BCA DEGREE (C.B.C.S.) EXAMINATION, MARCH 2023

2022 Admissions Regular & 2021 Admissions Supplementary / Improvement And 2020, 2019 And 2018 Admissions Supplementary

SEMESTER II - COMPLEMENTARY COURSE 2

(CLOUD TECHNOLOGY AND INFORMATION SECURITY MANAGEMENT)

MT2C04B18 - FUNDAMENTALS OF MATHEMATICS

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

Part A

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

1. Differentiate between consistent and inconsistent system of equations.

2. Differentiate between matrix and characteristic matrix.

3. Calculate the rank of $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, using elementary transformation.

4. Define limit of a function.

5. State Extreme value theorem.

6. Using the definition of limit , prove that $\lim\limits_{x \to 1} 5x - 3$ = 2.

7. Illustrate partial differential equation.

8. Eliminate the constants a and b from the equation z = (x+a)(y+b).

9. Write the method for solving Legrange's equation.

10. Eliminate the constants a and b from the equation $2z = (ax+y)^2 + b$.

11. Describe when Laplace transforms exists.

12. Calculate $\mathcal{L}$ (f) , where f(t) = sin wt.

Part B

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

13. Find the rank of the augmented matrix , obtained from the following linear non-homogeneous equation $x_1 + 2x_2 + 3x_3 = 4,$

$x_1 + x_2 + x_3 = 1,$

$x_2 - 4x_3 = 0.$

14. Find the characteristic vectors of the matrix $\begin{bmatrix} 0 & -2 & -2 \\ -1 & 1 & 2 \\ -1 & -1 & 2 \end{bmatrix}$.

15. Explain i) local extrema ii) absolute extrema.

16. Estimate the value of $\lim\limits_{x \to 0} \dfrac{-10+\sqrt{x^2+100}}{x^2}$.

17. Apply Sandwich theorem to find the limit of f(x) as $x \to 0$, where $\sqrt{5 - 2x^2} \le f(x) \le \sqrt{5 - x^2}$, for $-1 \le x \le 1$.

18. Explain briefly about the formation of a partial differential equation by eliminating arbitrary constants or functions.

19. Find any one integral curves of linear partial differential equation $(y+2x) p - (x + yz) q = x^2 - y^2$.

20. Find the laplace transforms of sin h at.

21. Calculate $\mathcal{L}$ (e^{at} cos wt) ,using first shifting theorem.

Part C

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

22. i) Find the critical points of $f(x) = \sin^2 x - \sin x - 1$, within the interval $0 \le x \le 2\pi$.

    ii) Write the method to find the absolute extrema of a function, with a suitable example.

23. Find the general integral of the linear partial differential equation px (x + y) =qy (x + y) - (x - y) (2x + 2y +z) .

24. Explain briefly about first shifting theorem and applying first shifting theorem , find the inverse transform of $\dfrac{2}{(s+1)^2+1}$

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25. Solve the following differential equation $y^{I} - 5 y = 1.5 e^{-4t}$, y(0) = 1 , by Laplace transform.