GATE

GATE ALL BRANCHES CRASH COURSE 2025

ENGINEERING MATHEMATICS
Complex Analysis

DPP

Q1 If $z_1 = 2+i$; $z_2 = 3-2i$; Then value of $\left|\frac{2z_2+z_1-5-i}{2z_1-z_2+3-i}\right|^2$ is____.

Q2 If $3x + 2iy - ix + 5y = 7 + 5i$, The value of $x^2 + y^2$ is-

(A) 3 (B) 4

(C) 5 (D) 7

Q3 The value of $\lim_{z\to i}\frac{3z^4-2z^3+8z^2-2z+5}{z-i} = \alpha + i\beta$.

The value of $\frac{\alpha-\beta}{\alpha+\beta}$ is—

(A) 0 (B) 2

(C) 3 (D) 4

Q4 If the function $f(z) = u(r,\theta) + i\cdot\gamma(r,\theta)$ is Analytic then the value of $\frac{\delta^2\gamma}{\delta r^2} + \frac{1}{\gamma}\cdot\frac{\delta\gamma}{\delta r} + \frac{1}{r^2}\cdot\frac{\delta^2\gamma}{\delta\theta^2}$ is_____.

Q5 If f(z) = 2x (1– y) + i× γ (x,y) is an analytic function, then γ (x,y)

(A) $2y + x^2 - y^2$

(B) $2y - x^2 - y^2$

(C) $2x + x^2 - y^2$

(D) $2x - x^2 + y^2$

Q6 $f(z) = x^2 - y^2 - 2xy - 2x + 3y + i\,\gamma(x, y)$ is analytic & $\gamma(0,0) = 0$; then $\gamma(1,1)$ is_.

(enter in Integer)

Q7 The orthogonal trajectories of the family of curves $x^3y - xy^3 = c$ when 'c' is an arbitrary constant is-

(A) $x^4 - 6x^2y^2 + y^4 = c^2$

(B) $x^4 + 6x^2y^2 + y^4 = c^2$

(C) $x^3 - 6x^2y + y^3 = c^2$

(D) $x^3 + 6x^2y + y^3 = c^2$

Q8 The value of $\lim_{z\to i}\frac{z^2-2iz-1}{z^4+2z^2+1}$ is_____.

(Round to one decimal place).

Q9 The value of $\oint_{c_1}\frac{z^2+2z-5}{(z^2+4)(z^2+2z+2)}dz$ is_____.

(Enter in Integer). (C_1 is the circle |z - 2| = 5).

Q10 The value of $\oint_c\frac{e^z}{(z^2+\pi^2)}dz$ where c: |z| = 4, is ki.

The value of 'k' is___. (Round off to two decimal places).

Q11 The coefficient of (z –1) term in Laurent's series expansion of $f(z) = \frac{e^{2z}}{(z-1)}$ $(z \neq 1)$ is___.

(Enter in two decimal places).

Q12 For the function $f(z) = \frac{z^2-2z}{(z+1)^2\cdot(z+4)}$ the Residue of f(z) at z = –1 is.

(A) $\frac{14}{25}$ (B) $-\frac{14}{25}$

(C) $\frac{7}{13}$ (D) $-\frac{7}{13}$

Q13 The value of $\oint_c\frac{2+3\cdot\sin\pi z}{z\cdot(z-1)^2}dz$ where c is a square having vertices at 3 + 3i , 3 –3*i* , – 3 + 3*i*, –3–3*i* is-

(A) $6\pi\ i$

(B) $4\pi\ i$

(C) $-6\pi\ i$

(D) $2\pi\ i$

Q14 The value of $\oint_c e^{-\frac{1}{z}}\cdot\sin\left(\frac{1}{z}\right)dz$ where c is the circle |z| =1 is kπi. The value of 'k' is____. (Enter in Integer).

Q15 The value of $\oint_c\frac{\cosh z}{z^3}dz$ where C is the square with vertices at z = ±2, z = ±2*i* is kπi . The value of 'k' is __. (Enter in Integer)

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Answer Key

Q1	1~1
Q2	(C)
Q3	(A)
Q4	0~0
Q5	(A)
Q6	-3~-3
Q7	(A)
Q8	-0.25~0.25
Q9	0.01~0.01
Q10	0.29~0.35
Q11	4.7~5.2
Q12	(B)
Q13	(C)
Q14	2~2
Q15	1~1