DEPARTMENT OF ECONOMICS				*CLASS: I M.A. Economics*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
I	Major Core-3	21P1VMC3	Mathematical Methods in Economics	4	6	25	75	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	
Skill oriented			Entrepreneurship oriented	

Course Objectives

1. To strengthen the quantitative background of the learner.
2. To understand the derivatives, partial derivatives, integration and Matrices
3. To apply the Mathematical methods in Economic analysis.
4. To gain knowledge about the operations research

Unit	Description	Hours	K-Level	CLO
I	**Analytical Geometry** Straight lines – Two points, slope – point slope and intercept and two intercepts form – quadratic equations and solution by using standard formula – applications – Demand and Supply curve – Determination of equilibrium price and output.	18	Up to 4	1
II	**Simple and Partial Differentiation** Meaning – Basic Rules of Simple Differentiation (Addition, Subtraction, Product, Quotient & Exponential) – Marginal concepts (Marginal Utility,, Marginal Cost & Marginal Revenue) – Elasticity of Demand – Utility Maximization – Profit Maximization – Cost Minimization – Partial Differentiation – Basic Rules – second order differentiation.	18	Up to 4	2
III	**Integration** Meaning – Basic Rules – Definite Integrals and Indefinite Integrals - Applications in Economics and Business Cost and Revenue functions (TC,AC,MC,TR, AR & MR)– Consumer's Surplus – Producer's Surplus.	18	Up to 4	3
IV	**Matrices** Meaning – Types – Inverse of a square matrix – Cramer's Rule – Input - output analysis - meaning - Assumptions – Uses – Limitations – solving Leontief Input-output system (Two Industries Model) - Simon-Hawkins conditions.	18	Up to 4	4
V	**Theory of Games and Linear Programming** Meaning of game- Two-Person-Zero Sum Game – pay off matrix- Maximin principle-Minimax principle -Pure and Mixed Strategies – Saddle Point solution – Graphical Method (2xm games-mx2 games).-Dominance property - Meaning of Linear Programming – basic concepts – uses - Graphical Method – Simplex Method (using slack variables only).	18	Up to 4	5

Books for Study

1. Chiang, A.C., "**Fundamental Methods in Mathematical Economics**", 1984, McGraw Hill, New Delhi.
2. Bose D., "**An Introduction to Mathematical Economics**", 2013, Himalaya Publishing House, Mumbai.

Books for References

1. Mehta and Madani, "**Mathematics for Economists**", 2009, Sultan Chand & Sons, New Delhi.
2. Allen, R.G.D., , "**Mathematical Analysis for Economics**", 1973, AITBS Publishers, New Delhi.
3. G.S Monga, "**Mathematics and Statistics for Economics**", 2003, Vikas Publishing House Pvt. Ltd., Noida.
4. Kalavathy, S., "**Operations Research**", 2013, Vikas Publishing House Pvt. Ltd., Noida.

Web Resources

1. Michael Klein, "**Mathematical Methods for Economics**", www.amazon.in/Mathematical-Methods-Economics-Addison-Wesley/dp/0201726262

Rationale for Nature of the course

Economics and mathematics are inseparable in nature. Mathematics plays a paramount role in science, engineering and social sciences. It helps in formulating economic modules for promoting economic modules for promoting economic policies. Besides Mathematical tools are very much useful for the students' community to appear for the competitive examinations. Recent researches in western counties are mostly applying the mathematical tools in economics. It is the moot point for the application of mathematics in economics.

Activities having direct bearing on skill development/ Employability / Entrepreneurship

Students are assigned to collect the data from the firm industry regarding the price, revenue, cost and profit or loss in order to find the producer's surplus and consumer surplus. Also the students are asked to interact the entrepreneurs and to summarize their constraints in the business to find out the feasible solution.

Pedagogy

Lecture method, PPT, Quiz, Group discussion, Seminar, Interaction, OOC.

