

SARDAR PATEL UNIVERSITY
B.Sc.(MATHEMATICS) SEMESTER - 6
Multiple Choice Question Of US06CMTH21 (COMPLEX ANALYSIS)
Effective from June 2020

Unit-1

Que. Fill in the following blanks.

- (1) Domain of $f(z) = \frac{1}{z^2 + 1}$ is
 (a) $\mathbb{C} - \{i\}$ (b) $\mathbb{C} - \{-i\}$ (c) $\mathbb{C} - \{\pm 1\}$ (d) $\mathbb{C} - \{\pm i\}$
- (2) Domain of $f(z) = z + \frac{1}{z}$ is
 (a) $\mathbb{C} - \{0\}$ (b) $\mathbb{C} - \{i\}$ (c) $\mathbb{C} - \{\pm 1\}$ (d) $\mathbb{C} - \{\pm i\}$
- (3) Domain of $f(z) = \frac{z}{z + \bar{z}}$ is
 (a) $\{z \in \mathbb{C} / \text{Im}z = 0\}$ (b) $\{z \in \mathbb{C} / \text{Re}z \neq 0\}$ (c) $\{z \in \mathbb{C} / \text{Im}z \neq 0\}$ (d) $\{z \in \mathbb{C} / \text{Re}z \neq 1\}$
- (4) Domain of $f(z) = \frac{z}{z - \bar{z}}$ is
 (a) $\{z \in \mathbb{C} / \text{Im}z \neq 0\}$ (b) $\{z \in \mathbb{C} / \text{Re}z \neq 0\}$ (c) $\{z \in \mathbb{C} / \text{Im}z = 0\}$ (d) $\{z \in \mathbb{C} / \text{Re}z \neq 1\}$
- (5) Domain of $f(z) = \frac{1}{1 - |z|^2}$ is
 (a) $\{z \in \mathbb{C} / |z| \neq 0\}$ (b) $\{z \in \mathbb{C} / |z| \neq 1\}$ (c) $\{z \in \mathbb{C} / z \neq 1\}$ (d) $\{z \in \mathbb{C} / |z| = 1\}$
- (6) Cartesian form of $f(z) = z^2$ is $f(z) = \dots\dots\dots$
 (a) $x^2 + y^2 + i2xy$ (b) $x^2 - y^2 + i2xy$ (c) $x^2 + y^2 - i2xy$ (d) $x^2 - y^2 - i2xy$
- (7) Cartesian form of $f(z) = \bar{z}^2 + 2iz$ is $f(z) = \dots\dots\dots$
 (a) $x^2 - y^2 - 2y + i2x(1 - y)$ (b) $(x^2 + y^2 - 2y) + i2x(1 - y)$ (c) $(x^2 + y^2 + 2y) + i2x(1 - y)$
 (d) $x^2 - y^2 - 2y - i2x(1 - y)$
- (8) $f(z) = (x^2 - y^2 - 2y) + i(2x - 2xy)$ can be expressed as $f(z) = \dots\dots\dots$
 (a) $\bar{z}^2 + 2z$ (b) $\bar{z}^2 + iz$ (c) $\bar{z}^2 - 2iz$ (d) $\bar{z}^2 + 2iz$
- (9) $f(z) = \left(x + \frac{x}{x^2 + y^2}\right) + i\left(y - \frac{y}{x^2 + y^2}\right)$ can be expressed as $f(z) = \dots\dots\dots$
 (a) $\bar{z} - z^{-1}$ (b) $z - z^{-1}$ (c) $z + z^{-1}$ (d) $\bar{z} + z^{-1}$
- (10) $\lim_{z \rightarrow 0} \frac{z}{\bar{z}} = \dots\dots\dots$
 (a) -1 (b) 0 (c) 1 (d) does not exist
- (11) $\lim_{z \rightarrow z_0} f(z) = \infty$ iff = 0
 (a) $\lim_{z \rightarrow z_0} \frac{1}{f(z)}$ (b) $\lim_{z \rightarrow 0} \frac{1}{f(z)}$ (c) $\lim_{z \rightarrow z_0} f\left(\frac{1}{z}\right)$ (d) $\lim_{z \rightarrow 0} \frac{1}{z}$
- (12) $\lim_{z \rightarrow \infty} f(z) = w_0$ iff = w_0
 (a) $\lim_{z \rightarrow \infty} \frac{1}{f(z)}$ (b) $\lim_{z \rightarrow 0} \frac{1}{f(z)}$ (c) $\lim_{z \rightarrow 0} f\left(\frac{1}{z}\right)$ (d) $\lim_{z \rightarrow 0} \frac{1}{z}$
- (13) $\lim_{z \rightarrow \infty} f(z) = \infty$ iff = 0
 (a) $\lim_{z \rightarrow \infty} \frac{1}{f(z)}$ (b) $\lim_{z \rightarrow 0} \frac{1}{f\left(\frac{1}{z}\right)}$ (c) $\lim_{z \rightarrow 0} f\left(\frac{1}{z}\right)$ (d) $\lim_{z \rightarrow 0} \frac{1}{z}$
- (14) $f(z) = |z|^2$ is differentiable only at
 (a) $z = 1$ (b) $z \neq 0$ (c) $z = 0$ (d) $z \neq 1$

