



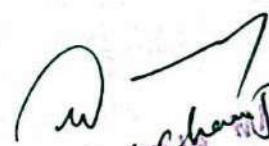
SRI VENKATESWARA UNIVERSITY - TIRUPATI
Syllabus for 4-Year UG Honors in B.Sc. (Mathematics) as Major
in consonance with Curriculum framework
w. e. f. AY 2025-26

COURSE STRUCTURE (for Semester I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1 ✓	Differential Equations	5	4
		2 ✓	Solid Geometry	5	4
	II	3 ✓	Group Theory	5	4
		4 ✓	Elementary Real Analysis	5	4
II	III	5	Ring Theory	5	4
		6	Advanced Real Analysis	5	4
		7	Theory of Matrices	5	4
	IV	8	Linear algebra	5	4
		9 ✓	Vector Calculus	5	4
		10	Linear Programming Problems	5	4
III	V	11 ✓	Special Functions	5	4
		12 A ✓	Laplace Transforms	5	4
		OR			
		12 B ✓	Foundations of Automata Theory	5	4
		13 A ✓	Numerical Methods	5	4
		OR			
		13 B ✓	Mathematical Methods using MATLAB	5	4

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
	VI				
		14 A ✓	Integral Transforms	5	4
		OR			
		14 B ✓	Statistical Analysis using R	5	4
		15 A	Advanced Numerical Methods	5	4
		OR			
		15 B	Mathematical Computations using Python	5	4

Note: In the III Year (during the V and VI Semesters), students are required to select a pair of electives from one of the **Two** specified domains. **For example: if set 'A' is chosen, courses 12 to 15 to be chosen as 12 A, 13 A, 14 A and 15 A.** To ensure in-depth understanding and skill development in the chosen domain, students must continue with the same domain electives in both the V and VI Semesters.


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SEMESTER - I

COURSE 2: SOLID GEOMETRY

Credits: 4

5 hrs/week

Course Objectives

1. To introduce fundamental concepts of planes, lines, and spheres in 3D geometry.
2. To develop analytical skills for deriving equations of planes, lines, and spheres in different forms.
3. To analyze geometric relationships, including angles, distances, and intersections between lines, planes, and spheres.
4. To study advanced properties of spheres, such as tangents, polar planes, and orthogonality conditions.
5. To apply geometric principles to solve problems involving coplanarity, shortest distances, and sphere-line/plane interactions.

Course Outcomes

1. Derive and interpret equations of planes and lines in various forms.
2. Compute angles, distances, and intersection conditions between geometric elements (lines, planes, spheres).
3. Determine coplanarity of lines and solve problems involving shortest distances in 3D space.
4. Analyse sphere-related problems, including tangents, intersections, and circle equations in 3D.
5. Apply advanced concepts like polar planes, conjugate points, and orthogonality conditions of spheres.

Course Content

Unit – 1

Equation of plane in terms of its intercepts on the axis - Equations of the plane through the given points - Length of the perpendicular from a given point to a given plane - Bisectors of angles between two planes - Combined equation of two planes.

Unit – 2

Equation of a line in various forms - Angle between a line and a plane - The condition that a given line may lie in a given plane - The condition that two given lines are coplanar - Number of arbitrary constants in the equations of straight line - Sets of conditions which determine a line.

Unit – 3

The shortest distance between two skew lines - The length and equations of the line of shortest distance between two skew lines - Length of the perpendicular from a given point to a given line.

Unit – 4

Definition and equation of the sphere - Equation of the sphere through four given points - Plane sections of a sphere - Intersection of two spheres - Equation of a circle - Sphere through a given circle - Intersection of a sphere and a line.

Unit – 5

Power of a point - Tangent plane - Plane of contact - Polar plane - Pole of a Plane - Conjugate points - Conjugate planes - Angle of intersection of two spheres - Conditions for two spheres to be orthogonal - Radical Plane - Coaxial system of spheres - Limiting Points.

Activities

The activities include quizzes, assignments, seminars, and student presentations. Additional tasks involve mini projects, concept flowcharts, operator method charts, peer teaching, LMS-based quizzes, board work challenges, poster presentations, and visual aids like chalk talks to enhance learning and engagement.

