

Internal Exam-2024(GE-1) Calculus ~~2020-2023~~ to 2021-2024

Mathematics

Answer any three question

1. State and prove Euler's theorem on homogeneous function of two independent variables x and y of degree n
2. Find the radius of curvature for the pedal curve $p = f(r)$
3. Evaluate the Integral $\int_0^{\frac{\pi}{2}} \sin^n x dx$
4. Prove that $\text{curl}(\phi \vec{a}) = \phi \overrightarrow{\text{curl} a} + (\text{grad} \phi) \times \vec{a}$ i.e. $\nabla \times (\phi \vec{a}) + (\nabla \phi) \times \vec{a}$
5. Find the surface area of sphere of radius a .

Internal Exam-2024(GE-2) Diff Equation ~~2020-2023~~ to 2021-2024

Answer any three question

1. Solve by the method of variation of parameters the equations

$$\frac{d^2y}{dx^2} + a^2y = \sec ax.$$

2. Solve $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} - \frac{dy}{dx} - y = \cos 2x$

3. Solve $(p^2 + q^2)y = qz$ by applying Charpit's method.

4. Solve $p^3 + q^3 = 3pqz$.

5. (a) Define linear differential equation of first order.

(b) Define Lagrange's auxiliary equations.

Internal Exam-2024(GE-3) Real Anal 2020-2023 to 2021-2024

Answer any three question

- 1.State and prove Bolzano-Weierstrass theorem for sets.
- 2.State and prove D -Alemberts ratio test.
3. Examine the convergence of

$$\frac{1}{3} + \frac{1.2}{3.5} + \frac{1.2.3}{3.5.7} \dots$$

- 4.Test the convergence of

$$\frac{\log 2}{2^2} - \frac{\log 3}{3^2} + \frac{\log 4}{4^2} - \dots$$

- 5.(a) Define Cauchy sequence.
(b) Define suprema and minima.

Internal Exam-2024(GE-4) Algebra 2020-2023 to 2021-2024

Answer any three question

- 1.Prove that cubic roots of unity is an abelian group.
- 2.Prove that Intersection of any two normal sub group is a normal sub group.
3. Every finite integral domain is a field.
- 4.In a group G for all $a, b \in G$ then $(a \cdot b)^{-1} = b^{-1} \cdot a^{-1}$
- 5.(a) Define ring (b) Define order of a group