- (15) $Re(z + z^{-1}) = \dots\dots\dots$
 (a) $\left(y - \frac{y}{x^2 + y^2}\right)$ (b) $\left(x - \frac{x}{x^2 + y^2}\right)$ (c) $\left(x + \frac{x}{x^2 + y^2}\right)$ (d) $\left(y + \frac{y}{x^2 + y^2}\right)$
- (16) $Im(z + z^{-1}) = \dots\dots\dots$
 (a) $\left(y - \frac{y}{x^2 + y^2}\right)$ (b) $\left(x - \frac{x}{x^2 + y^2}\right)$ (c) $\left(x + \frac{x}{x^2 + y^2}\right)$ (d) $\left(y + \frac{y}{x^2 + y^2}\right)$
- (17) $Re(z + z^{-1}) = \dots\dots\dots$
 (a) $(r - r^{-1}) \cos \theta$ (b) $(r - r^{-1}) \sin \theta$ (c) $(r + r^{-1}) \sin \theta$ (d) $(r + r^{-1}) \cos \theta$
- (18) $Im(z + z^{-1}) = \dots\dots\dots$
 (a) $(r - r^{-1}) \cos \theta$ (b) $(r - r^{-1}) \sin \theta$ (c) $(r + r^{-1}) \sin \theta$ (d) $(r + r^{-1}) \cos \theta$
- (19) $Re(z^3 + z + 1) = \dots\dots\dots$
 (a) $x^3 + 3xy^2 + x + 1$ (b) $-y^3 + 3xy^2 + y$ (c) $-y^3 + 3yx^2 + y$ (d) $x^3 - 3xy^2 + x + 1$
- (20) $Im(z^3 + z + 1) = \dots\dots\dots$
 (a) $x^3 + 3xy^2 + x + 1$ (b) $-y^3 + 3xy^2 + y$ (c) $-y^3 + 3yx^2 + y$ (d) $x^3 - 3xy^2 + x + 1$
- (21) $Re(z^3 + z + 1) = \dots\dots\dots$
 (a) $r^3 \cos 3\theta + r \cos \theta + 1$ (b) $r^3 \cos 3\theta + r^2 \cos 2\theta + 1$ (c) $r^3 \cos 3\theta + \cos \theta + 1$ (d) $\cos 3\theta + \cos \theta + 1$
- (22) $Im(z^3 + z + 1) = \dots\dots\dots$
 (a) $r^3 \cos 3\theta + r \cos \theta + 1$ (b) $r^3 \sin 3\theta + r \sin \theta$ (c) $r^2 \sin 2\theta + r \sin \theta$ (d) $r^3 \sin 3\theta + r \sin \theta + 1$
- (23) For $f(z) = z^2$, $u_{xx} = \dots\dots\dots$
 (a) 0 (b) 2 (c) 1 (d) $2z$
- (24) For $f(z) = z^2$, $v_x = \dots\dots\dots$
 (a) 0 (b) 2 (c) 1 (d) $2z$
- (25) Derivative of $(2z^2 + i)^5$ is $\dots\dots\dots$
 (a) $20z(2z^2 + i)^4$ (b) $5z(2z^2 + i)^4$ (c) $10z(2z^2 + i)^4$ (d) $20(2z^2 + i)^4$
- (26) Derivative of $(1 - 4z^2)^3$ is $\dots\dots\dots$
 (a) $24z(1 - 4z^2)^2$ (b) $-24(1 - 4z^2)^2$ (c) $-24z(1 - 8z)^2$ (d) $-24z(1 - 4z^2)^2$
- (27) $f(z) = \frac{x^3y(y - ix)}{z(x^6 + y^2)}$, $\lim_{z \rightarrow 0} f(z)$ along the line $y = x$ is $\dots\dots\dots$
 (a) $-i/2$ (b) 0 (c) 1 (d) $i/2$
- (28) $f(z) = \frac{x^3y(y - ix)}{z(x^6 + y^2)}$, $\lim_{z \rightarrow 0} f(z)$ along the line $y = x^3$ is $\dots\dots\dots$
 (a) $1/2$ (b) 0 (c) $i/2$ (d) $-i/2$

