Semester	**5**
Course	**Major**
Paper Code	C3MT230541T
Paper Title	**Analysis-4**
No. of Credits	**4**
Theory / Practical / Composite	**Theory**
Minimum No. of preparatory hours per week a student has to devote	**4**
Number of Modules	**Nil**
Syllabus	Concept of limit, Continuity of functions of two real variables, continuity of vector valued functions **(7)** Partial derivatives and directional derivatives and its relation with continuity, sufficient conditions of continuity**(6)**. Differentiability of two variables functions and its relation with partial derivatives and continuity, sufficient conditions of differentiability, commutativity of mixed order partial derivatives **(5)**. Differentiability of vector valued functions, examples, linear maps, bilinear maps, differentiability of standard maps, jacobian matrix and chain rule **(6)**. Mean value theorem of scalar valued maps on vector domains, Mean value inequality of vector valued maps, functions of vanishing partial derivatives on connected domains **(5)**. Functions with non-singular derivatives, Inverse function theorem, Implicit Function theorem and their applications **(6)**.Levelsurface, tangent space to the regular level surfaces, gradient as normal to the regular levelsurfaces,Criticalpoints,Extremevalues**(6)**,Lagrange'smultiplier method ,local expression of a function near non-degenerate critical points**(5)**. Introduction to Double Integrals & its Applications to compute area & volume **(6).**

Learning Outcomes	On successful completion of the course a student will be able to do the following: • Will be able to understand the continuity and differentiability of functions of more than one variable. • Understanding derivative as a linear map. • Will be able to understand the role of gradient of a function and its related geometry. • Learning chain rule, MVT, Inverse and Implicit function theorem and their applications (geometric). • Will be able to understand the calculus of extreme values of functions and conditional extrema and its applications to various problems.	
Reading/Reference Lists	1. Calculus: T. M. Apostol vol.II 2. Calculus on Manifolds: M. Spivak 3. Multivariate Calculus and Geometry: Sean Dineen 4. Basic Multivariate Calculus: A. Weienstein, J. Marsden, A. Tromba	
Evaluation	End Sem; 70 CIA:30(20(MidSem)+5(Assignment) +5(Attendance))	
Paper Structure for Theory Semester Exam	7 questions each carrying 10 marks out of 13/14 questions.	