

**Third Semester FYUGP Degree Examination NOVEMBER
2025**
**KU3DSCCMT201 - INTRODUCTION TO GEOMETRY AND
ANALYSIS**
2024 Admission onwards

Time : 2 hours

Maximum Marks : 70

Section A

Answer any 6 questions. Each carry 3 marks.

1. Give a precise idea of a limit of a sequence
2. Define convergent sequence.
3. Write the equation of the parabola with focus $(0, p)$ and directrix $y = -p$
4. Find the asymptotes of the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1.$$

5. Find the asymptotes of the hyperbola

$$-\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1.$$

6. Define absolute convergence of a series.
7. What is the relation between absolute convergence and convergence of a series?
8. What about the convergence of the series $\sum a_n$ if

$$\lim_{n \rightarrow \infty} |a_n|^{1/n} = \frac{1}{5}.$$

Section B

Answer any 4 questions. Each carry 6 marks.

9. Find the equation of an ellipse with foci $(0, \pm 2)$ and vertices $(0, \pm 3)$.
10. Find the foci of the ellipse

$$9x^2 + 16y^2 = 144.$$

11. Find the rectangular coordinates of a point whose cylindrical coordinates are $(2, 2\pi, 1)$.
12. Define alternating series. State the alternating series test for convergence.
13. Test the convergence of

$$\sum_{n=1}^{\infty} \left(\frac{2n-1}{3n+2} \right)^n.$$

14. Show by an example that the Ratio Test fails when

$$\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = 1.$$

Section C

Answer any 2 questions. Each carry 14 marks.

15. (a) Distinguish between elliptic cylinder and hyperbolic cylinder by an example for each.
(b) Distinguish between elliptic paraboloid and hyperbolic paraboloid by an example for each.
16. (a) Identify the surface $y = x^2$.
(b) Describe the surface $z^2 + x^2 = 1$.
(c) Classify the surface $z = y^2 - x^2$.
17. (a) Find the sum of the series whose n^{th} partial sum is given by

$$S_n = \frac{n^2 - 1}{4n^2 - 1}.$$

- (b) Test the convergence of the series

$$\sum_{n=1}^{\infty} \frac{1}{n(n+1)}.$$