MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

MATRICES

Multiple Choice Questions

1. If A = $\begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$ then :

A. only AB is defined

B. only BA is defined

C. AB and BA both are defined

D. AB and BA both are not defined .

Answer: C

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2. The matrix A = $A = \begin{bmatrix} 0 & 0 & 5 \\ 0 & 5 & 0 \\ 5 & 0 & 0 \end{bmatrix}$ is a :

A. scalar matrix

B. diagonal matrix

C. unit matrix

D. square matrix

Answer: D

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3. If A and B are symmetric matrices of the same order , then $(AB - BA)$ is a :

A. Skew symmetric matrix

B. Null matrix

C. Symmetric matrix

D. None of these

Answer: A

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4. If $\begin{bmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{bmatrix} = \begin{bmatrix} 7 & 7y-13 \\ y & x+6 \end{bmatrix}$, then the value of x and y is :

A. x = 3 , y = 1

B. x = 2 , y = 3

C. x = 2 , y = 4

D. x = 3 , y = 3

Answer: B

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5. If $A = \frac{1}{\pi}\begin{bmatrix} \sin^{-1}(x\pi) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & \cot^{-1}(\pi x) \end{bmatrix}$

$B = \frac{1}{\pi}\begin{bmatrix} -\cos^{-1}(x\pi) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & -\tan^{-1}(\pi x) \end{bmatrix}$

then $A - B$ is equal to :

A. I

B. 0

C. 2I

D. $\frac{1}{2}I$

Answer: D

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6. If matrix $A = \left[a_{ij}\right]_{2 \times 2}$ where $a_{ij} \begin{matrix} -1 & \text{if } i \neq j \\ = 0 & \text{if } i = j \end{matrix}$ then A^2 is equal to :

A. I

B. A

C. O

D. None of these

Answer: A

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7. If A is matrix of order $m \times n$ and B is a matrix such that AB' and B'A are both defined , then order of matrix B is :

A. $m \times m$

B. $n \times n$

C. $n \times m$

D. $m \times n$

Answer: D

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8. If A is a square matrix such that $A^2 = I,$ then : $(A-I)^3 + (A+I)^3 - 7A$ is equal to :

A. A

B. $I - A$

C. $I + A$

D. 3A

Answer: A

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9. On using elementary operation $C_2 \to C_2 - 2C_1$ in the following matrix equation : $\begin{bmatrix} 1 & -3 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$ we have :

A. $\begin{bmatrix} 1 & -5 \\ 0 & 4 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ -2 & 2 \end{bmatrix}\begin{bmatrix} 3 & -5 \\ 2 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -5 \\ 0 & 4 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 3 & -5 \\ -0 & 2 \end{bmatrix}$

C. $\begin{bmatrix} 1 & -5 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 1 & -3 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 3 & 1 \\ -2 & 4 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -5 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 3 & -5 \\ 2 & 0 \end{bmatrix}$

Answer: D

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10. If A = $\begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 0 & 1 & 3 \end{bmatrix}$, then A^{-1} exists if :

A. $\lambda = 2$

B. $\lambda \neq 2$

C. $\lambda \neq -2$

D. None of these

Answer: D

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11. If A and B are invertible matrices , then which of the following is not correct :

A. adj A |A| . A^{-1}

B. det $\left(A^{-1}\right) = [\det(A)]^{-1}$

C. $(AB)^{-1} = B^{-1}A^{-1}$

D. $(A+B)^{-1}=B^{-1}+A^{-1}$

Answer: D

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12. If $A_{\theta}=\begin{bmatrix}\cos\theta & \sin\theta \\ -\sin\theta & \cos\theta\end{bmatrix}$ then $A_{\alpha}A_{\beta}$ equals :

A. $A_{\alpha\beta}$

B. $A_{\alpha+\beta}$

C. $A_{\alpha-\beta}$

D. None of these

Answer: B

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13. If $\begin{bmatrix} I & 0 \\ 3 & -i \end{bmatrix} + A = \begin{bmatrix} I & 2 \\ 3 & 4+i \end{bmatrix} - A$, then A equals :

A. $\begin{bmatrix} 0 & 1 \\ 0 & 2+i \end{bmatrix}$

B. $\begin{bmatrix} 0 & -1 \\ 3 & i \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 2-i \end{bmatrix}$

D. None of these

Answer: A

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14. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$, then $A^3 - 3A^2 - A + 9I$ equals :

