

ILVA college
B.Sc. 1st Sem.

Mathematics Assignment
Matrix theory, Calculus and Geometry

Que. 1. find Eigen values and eigen vector of matrix

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

Que. 2. State and prove Lagrange's mean value theorem.

Que. 3. If $I_n = \int_0^a (a^2 - x^2)^n dx$ when $n > 0$

then prove that $I_n = \left(\frac{2na^2}{2n+1} \right) I_{n-1}$

Que. 4. find all values of $i : (1)^{1/3}$

Que. 5. find the equation of cylinder whose generators are parallel to the line

$$\frac{x}{1} = \frac{y}{-2} = \frac{z}{3} \text{ and base curve is}$$

$$x^2 + 2y^2 = 1, z = 0$$

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B.Sc. IInd sem

Mathematics Assignment

Advanced calculus, Diffⁿ. eqⁿ, vector calculusQues. 1. If $\cos^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{xe}{n}\right)^n$ then prove that

$$x^2 \frac{y}{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$$

Ques. 2. Solve: $(D^3 + 3D^2 + 3D + 1)y = e^{-2x}$

Ques. 3. Solve by variation of parameter:

$$\frac{d^2 y}{dx^2} + 4y = 4 + \sin 2x.$$

Ques. 4. Prove that: $\nabla^2 f(x) = f''(x) + \frac{2}{x} f'(x)$ Ques. 5. Evaluate $\iint_R e^{2x+3y} dx dy$ where R is a triangle bounded by $x=0$, $y=0$ and $x+y=1$

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B.Sc. III sem

Mathematics Assignment

Real Analysis, Diffⁿ. eqⁿ, - and Abstract Algebra

Que. 1. prove that the series :

$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n^2} = 1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$$

absolutely convergent.

Que. 2 solve $\frac{d^2y}{dx^2} + y = 0$ by power series method.

Que. 3. prove that every group of prime order is cyclic.

Que. 4. prove that any two left (right) cosets of H in G are either identical or disjoint.

Que. 5. prove that $J_n(-x) = (-1)^n J_n(x)$,
- where n is any integer.

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B.Sc. IV Sem

Mathematics Assignment

Abstract Algebra, Advanced calculus,
partial diffⁿ. eqⁿ and complex Analysis.

Que. 1. State and prove the Cauchy's theorem.

Que. 2. Discuss the maxima and minima of function
 $U = x^3 + y^3 - 3axy$.

Que. 3. Show that $\int_0^2 x(8-x^3)^{1/3} dx = \frac{16\pi}{9\sqrt{3}}$

Que. 4. Solve : $P + r + s = 1$

Que. 5. Find the fixed points and normal form of the bilinear transformation

$$w = \frac{3z-4}{z-1}$$

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B.Sc. V sem

Mathematics Assignment
Linear Algebra and Numerical Analysis

- Ques. 1. prove that the kernel of homomorphism is a subspace of $U(F)$.
- Ques. 2. Apply Gauss-Jordan method to solve this;

$$x + y + z = 9$$

$$2x - 3y + 4z = 13$$

$$3x + 4y + 5z = 40$$
- Ques. 3. use Newton's method to find a root of equation

$$x^3 - 3x - 5 = 0$$
- Ques. 4. Apply LU Decomposition method to solve this;

$$3x_1 + 2x_2 + x_3 = 10$$

$$2x_1 + 3x_2 + 2x_3 = 14$$

$$x_1 + 2x_2 + 3x_3 = 14$$
- Ques. 5. show that the transformation $T: \mathbb{R}^2 \rightarrow \mathbb{R}^3$ defined as below is a linear transformation from \mathbb{R}^2 into \mathbb{R}^3 . find the range, rank, nullspace and nullity of T .