

**PSG COLLEGE OF ARTS & SCIENCE**  
(AUTONOMOUS)  
**BA DEGREE EXAMINATION DECEMBER 2024**  
(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	Find $\lim_{x \rightarrow 4} f(x)$ : $f(x) = ax^2 + bx + c$ a) $+\infty$ b) $16a + 4b + c$ c) $-\infty$ d) Does not exist!	K1	CO1
	2	What will be the values of x for which the value of $\cos x$ is minimum? a) $(2m+1)\pi$ b) $(2m)\pi$ c) $(2m+1)\pi/2$ d) $(2m-1)\pi$	K2	CO1
2	3	What does the second derivative represent in calculus? a) Rate of change              b) Concavity c) Slope                              d) Area under the curve	K1	CO2
	4	A linear function in three-dimensional space is a ____ a) Midpoint    b) Plane    c) Laminar    d) Zero	K2	CO2
3	5	Implicit functions are those functions _____ a) Which can be solved for a single variable b) Which cannot be solved for a single variable c) Which can be eliminated to give zero d) Which are rational in nature.	K1	CO3
	6	In Euler theorem $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = nz$ , here 'n' indicates? a) order of z                              b) degree of z c) neither order nor degree          d) constant of z	K2	CO3
4	7	Integrate $3x^2(\cos x^3 + 8)$ . a) $\sin x^3 - 8x^3 + C$ b) $\sin x^3 + 8x^3 + C$ c) $-\sin x^3 + 8x^3 + C$ d) $\sin x^3 - x^3 + C$	K1	CO4
	8	What will be the nature of the equation $(\sin \theta)/\theta$ for $0 < \theta < \pi/2$ if $\theta$ increases continuously? a) Decreases b) Increases c) Cannot be determined for $0 < \theta < \pi/2$ d) A constant function	K2	CO4
5	9	The linear inequalities or equations or restrictions on the variables of a linear programming problem are called: a) A constraint                      b) Decision variable c) Objective function              d) Fixed variable	K1	CO5
	10	If the value of the game is zero, then the game is known as: a) Fair strategy                              b) Pure strategy c) Pure game                                  d) Mixed strategy	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.	Illustrate the rules of differential calculus.	K3	CO1
	(OR)			
	11.b.	Verify that the function $y = e^{-3x}$ is a solution of the differential equation $d^2y/dx^2 + dy/dx - 6y = 0$		
2	12.a.	Find $\partial f/\partial x$ , $\partial f/\partial y$ , $\partial f/\partial z$ for the given function, $f(x, y, z) = x \cos z + x^2 y^3 e^z$	K2	CO2
	(OR)			
	12.b.	Determine the partial derivative of the function: $f(x, y) = 3x + 4y$ .		
3	13.a.	Find $dy/dx$ by implicit differentiation: $3x + 2y = \cos y$ .	K4	CO3
	(OR)			
	13.b.	Find if the function $f(x, y) = x^3 + 2x^2y - 3xy^2 + y^3$ is a homogeneous function.		
4	14.a.	Calculate $\int \cos^2 x \, dx$	K5	CO4
	(OR)			
	14.b.	Evaluate $f(x)$ , given that $f'(x) = 6x^8 - 20x^4 + x^2 + 9$		
5	15.a.	Construct the problems of linear programming.	K4	CO5
	(OR)			
	15.b.	Analase the applications of the game theory.		

**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	Find the local maxima and minima of the function $f(x) = 3x^4 + 4x^3 - 12x^2 + 12$ .	K4	CO1
2	17	Classify the different partial derivatives rules.	K4	CO2
3	18	Solve the differential equation $y^2 dx + (xy + x^2)dy = 0$	K5	CO3
4	19	Calculate the producer's surplus at $x = 5$ for the supply function $p = 7 + x$ .	K3	CO4
5	20	Solve the following linear programming problem graphically: Minimize $Z = 200x + 500y$ subject to the constraints: $x + 2y \geq 10$ $3x + 4y \leq 24$ $x \geq 0, y \geq 0$	K5	CO5