A. I

B. O

C. A

D. A^2

Answer: B

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15. If $A = \begin{bmatrix} 5 & -1 & 3 \\ 0 & 1 & 2 \end{bmatrix}$. $B = \begin{bmatrix} 0 & 2 & 3 \\ 1 & -1 & 4 \end{bmatrix}$, then (AB') ' equals :

A. $\begin{bmatrix} -7 & 8 \\ 0 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 7 & 8 \\ 18 & 7 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 8 \\ 7 & 0 \end{bmatrix}$

D. None of these

Answer: B

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16. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 5 & 1 & x \\ 1 & 1 & 1 \end{bmatrix}$ is a sigular matrix , then x equals :

A. 5

B. 11

C. 3

D. 9

Answer: D

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17. If A is square matrix such that $A^2 + I = O$, then A equals :

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 2 \\ -1 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 0 \\ 0 & -i \end{bmatrix}$

D. $\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$

Answer: D

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18. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ then A^{-1} equals :

A. A

B. A^3

C. A^2

D. A^4

Answer: B

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19. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ -1 & -2 & -3 \end{bmatrix}$, then A is a nilotent of index :

A. 5

B. 4

C. 3

D. 2

Answer: D

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20. If $A=\begin{bmatrix}2 & 3-i & -i\\ 3+i & \pi & 7+i\\ i & 7-i & 2\end{bmatrix}$, then A is :

A. Hermitian

B. Skew - hermitian

C. symmetric

D. None of these

Answer: A

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21. If $A = B + C$ such that B is a symmetric matrix and C is a skew - symmetric matrix , then B is given by :

A. A+A'

B. A-A'

C. $\frac{1}{2}(A + A')$

D. $\frac{1}{2}(A - A')$

Answer: C

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22. 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

Answer: D

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23. If each element of a 3×3 matrix A is multiplied by 3 , then the determinant of the newly formed matrix is :

A. 3 det A

B. 9 det . A

C. $(\det . A)^3$

D. 27 det . A

Answer: D

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24. Let A be a ral matrix such that $A^{67} = A^{-1}$, then :

A. $|A| = \pm 1$

B. $|A| = 1$

C. $A = I, I$ being unit matrix.

D. A is a diagonal matrix

Answer: A

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25. If A and B are two matrices cush that $A + B = \lambda I$, where I is the identify matrix , then :

A. $A = \mu I$ for some μ

B. $B = \mu I$ for sme μ

C. $A = \mu I$ for some μ, $B = \mu' I$ I sor some μ

D. $A = \mu I$ if $B = \mu'$ I , for some μ

Answer: D

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26. Let A and B be 3×3 matrices such that A' = - A , B ' = B , then matrix $\lambda AB + 3BA$ is a skew - symmetric matrix for :

A. $\lambda = 3$

B. $\lambda = -3$

C. $\lambda = 3 \text{ or } \lambda = -3$

D. $\lambda = 3 \text{ and } \lambda = -3$

Answer: A

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27. If A is a 3×3 non -singular matrix , then det . [adj .A] is equal to :

A. $(\det A)^2$

B. $(\det A)^3$

C. $\det A$

D. $(\det A)^{-1}$

Answer: A

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28. If A and B are matrices such that $A+B$ and BA are both defined , then :

A. A and B can be any matrices

B. A,B are square matrices not necessarily of same order

C. A,B are square matrices of same order

D. number of columns of A = number of rows of B .

Answer: C

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29. If $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is to be square root of the two rowed unit matrix , then α, β and γ should satisfy the relation :

A. $1+\alpha^2+\beta\gamma=0$

B. $1-\alpha^2-\beta\gamma=0$

C. $1-\alpha^2+\beta\gamma=0$

D. $1+\alpha^2-\beta\gamma=0$

Answer: B

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30. If A and B are square matrices of order 3 , such that $|A| = -1, |B| = 3$, then thee determinant of 3 AB equals :

A. -9

B. -27

C. -81

D. 81

Answer: C

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31. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, such that $ad - bc \neq 0$ then A^{-1} is :

A. $\dfrac{1}{ad - bc}\begin{pmatrix} d & b \\ -c & a \end{pmatrix}$

B. $\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

C. $\dfrac{1}{ad - bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

D. None of these

Answer: C

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32. 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

Answer: C

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33. If A,B are square matrices of order 3 , then :

