Total No. of Question : [4]

Registration No. : | | | | | | | | | |

Programme Name : F.Y.B.Tech
Regular F.Y.B.Tech. ESE Sem. I (A.Y.2023-24) Dec.2023
I SEMESTER (2023 BATCH)
231FYL101-Linear Algebra and Calculus

Duration : [- - -]
Date : -
Day : -

Marks : 50

Instructions :

(Q1) **Attempt the following questions** [20.0]

(1.1) Test the consistency of the following equations and if consistent solve it [6.0]

$$2x + 3y + 4z = 11,\ x + 5y + 7z = 15,\ 3x + 11y + 13z = 25$$

CO :- 101.1
Blooms Taxonomy :- Understand, Apply

(1.2) Compute the eigen values and eigen vectors corresponding to largest eigen value for the matrix [7.0]

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

CO :- 101.2
Blooms Taxonomy :- Understand, Apply

(1.3) Solve the following system of equations by using Gauss Seidel method (Perform **three** iterations only) [7.0]

$$4x - 2y - z = 40, x - 6y + 2z = -28,\ x - 2y + 12z = -86$$

CO :- 101.3
Blooms Taxonomy :- Apply

(Q2) **Attempt any two of the following questions** [10.0]

CO :- 101.4
Blooms Taxonomy :- Understand, Apply

(2.1) [5.0]

Expand $2x^3 + 7x^2 + x - 6$ in powers of $(x - 2)$

(2.2) Using Maclaurin's series, prove that $e^{x\,cosx} = 1 + x + \frac{x^2}{2} + \cdots$ [5.0]

(2.3) Evaluate $\lim_{x \to 1} \left[\frac{1}{logx} - \frac{x}{x-1}\right]$ [5.0]

(Q3) **Attempt any two of the following questions** [10.0]

CO :- 101.5
Blooms Taxonomy :- Apply

(3.1) If $z = \log(x^2 + y^2)$, then verify that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$ [5.0]

(3.2) If $u = log\left(\frac{x^3+y^3}{x^2+y^2}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 1$ [5.0]

(3.3) If $x = u(1 - v), y = uv$, Find $\frac{\partial(x,y)}{\partial(u,v)}$ [5.0]

(Q4) **Attempt any two of the following questions** [10.0]

CO :- 101.6
Blooms Taxonomy :- Apply

(4.1) Evaluate $\int_0^1 \frac{1}{\sqrt{-\log x}}\,dx$ [5.0]

(4.2) Evaluate $\int_0^4 \sqrt{x}\,(4 - x)^{\frac{3}{2}}\,dx$ [5.0]

(4.3) Show that $\int_0^\infty e^{-x^2-2ax}dx = \frac{\sqrt{\pi}}{2}\,e^{a^2}[1 - \text{erf}\,(a)]$ [5.0]

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