begin{bmatrix} 3 & -2 \\ 2 & 2 \end{bmatrix}$

3) $\frac{1}{10}\begin{bmatrix} 2 & 2 \\ -2 & 3 \end{bmatrix}$ 4) $\frac{1}{10}\begin{bmatrix} 3 & 2 \\ -2 & 2 \end{bmatrix}$

14. A square matrix (a_{ij}) in which $a_{ij} = 0$ for $i \neq j$ and a_{ij} = k (constant) for i = j is

1) Unit matrix 2) Scalar matrix

3) Null matrix 4) Diagonal matrix

15. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$, $KA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a, b are respectively

1) -6, -12, -18 2) -6, 4, 9

3) -6, -4, -9 4) -6, 12, 18

Eamcet 2000

16. If A and B are two square matrices such that $B = -A^{-1}BA$ then $(A + B)^2$ =

1) 0 2) $A^2 + B^2$

3) $A^2 + 2AB + B^2$ 4) A + B

17. If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, then the determinant $A^2 - 2A$ is

1) 5 2) 25 3) -5 4) -25

18. If 'd' is the determinant of a square matrix A of order n, then the determinant of its adjoint is

1) d^n 2) d^{n-1} 3) d^{n-2} 4) d

19. If $a \neq 6$, b, c satisfy $\begin{vmatrix} a & 2b & 2c \\ 3 & b & c \\ 4 & a & b \end{vmatrix} = 0$, then abc=

1) a + b + c 2) 0

3) b^3 4) ab + b - c

Eamcet : 1999

20. If $A(\alpha) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ then $A(\alpha)\,A(\beta) =$

1) $A(\alpha) - A(\beta)$ 2) $A(\alpha) + A(\beta)$

3) $A(\alpha - \beta)$ 4) $A(\alpha + \beta)$

21. The real part of determinant of $\begin{bmatrix} \cos\alpha + i\sin\alpha & \cos\beta + i\sin\beta \\ \sin\beta + i\cos\beta & \sin\alpha + i\cos\alpha \end{bmatrix}$ is

1) 2 cos α 2) 2 sin β

3) 0 4) 1

22. If the matrix $\begin{bmatrix} \cos\theta & \sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is singular, then $\theta =$

1) π 2) $\pi/2$ 3) $\pi/3$ 4) $\pi/4$

23. If $x \neq 0$ and $\begin{vmatrix} 1 & x & 2x \\ 1 & 3x & 5x \\ 1 & 3 & 4 \end{vmatrix} = 0$, then x =

1) 1 2) -1 3) 2 4) -2

24. If $\begin{bmatrix} x & y^3 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 1 & 8 \\ 2 & 0 \end{bmatrix}$, then $\begin{bmatrix} x & y \\ 2 & 0 \end{bmatrix}^{-1} =$

1) $\begin{bmatrix} 0 & -2 \\ -2 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 0 & -8 \\ -2 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} 0 & \frac{1}{2} \\ \frac{1}{2} & -\frac{1}{4} \end{bmatrix}$

Eamcet 1998

25. $\begin{vmatrix} x & 1 & y+z \\ y & 1 & z+x \\ z & 1 & x+y \end{vmatrix} =$

1) $1 + x + y + z$ 2) $x + y + z$
3) 0 4) 1

26. The matrix $\begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 3 & 1 & 1 \end{bmatrix}$ is

1) non-singular 2) singular
3) skew symmetric 4) symmetric

27. A non-singlar matrix A satisfies $A^2 - A + 2I = 0$, then $A^{-1} =$

1) 1 - A 2) $\frac{I-A}{2}$ 3) $I + A$ 4) $\frac{(I+A)}{2}$

28. The system of equations 3x - 2y + z = 0, $\lambda x - 14y + 15z = 0$ and x + 2y - 3z = 0 have non -zero solution, then $\lambda =$

1) 1 2) 3 3) 5 4) 0

29. If a + b + c = 0, then one root of $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$ is

1) a + b 2) 0 3) b + c 4) a + c

30. The inverse of the matrix $\begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ is

1) $\frac{1}{5}\begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ 2) $\frac{1}{5}\begin{bmatrix} 3 & -1 \\ -1 & 2 \end{bmatrix}$

3) $\frac{1}{5}\begin{bmatrix} -3 & 1 \\ -1 & 2 \end{bmatrix}$ 4) $\frac{1}{5}\begin{bmatrix} -3 & 1 \\ 1 & 2 \end{bmatrix}$