A. adj (AB) = (adj. A) (adj . B)

B. $(A+B)^{-1}=A^{-1}+B^{-1}$

C. $AB=O=\ \Rightarrow |A|=0 \text{ or } |B|=0$

D. $AB=O \Rightarrow |A|=0 \text{ and } |B|=0$

Answer: B

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34. If $A=\begin{bmatrix}0 & c & -b\\ -c & 0 & a\\ b & -a & 0\end{bmatrix}$ and $B=\begin{bmatrix}a^2 & ab & ac\\ ab & b^2 & bc\\ ac & bc & a^2\end{bmatrix}$ then AB is :

A. A

B. B

C. I

D. O

Answer: D

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35. If $A=\begin{bmatrix}1 & 2\\ 3 & -5\end{bmatrix}$, $B=\begin{bmatrix}1 & 0\\ 0 & 2\end{bmatrix}$ and X be a matrix such that A = BX , then X is :

A. $\begin{bmatrix} 2 & 4 \\ 3 & -5 \end{bmatrix}$

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

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

D. None of these

Answer: B

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36. Inverse $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 6 \end{bmatrix}$ is :

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

B. $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 6 \end{bmatrix}$

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

D. None of these

Answer: C

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37. If A and B are any 2×2 matrices , then det $(A + B) = 0$ implies :

A. det .A +det . B = 0

B. det . A = 0 or det .B = 0

C. det A = 0 and det B = 0

D. None of these

Answer: D

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38. Let A be an invertible matrix . Which of the following is not true ?

A. $A^{-1} = |A|^{-1}$

B. $(A^2)^{-1} = (A^{-1})^2$

C. $(A)^{-1} = (A^{-1})$

D. None of these

Answer: A

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39. The multiplicative inverse of : $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ 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. $\begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

Answer: B

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40. If A is a square matrix such that |A| = 2 , then for any + ve integar n , $|A^n|$ is equal to :

A. AB = BA = O

B. AB = BA = 1

C. AB = BA = B

D. AB = BA = A

Answer: C

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41. The sum of the idempotent matrices A and B is idempotent if :

A. AB = BA = O

B. AB = BA = 1

C. AB = BA = B

D. AB = BA = A

Answer: A

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42. If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ and $n \in N,$ then A^n equals :

A. nA

B. 2^nA

C. $2^{n-1}A$

D. None of these

Answer: C

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43. If $A = \begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix}$ then :

A. A is symmetric matrix

B. A is a skew - symmetric matrix

C. A is an aothogonal matrix

D. None of these

Answer: C

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44. If $A = \begin{bmatrix} a^2 & ab & ac \\ ab & b^2 & bc \\ ac & bc & c^2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ then the product AB equals :

A. I

B. O

C. A

D. B

Answer: B

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45. If A is an orthogonal matrix , then A^{-1} equals :

A. AA'

B. A'

C. A

D. None of these

Answer: B

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46. Let A and B be skew - symmetric metrices of order n . Then :

A. AB is a symmetric matrix

B. AB is a skew - symmetric matrix

C. AB is symmetric matrix if A an B commute

D. None of these

Answer: C

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47. The inverse of a symmetric matrix is :

A. a symmertic martix

B. a skew -symmetric matrix

C. a diagonal matrix

D. None of these

Answer: A

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48. The inverse of a skew - symmetric matrix of odd order :

A. a symmetric matrix

B. is a skew - symmetric matrix

C. is a diagonal

D. does not exist

Answer: B

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49. The inverse of a skew - symmetric matrix of odd order :

A. is a symmetric matrix

B. is a skew - symmetric matrix

C. is a diagonal matrix

D. does not exist

Answer: D

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50. If A is an orthogonal matrix , then |A| is :

A. 0

B. -1

C. 1

D. ± 1

Answer: D

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51. If ω is a complex cube root of unity , then the matrix

$$A = \begin{bmatrix} 1 & \omega^2 & \omega \\ \omega^2 & \omega & 1 \\ \omega & 1 & \omega^2 \end{bmatrix}$$ is a :

A. symmetric matrix

B. skew - symmetric matrix

C. singular matrix

D. non - singular matrix

Answer: C

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52. If A and B are two symmetric matrices , then AB=B and BA = A , then $A^2 + B^2$ equals :

A. 2AB

B. 2BA

C. AB

D. $A + B$

Answer: D

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53. If A and B are symmetric matrices , then ABA is :

