



# PETRODICE ACADEMY

Head office: Hyderabad Branch

Topic: Linear Algebra

Time Allowed: 45 Min

Maximum Marks:25

Read the following instructions carefully.

01. (i) Question Numbers 01 to 05 (05 questions) will carry one mark each.

(ii) Question Numbers 06 to 15 (10 questions) will carry two marks each.

02. Wrong answers carry 33% negative marks. In Q. 01 to Q.05, 1/3 mark will be deducted for each wrong answer and in Q. 06 to Q.15, 2/3 mark will be deducted for each wrong answer. However, there is no negative marking for numerical answer Type questions.

### GROUP – I

Each question carries ONE mark

$$5 \times 1 = 5$$

1. Which of the following is wrong?

a)  $(AB)^T = B^T A^T$

b)  $\text{adj}(AB) = \text{adj}(B)\text{adj}(A)$

c) If  $|A| = 0$  Then  $|\text{adj}(A)| \neq 0$

d) Both b and c

2. Let A, B, C and D be nxn matrices, each with non-zero determinant.  $ABCD = I$  Then  $B^{-1} =$

a)  $D^{-1} C^{-1} A^{-1}$

b) CDA

c) ACD

d) none

3. If a matrix, rank equals both the number of rows and number of columns, then the matrix is called

a) singular matrix

b) non-singular matrix

c) minor

d) all the above

4. Let  $A = [a_{ij}]$ ,  $1 \leq i, j \leq n$  with  $n \geq 3$  and  $a_{ij} = i \cdot j$ .

Then the rank of A is

a) 0

b) 1

c) n-1

d) n

5. Find the rank of  $A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$

a) 4

b) 3

c) 2

d) 1

### GROUP – II

Each question carries TWO mark

1. If  $\delta^3 - 6\delta^2 + 7\delta + 2 = 0$  is a characteristic equations of

$A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$  then  $A^{-1} =$  in terms of A and  $A^2 =$

a)  $\frac{1}{2}[6A + 7I - A^2]$

b)  $\frac{1}{2}[6A - 7I - A^2]$

c)  $\frac{1}{2}[6A - 7I + A^2]$

d)  $\frac{1}{2}[6A - I - A^2]$

2. The product of none zero eigen values of the matrix

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 & 1 \\ 0 & -1 & -1 & -1 & 0 \\ 0 & -1 & -1 & -1 & 0 \\ 0 & -1 & -1 & -1 & 0 \\ 1 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Is \_\_\_\_\_

3. If A is a non-singular matrix and  $(I-A+A^2-\dots(-1)^n A^n)=O$  then  $A^{-1} =$

- a)  $A^n$                       b)  $-A^{(n-1)}$
- c)  $(-1)^{n-1} \cdot A^{n-1}$       d)  $(-1)^{n+1} \cdot A^n$

4. The Eigen vector pair of the matrix

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

- a)  $\begin{pmatrix} 1 \\ 0 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix}$
- b)  $\begin{pmatrix} 2 \\ 0 \end{pmatrix} \begin{pmatrix} 2 \\ 2 \end{pmatrix}$
- c)  $\begin{pmatrix} 0 \\ 1 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix}$
- d)  $\begin{pmatrix} 0 \\ 1 \end{pmatrix} \begin{pmatrix} 2 \\ 2 \end{pmatrix}$

5. The value of  $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$  is

- a)  $1+a+b+c$
- b)  $abc$
- c)  $(a-b)(b-c)(c-a)$
- d)  $1-abc$

6. if a square matrix of order 100 has exactly 15 distinct eigen values, then the degree of the minimal polynomial is

- a) Atleast 15
- b) Atmost 15
- c) Always 15
- d) Exactly 100

7. if  $f(x) = \begin{vmatrix} \cos x & x & 1 \\ 2\sin x & x^2 & 2x \\ \tan x & x & x \end{vmatrix}$

then  $\lim_{x \rightarrow 0} \frac{f(x)}{x^2}$  is .

8. if A is a 3x3 matrix with characteristic equation  $\lambda^3 - 6\lambda^2 + 9\lambda - 4 = 0$  then which of the following is true?

- a)  $|A| = -4$
- b) Trace of A = -6
- c)  $|A| = 9$

d) Trace of A = 6

9. The value of K, for which the vector  $\begin{bmatrix} 1 \\ 2 \\ K \end{bmatrix}$  is an eigen vector of is \_

10. if X and Y are two non-Zero matrices of the same order such that  $XY = O_{n \times n}$  then

- a)  $|X| \neq 0 \quad |Y| \neq 0$
- b)  $|X| \neq 0 \quad |Y| = 0$
- c)  $|X| = 0 \quad |Y| \neq 0$
- d)  $|X| = 0 \quad |Y| = 0$