Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET - B

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 $0, 10, 100$ are the eigen values of matrix A then the determinent of A is _____.
(CO1) [Knowledge]

2. Find the eigen values for the given characteristic equation $\lambda^2 - 4 = 0$.
(CO1) [Knowledge]

3. If $z = f(u, v)$, where $u = g(s)$ and $v = h(s)$, then write the chain rule for $\frac{dz}{ds}$.
(CO2) [Knowledge]

4. Write the Taylor's series expansion of the function $f(x, y)$ in powers of $x - 1$ and $y - 2$ up to second degree.
(CO2) [Knowledge]

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

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

7. Find the value of the Gamma function $\Gamma\left(\frac{9}{2}\right)$.
(CO3) [Knowledge]

8. What is the complementry function for $(D - 3)^2 y = 0.$
(CO4) [Knowledge]

9. Find the complementry function for $(D^2+4)y=0.$

(CO4) [Knowledge]

10. What is the complementry function for $(D-3)^2y=0.$

(CO4) [Knowledge]

PART B

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

11. Verify the Cayley-Hamilton theorem for $\begin{bmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.

(CO1) [Comprehension]

12. Suppose $u = cos^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+\frac{1}{2}cotu=0$

(CO2) [Comprehension]

13. Find Taylor's series expansion for the function $x^2y+3y-2$ in powers of $x-1$ and $y+2$ up to second degree terms.

(CO2) [Comprehension]

14. Evaluate $\int_0^1\int_0^{\sqrt{1-y^2}} x^3y\ dxdy.$

(CO3) [Comprehension]

15. Obtain the general solution of $(D^2-6D+9)y=4e^{3x}.$

(CO4) [Comprehension]

PART C

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

16. Verify the Cayley-Hamilton theorem for $\begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$ and use it to find A^{-1}.

(CO2,CO1) [Application]

17. Solve $y''+2y'+3y=e^xcosx$.

(CO4,CO3) [Application]