Semester	II
Paper Number	HECCR2041T
Paper Title	MATHEMATICAL METHODS IN ECONOMICS - II
No. of Credits	6
Theory/Composite	Theory
No. of periods assigned	5 Theory + 1 Tutorial
Course description/objective	This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this Syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.
Syllabus	**Module 1 (65 marks)** **1. Linear algebra** Vector spaces: algebraic and geometric properties, scalar products, norms, orthogonality; linear transformations: properties, matrix representations and elementary operations; systems of linear equations: properties of their solution sets; determinants: characterization, properties and applications. **2. Functions of several real variables** Geometric representations: graphs and level curves; differentiable functions: characterizations, properties with respect to various operations and applications; second order derivatives: properties and applications; the implicit function theorem, and application to comparative statics problems; homogeneous and homothetic functions: characterizations and applications. **3. Multi-variable optimization** Convex sets; geometric properties of functions: convex concave functions, their characterizations, properties and applications; further geometric properties of functions: quasiconvex quasiconcave functions, their characterizations, properties and applications; unconstrained optimization: geometric characterizations, characterizations using calculus and applications; constrained optimization with equality constraints: geometric characterizations, lagrange characterization using calculus and applications; properties of value function: envelope theorem and applications. **Number of Classes per week: 4** **Module 2 (15 marks)** **4. Differential equations:** First-Order and Second Order with

	economic applications
	Number of Classes per week: 1
	Tutorial Classes per week: 1
Readings	1) K. Sydsaeter and P. Hammond, *Mathematics for Economic Analysis*, Pearson Educational Asia: Delhi, 2002. 2) Lawrence Blume and Carl Simon, *Mathematics for Economists*, W.W. Norton and Company, 1994. 3) Alpha Chiang and Kevin Wainwright, *Fundamental Methods of Mathematical Economics,* Fourth Edition, Mc-graw Hill, 2005.
Evaluation	Continuous Internal Assessment: 20 marks End- Semester Theory Examination: 80 marks

Paper Structure for End Sem Theory	Module	No. of Questions to be Answered	No. of Alternatives	Marks
	Module 1	3	4	5 x 3 = 15
		5	6	10 x 5 = 50
	Module 2	1	2	5 x 1 = 5
		1	2	10 x 1 = 10
	Total Marks			80