Semester	I
Paper Number	HECCR1021T
Paper Title	MATHEMATICAL METHODS IN ECONOMICS–I
No. of Credits	6
Theory/Composite	Theory
No. of periods assigned	5 Theory + 1 Tutorial
Course description/objective	This is the first of a compulsory two-course sequence. 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 (55 marks)** **1.Preliminaries** Logicandprooftechniques;setsandsetoperations;relations;functionsandtheir properties;numbersystems. **2.Functionsofonerealvariable** Graphs; elementarytypesoffunctions:quadratic,polynomial,power,exponential, logarithmic;sequences,series and limits,algebraicpropertiesandapplications; continuousfunctions:characterizations,propertieswithrespecttovariousoperationsand applications;differentiablefunctions:characterizations,propertieswithrespecttovarious operationsandapplications;secondandhigherorderderivatives:propertiesand applications. **3.Single-variableoptimization** Geometricpropertiesoffunctions: linear concave and convexfunctions,theircharacterizationsand applications;localandglobaloptima:geometriccharacterizations,characterizations using calculusand applications. **4.Integrationoffunctions :** Integration by parts, method of substitution, Definite Integral **5.Differenceequations:** First-Order and Second Order with economic applications **Number of Classes per week: 4** **Module 2 (25 marks)** **Elementary Probability Theory** Sample Space and events; probability axioms and properties; counting techniques; conditional probability; Bayes' rule and independence of events; Random variable and probability distributions; Discrete and continuous, Expectation of a random variable. **Number of Classes per week: 1** **Tutorial Classes per week: 1**

<table>
<tr><td>Readings</td><td>1) K.SydsaeterandP.Hammond,MathematicsforEconomicAnalysis,Pearson Educational Asia: Delhi,2002.
2) A. Mukherjee and S.Guha, Mathematical Methods & Economic Theory, Oxford University Press, 2011.
3) Apostol T. M., Calculus, Volume 1, One Variable Calculus With An Introduction To Linear Algebra, (1967), Wiley, ISBN 0-536-00005-0, ISBN 978-0-47-00005-1.
4) K.G. Binmore, Mathematical Analysis, Cambridge University Press, 1991.
5) R.V. Hogg and A.T. Craig, An Introduction to Mathematical Statistics, Third Edition, Amerind, New York, London.
6) Kenny and Keeping ,Mathematical Statistics, Van Nostrand.
7) Alpha Chiang and Kevin Wainwright, Fundamental Methods of Mathematical Economics, Fourth Edition, Mc-graw Hill, 2005.</td></tr>
<tr><td>Evaluation</td><td>Continuous Internal Assessment: 20 marks
End- Semester Theory Examination: 80 marks</td></tr>
<tr><td>Paper Structure for End Sem Theory</td><td>
<table>
<tr><th>Module</th><th>No. of Questions to be Answered</th><th>No. of Alternatives</th><th>Marks</th></tr>
<tr><td rowspan="2">Module 1</td><td>3</td><td>4</td><td>5 x 3 = 15</td></tr>
<tr><td>4</td><td>5</td><td>10 x 4 = 40</td></tr>
<tr><td rowspan="2">Module 2</td><td>1</td><td>2</td><td>5 x 1 = 5</td></tr>
<tr><td>2</td><td>3</td><td>10 x 2 = 20</td></tr>
<tr><td colspan="3">Total Marks</td><td>80</td></tr>
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