

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MA DEGREE EXAMINATION MAY 2025
(Second Semester)

Branch - ECONOMICS

MATHEMATICAL ANALYSIS

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	The system of simultaneous linear equations $x + 2y + 3z = 5$, $x + y + 4z = 10$, $2x + 2y + 8z = \mu$ will have infinitely many solutions for μ equals to _____. a) 15 b) 16 c) 20 d) 0	K1	CO1
	2	The rank of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$ is _____. a) 0 b) 1 c) 2 d) 3	K2	CO1
2	3	What is the degree of differential equation $(y''')^2 + (y'')^3 + (y')^4 + y^5 = 0$? a) 2 b) 3 c) 4 d) 5	K1	CO2
	4	What will be the maximum value of the function $2x^3 + 3x^2 - 36x + 10$? a) 71 b) 81 c) 91 d) 0	K2	CO2
3	5	A number of third-order partial derivatives of function of two independent variables is _____. a) 9 b) 8 c) 4 d) 2	K1	CO3
	6	For function $f(x,y)$ to have minimum value at (a,b) value is? a) $rt - s^2 > 0$ and $r < 0$ b) $rt - s^2 > 0$ and $r > 0$ c) $rt - s^2 < 0$ and $r < 0$ d) $rt - s^2 > 0$ and $r > 0$	K2	CO3
4	7	The order of a differential equation whose general solution is $y = A \sin(x) + B \cos(x)$ is _____. a) 4 b) 0 c) 2 d) 3	K1	CO4
	8	Which of the following equations is linear? a) $y' + xy^2 = 1$ b) $x^2y' + y^2 = e^x$ c) $y' + 3y = xy^2$ d) None	K2	CO4
5	9	Integrate x^{-11} concerning x. a) $X^{-9} / -9 + C$ b) $X^{-10} / -10 + C$ c) $X^{-11} / -11 + C$ d) $X^{12} + C$	K1	CO5
	10	Given that $f(x) = 3x^2$, then calculate the integration function of the given function. a) $3x^2$ b) $2x^2$ c) $9x^2$ d) x^2	K2	CO5

Cont...

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 the uses and limitations of mathematical economics.	K2	CO1
	(OR)			
	11.b.	Find the cofactor matrix of the matrix: $A = \begin{bmatrix} 1 & 9 & 3 \\ 2 & 5 & 4 \\ 3 & 7 & 8 \end{bmatrix}$		
2	12.a.	Solve the derivative of $f(x) = e^{\sin(2x)}$	K3	CO2
	(OR)			
	12.b.	Construct the applications of differential calculus.		
3	13.a.	Examine all the second-order partial derivatives of the following function: $f(x, y) = x^2y^3$	K4	CO3
	(OR)			
	13.b.	Analyze the minimum and maximum values problem, of Z for the minimize and maximize $Z = 3x + 9y$ subject to the constraints $x+3y \leq 60$, $x+y \geq 10$, $x \leq y$, are respectively		
4	14.a.	Explain the applications of differential equations.	K5	CO4
	(OR)			
	14.b.	Prove the Linear Differential $E = dy/dx = [1/(1+x^3)] - [3x^2/(1+x^2)]y$		
5	15.a.	Discuss the different types of integrals.	K6	CO5
	(OR)			
	15.b.	Solve Integrate $\int (x^2-1) (4+3x) dx$.		

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	Solve the following system of equations by the rank method $x + y + z = 9$, $2x + 5y + 7z = 52$, $2x - y - z = 0$	K4	CO1
2	17	Find the maxima and minima for $f(x) = 2x^3 - 21x^2 + 36x - 15$	K5	CO2
3	18	Find the total differential coefficient of the function x^2y concerning x where $x^2 + xy + y^2 = 1$.	K5	CO3
4	19	Find the solution for the exact differential equation $(2xy - \sin x) dx + (x^2 - \cos y) dy = 0$	K5	CO4
5	20	Discuss the different methods of integration.	K6	CO5

Z-Z-Z

END