Eamcet 1997

31. If $A = \begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix} = f(x)$ then $A^{-1} =$

1) f(- x) 2) f(x) 3) - f(x) 4) -f (-x)

32. If a, b, c are distinct and $\begin{vmatrix} a & a^2 & a^3-1 \\ b & b^2 & b^3-1 \\ c & c^2 & c^3-1 \end{vmatrix} = 0$, then

1) a + b + c = 1 2) ab + bc + ca = 0
3) a + b + c = 0 4) abc = 1

33. If the system of equations x + y + z = 6, x + 2y + λz = 0, x + 2y + 3z = 10 has no solution, then $\lambda =$

1) 2 2) 3 3) 4 4) 5

Eamcet 1996

34. $\begin{vmatrix} a+b & a & b \\ a & a+c & c \\ b & c & b+c \end{vmatrix} =$

1) 4 abc 2) abc 3) $a^2 b^2 c^2$ 4) $4a^2 b^2 c^2$

35. The matrix A is such that A $\begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} -4 & 1 \\ 7 & 7 \end{bmatrix}$ then A =

1) $\begin{bmatrix} 1 & 1 \\ 2 & -3 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 1 \\ -2 & 3 \end{bmatrix}$ 3) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ 4) $\begin{bmatrix} -1 & 1 \\ 2 & 3 \end{bmatrix}$

36. $A = \begin{bmatrix} 2 & 3 \\ 2 & -1 \end{bmatrix}$ then $8A^{-1} =$

1) $\begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 3 \\ -2 & 2 \end{bmatrix}$

3) $\begin{bmatrix} -1 & 3 \\ 2 & 2 \end{bmatrix}$ 4) $\begin{bmatrix} 1 & 3 \\ 2 & -2 \end{bmatrix}$

37. If A is a 3 x 3 matrix and det (3A) = k. det A, then k =

1) 9 2) 6 3) 1 4) 27

38. $\begin{vmatrix} x & 1 & y+z \\ y & 1 & z+x \\ z & 1 & x+y \end{vmatrix} =$

1) 1 + x + y + z 2) x + y + z
3) 0 4) 1

Eamcet 1995

39. If $\Delta = \begin{vmatrix} a-b-c & 2b & 2c \\ 2a & b-c-a & 2c \\ 2a & 2b & c-a-b \end{vmatrix}$ then $\Delta =$

1) $(a+b+c)^2$ 2) $(a+b+c)^4$
3) $(a+b+c)^3$ 4) $(a+b+c)$

40. $\det \begin{bmatrix} 1 & 1 & 1 \\ \sin A & \sin B & \sin C \\ \sin^2 A & \sin^2 B & \sin^2 C \end{bmatrix} =$

1) $\frac{1}{8R^3}(a-b)(b-c)(c-a)$

2) $8R^3(a-b)(b-c)(c-a)$

3) $(a-b)(b-c)(c-a)$

4) $\frac{1}{8R}(a-b)(b-c)(c-a)$

41. If A is 3 x 5 matrix, B is 2 x 3 matrix, then the order of the matrix BA is

1) 2 x 3 2) 3 x 2 3) 2 x 5 4) 5 x 2

42. (1 2 3) B = (3 4) then order of B is

1) 3 x 1 2) 1 x 3 3) 2 x 3 4) 3 x 2

43. If A is $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \lambda \end{bmatrix}$ is a singular matrix then $\lambda =$

1) 3 2) 4 3) 2 4) 5

Eamcet 1994

44. The order of $[x\ y\ z] \begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ is

1) 3 x 1 2) 1 x 1 3) 1 x 3 4) 3 x 3

45. If A and B are two matrices such that AB = B and BA = A then $A^2 + B^2 =$

1) 2AB 2) 2BA 3) A + B 4) AB

46. $\begin{pmatrix} 1 & 3 \\ 3 & 10 \end{pmatrix}^{-1} =$

1) $\begin{pmatrix} 10 & 3 \\ 3 & 1 \end{pmatrix}$ 2) $\begin{pmatrix} 10 & -3 \\ -3 & 1 \end{pmatrix}$

3) $\begin{pmatrix} 1 & 3 \\ 3 & 10 \end{pmatrix}$ 4) $\begin{pmatrix} -1 & -3 \\ -3 & -10 \end{pmatrix}$

47. If $A = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ then $A^4 =$

1) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ 2) $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$

3) $\begin{pmatrix} 0 & 0 \\ 1 & 1 \end{pmatrix}$ 4) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

