

Mid-West University
Examinations Management Office
 Birendranagar, Surkhet
End Semester (Alternative/Physical) Examinations -2078

Bachelor level/ B.Sc / 2nd Semester
 Time: 3hrs
Subject : Calculus II (MATH 323)

Full Marks : 60
 Pass Marks : 30

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

[6 x10 = 30]

1. a) Find the vertex and focus of the ellipse $\frac{x^2}{64} + \frac{y^2}{100} = 1$. Identify and sketch the surface $x^2 + y^2 = 1$.
 b) Determine whether given vectors are orthogonal, parallel or neither, where $\vec{a} = \langle -5, 3, 7 \rangle$ and $\vec{b} = \langle 6, -8, 2 \rangle$. Find the equations of the plane passing through the points (3, -1, 2), (8, 2, 4) and (-1, -2, -3).
2. Find the volume of the parelloiped determined by the vector $\vec{a} = \langle 6, 3, -1 \rangle$, $\vec{b} = \langle 0, 1, 2 \rangle$ and $\vec{c} = \langle 4, -2, 5 \rangle$. Derive the parametric equation of the line through the point $P_0 = (x_0, y_0, z_0)$ and parallel to the vector $\vec{v} = \langle a, b, c \rangle$.
3. a) Determine the series $\sum_{n=1}^{\infty} \frac{2n^2+3n}{\sqrt{5+n^6}}$ is convergent or divergent. Determine the given series is convergent or divergent $1 - \frac{1 \cdot 3}{3!} + \frac{1 \cdot 3 \cdot 5}{5!} - \frac{1 \cdot 3 \cdot 5 \cdot 7}{7!} + \dots$
 b) When a series is conditionally convergent? Give an example. Find a power series of $\frac{1}{x-2}$ and also find $\ln(x-2)$.

OR

Find the radius of convergence and interval of convergence of the given series $\sum_{n=1}^{\infty} (-2)^n \cdot \frac{x^n}{n^4}$. Define power series. Find the radius of convergence of the given series $\sum_{n=1}^{\infty} \frac{n(x+2)^n}{3^{n+1}}$.

4. a) Show that $(\vec{a} \times \vec{b}) \cdot \vec{a} = 0$. Find the volume of the parelloiped determined by the vector $\vec{a} = \langle 6, 3, -1 \rangle$, $\vec{b} = \langle 0, 1, 2 \rangle$ and $\vec{c} = \langle 4, -2, 5 \rangle$.
 b) . Find the equation of the tangent to the curve $x = r(\theta - \sin\theta)$, $y = r(1 - \cos\theta)$ at $\theta = \frac{\pi}{3}$.
5. If θ is the angle between two vectors, then prove that $\vec{a} \cdot \vec{b} = ab \cos\theta$. Prove that $\vec{a} \times \vec{b}$ is perpendicular to \vec{b} . If θ is the angle between two vectors \vec{a} and \vec{b} , show that $|\vec{a} \times \vec{b}| = |\vec{a}||\vec{b}| \sin \theta$.

OR

Test the convergence of the series $\sum_{n=1}^{\infty} \left(\frac{3n+2}{2n+3}\right)^n$ by the root test. Find the sum of the series $\sum_{n=1}^{\infty} \left(\frac{1}{n(n+1)} + \frac{2}{e^n}\right)$

6. Solve this diff. equation $y'' - 2y' - 3y = x + 2$ by the method of variation of parameters. Solve $y'' - 4y = x e^x + \sin 2x$ by the method of undetermined coefficients.

THE – END