Text Book

Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, published by S. Chand & Company Ltd. 7th Edition.

Reference Books

1. A Text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khalel Ahmed, published by Wiley Eastern Ltd., 1999.
2. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman, published by Tata McGraw-Hill Publishers.
3. Solid Geometry by B. Rama Bhupal Reddy, published by Spectrum University Press.


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SRI VENKATESHWARA UNIVERSITY -TIRUPATI

B.Sc (Honors)-Mathematics(Major)

I Semester

Course 2:SOLID GEOMETRY

Time: 3 Hours.

Maxi. Marks: 75

SECTION – A

Answer Any five questions Each question carries 3 Marks (5 × 3 = 15 Marks)

1. Find the equation of a plane which makes intercepts 4, 5, and 6 on the coordinate axes.
2. Find the length of the perpendicular from the point (2, -3, 4) to the plane $3x + 4y + 12z = 26$.
3. Find the symmetric form of the line passing through (1, -2, 3) and parallel to the vector $2\mathbf{i} + 3\mathbf{j} - \mathbf{k}$.
4. Find the angle between the line $x/2 = (y-1)/3 = (z+2)/-2$ and the plane $3x - 6y + 2z + 7 = 0$.
5. Define skew lines and give an example.
6. Find the shortest distance between the skew lines $x/1 = (y-1)/-2 = (z+1)/3$ and $(x-2)/2 = (y+3)/1 = z/-2$.
7. Find the equation of a sphere whose diameter has end points (1, 2, 3) and (5, 6, 7).
8. Find the equation of the circle formed by the intersection of the spheres $x^2 + y^2 + z^2 = 25$ and $x^2 + y^2 + z^2 - 4x - 6y - 2z + 3 = 0$.
9. Find the equation of the tangent plane to the sphere $x^2 + y^2 + z^2 = 49$ at the point (3, 4, 0).
10. Find the equation of the polar plane of the point (1, 2, -1) with respect to the sphere $x^2 + y^2 + z^2 - 6x - 8y + 2z + 1 = 0$.

SECTION – B

Answer ALL questions Each question carries 12 Marks (5 × 12 = 60 Marks)

11. (a) Find the equation of the plane passing through the points (1, 2, 3), (2, 3, 4), and (3, 1, 2).

(OR)

- (b) Find the bisector planes between the planes $x + 2y + 2z = 3$ and $2x + y + 2z = 5$.

12. (a) Derive the condition for two lines to be coplanar and verify it for the lines $x = 1 + t, y = 2t, z = 3t$ and $x = 2s, y = 1 + 3s, z = 2 + 4s$.

(OR)

(b) Find the equation of the line of intersection of the planes $x + y + z = 6$ and $2x - y + 3z = 4$.

13. (a) Find the shortest distance between the lines $(x - 1)/2 = (y + 1)/-1 = (z - 2)/3$ and $(x + 2)/1 = (y - 3)/2 = (z + 4)/-2$.

(OR)

(b) Find the perpendicular distance from the point $(3, -2, 1)$ to the line $(x - 2)/3 = (y + 1)/-4 = (z - 5)/2$.

14. (a) Find the equation of the sphere through the points $(1, 0, 0)$, $(0, 1, 0)$, $(0, 0, 1)$, and $(1, 1, 1)$.

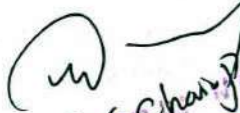
(OR)

(b) Prove that the intersection of the sphere $x^2 + y^2 + z^2 - 6x + 2y - 4z + 5 = 0$ and $x^2 + y^2 + z^2 - 2x + 4y - 6z + 3 = 0$ is a circle and find its equation.

15. (a) Find the equation of the radical plane of the spheres $x^2 + y^2 + z^2 = 25$ and $x^2 + y^2 + z^2 - 4x - 6y + 2z + 3 = 0$.

(OR)

(b) Prove that the angle of intersection of the spheres $x^2 + y^2 + z^2 = 16$ and $x^2 + y^2 + z^2 - 4x - 6y - 2z + 9 = 0$ is 90° .


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