

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BA DEGREE EXAMINATION DECEMBER 2025
(Second Semester)

Branch - **ECONOMICS**

MATHEMATICAL METHODS – 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 | What is the Marginal analysis closely related to a mathematical technique known a) Differential calculus b) Integration calculus c) Matrix analysis d) Algebra | K1 | CO1 |
| | 2 | Interpret the differentiation of $\log x$. a) \log b) x c) $1/x$ d) $\log x$ | K2 | CO1 |
| 2 | 3 | Illustrate $z=3xy+4x^2$, what is the value of $\partial z / \partial x$? a) $3y+8x$ b) $3x+4x^2$ c) $3xy+8x$ d) $3y+3x+8x$ | K1 | CO2 |
| | 4 | Interpret the odd one out a) $U=x^2+10y$ b) $U=6x^3+4x^2y$ c) $U=x^2+xy$ d) $U=x^3+5x^2$ | K2 | CO2 |
| 3 | 5 | What is the derivatives of the function: $Y = x^3+4$ a) $3x^2$ b) 3 c) $3x^3$ d) $3x$ | K1 | CO3 |
| | 6 | Summarize the Linear programming is a technique which is applied for finding a) Maximum and Minimum value b) First order of maximum c) Second order condition of minimum d) Not applicable to this | K2 | CO3 |
| 4 | 7 | Find the value of the integral e^x a) x^e b) e^x c) $e^x/x+1$ d) e | K1 | CO4 |
| | 8 | Infer the marginal cost function is $MC = 2Q + 5$, and fixed costs are 100, what is the total cost function? a) $TC = Q^2 + 5Q + 100$ b) $TC = 2Q + 105$ c) $TC = Q^2 + 5Q$ d) $TC = 2 + 100Q$ | K2 | CO4 |
| 5 | 9 | Show the game theory concerned with a) Predicting the results of bets placed on games like roulette b) The choice of an optimal strategy in conflict situation c) Utility maximization by firms in perfectly competitive markets d) The way in which a player can win every game | K1 | CO5 |
| | 10 | Outline the two-person zero-sum game means that the a) the sum of losses to one player is equal to the sum of gains to other b) the sum of losses to one player is not equal to the sum of gains to other c) no any player gains or losses d) number of players | K2 | CO5 |

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

 $(5 \times 7 = 35)$

| Module No. | Question No. | Question | K Level | CO |
|------------|--------------|-----------------------------------------------------------------------------------------------------------------|---------|-----|
| 1 | 11.a. | Construct the differential calculus relate to marginal analysis? (OR) | K3 | CO1 |
| | 11.b. | Solve $\frac{dy}{dx}$ of the following $y = (1 - \sqrt{x})(1 + \sqrt{x})$ | | |
| 2 | 12.a. | Construct the partial derivatives of I. $z = 4x^2 + 4xy + y^2$ II. $z = 2x^2 + 5y + 6$ (OR) | K3 | CO2 |
| | 12.b. | Solve the cross partial derivatives of $f(x) = x^2 + y^3 - xy$ | | |
| 3 | 13.a. | Contrast the total differential of the sum of terms $z = (x^2 + y)(2x - y^2)$ (OR) | K4 | CO3 |
| | 13.b. | Classify the degree of homogeneity of the following functions: $Z = f(x_1, x_2) = x_1^3 + 4x_1^2x_2 + x_2^3$ | | |
| 4 | 14.a. | Analyse the integration of the function: $\int (e^x + \frac{1}{x^3}) dx$ (OR) | K4 | CO4 |
| | 14.b. | Simplify the following Functions : $\int (\frac{1}{x^2} + \frac{4}{\sqrt[3]{x}} + 2) dx$ | | |
| 5 | 15.a. | Explain the uses of Linear Programming (OR) | K5 | CO5 |
| | 15.b. | Interpret the dy/dx , if $x = at^3$ and $y = 3.at$ | | |

SECTION - C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

 $(3 \times 10 = 30)$

| Module No. | Question No. | Question | K Level | CO |
|------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|
| 1 | 16 | Analyse the Maximum and Minimum values of the following function $Y = 3x^4 - 10x^3 + 6x^2 + 5$ | K4 | CO1 |
| 2 | 17 | Examine the demand functions for two commodities x_1 and x_2 $x_1 = p_1^{-1.7} p_2^{0.8}$ and $x_2 = p_1^{0.5} p_2^{-0.2}$ Determine whether the commodities are complementary or competitive and also find four partial elasticities of demand | K4 | CO2 |
| 3 | 18 | Examine the $\frac{dy}{dx}$ of the implicit function: $x^2 - xy - 2x + 3 = 0$ | K4 | CO3 |
| 4 | 19 | Evaluate $\int \frac{dx}{x^3 + 1}$ | K5 | CO4 |
| 5 | 20 | Construct the following Linear Programming Problem and solve graphically Maximise $Z = 2X + 5Y$ Subject to $X + 4Y \leq 24$ $3X + Y \leq 21$ $X + Y \leq 9$ and X and $Y \geq 0$ | K5 | CO5 |