48. $\begin{vmatrix} \sin^2 x & \cos^2 x & 1 \\ \cos^2 x & \sin^2 x & 1 \\ -10 & 12 & 2 \end{vmatrix} =$

1) 0 2) $12\cos^2 x - 10\sin^2 x + 2$
3) $12\sin^2 x - 10\cos^2 x - 2$ 4) $10\sin 2x$

49. The system of linear equations x + y + z = 2, 2x + y - z = 3, 3x + 2y + kz = 4 has a unique solution, if

1) $k \neq 0$ 2) $-1 < k < 1$
3) $-2 < k < 2$ 4) $k = 0$

Eamcet 1993

50. $\begin{vmatrix} 0 & p-q & p-r \\ q-p & 0 & q-r \\ r-p & r-q & 0 \end{vmatrix} =$

1) 0 2) (p - q) (q - r) (r - p)
3) pqr 4) 3 pqr

51. If $A=\begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ and A^2 is identity matrix, then x=

1) 1 2) -1 3) ± 1 4) 0

52. The roots of the determinantal equation $\begin{vmatrix} a & a & x \\ m & m & m \\ b & x & b \end{vmatrix} = 0$ are

1) a 2) b 3) a or b 4) 0, 0

Eamcet 1992

53. Matrix A is such that $A^2 = 2A - I$ where I is the unit matrix. Then for $x \geq 2,\ A^n =$

1) nA - (n - 1)I 2) nA - I
3) $2^{n-1}A-(n-1)I$ 4) $2^{n-1}(A)-I$

54. $\begin{vmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{vmatrix} = k\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ then k =

1) 1 2) 2 3) 3 4) 4

55. If the traces of the matrices A and B are 20 and -8, then trace of A + B =

1) 28 2) 20 3) - 8 4) 12

56. If the system of equations 3x - 2y + z = 0, $\lambda x - 14y + 15z = 0,\ x + 2y + 3z = 0$ have a non-trival solution then $\lambda =$

1) 22 2) 24 3) 23 4) 29

Eamcet 1991

57. If $X=\begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$ then X^n is

1) $\begin{pmatrix} 3n & -4n \\ n & -n \end{pmatrix}$ 2) $\begin{pmatrix} 2+n & 5-n \\ n & -n \end{pmatrix}$

3) $\begin{pmatrix} 3^n & (-4)^n \\ 1^n & (-1)^n \end{pmatrix}$ 4) None

58. $2\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2-bc & b^2-ca & c^2-ab \end{vmatrix} =$

1) 0 2) 2 3) 4 4) - 4

Eamcet 1990

59. A is a 3 x 3 matrix and B is its adjoint matrix. If the determinent of B is 64, then the det A is

1) 4 2) ± 4 3) ± 8 4) 8

60. The inverse of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ is

1) $\begin{bmatrix} 1 & -2 & 7 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 2 & 7 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$

3) $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 7 & 2 & 1 \end{bmatrix}$ 4) $\frac{1}{2}\begin{bmatrix} 1 & 2 & -7 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$

Eamcet-2007

61. If $\begin{pmatrix} 1 & 2 & x \\ 4 & -1 & 7 \\ 2 & 4 & -6 \end{pmatrix}$ is a singular matrix, then x = **(E-2007)**

1) 0 2) 1 3) -3 4) 3

62. If A is a square matrix such that A (AdjA) $= \begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix}$ then det (AdjA) = **(E-2007)**

1) 4 2) 16 3) 64 4) 256

63. The number of nontrivial solutions of the system: **(E-2007)**
$x - y + z = 0, x + 2y - z = 0, 2x + y + 3z = 0$ is

1) 0 2) 1 3) 2 4) 3

KEY

1)4	2)1	3)1	4)3	5)4
6)4	7)3	8)4	9)3	10) 1&3
11)1	12)3	13)1	14)2	15)3
16) 2	17)2	18)2	19)3	20)4
21)3	22) 4	23)2	24)4	25)3
26)2	27)2	28) 3	29)2	30)2
31)1	32)4	33)2	34) 1	35)3
36)4	37)4	38)3	39)3	40) 1
41) 3	42) 4	43) 1	44) 2	45) 3
46) 2	47) 1	48) 1	49) 1	50) 1
51) 4	52) 3	53) 1	54) 2	55) 4
56) 4	57) 4	58) 1	59) 3	60) 1
61) 3	62) 2	63) 1		