Course Designer

Dr.V. Sriman Narayanan

Lecture Schedule

Unit	Topics	Hours	Mode
Unit I	Straight lines – Two points, slope	2	Lecture Method, OOC Seminar, Test
	Point slope and intercept and two intercepts form	4	
	Quadratic equations and solution by using standard formula	4	
	Applications – Demand and Supply curve	4	
	Determination of equilibrium price and output	4	
Unit II	Meaning, Basic Rules of Simple Differentiation (Addition, Subtraction, Product, Quotient & Exponential)	4	Lecture Method, Seminar, Quiz
	Marginal concepts (Marginal Utility, Marginal Cost & Marginal Revenue) and Elasticity of Demand	4	
	Utility Maximization and Profit Maximization	4	
	Cost Minimization and Partial Differentiation	4	
	Basic Rules and second order differentiation	2	
Unit III	Meaning – Basic Rules – Definite Integrals and Indefinite Integrals	4	Lecture Method, Seminar, Group Discussion
	Applications in Economics and Business Cost (TC,AC,MC)	4	
	Applications in Economics Revenue Functions (TR, AR & MR)	4	
	Consumer's Surplus	3	
	Producer's Surplus	3	
Unit IV	Meaning – Types – Inverse of a square matrix	4	Lecture Method, Seminar, PPT
	Cramer's Rule	4	
	Input - output analysis - meaning - Assumptions – Uses – Limitations	4	
	Solving Leontief Input-output system (Two Industries Model)	4	
	Simon-Hawkins conditions.	2	
Unit V	Meaning of game- Two-Person-Zero Sum Game – pay off matrix- Maximin principle-Minimax principle	4	Lecture Method, Seminar, PPT
	Pure and Mixed Strategies – Saddle Point solution	4	
	Graphical Method (2xm games-mx2 games).-Dominance property	4	
	Meaning of Linear Programming – basic concepts – uses - Graphical Method	3	
	Simplex Method (using slack variables only).	3	
	Total	90	

Course Learning Outcome:

On successful completion of the course, the students will be able to:

CLO	Course Learning Outcome	Knowledge Level
CLO1	Acquire the knowledge of basic mathematical concepts	**Up to K4**
CLO2	Apply the concepts of analytical geometry and differentiation and their applications in economics	**Up to K4**
CLO3	Estimate the extent of surplus in economic decisions by using integration	**Up to K4**
CLO4	Solve a system of equations by using matrices	**Up to K4**
CLO5	Apply decision making techniques in analyzing complex economic problems in theory of games and optimization of profit and cost	**Up to K4**

K1 – Remembering **K2** – Understanding

K3 – Application **K4** – Examining, analyzing and presentation

Mapping of CLOs with POs

#	PO1	PO2	PO3	PO4	PO5
CLO-1	2	2	-	1	2
CLO-2	3	2	1	1	3
CLO-3	3	2	2	1	3
CLO-4	3	3	1	2	3
CLO-5	3	3	2	2	3

Measurement of Scaling : Advanced Application-3, Intermediate Level-2, Basic Level-1.

Learning Outcome Based Education (LOBE) & Assessment

Formative – Blue – Print – Model

(Articulation Mapping with Course Learning Outcome (CLOs))

Units	CLOs	K-Level	Section - A		Section – B (Either or Choice)	Section – C (Open choice)
			Short Answers			
			No. of Questions	K-Level		
I & II	CLO 1 & 2	Up to K4	2	K2, K3	2 (K3 & K3)	2 (K2, K3)
III, IV	CLO 3 & 4	Up to K4	3	K2, K2, K3	2 (K4 & K4)	1(K3/K4)
No. of questions to be asked			5		4	3
No. of questions to be answered			5		2	2
Marks for each question			2		5	10
Total marks for each section			**10**		**10**	**20**

Learning Outcome Based Education (LOBE) & Assessment

Summative – Blue – Print – Model

(Articulation Mapping with Course Learning Outcome (CLOs))

Unit	CLOs	K-Level	Section – A MCQs		Section – B Short Answer		Section – C (Either or Choice	Section – D (Open Choice)
			No. of Questions	K-Level	No. of Questions	K-Level		
I	**CLO-1**	Up to K4	2	K1 & K1	1	K1	2 (K3 & K3)	1 (K3)
II	**CLO-2**	Up to K4	2	K2 & K3	1	K2	2 (K1 & K1)	1 (K3)
III	**CLO-3**	Up to K4	2	K2 & K3	1	K1	2 (K4 & K4)	1 (K4)
IV	**CLO-4**	Up to K4	2	K3 & K4	1	K3	2 (K4 & K4)	1 (K4)
V	**CLO-5**	Up to K4	2	K2 & K3	1	K2	2 (K2 & K2)	1 (K2)
No. of questions to be asked			10		5		10	5
No. of question to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total marks for each			**10**		**10**		**25**	**30**

K1 – Remembering **K2** – Understanding

K3 – Application **K4** – Examining, analyzing and presentation

Distribution of Section-wise Marks with K-Levels

K Levels	Section – A (No Choice)	Section – B (No Choice)	Section – C (Either or)	Section – D (Open Choice)	Total Marks	% of Marks without choice
K1	2	4	10	-	16	13.33
K2	2	4	10	10	26	21.67
K3	4	2	10	20	36	30.00
K4	2	-	20	20	42	35.00
Total Marks	**10**	**10**	**50**	**50**	**120**	**100.00**