Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET - A

SCHOOL OF ENGINEERING
END TERM EXAMINATION - FEB 2023

Semester : Semester I - 2022
Course Code : MAT1001
Course Name : Sem I - MAT1001 - Calculus and Linear Algebra
Program : B.Tech - (All Programs)

Date : 25-FEB-2023
Time : 1.00PM - 4.00PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(10 X 2 = 20M)**

1. If $1, -1, 2$ are the eigenvalues of the matrix A then the eigen values of A^{-1} are _____.
(CO1) [Knowledge]

2. If $\lambda^2 - 5\lambda = 0$ is the characteristic equation for the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ then apply Cayley Hamilton theorem.
(CO1) [Knowledge]

3. Check the function $f(x,y) = \dfrac{4x^3 - 2xy^2}{xy^0}$ is homogeneous or not?
(CO2) [Knowledge]

4. Suppose $u = 7e^{0x}$ and $v = -2e^{0y}$ then find $\dfrac{\partial(u,v)}{\partial(x,y)}$.
(CO2) [Knowledge]

5. Write down the conditons for the function $f(x,y)$ attains maximum value at (x_0, y_0).
(CO2) [Knowledge]

6. Define Gamma function.
(CO3) [Knowledge]

7. What is the relationship between Beta and Gamma function?
(CO3) [Knowledge]

8. If the roots are real and equal then write the complementry function.
(CO4) [Knowledge]

9. If the roots are real and distinct then write the complementry function.

(CO4) [Knowledge]

10. If the roots are real and equal then write the complementry function.

(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(5 X 10 = 50M)**

11. Find A^{-1} if $A = \begin{bmatrix} 1 & -1 & 4 \\ 3 & 2 & -1 \\ 2 & 1 & -1 \end{bmatrix}$, using Cayley-Hamilton theorem.

(CO1) [Comprehension]

12. Suppose $sinu = \dfrac{x^3 + y^3}{x - y}$, then show that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} - 2tanu = 0$.

(CO2) [Comprehension]

13. Expand $e^x log(1 + y)$ in powers of x and y up to second degree by Taylor's theorem.

(CO2) [Comprehension]

14. Find $\int_{-c}^{c}\int_{-b}^{b}\int_{-a}^{a}(x^2 + y^2 + z^2)\, dzdydx.$

(CO3) [Comprehension]

15. Solve $y'' - 8y' + 16y = 3e^{4x}$ given that $y = 0$ at $x = 0$ and $x = 2$.

(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **(2 X 15 = 30M)**

16. Find the Eigenvalues and Eigenvectors of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

(CO2,CO1) [Application]

17. Find general solution of $(D^2 - 2D + 5)y = e^{2x}sinx$.

(CO4,CO3) [Application]