UNIT-2

- (1) If f is differentiable at z_0 then C-R equations are satisfied at $\dots\dots\dots$
 (a) z (b) 1 (c) 0 (d) z_0 .
- (2) If C-R equations are not satisfied at z_0 then $f(z)$ is $\dots\dots\dots$ at z_0 .
 (a) differentiable (b) not differentiable (c) need not be differentiable (d) none of these.
- (3) If C-R equations are satisfied at z_0 then $f(z)$ is $\dots\dots\dots$ at z_0 .
 (a) need not be differentiable (b) not differentiable (c) differentiable (d) none of these.
- (4) If $f(z) = 2x + iy^2x$ then f is differentiable at $\dots\dots\dots$
 (a) 2 (b) 1 (c) 0 (d) none of these

- (5) Singular point of $f(z) = \frac{z^3 + 4}{(z^2 - 3)(z^2 + 1)}$ are $z = \dots\dots\dots$
 (a) $\sqrt{3}$, i (b) $\pm\sqrt{3}$ (c) $\pm\sqrt{3}$, $\pm i$ (d) none of these
- (6) Singular point of $f(z) = \frac{z^3 + 4}{(z^2 + 3)(z^2 + 1)}$ are $z = \dots\dots\dots$
 (a) $\sqrt{3}$, i (b) $\pm\sqrt{3}$ (c) $\pm\sqrt{3}$, $\pm i$ (d) $\pm\sqrt{3}i$, $\pm i$
- (7) Singular point of $f(z) = \frac{z^3 + i}{(z^2 - 3z + 2)}$ are $z = \dots\dots\dots$
 (a) 1 , 2 (b) 1 , i (c) 1 , 3 , i (d) 1 , 2 , i
- (8) Singular point of $f(z) = \frac{2z}{z(z^2 + 1)}$ are $z = \dots\dots\dots$
 (a) 0 , 1 (b) 2, i (c) 0 , i (d) 0 , $\pm i$
- (9) $f(z) = \frac{z^3 + 4}{(z^2 - 3)(z^2 + 1)}$ is analytic in $\dots\dots\dots$
 (a) $\{\pm\sqrt{3}$, $\pm i\}$ (b) $\mathbb{C} - \{\sqrt{3}$, $i\}$ (c) $\mathbb{C} - \{\sqrt{3}$, $\pm i\}$ (d) none of these
- (10) $f(z) = \frac{z^3 + i}{(z^2 - 3z + 2)}$ is analytic in $\dots\dots\dots$
 (a) $\{\pm\sqrt{1}$, $\pm 2\}$ (b) $\mathbb{C} - \{1$, $2\}$ (c) $\mathbb{C} - \{3$, $\pm 2\}$ (d) $\{1$, $2\}$
- (11) $f(z) = \frac{2z}{z(z^2 + 1)}$ is analytic in $\dots\dots\dots$
 (a) $\mathbb{C} - \{\pm i\}$ (b) $\{0$, $\pm i\}$ (c) $\mathbb{C} - \{0\}$ (d) $\mathbb{C} - \{0$, $\pm i\}$
- (12) If $u(x, y) = y^3 - 3x^2y$ then $\dots\dots\dots$
 (a) $u_{xx} + u_{yy} = 0$ (b) $u_{xx} + u_{xy} = 0$ (c) $u_{xx} + u_{yy} = 1$ (d) none of these
- (13) If $u(x, y) = 2x - x^3 + 3xy^2$ then $\dots\dots\dots$
 (a) $u_{xx} + u_{xy} = 0$ (b) $u_{xx} + u_{yy} = 0$ (c) $u_{xx} + u_{yy} = 1$ (d) none of these
- (14) For $u = \frac{x^3 - 3xy^2}{x^2 + y^2}$, $u_x = \dots\dots\dots$
 (a) 0 (b) i (c) -1 (d) 1
- (15) For $u = \frac{x^3 - 3xy^2}{x^2 + y^2}$, $u_y = \dots\dots\dots$
 (a) 0 (b) i (c) -1 (d) 1
- (16) For $u = \frac{y^3 - 3yx^2}{x^2 + y^2}$, $u_x = \dots\dots\dots$
 (a) 1 (b) i (c) -1 (d) 0
- (17) For $u = \frac{y^3 - 3yx^2}{x^2 + y^2}$, $u_y = \dots\dots\dots$
 (a) 0 (b) i (c) -1 (d) 1
- (18) For $u = \frac{x^3 - y^3}{x^2 + y^2}$, $u_x = \dots\dots\dots$
 (a) 0 (b) i (c) -1 (d) 1
- (19) For $u = \frac{x^3 - y^3}{x^2 + y^2}$, $u_y = \dots\dots\dots$
 (a) 0 (b) i (c) -1 (d) 1
- (20) For $u = \frac{x^3 + y^3}{x^2 + y^2}$, $u_x = \dots\dots\dots$
 (a) 0 (b) i (c) -1 (d) 1

