Department of Mathematics				*CLASS: I B.Sc. Mathematics*				
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ week**	**CIA**	**Ext**	**Total**
II	Core	20U2MMC3	Analytical Geometry of Three Dimension and Vector Calculus	4	4	25	75	100

*COURSE OBJECTIVES***:**

1. Acquire a knowledge of geometry of spheres, cone, cylinder in 3 Dimensional problems.
2. Apply analytical techniques in solving 3D problems.
3. Demonstrate an understanding in vector differentiation.
4. Knowledge of evaluating line and surface integrals by applying Green's, Gauss and Stoke's theorems.

Unit-I:

Equation of a Plane – passing through three points – coplanar - intercept form – Normal form - Angle between two planes – parallel planes – perpendicular planes – intersection of two planes - Angle bisectors of two planes

Unit-II:

Introduction -Equation of a sphere – centre radius form – general form – diameter form - Tangent line and tangent plane – tangent plane parallel to plane -tangent plane passes through a point- intersection of two spheres - Section of a sphere - orthogonal.

Unit-III:

Equation of a Cone - Right circular cone – Angle between line of intersection of cone and a plane - Cylinder - Right circular cylinder – circular cylinder.

Unit-IV:

Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product - The vector operator 'del' - Gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors - Laplacian operator.

Unit-V:

Line integrals - Surface integrals - Green's, Gauss and Stoke's theorems (without proof) - Problems.

Text Book:

1. S. Arumugam, A.Thangapandi Issac & Somasundaram, Analytical, Edition 20, Yes Dee Publishing Private Limited, Chennai.
   Chapters:-10,12, **13**(Analytical Geoemetry)
2. S. Arumugam &A.Thangapandi Issac, Analytical Geometry (3D) and Vector Calculus, Edition 2017, New Gamma Publishing House.

Part B (Vector Calculus) -Chapters: 5,6,7

Reference Books:
1. T. K. Manickavachagom Pillai and T. Natarajan, Analytical Geometry (3D), Edition 2011, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. M. K.Venkataraman and Manorama Sridhar, Vector calculus and Fourier series, 2002 Edition, The National Publishing Company.

Web References:
1. https://nptel.ac.in/courses/111/105/111105122/
2. https://www.maths.ox.ac.uk/study-here/undergraduate-study/practice-problems
3. http://www.freebookcentre.net/SpecialCat/Free-Mathematics-Books-Download.html

Course Learning Outcomes

On the successful completion of the course, students will be able to

Number	Course Learning Outcome	Knowledge level
CLO1	Understand the basic concept of plane. Compute angles between two planes and bisectors of two planes. Understand the basic concept of sphere.	Upto K3
CLO2	Know the concept of sphere – Evaluate tangent line and tangent plane and section of sphere.	Upto K4
CLO3	Obtain the geometrical knowledge of cone and Cylinder. Determine equations of cone, right cone, cylinder and right circular cylinder.	Upto K3
CLO4	Acquire the idea of gradient, divergence, curl, solenodial and irrational of vectors. Use vector differentiation in solving problems	Upto K2
CLO5	Discuss about green's, Stoke's, Gauss Divergence theorem and apply it in solving various problems.	Upto K4

K1- Recall, K2 – Understanding, K3 – Applying, K4- analyzing, K5-Evaluating, K6-Creating

Mapping with Courses Learning Outcomes (CLOs)

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	2	1	-	-	-	3	3	3	1	-	-	-
CLO2	1	2	-	-	1	3	3	3	3	1	2	1
CLO3	1	2	-	-	1	3	3	3	3	-	2	1
CLO4	3	-	-	1	-	3	2	3	2	1	-	1
CLO5	2	3	-	1	2	3	1	2	3	-	3	-

1. Basic level   2. Intermediate level   3. Advance Application

Pedagogy:

Lecture, Power point presentation, Group Discussion, Seminar, Quiz, Problem Solving and Tutorial.

Lesson Plan

S. No.	UNIT	DESCRIPTION	TAKING HOURS	TOTAL	Pedagogy
1.	I	Equation of a Plane and its problem	4	12	Lecture, Quiz
		Angle between two planes and examples	4		Lecture
		Angle bisectors of two planes and problems	4		Lecture ,Problem Solving
2.	II	Introduction to sphere	1	12	Lecture ,Group Discussion
		Equation of a sphere	3		Lecture ,Problem Solving
		Tangent line and tangent plane	4		Lecture, quiz
		Section of a sphere and its problems	4		Lecture, Tutorial
3.	III	Equation of a Cone	2	12	Lecture
		Cone with Vertex at the origin	2		Lecture, Quiz
		Right circular cone and it's problems	3		Lecture
		Equation of cylinder	2		Lecture ,Group Discussion
		Right circular cylinder and it's problems	3		Lecture ,Tutorial
4.	IV	Vector point function - Scalar point function - examples	1	12	Lecture ,Quiz
		Derivative of a vector and derivative of a sum of vectors	1		Lecture
		Derivative of a product of a scalar and a vector point function	1		Lecture
		Derivative of a scalar product and vector product	2		Lecture, ICT
		The vector operator 'del'	1		Lecture, Group discussion
		Gradient of a scalar point function	2		Lecture
		Divergence of a vector	1		Lecture
		Curl of a vector - solenoidal and irrotational vectors	1		Lecture, problem solving
		Laplacian operator.	2		Lecture
5.	V	Line integral and Surface integral	2	12	Lecture,Quiz
		Volume integral- example	2		Lecture, ICT
		Stokes Theorem, Gauss-divergence Theorem -problems	4		Lecture, Seminar
		Green's Theorem in two dimensions - Problems	4		Lecture ,Tutorial.
		Total		**60**	

Course Designer: Dr. I. Padmavathi, Assistant Professor of Mathematics