

Course Code	EM 202	Course Name	Mathematics IV			
Credits	3	Time Allocation (hrs)	Lecture	Tutorial	Practical	Assignment/ Design class
Status	Core		36	9	-	-
Prerequisite	None					
Aim	To give essential mathematical concepts of several variable functions and vector calculus and to give the basic concepts of continuous probability distributions and statistics in engineering applications					
Learning Outcomes (LOs)	<p>At the completion of this module students should be able to</p> <p>LO1. Identify domain of several variable functions, draw level curves and level surfaces of a given function, and sketch surfaces and solids,</p> <p>LO 2. Identify physical interpretation of partial derivatives, use chain rule and Taylor series expansion, and define Jacobean and identify its properties</p> <p>LO 3. Compute volume of region under a given surface, double and triple integrals of given functions over any given 2D or 3D region</p> <p>LO 4. define gradient, divergence and curl of a given function and interpret their geometrical or physical meaning</p>					
Course Outline	<p>Functions of Several Variables: Point sets, mapping, Graphs and level curves limits, Continuity. Sketching; curves, surfaces and solids</p> <p>Partial Derivatives: Geometric interpretation, total differentials, sensitivity. Chain rules, Taylor's expansion. Jacobians and its properties</p> <p>Double and Triple Integration: Integration methods for areas of surfaces and volumes</p> <p>Field and Operators: Scalar fields and vector fields. Grad, Div, Curl. Geometrical and physical interpretations. 3-D geometry; surfaces, tangent planes and normals</p> <p>Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates</p> <p>Integrals and Integral Theorems: Line, surface and volume integrals. Gauss, Stokes, and Greens theorems. Conservative fields.</p> <p>Constrained Optimization of Functions of Several Variables: Unconstrained optimization. Constrained optimization, Lagrange multipliers.</p> <p>Continuous probability distributions: Uniform distribution, Exponential distribution, Normal distribution, Weibull distribution</p> <p>Sampling distributions: Sampling distribution of sample mean, Central Limit Theorem and Normal approximation to the Binomial Distribution, The sampling distribution of sample variance</p> <p>Estimation and Confidence Intervals / Hypothesis Testing: Estimation and Confidence Intervals / Hypothesis Testing</p>					
Method of Assessment	Continuous assessment (Assignments and quizzes)					10%
	Mid-semester examination (written)					30%
	End of semester examination (written)					60%