K25FY4579 Pages: 2 Reg No:.....
Name:.....

First Semester FYUGP Degree (Reg/Sup) Examination November 2025

KU1DSCMAT117 - CALCULUS AND MATRIX ALGEBRA - I

2024 Admission onwards

Time : 2 hours Maximum Marks : 70

Section A

Answer any 6 questions. Each carry 3 marks.

1. Compute $\log_{11}(121)$ and $\log_4(1)$.
2. Find the value of $\sin^{-1}\left(\frac{-1}{2}\right)$.
3. Find $\frac{d}{dx}(\cot x)$.
4. For any number a, find the derivative of $\ln ax$.
5. Find $\frac{d}{dx}(\sinh x)$.
6. Find the rank of the 2×2 matrix $\begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$.
7. Reduce the matrix to row echelon form $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$.
8. Write the system of equations corresponding to the augmented matrix $\left[\begin{array}{c|c} A & B \end{array}\right] = \left[\begin{array}{cc|c} 0 & 1 & 1 \\ -1 & 2 & 1 \end{array}\right]$.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Find the value of derivative of the function $s = 5 - 2t^2$ at $t = -2$.
10. Find the tangent line to the curve $y = \sqrt{x}$ at $x = 4$
11. Find $\frac{dy}{dx}$ if $y = \ln(1 - xe^{-x})$.
12. Find the rank of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

قل ربّ زدني علما
SIR SYED COLLEGE
CENTRAL LIBRARY

13. Reduce the given matrix $A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ to its row echelon form, and hence find the rank.

14. Find the rank of $A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$ by reducing to its row echelon form.

Section C

Answer any 2 questions. Each carry 14 marks.

15. (a)Find $\int \frac{3\cos x - 4}{\sin^2 x}\, dx$.

    (b)Evaluate $\int \frac{(1+2x)^3}{x^4}\, dx$.

16. (a)Evaluate $\int_0^2 \frac{x^4}{1+x^2}\, dx$.

    (b)Evaluate $\int \sqrt{e^x - 1}\, dx$.

17. (a)Find the domain and range for the function $g(t) = \cos(e^{-t})$.

    (b)Simplify $3\ln\sqrt[3]{t^2-1} - \ln(t+1)$.

    (c)Compute $\lim_{x\to 1} \frac{x^2+x-2}{x^2-x}$.

قل ربّ زدني علما
SIR SYED COLLEGE
CENTRAL LIBRARY