MA1003D MATHEMATICS FOR ARCHITECTURE

Pre-requisites:Nil

L	T	P	C
3	1	0	3

Total Lecture hours: 39

Course Outcomes:

Students will be able to:

CO1 formulate different menstruation problems as multiple integrals and evaluate them.

CO2 find the parametric representation of curves and surfaces in space and will be able to evaluate integral of functions over curves and surfaces.

CO3 test for the convergence of sequences and series of numbers as well as functions.

CO4 use vector differential calculus to solve problems related to curvature and surface normal.

CO5 find solutions for right angled spherical triangles.

CO6 draw and analyze different plane curves in Cartesian and polar coordinate systems.

Module 1 (10 hours)

Basic Calculus: Review of differentiation and integration, applications of differentiation, definite integrals, volumes using cross sections, solids of revolution, volumes using cylindrical shells, arc length, areas of surface of revolution, double integrals, area and volume by double integration triple integrals.

Module 2 (10 hours)

Plane Curves: Parameterizations of plane curves, calculus with parameterized curves, polar coordinates, areas and lengths in polar coordinates, conic sections. vectors and the geometry of space, three dimensional coordinate systems, vectors, lines and planes in space, cylinders and quadric surfaces, curves in space and their tangents, arc length in space, curvature, normal, velocity and acceleration.

Module 3 (10 hours)

Introduction to Spherical Trigonometry: Geometry of the sphere, length of a circle arc, spherical triangle, cosine, sine and supplemental formulae, solution of right angled triangles, curve tracing, asymptotes, singular points, tangents at the origin, cusps, tracing of curves in Cartesian and polar form.

Module 4 (9 hours)

Sequences and Series of real numbers and real functions of one variable, convergence and tests for convergence, mathematics in art, Fibonacci series and Golden ratio, Phillotaxis, rectangular pentagon, honeycombs and cracks, Tessellation and Penrose tiles, introduction to fractals, fractal shape, properties and construction of fractals.

References

1. G.B. Thomas, R.L. Finney, Calculus and Analytical Geometry, Addison-Wesley, Bosten, 1998.
2. S. Balachandra Rao, C K. Shantha, Differential Calculus, Wiley Eastern Ltd, New Delhi, 2002.
3. V. Gutenmacher, N B Vasilyev, Lines and Curves: A Practical Geometry Handbook, Birkhäuser, Boston, 2004.
4. Jr. Ayres Frank, Theory and Problems of Plane and Spherical Trigonometry, Schaum's Outline Series, 1954.
5. M. F Barnsley, Fractals Everywhere, Academic Press Professional, Cambridge, 1993.
6. B. Mandelbrot, The Fractal Geometry of Nature, W.H Freeman and Company, New York, 1977.

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3	1	0	3

Total Lecture hours: 39

Brief Syllabus:

Basic Calculus, applications of differentiation and integration, double and triple integrals, curves in plane , vectors, lines, planes and other surfaces in space, tangent and normal, curve tracing, introduction to spherical trigonometry, sequences and series, convergence, Golden ratio and Fibonacci series, Tessellation and Penrose tiles, introduction to fractals.