

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BA DEGREE EXAMINATION MAY 2026
(Second Semester)**

Branch - **ECONOMICS**

MATHEMATICAL METHODS FOR ECONOMICS – II

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	If the Total Cost function is $TC = 5q^2 + 10q + 5$, what is the Marginal Cost (MC)? (i) $10q + 10$ (ii) $5q + 10$ (iii) $10q$ (iv) 5	K1	CO1
	2	The point where a function stops increasing and starts decreasing is known as: (i) Minimum (ii) Maximum (iii) Saddle Point (iv) Point of Inflection	K2	CO1
2	3	Given $z = 3x^2y$, what is the partial derivative $\frac{\partial z}{\partial x}$? (i) $3xy$ (ii) $6xy$ (iii) $3x^2$ (iv) $6x$	K1	CO2
	4	In optimization without constraints, the first-order condition for a function $f(x, y)$ requires: (i) $f_x = 1$ and $f_y = 1$ (ii) $f_x = 0$ and $f_y = 0$ (iii) $f_{xx} > 0$ (iv) $f_{xy} = f_{yx}$	K2	CO2
3	5	The Euler's Theorem is applicable to which type of functions? (i) Implicit Functions (ii) Logarithmic Functions (iii) Linear Homogenous Functions (iv) Exponential Functions	K1	CO3
	6	In a Cobb-Douglas production function $Q = AL^\alpha K^\beta$, if $\alpha + \beta = 1$, the function exhibits: (i) Increasing returns to scale (ii) Decreasing returns to scale (iii) Constant returns to scale (iv) Negative returns to scale	K2	CO3
4	7	The process of finding the total function from a marginal function is: (i) Differentiation (ii) Integration (iii) Optimization (iv) Linear Programming	K1	CO4
	8	Consumer Surplus is the area: (i) Above the price line and below the demand curve (ii) Below the price line and above the supply curve (iii) Above the demand curve (iv) Below the supply curve	K2	CO4
5	9	In Linear Programming, the "Duality" principle states that every Primal problem has a corresponding: (i) Objective (ii) Constraint (iii) Dual (iv) Solution	K1	CO5
	10	A game is said to have a "Saddle Point" when: (i) $\text{Maximin} > \text{Minimax}$ (ii) $\text{Maximin} < \text{Minimax}$ (iii) $\text{Maximin} = \text{Minimax}$ (iv) The payoff is zero	K2	CO5

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SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain Madhava's contributions to Differential Calculus.	K2	CO2
		(OR)		
	11.b.	Given the demand function $P = 50 - 2Q$, find the elasticity of demand when $Q = 10$.		
2	12.a.	State and explain the rules for Partial Differentiation.	K2	CO3
		(OR)		
	12.b.	Find the second-order partial derivatives for $z = x^3 + y^3 - 3xy$.		
3	13.a.	Explain the properties of the Cobb-Douglas Production Function.	K3	CO4
		(OR)		
	13.b.	Find the total derivative dz/dt if $z = x^2 + y^2$, where $x = 2t$ and $y = t^2$.		
4	14.a.	Evaluate $\int (4x^3 + 3x^2 + 2x + 5) dx$.	K3	CO4
		(OR)		
	14.b.	If the marginal cost function is $MC = 10 + 2Q$, find the Total Cost (TC) function assuming fixed cost is 50.		
5	15.a.	Explain the graphical method of solving a Linear Programming Problem.	K3	CO5
		(OR)		
	15.b.	Define Game Theory and distinguish between Pure and Mixed strategies.		

SECTION - C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Examine the relationship between Average Cost (AC) and Marginal Cost (MC) curves using differential calculus.	K1	CO1
2	17	Solve for the maximum or minimum values of the function $z = 2x^2 - xy + y^2 - 3x + 1$ (Optimization without constraints).	K2	CO2
3	18	State and prove Euler's Theorem for a linear homogenous function.	K3	CO3
4	19	Given the demand function $P_d = 25 - Q^2$ and supply function $P_s = 2Q + 1$, calculate the Consumer's Surplus at the equilibrium price.	K4	CO4
5	20	Explain the concept of Duality in Linear Programming and list its various uses in economic decision-making.	K5	CO5

Z-Z-Z

END