A. symmetric matrix

B. skew - symmetric matrix

C. singular matrix

D. non - singular matrix

Answer: A

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54. If A,B are symmetric matrices of same order , then $AB - BA$ is a :

A. null matrix

B. unit matrix

C. Symmetric matrix

D. skew - symmetric matrix

Answer: D

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55. If A is non - singular square matrix , then |adj A| is :

A. |A|

B. $|A|^{x-2}$

C. $|A|^{n-1}$

D. $|A|^{n}$

Answer: C

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56. For a square matrix A and a non singular matrix B of the same order , the value of det $(B^{-1}AB)$ is :

A. |A|

B. $\left|A^{-1}\right|$

C. $|B|$

D. $\left|B^{-1}\right|$

Answer: A

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57. For 3×3 matrix A, if |A| = 4, then |adj A| equals :

A. 4

B. -4

C. 16

D. 64

Answer: C

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58. Rank of a null matrix is :

A. 1

B. 0

C. does not exist

D. None of these

Answer: C

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59. For a matrix of rank r ,

A. rank (A') $< r$

B. rank (A') = r

C. rank (A') $> r$

D. None of these

Answer: A

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60. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ whenever $A^2 = B$

then value of α is :

A. 5

B. -1

C. 11

D. no real value of α

Answer: D

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61. 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. A is zero matrix

B. $A = (-1) = I$, where I is a unit matrix

C. A^{-1} does not exist

D. $A^2 = I$

Answer: D

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62. If $A^2 - A + I = O$, then the inverse of A is :

A. A

B. $A + I$

C. $I - A$

D. $A - I$

Answer: C

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63. If A+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. A=B

B. AB = BA

C. either A or B is a zero matrix

D. either A or B is an identify matrix .

Answer: B

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64. Let $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$, $ab \in N$. Then :

A. there cannot exist any B such that AB BA

B. there exists more than one but finite number B's such that AB = BA

C. there exists exactly one B such that AB = BA

D. there exists infinitely many B's such that AB = BA

Answer: D

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65. Let $A = \begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$

If $|A^2| = 25,$ then $|\alpha|$ equals :

A. 1

B. $\frac{1}{5}$

C. 5

D. 5^2

Answer: B

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66. If A =$[(3, 2), (0, 1]$, then A^{-3} is :

A. $\frac{1}{27}\begin{bmatrix}1 & -26 \\ 0 & 27\end{bmatrix}$

B. $\frac{1}{27}\begin{bmatrix}-1 & 26 \\ 0 & -27\end{bmatrix}$

C. $\frac{1}{27}\begin{bmatrix}1 & -26 \\ 0 & -27\end{bmatrix}$

D. $\frac{1}{27}\begin{bmatrix}-1 & -26 \\ 0 & -27\end{bmatrix}$

Answer: A

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67. If $A = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$ then $A^{4n}(n \in N)$ equals :

A. $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$

B. $\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

Answer: C

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68. If A (adj . A) = 81 , for a 3×3 matrix A , then det . A is equal to :

A. 1

B. 2

C. 4

D. 9

Answer: D

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69. If $A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$ then det . (adj (adj A)) is :

A. 14^1

B. 14^2

C. 14^3

D. 14^4

Answer: D

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70. If $\begin{pmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{pmatrix}\begin{pmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{pmatrix}^{-1} = \begin{pmatrix} a & -b \\ b & a \end{pmatrix}$

then :

A. a=1,b=1

B. $a = \cos 2\theta, b = \sin 2\theta$

C. $a = \sin 2\theta, b = \cos 2\theta$

D. None of these

Answer: B

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71. If $A = \begin{pmatrix} 3 & 4 \\ 2 & 3 \end{pmatrix}, B = \begin{pmatrix} -2 & -2 \\ 0 & -1 \end{pmatrix}$, then $(A+B)^{-1}$:

A. $= A^{-1} + B^{-1}$

B. does not exist

C. is a skew - symmetric matrix

D. None of these

Answer: D

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72. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix}$ and $A^{-1} = \alpha A,$ then the value of α is :

A. 7

B. -7

C. $\frac{1}{7}$

D. $-\frac{1}{7}$

Answer: C

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73. If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then :

A. $\alpha = 2ab, \beta = a^2 + b^2$

B. $\alpha = a^2 + b^2, \beta = ab$

C. $\alpha = a^2 + b^2, \beta = 2ab$

D. $\alpha = a^2 + b^2, \beta = a^2 - b^2$

Answer: C

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74. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $(10)B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$

If B is the inverse of A , then α is :

A. -2

B. -1

C. 2

D. 5

Answer: D

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75. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then which one of the following holds for all $n \geq 1$ by the principle of mathematical induction :

A. $A^n = 2^{n-1}A - (n-1)I$

B. $A^n = nA - (n-1)I$

C. $A^n = 2^{n-1}A + (n-1)I$

D. $A^n = nA + (n-1)I$

Answer: B

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76. Let A be a square matrix all of the whose entires are integers. Then which one of the following is true ?

