22. A Estimate the Sum of infinity series

$$(1+\tfrac{1}{2})+\left(\tfrac{1}{3}+\tfrac{1}{4}\right).\tfrac{1}{9}+\left(\tfrac{1}{5}+\tfrac{1}{6}\right).\tfrac{1}{9^2}+\cdots\infty$$

OR

B Estimate the Sum of infinity series

$$2^2+\frac{3^2}{1!}x+\frac{4^2}{2!}x^2+\frac{5^2}{3!}x^3+\cdots\infty$$

23. A If $A=\begin{bmatrix}2 & 3\\ 4 & 5\end{bmatrix}$, Conclude that AA' and A' A are symmetric But. AA' ≠ A' A.

OR

B Define Matrix and list its types.

24. A Show that the matrix A is orthogonal.

$$\begin{bmatrix}\frac{1}{\sqrt{3}} & \frac{1}{\sqrt{6}} & \frac{-1}{\sqrt{2}}\\ \frac{1}{\sqrt{3}} & \frac{-2}{\sqrt{6}} & 0\\ \frac{1}{\sqrt{3}} & \frac{1}{\sqrt{6}} & \frac{1}{\sqrt{2}}\end{bmatrix}$$

OR

B Examine the rank of the matrix A and B.

$$A=\begin{bmatrix}0 & i & -i\\ -i & 0 & i\\ i & -i & 0\end{bmatrix},$$

$$B=\begin{bmatrix}1 & 1 & 1\\ a & b & c\\ a^2 & b^2 & c^2\end{bmatrix}.$$

25. A Use Cayley-Hamilton theorem to identify the characteristic equation of A and show that the matrix satisfies the equation. $A=\begin{bmatrix}1 & 1 & 3\\ 5 & 2 & 6\\ -2 & -1 & -3\end{bmatrix}$;

OR

B Calculate the eigenvalues and eigenvectors of the matrix A.

$$A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix};$$

Four Pages
S. No. 31316

23UMAEGS05

Reg. No.								

END SEMESTER EXAMINATION NOV/DEC-2023

First Semester

B.C.A/B.Sc COMPUTER SCIENCE/B.Sc COMPUTER SCIENCE (AI & DS)/ B.Sc INFORMATION TECHNOLOGY

ELECTIVE COURSE EC I – GENERIC SPECIFIC – INTRODUCTION TO LINEAR ALGEBRA/ ELECTIVE COURSE GENERIC SPECIFIC EC I – INTRODUCTION TO LINEAR ALGEBRA

Time: Three Hours **Maximum: 75 marks**

SECTION A – (15 x 1 = 15 marks)
ANSWER ALL QUESTIONS

1. What is the Sum of Binomial co-efficient?
   A 0 B 2^n
   C 1 D 2
2. $1+x+x^2+x^3+\ldots$ relate the series representation?
   A $(1-x)^{-1}$ B $(1+x)^{-1}$
   C $(1+x)^{-2}$ D $(1-x)^{-2}$
3. Express the coefficient of x^3 in $(1-x)^{-2}$.
   A -4 B 3
   C -3 D 4
4. Which of the following is an irrational number?
   A e B 2
   C 4 D 1/q
5. Indicate the value of e lies between?
   A 1<e<2 B 2<e<5
   C 1<e<3 D 2<e<3

6. What is the value of 1-1/2+1/3-1/4+...
   A Log1 B Log0
   C Log2 D Log3
7. What is the transpose of (AB) matrix $(AB)^T$=?
   A A^TB^T B A^TB
   C B^TA^T D AB^T
8. If the determinant value is zero then relate the matrix with the following.
   A Non-singular matrix B Singular matrix
   C Zero matrix D Unit Matrix
9. Roots of the matrix A are 1,5,10,then What are the eigen values of A^{-1}?
   A 1,1/5,1/10 B 10,2,1
   C 1,5,10 D 5,10,1
10. Find the characteristic root of the orthogonal matrix.
   A 0 B unit
   C Unit modulus D real
11. What is the rank of the 2^x2 diagonal matrixes with non-zero diagonal entries?
   A 0 B 1
   C 2 D 3
12. Rank(A,B)≠Rank(A) Then select the solution of AX=B is
   A Unique solution B Infinite number solution
   C No solution D Finite number of solution
13. What are the Eigenvalues of unit matrix?
   A 1 B 0
   C 2 D 3
14. If the eigenvalues of a matrix are 1,2,-3,then choose its determinant value.
   A 6 B 0

   C -6 D 1
15. If the eigenvalues of a matrix are distinct, then relate the eigenvectors with the following?
   A Equal B Distinct
   C Cannot be determined D Insufficient Data

SECTION B – (2 x 5 = 10 marks)

ANSWER ANY TWO QUESTIONS

16. Resolve into partial fractions
$$\frac{2x+3}{(x^2+1)(x+4)}$$
17. Simplify the infinity series $1+\frac{1+2}{2!}+\frac{1+2+2^2}{3!}+\cdots\infty$
18. Show that every square matrix is uniquely expressible as the sum of a Hermitian and skew Hermitian matrix.
19. Inspect the solution for what values of λ,μ the system of equations
    x+y+z=6;
    x+2y+3z=10
    x+2y+λz=μ
20. Calculate the eigenvalues of Matrices A
$$A=\begin{bmatrix} a & h & g \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$$

SECTION C – (5 x 10 = 50 marks)

ANSWER ALL QUESTIONS

21. A Resolve into partial fractions
$$\frac{x^2}{(x^2+1)(x^2+2)(x^2+3)}$$

OR

B Simplify the infinity series
$$\frac{1.3}{2.4.6.8}+\frac{1.3.5}{2.4.6.8.10}+\frac{1.3.5.7}{2.4.6.8.10.12}+..+\infty$$