TB242156V

Reg. No :.....

Name :.....

BACHELOR'S DEGREE (C.B.C.S) EXAMINATION, MARCH 2024

2023 ADMISSIONS REGULAR

SEMESTER II - COMPLEMENTARY COURSE 1

MT2B04B23 - Fundamentals of Mathematics

Time : 3 Hours **Maximum Marks : 80**

Part A

I. Answer any Ten questions. Each question carries 2 marks **(10x2=20)**

1. Explain briefly about the two different methods to find the rank of a matrix .
2. Differentiate between consistent and inconsistent system of equations.
3. Find the determinant of the matrix $\begin{bmatrix} 1 & -1 & 0 & 0 \\ 0 & 2 & 3 & 0 \\ 0 & 3 & 2 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$.
4. state the sandwich theorem
5. Define absolute maximum and absolute minimum
6. Find $\lim_{x \to 3} x^3 + 4x^2 - 3$.
7. define order of partial differential equation with example
8. Give an example of partial differential equation
9. Explain the method of eliminating arbitrary constants from an equation to form a partial differential equation.
10. Write the method for solving Legrange's equation.
11. Define Laplace transforms of a function f(t).
12. Calculate $\mathcal{L}$ (f) , where f(t) = t.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. write the procedure for solving a non homogenous differential equation
14. Using elementary transformation , find the normal form of $\begin{bmatrix} 0 & 2 & 2 \\ 1 & 3 & 3 \\ 2 & 4 & 2 \end{bmatrix}$.
15. define limit of a function with example
16. Explain briefly about extreme values of a function.
17. Show that the equation $x^3 + 3x + 1 = 0$ has exactly one real solution.
18. Define the elimination of arbitrary constant through an example
19. Find the general solution of the differential equation $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{(x+y)z}$.
20. Explain existence theorem for Laplace transforms.
21. Calculate $\mathcal{L}$ (e^{at} sin wt) ,using first shifting theorem.

Part C

III. Answer any Two questions. Each question carries 15 marks **(2x15=30)**

22. Find the absolute maximum and absolute minimum values of the function $f(x) = \frac{2}{3}x - 5$, $-2 \leq x \leq 3$.

23. Find the general integral of $y^2 p - xyq = x(z - 2y)$.

24. Explain the method of convolution to solve integral equations.

25. Explain briefly about the inverse Laplace transform and find the inverse transform of $\frac{2}{s^2+s+\frac{3}{2}}$.