A. if det $A = \pm 1$, then A^{-1} need not exist

B. If det $A = \pm 1$, then A^{-1} exists but all its entries are necessarily integers

C. If det $A \neq \pm 1$ then A^{-1} exists and all its entries are non - integers

D. If det $A = \pm 1$, then A^{-1} exists and all its entries are integers .

Answer: D

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77. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & -2 & 4 \end{bmatrix}$ and also $A^{-1} = \frac{1}{6}\left(A^2 + cA + dI\right)$, where I is unit matrix , then the ordered pair (c,d) is :

A. $(-6, 11)$

B. $(-11, 6)$

C. $(11, 6)$

D. $(6, 11)$

Answer: A

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78. If

$$P=\begin{bmatrix}\left(\frac{\sqrt{3}}{2},\frac{1}{2}\right) & \left(\frac{1}{2}\right)\\ \left(\frac{-1}{2}\right) & \frac{\sqrt{3}}{2}\end{bmatrix} \text{ and } A=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix} \text{ and } Q=PAP^T,$$

then P^TQ^{2005} P is equal to :

A. $\begin{bmatrix}1 & 2005\\ 0 & 1\end{bmatrix}$

B. $\begin{bmatrix}2005 & 2005\\ 0 & 1\end{bmatrix}$

C. $\frac{1}{4}\begin{bmatrix}4+2004\sqrt{3} & 6025\\ -2005 & 402005\sqrt{3}\end{bmatrix}$

D. None of now .

Answer: A

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1. The number of 3×3 non - singular matrices , with four entries as 1 and all other entries as 0 , is :

A. less than 4

B. 5

C. 6

D. at least 7

Answer: D

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2. The number of 3×3 matrices A whose entries are either 0 or 1 and for which the system : $A\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ has exactly two distinct solutions , is :

A. 0

B. $2^9 - 1$

C. 168

D. 2

Answer: A

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3. Let $\omega \neq 1$ be a cube root of unity and S be the ste of all non - singular matrices of the form : $\begin{bmatrix} 1 & a & b \\ \omega & 1 & c \\ \omega^2 & \omega & 1 \end{bmatrix}$ where each of a , b and c is either 1 or 2 . Then the number of distinct matrices in the set S is :

A. 2

B. 6

C. 4

D. 8

Answer: A

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4. Let M and N be two 3×3 non - singular skew symmetric matrices such that MN = NM Let P^T denote the transpose of P, then : $M^2N^2(M^TN)^{-1}(MN^{-1})^T$ is equal to :

A. M^2

B. $-N^2$

C. $-M^2$

D. MN

Answer: C

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5. If $\omega \neq 1$ is the complex root of unity and matrix $H = \begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$ then H^{70} is equal to :

A. O

B. $-H$

C. H^2

D. H

Answer: D

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6. Let $A = [(1, 0, 0,), (2, 1, 0), (3, 2, 1)]$. "If u_1 and u_2 are column matrices such that $Au_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ and $Au_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$ then $u_1 + u_2$ is equal to :

A. $\begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$

B. $\begin{bmatrix} -1 \\ 1 \\ -1 \end{bmatrix}$

C. $\begin{bmatrix} -1 \\ -1 \\ 0 \end{bmatrix}$

D. $\begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$

Answer: D

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7. Let P and Q be 3×3 matrices with $P \neq Q$. If $P^3 = Q^3$ and $P^2Q = P^2Q = Q^2P$, then determinant of $(P^2 + Q^2)$ is equal to :

A. -2

B. 1

C. 0

D. -1

Answer: C

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8. Let $P = [a_{ij}]$ be a 3×3 matrix and let Q = $[b_{ij}]$, where $b_{ij} = 2^{i+j} a_{ij}$ for $1 \leq I, j \leq 3.$ If the determinant of P is 2 . Then tehd etarminat of the matrix Q is :

