

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2025
(Second Semester)

Branch – STATISTICS

MATHEMATICS - II FOR STATISTICS / MATHEMATICS – 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	The value of $f(0)$ if $f(x) = x \sin \frac{1}{x}$ is _____. a) 1 b) -1 c) 0 d) ∞	K1	CO1
	2	_____ is an even function. a) $\cos x$ b) e^x c) e^{-x} d) e^{2x}	K2	CO3
2	3	The complete integral for the equation $z = px + qy + \left(\frac{q}{p} - p\right)$ is _____. a) $z = ax - by - \frac{b}{a} + a$ b) $z = ax + by + \frac{b}{a} - a$ c) $z = ax + by$ d) $\frac{b}{a} - a$	K1	CO3
	4	The solution for $\frac{\partial^2 z}{\partial x^2} = \sin y$ is _____. a) $z = x \sin y + xf(y) + \phi(y)$ b) $z = x \cos y + x + \phi(y)$ c) $z = -x \cos y + f(y) + \phi(y)$ d) $z = \frac{x^2}{2} \sin y + xf(y) + \phi(y)$	K2	CO1
3	5	$L[e^{-7t}] = \frac{1}{s+7}$ a) $\frac{1}{s+7}$ b) $\frac{1}{s-7}$ c) $\frac{1}{s^2+7}$ d) $\frac{1}{s^2-7}$	K1	CO1
	6	$L(t^3) = \frac{6}{s^4}$ a) $\frac{1}{s^4}$ b) $\frac{6}{s^4}$ c) $-\frac{1}{s^4}$ d) $\frac{7}{s^4}$	K2	CO1
4	7	If $f = 1$, $g = e^t$ then $f * g$ is _____. a) $e^t - 1$ b) e^t c) e^{-t} d) $e^{-t} - 1$	K1	CO3
	8	$L^{-1}\left[\frac{s+6}{(s+6)^2+9}\right]$ is _____. a) $e^{6t} \cos 3t$ b) $e^{-6t} \sin 3t$ c) $e^{-6t} \cos 3t$ d) $e^{6t} \sin 3t$	K2	CO3
5	9	_____ is a direct method based on the elimination of the unknowns, one by one. a) Gauss elimination method b) Numerical method c) Cramer's method d) Gauss jordon method	K1	CO3
	10	In an indirect or iterative method, the amount of computation depends on the _____ required. a) degree of accuracy b) coefficient c) approximation d) convergency	K2	CO3

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.	Prove that for $-\pi < x < \pi$, $\frac{x(\pi^2 - x^2)}{12} = \frac{\sin x}{1^3} - \frac{\sin 2x}{2^3} + \frac{\sin 3x}{3^3} - \dots$	K2	CO4
		(OR)		

Cont...

	11.b.	Find a half-range sine series which represents $f(x) = \sin px$ for p not an integer on the interval $0 < x < \pi$.		
2	12.a.	Find the differential equation of all spheres of the radius 'c' having their centres on the yz-plane.	K2	CO2
	(OR)			
	12.b.	Solve $ap + bq + cz = 0$.		
3	13.a.	Find $L[\sin^2 t \cos^3 t]$.	K3	CO4
	(OR)			
	13.b.	Find $L\left[\int_0^t \frac{e^{-t} \sin t}{t} dt\right]$.		
4	14.a.	Find $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$ using convolution theorem.	K3	CO2
	(OR)			
	14.b.	Find $L^{-1}\left[\log \frac{s^2+a^2}{s^2-b^2}\right]$.		
5	15.a.	Solve by Gauss-Jordon method the equations $2x + y + 4z = 12$ $8x - 3y + 2z = 20$ $4x + 11y - z = 33$.	K2	CO4
	(OR)			
	15.b.	Solve by Gauss elimination procedure, the equations $3.15x - 1.96y + 3.85z = 12.95$ $2.13x + 5.12y - 2.89z = -8.61$ $5.92x + 3.05y + 2.15z = 6.88$.		

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	Expand $f(x) = (\pi - x)^2$ in $(-\pi, \pi)$ as a fourier series.	K3	CO4
2	17	Solve $(x^2 - y^2 - z^2)p + 2xyq - 2xz = 0$.	K3	CO5
3	18	(i) Find $L[e^{-3t} \sin^2 t]$ (ii) Find $L[\cos^3 3t]$.	K3	CO4
4	19	Use laplace transform to solve $(D^2 + 5D + 6)x = e^{-t}$ given that $x(0) = \frac{15}{2}$; $x'(0) = \frac{37}{2}$.	K3	CO5
5	20	Solve by Gauss-Jacobi method of iteration the equations $27x + 6y - z = 85$ $6x + 15y + 2z = 72$ $x + y + 54z = 110$.	K3	CO4

Z-Z-Z END