

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(Sixth Semester)

Branch – MATHEMATICS

COMPLEX 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	A function which is analytic in the finite plane is an -----. (i) Integral function (ii) entire function (iii) extended function (iv) constant	K1	CO1
	2	A differentiable function is continuous but a continuous function need not be -----. (i) differentiable (ii) integrable (iii) convergent (iv) analytic	K2	CO1
2	3	$w = 1/z$ represents a -----. (i) translation (ii) inversion (iii) rotation (iv) magnification	K1	CO2
	4	The set of all bilinear transformations forms a group under -----. (i) composition (ii) addition (iii) multiplication (iv) division	K2	CO2
3	5	$z = \cos t + i \sin t$ $0 \leq t \leq 2\pi$ represents a -----. (i) semi circle (ii) circle (iii) straight line (iv) parabolic curve	K1	CO3
	6	Integration along a curve is known as ----- . (i) contour (ii) definite (iii) irregular (iv) none of the above	K2	CO3
4	7	----- series is a series of positive powers. (i) Laurents (ii) Maclaurins (iii) Taylors (iv) exponential	K1	CO4
	8	Singular point of $f(z) = 1/z - 5$ is -----. (i) 5 (ii) 1 (iii) 0 (iv) 2	K2	CO4
5	9	If $f(z) = \cot z$ then $z = \text{-----}$ is a simple pole of $f(z)$. (i) 0 (ii) 1 (iii) π (iv) $\pi/4$	K1	CO5
	10	The residue of $1/z$ about $z = 0$ is -----. (i) 1 (ii) -1 (iii) 0 (iv) ∞	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.	If $f(z) = u + iv$ is analytic and $f(z)$ not equal to zero prove that $(\partial^2/\partial x^2 + \partial^2/\partial y^2) \log f(z) = 0$.	K2	CO1
		(OR)		
	11.b.	Show that $f(z) = e^x(\cos y + i \sin y)$ is analytic in the finite plane. Find its derivative.		
2	12.a.	Find the fixed points of $w = (1+z)/(1-z)$.	K2	CO2
		(OR)		
	12.b.	Discuss the transformation $w = 1/z$		
3	13.a.	Evaluate $\int_c f(z) dz$ where $f(z) = y - x - i3x^2$ and the line segment from $z = 0$ to $z = 1 + i$.	K2	CO3
		(OR)		
	13.b.	State and prove Cauchy's integral formula.		
4	14.a.	Find the Taylor's series of $1/z$ about $z = 1, 2, i$.	K3	CO4
		(OR)		
	14.b.	Expand $-1/(z-1)(z-2)$ as a power series in z valid in (i) $ z < 2$.		
5	15.a.	Find the poles of $f(z) = 2z+1/(z^2 - z - 2)$.	K3	CO5
		(OR)		
	15.b.	Find the residue of $f(z) = z+1/(z^2 - 2z)$ at $z = 2$.		

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	Derive CR equations in polar coordinates.	K2	CO1
2	17	Prove that cross ratio is preserved by a bilinear transformation.	K2	CO2
3	18	Evaluate $\int_c \frac{z dz}{z^2 - 1}$ where c is $ z = 2$.	K2	CO3
4	19	Find the Laurent's series for $z/(z+1)(z+2)$ about $z = -2$	K3	CO4
5	20	Evaluate $\int_0^{2\pi} \frac{d\theta}{5 + 4 \sin \theta}$.	K3	CO5

Z-Z-Z

END