A. 2^{10}

B. 2^{11}

C. 2^{12}

D. 2^{13}

Answer: D

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9. If P is a 3×3 matrix such that $P^T = 2P + I,$ where P^T is the transpose f P and I is the 3×3 identify matrix then there exists a column matrix $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \neq \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$ such that :

A. $PX = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

B. PX = X

C. PX = 2X

D. PX = - X

Answer: D

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10. If the adjoint of a 3×3 matrix P is $\begin{bmatrix} 1 & 4 & 4 \\ 2 & 1 & 7 \\ 1 & 1 & 3 \end{bmatrix}$ then the possible value (s) of the determinant of P is :

A. -2

B. -1

C. 1

D. 2

Answer: A::D

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11. If $P = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{bmatrix}$ is the adjoint of a 3×3 matrix A and |A| = 4 , then α is equal to :

A. 11

B. 5

C. 0

D. 4

Answer: A

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12. If A is an 3×3 non -sngular matrix such tat A A ' = A'A and B = $A^{-1}A'$ tehn B B ' equals :

A. I

B. B^{-1}

C. (B^{-1})

D. $I + B$

Answer: A

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13. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satifying the equation $\mathrm{AA}^T = 9I$ where I is a 3×3 identify matrix , thenthe ordered pair (a,b) is equal to :

A. $(2, -1)$

B. $(-2, 1)$

C. (2,1)

D. $(-2, -1)$

Answer: D

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Questions From Karnataka Cet Comed

1. If A is a 3×3 non - singular matrix and if |A| = 3 , then $\left|(2A)^{-1}\right|$=

A. $\frac{1}{24}$

B. $\frac{1}{3}$

C. 3

D. 24

Answer: A

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2. If $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$ then $A^2 + xA + yI = 0$ for (x,y) =

A. (1,3)

B. $(4, \ -1)$

C. $(-1, 3)$

D. $(-4, 1)$

Answer: D

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3. If A (adj .A) = 5I , where I is idensity martrix of order 3 , then |adj A | =

A. 125

B. 25

C. 10

D. 5

Answer: B

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4. If | adj A| = 25 [A is of order 3] , then $\left|A^{-1}\right| =$

A. 0.2

B. ± 5

C. $\frac{1}{5\sqrt{625}}$

D. ± 0.2

Answer: D

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5. If A is 3×4 matrix and B is a matrix such that A'B and BA' are both defined, then B is of the type

A. 3×4

B. 3×3

C. 4×4

D. 4×3

Answer: A

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6. The symmetric part of the matrix

$$A = \begin{bmatrix} 1 & 2 & 4 \\ 6 & 8 & 2 \\ 2 & -2 & 7 \end{bmatrix}$$ is

A. $\begin{pmatrix} 1 & 4 & 3 \\ 2 & 8 & 0 \\ 3 & 0 & 7 \end{pmatrix}$

B. $\begin{pmatrix} 1 & 4 & 3 \\ 4 & 8 & 0 \\ 3 & 0 & 7 \end{pmatrix}$

C. $\begin{pmatrix} 0 & 2 & 1 \\ 2 & 0 & 2 \\ 1 & 2 & 0 \end{pmatrix}$

D. $\begin{pmatrix} 0 & 2 & 1 \\ 2 & 0 & 2 \\ 1 & 2 & 0 \end{pmatrix}$

Answer: B

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7. If A is a matrix of order 3, such that

A (adj A) $= 10I$, then |adj A| $=$

A. 10

B. 101

C. 1

D. 100

Answer: D

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8. The inverse of the matrix A $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ is :

A. $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

B. $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{4} \end{bmatrix}$

C. $\frac{1}{24}\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

D. $\frac{1}{24}\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Answer: B

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9. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, then A^n is :

A. $\begin{bmatrix} 1 & 2^n \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & n^2 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2n \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & n^2 \\ 1 & 1 \end{bmatrix}$

Answer: C

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10. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then A^2 is equal to :

A. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

Answer: A

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11. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $A^3 = 27$ then $\alpha =$ ________

A. ± 1

B. ± 2

C. $\pm \sqrt{7}$

D. $\pm \sqrt{5}$

Answer: C

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12. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $A^8 = aA + bI$, then (a,b) =

A. (8,7)

B. $(-7, 8)$

C. $(8, -7)$

D. $(-8, -7)$

Answer: C

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13. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then det (Adj A) is :

A. a^{27}

B. a^5

C. a^6

D. a^2

Answer: C

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