K25FY2771 pages: 2 Reg No:.....
Name :.....

First Semester FYUGP Degree Supplementary Examination January 2025

KU1DSCMAT113 - FUNCTIONS, CALCULUS AND MATRICES

2024 Admission onwards

Time : 2 hours Maximum Marks : 70

Section A

Answer any 6 questions. Each carry 3 marks.

1. Simplify and obtain the value of expression $2\ln(\sqrt{e})$.
2. Simplify the expression for $e^{-\ln x^2}$.
3. Using Sandwich theorem, prove that $\lim_{\theta \to 0} \sin\theta = 0$.
4. Differentiate $\sin(x^2 + e^x)$ with respect to x.
5. Find $\frac{d}{dx}\left(3^{-x}\right)$.
6. Find $\frac{d}{dx}\left(3^{x}\right)$.
7. Obtain $\int \sqrt[3]{x^2}\, dx$.
8. Evaluate $\int_1^2 \frac{1}{x} dx$.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Investment companies often use the model $y = Pe^{rt}$ in calculating the growth of an investment. Use this model to track the growth of \$100 invested in 2000 at an annual interest rate of 5.5%.
10. Calculate the value of the limit $\lim_{v \to 2} \frac{v^2 - 4}{v^4 - 16}$.
11. Simplify: $\ln(\cosh x + \sinh x) + \ln(\cosh x - \sinh x)$.
12. Find an equation for a line that is tangent to the graph of $y = e^x$ and goes through the origin.
13. Evaluate $\lim_{x \to \pi/2} \cos\left(2x + \sin\left(\frac{3\pi}{2} + x\right)\right)$.

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14. Find $\frac{dy}{dx}$ if $y = \cos(\ln x)$.

Section C

Answer any 2 questions. Each carry 14 marks.

15. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, compute $adj\,A$ and A^{-1}.

16. Use Gauss-Jordan method to find the inverse of the matrix $\begin{bmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 5 & 2 & -3 \end{bmatrix}$.

17. (a) Evaluate $\int_0^1 \frac{x^5}{1+x^{12}}\,dx$.

    (b) Evaluate $\int \csc x\,dx$.

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