

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2026
(First Semester)

Branch – STATISTICS

MATHEMATICS – I FOR STATISTICS

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 x is roots of a reciprocal equation then a) -x is always a root b) $1/x$ is always a root c) x^2 is always a root d) x^{-2} is always a root	K1	CO1
	2	If the roots of $x^2-3x+2=0$ are doubled the transformed equation is a) $x^2-6x+8=0$ b) $x^2-6x-8=0$ c) $x^2-6x+8=1$ d) $x^2-6x+8=-1$	K2	CO1
2	3	Find the value of $\lim_{x \rightarrow \infty} (1 + 1/x)^n$? a) 0 b) 1 c) e d) infinity	K1	CO2
	4	Find the derivative of $\sqrt{x}$? a) $\frac{1}{2\sqrt{x}}$ b) $\frac{1}{\sqrt{x}}$ c) $\frac{1}{2-\sqrt{x}}$ d) $-\frac{1}{2\sqrt{x}}$	K2	CO2
3	5	Find the minimum value of $\cos x$? a) 0 b) 1 c) -1 d) infinity	K1	CO3
	6	Find the maximum value of $f(x,y)=xy$ subject to the conditions $x^2+y^2=4$? a) 2 b) 4 c) -2 d) -4	K2	CO3
4	7	If $\vec{F} = (x, y, z)$ then $\nabla \cdot \vec{F}$? a) 0 b) 1 c) 3 d) $x+y+z$	K1	CO4
	8	The divergence of a constant vector field is a) 0 b) 1 c) c d) infinity	K2	CO4
5	9	Solve the exact differential equation $(3x^2y+2)dx+x^3dy=0$? a) $x^3y+2x=c$ b) $x^3y-2x=c$ c) $3x^2y+x^3=c$ d) $y^3+x^3=c$	K1	CO5
	10	Which one of the following is not a first order differential equation? a) $\frac{dy}{dx} = x + y$ b) $\frac{d^2y}{dx^2} + y = 0$ c) $\frac{d^2y}{dx^2} + y^2 = 0$ d) $\frac{d^3y}{dx^3} + y^3 = 0$	K2	CO5

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.	Solve the equation $x^5 - x^4 + x^2 - 9x - 15 = 0$ and if $\sqrt{3}$ and $1-2i$ are two of its roots.	K2	CO2
		(OR)		
	11.b.	Diminish by 3 the roots of $x^4 + 3x^3 - 2x^2 - 4x - 3 = 0$.		
2	12.a.	Use Mean value theorem $f(x) = x^{2/3}, a = -8, b = +8$. Find $f'(c)$.	K3	CO3
		(OR)		
	12.b.	Use Rolle's Theorem $y = x^3 - 4x$ find the solutions.		

Cont...

3	13.a.	Find a point within a triangle such that the sum of the squares of its distance from the three vertices is a minimum.	K4	CO4
	(OR)			
	13.b.	Find the dimension of the rectangular box open at the top with maximum volume and given surface area A.		
4	14.a.	If $(x, y) = \log \sqrt{x^2 + y^2}$. Show that $grad \varphi = \frac{r - (k.r).k}{(r - (k.r).k).(r - (k.r).k)}$	K4	CO5
	(OR)			
	14.b.	Find curl curl f at the point (1,1,1) if $f = x^2yi + xzj + 2yzk$		
5	15.a.	Solve $\frac{dy}{dx} = \frac{6x - 4y + 3}{3x - 2y + 1}$.	K4	CO5
	(OR)			
	15.b.	Solve $(1 + y^2) dx + (x \tan^{-1} y) dy = 0$		

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 $6x^5 + x^4 - 43x^3 - 43x^2 + x + 6 = 0$	K3	CO2
2	17	a) State and Prove Cauchy Mean Theorem. b) State and Prove Lagrange Theorem.	K4	CO3
3	18	Find the maximum and minimum values of $u = x^3y^2(1-x-y)$	K4	CO4
4	19	Prove that $\nabla \phi = (y + \sin z)i + xj + x \cos z k$. Find ϕ .	K4	CO5
5	20	Solve $xyp^2 + p(3x^2 - 2y^2) - 6xy = 0$	K4	CO5

Z-Z-Z

END