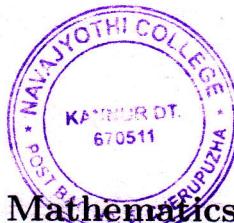


Reg No:.....  
Name :.....



K24FY 1341 (B)

**First Semester FYUGP Mathematics Examination  
NOVEMBER 2024 (2024 Admission onwards)  
KU1DSCMAT111 (BASIC MATHEMATICS I)  
(DATE OF EXAM: 4-12-2024)**

Time : 120 min

Maximum Marks : 70

**Part A (Answer any 6 questions. Each carries 3 marks)**

1. Find the value of  $\cos^{-1} \left( \frac{\sqrt{3}}{2} \right)$  3

2. Calculate  $\lim_{x \rightarrow 5} \frac{x - 5}{x^2 - 25}$ . 3

3. Calculate  $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$ . 3

4. If  $h(t) = t - \frac{1}{t}$ , find the value of  $h'(t)$  at  $t = -1$ . 3

5. If  $f(x) = 4 - x^2$ , evaluate the derivatives  $f'(-3)$  and  $f'(0)$ . 3

6. Find  $\frac{d}{dx} (e^{-x})$ . 3

7. Find the transpose of

$$\begin{bmatrix} 2 & 4 & 3 & 1 \\ 4 & 5 & 5 & 7 \\ 5 & 12 & 2 & 4 \end{bmatrix}$$

3

8. Compute the inverse of the matrix

$$A = \begin{bmatrix} 2 & 1 \\ 3 & 5 \end{bmatrix}$$

3

**Part B (Answer any 4 questions. Each carries 6 marks)**

9. Simplify using the rules for exponents

(a)  $3^{1.1} \cdot 3^{0.7}$

(b)  $(\sqrt{10})^{-3}$

(c)  $(5^2)^{\frac{5}{2}}$

6

10. Determine the domain and range of the following functions.

(a)  $f(x, y) = \sin xy$

(b)  $f(x, y, z) = \frac{1}{x^2 + y^2 + z^2}$ .

11. Calculate the value of the limit  $\lim_{v \rightarrow 2} \frac{v^2 - 4}{v^4 - 16}$  6
12. Find the derivatives of the functions (a)  $y = \frac{2x + 5}{3x - 2}$  (b)  $f(x) = (x^2 - 1)(x^2 + x - 2)$  6
13. Given the equation  $x^3 + xy - 2x = 1$ , find  $\frac{dy}{dx}$  by differentiating implicitly. 6
14. Determine  $\frac{d^2y}{dx^2}$  by implicit differentiation if  $3x^2 - 4y^2 = 7$ . 6

**Part C (Answer any 2 question(s). Each carries 14 marks)**

15. (a) Evaluate  $\int_0^1 \frac{x^4}{x^2 + 1} dx$ .  
 (b) Evaluate  $\int \sin^3 x dx$ . 14
16. Using partial fractions, evaluate the integral  $\int \frac{6x + 7}{(x + 2)^2} dx$ . 14
17. If  $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ , find  $A^{-1}$  and verify that  $A^3 = A^{-1}$ . 14