LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION – **STATISTICS**

THIRDSEMESTER – APRIL 2017

ST 3506- MATRIX AND LINEAR ALGEBRA

Date: 03-05-2017   Dept. No.   Max. : 100 Marks
09:00-12:00

PART – A

Answer ALL the questions: **(10x=20 Marks)**

1. Define Hermitian matrix and give an example.
2. Define a symmetric matrix with an example.
3. Find the rank of the matrix $A = \begin{bmatrix} 6 & 2 \\ 3 & 2 \end{bmatrix}$
4. Define transpose of a matrix with an example.
5. Define 'Basis' of a sub space
6. Let $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$. Hence find A^{-1}
7. When the vectors are said to be linearly independent?
8. Write down the relationship with determinant of the matrix with Adjoint determinant.
9. State the any two properties of linear transformation.
10. Find the characteristic roots of $\begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$

PART – B

Answer any FIVE questions: **(5x8=40 Marks)**

11. Prove that if A and B are idempotent matrices, then AB is idempotent if A and B commute.

12. Show that the matrix $\begin{bmatrix} ab & b^2 \\ -a^2 & -ab \end{bmatrix}$ is nilpotent.

13. Show that adj. A'=(adj.A)'

14. Using Cramer's rule, find the solution of

    5x+3y-6z=12

    2x+y-8z=6

    2x+7y-5z=20

15. If A and B are square matrices of the same order, then prove that (AB)'=B'A'

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16. Show that of A and B are matrixes of the same order show that

$$tr(A+B)=tr(A)+tr(B)$$

$$tr(KA)=K\,trA.$$

17. Examine the linear Independence of the vectors $(3,1,-4)$ $(2,2,-3)$ and $(0,-4,1)$

18. Use Laplace's method of expension to show that

$$\begin{bmatrix} a & -b & -a & b \\ b & a & -b & -1 \\ c & -d & c & -d \\ d & c & d & c \end{bmatrix} = 4(a^2+b^2)\,(c^2+d^2)$$

PART – C

Answer any TWO questions: **(2x20=40 Marks)**

19. (a) Prove that every square matrix A can be expressed in one and only one way as P+Q where P and Q are symmetric and skew symmetric matrices.

   (b) Write down the properties of determinants.

20. Find the inverse of the following matrix:

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

21. (a) Find the rank of matrix A $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & 7 \end{bmatrix}$

   (b) Prove the rank $\begin{vmatrix} 13 & 16 & 19 \\ 14 & 17 & 20 \\ 15 & 18 & 21 \end{vmatrix} = 0$

22. (a) Solve the following system of equations by matrix method.

$$3x-2y+3z=8$$
$$2x+y-z=1$$
$$4x-3y+2z=40$$

   (b) State and prove Cayiey – Hamition theorem.

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