Mid-West University

Examinations Management Office

Surkhet ,Nepal

Final Examinations -2079

Bachelor level/ B.Sc /2nd Semester — Full Marks : 100

Time: 3 hrs — Pass Marks : 50

Subject : Calculus II (MATH 323)

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

Group – A

Attempt all Long question **[4×6=24]**

1. Show the length of polar curve $r = f(\theta), a \le \theta \le b$ is $L = \int_a^b \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2}\, d\theta$. Find the length of the curve $r = 3sin\theta,\ 0 \le \theta \le \frac{\pi}{2}$.
2. Approximate the function $f(x) = \sqrt[3]{x}$ by Taylor polynomial of degree 2 at $a = 8$. Find the Maclaurin series for $f(x) = \ln(1+x)$.
3. Find the symmetric equation for the line of intersection of the planes $5x - 2y - 2z = 1$ and $4x + y + z = 6$. Also find the angle between the planes.
4. Solve the differential equation $y'' + y' - 2y = x + sin2x, y(0) = 1, y'(0) = 0$

Group – B

Attempt all Short question **[6×4=24]**

5. Find the points where the tangent is horizontal or vertical on the curve $x = 2t^3 + 3t^2 - 12t\ , y = 2t^3 + 3t^2 + 1$. Also, find $\frac{dy}{dx}$.
6. Find the vertices, foci and asymptotes of the hyperbola $9x^2 - 4y^2 = 36$.
7. Determine the sum of the series $\sum_{n=1}^{\infty} \ln\left(\frac{n^2+1}{2n^2+1}\right)$.
8. Find the radius of convergence and interval of convergence of the series $\sum_{n=0}^{\infty} \frac{(x-2)^n}{n^2+1}$.
9. Find the vector perpendicular to both vectors $\vec{a} = \langle 6,2,1\rangle$ and $\vec{b} = \langle 0,1,3\rangle$.
10. Solve the differential equation; $y'' - 2y' = sin4t$.

Group – C

Attempt all Very Short question **[6×2 =12]**

11. a. Find the limit of convergence of $a_n = \frac{3+5n^2}{n+n^2}$.

    b. Find the sum of the series $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$.

12. .a. Find radius of convergence of the series $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}}$.

    b. Find the equation of sphere that passes through the origin and whose center is $(1,2,3)$.

13. a. Determine scalar projection of $\vec{b}$ onto $\vec{a}$, where $\vec{a} = \langle 3,6,-2\rangle$ and $\vec{b} = \langle 3,6,-2\rangle$.

    b. Solve; $y'' + 4y' + 4y = 0$.

THE – END