PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MA DEGREE EXAMINATION MAY 2023
(Second Semester)

Branch – ECONOMICS

MATHEMATICAL ANALYSIS / MATHEMATICAL METHODS

Time: Three Hours   Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (5 x 1 = 5)

1 A is a 3 x 4 real matrix and Ax = b is an inconsistent system of equations. The highest possible rank of A is
   (i) 1   (ii) 2
   (iii) 3   (iv) 4

2 What will be the point of maximum of the function $2x^3 + 3x^2 - 36x + 10$?
   (i) -1   (ii) -2
   (iii) -3   (iv) -4

3 If $z = 3xy + 4x^2$, what is the value of $\partial z/\partial x$?
   (i) $3y+8x$ (ii) $3x+4x^2$
   (iii) $3xy+8x$ (iv) $3y+3x+8x$

4 What is the degree of differential equation $(y''')^2 + (y'')^3 + (y')^4 + y^5 = 0$?
   (i) 2   (ii) 3
   (iii) 4   (iv) 5

5 If $\int 2^x \, dx = f(x) + C$, then $f(x)$ is
   (i) 2^x (ii) $2^x \log_e 2$
   (iii) $2^x / \log_e 2$ (iv) $2^{x+1} / x + 1$

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks   (5 x 3 = 15)

6 a   Let A = $\begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$, B = $\begin{bmatrix} 1 & 4 \\ 3 & -1 \end{bmatrix}$ Calculate A + B.

   OR

   b   State the uses of mathematical economics.

7 a   Find the derivative of the function $f(x) = 6x^2 - 4x$.

   OR

   b   Suppose a company's demand function is $D(p) = 100 - p2$, and the company's current price is $5. What will happen to revenue if they raise the price $0.05?

8 a   Determine the partial derivative of the function: $f(x,y) = 3x + 4y$.

   OR

   b   Show the conditions of maxima and minima.

Cont...

9   a   Explain the definition of differential equation.

<div align="center">OR</div>

     b   Produce the definition of exact differential equation.

10   a   Solve the integral of $\cos^2 n$ with respect to n.

<div align="center">OR</div>

     b   Find the integral parts $\int \log x \, dx$.

<div align="center">

SECTION -C (30 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks   (5 x 6 = 30)

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11   a   Solve the following system of linear equations using matrix method:
$3x + y + z = 1, 2x = 0, 5x + y + 2z = 2$

<div align="center">OR</div>

     b   Solve, by Cramer's rule, the system of equations.
$x_1 - x_2 = 3, 2x_1 + 3x_2 + 4x_3 = 17, x_2 + 2x_3 = 7.$

12   a   Find the local maxima and minima of the function
$f(x) = 3x^4 + 4x^3 - 12x^2 + 12.$

<div align="center">OR</div>

     b   Elucidate the necessary and sufficient conditions for optimization.

13   a   Find the total differential coefficient of the function $x^2 y$ with respect to x where $x^2 + xy + y^2 = 1.$

<div align="center">OR</div>

     b   Invent the types and limits of derivatives.

14   a   Find the particular solution of the differential equation
$dy/dx = -4xy^2$ given that $y=1$ and $x = 0$.

<div align="center">OR</div>

     b   Enumerate the types of differential equations.

15   a   Design the various methods of integration.

<div align="center">OR</div>

     b   The demand and supply function of a commodity are $p_d = 18 - 2x - x^2$ and $p_s = 2x - 3$. Find the consumer's surplus and producer's surplus at equilibrium price.

<div align="center">Z-Z-Z   END</div>