- (21) For $u = \frac{x^3 + y^3}{x^2 + y^2}$, $u_y = \dots\dots\dots$
 (a) 0 (b) i (c) 1 (d) -1
- (22) For $f(z) = iz + 2$, $u_x + iv_x = \dots\dots\dots$
 (a) 0 (b) i (c) $-i$ (d) -1
- (23) For $f(z) = e^{-z}$, $u_x + iv_x = \dots\dots\dots$
 (a) e^{-z} (b) i (c) $-e^{-z}$ (d) -1
- (24) For $f(z) = z^3$, $u_x + iv_x = \dots\dots\dots$
 (a) 1 (b) $3z^2$ (c) $-i$ (d) z^2
- (25) For $f(z) = z^3$, $u_{xx} + iv_{yy} = \dots\dots\dots$
 (a) $6z$ (b) $3z^2$ (c) z (d) z^2
- (26) For $f(z) = z \operatorname{Im}(z)$, $u_x + iv_x = \dots\dots\dots$
 (a) x (b) y (c) $x + i2y$ (d) $2y$
- (27) For $f(z) = z \operatorname{Im}(z)$, $u_y + iv_y = \dots\dots\dots$
 (a) x (b) y (c) $x + i2y$ (d) $x - i2y$
- (28) For $f(z) = 1/z$, $u_x + iv_x = \dots\dots\dots$
 (a) $-1/z$ (b) z (c) $1/z^2$ (d) $-1/z^2$
- (29) Harmonic conjugate of $x^2 - y^2$ is $\dots\dots\dots$
 (a) $xy + C$ (b) $xy^2 + C$ (c) $x^2 + y^2 + C$ (d) $2xy + C$
- (30) Harmonic conjugate of $2x(1 - y)$ is $\dots\dots\dots$
 (a) $x^2 + 2xy - y^2 + C$ (b) $x^2 + xy - y^2 + C$ (c) $x^2 + y^2 + C$ (d) $x^2 + 2xy + y^2 + C$
- (31) Harmonic conjugate of $\sinh x \sin y$ is $\dots\dots\dots$
 (a) $\cosh x \cos y + C$ (b) $-\cosh x \cos y + C$ (c) $-\cosh x \cosh y + C$ (d) $-\cos x \cosh y + C$
- (32) Harmonic conjugate of $\frac{y}{x^2 + y^2}$ is $\dots\dots\dots$
 (a) $\frac{x}{x^2 + y^2} + C$ (b) $\frac{xy}{x^2 + y^2} + C$ (c) $\frac{2x}{x^2 + y^2} + C$ (d) $\frac{-x}{x^2 + y^2} + C$
- (33) Harmonic conjugate of $2x - x^3 + 3xy^2$ is $\dots\dots\dots$
 (a) $3x^2y + 2y + y^3 + C$ (b) $-3x^2y + 2y + y^3 + C$ (c) $-x^2y + 2y + y^3 + C$ (d) $-3x^2y + 2y - y^3 + C$
- (34) Harmonic conjugate of $y^3 - 3x^2y$ is $\dots\dots\dots$
 (a) $-3yx + x^3 + C$ (b) $-3y^2x - x^3 + C$ (c) $-3y^2x + x^3 + C$ (d) $-3x^2y + y^3 + C$

UNIT-3

- (1) $\exp\left(\frac{2 + \pi i}{4}\right) = \dots\dots\dots$
 (a) $\sqrt{e/2}(1 - i)$ (b) $\sqrt{e/2}(1 + i)$ (c) $\frac{\sqrt{e}(1 + i)}{2}$ (d) none of these
- (2) $\exp(2 \pm 3\pi i) = \dots\dots\dots$
 (a) $-e^2$ (b) e^2 (c) e^{-2} (d) $-e$
- (3) $\exp(z + \pi i) = \dots\dots\dots$
 (a) $-e^{-z}$ (b) e^z (c) $-e^z$ (d) $-e$
- (4) $\exp z \dots\dots\dots 0$, $\forall z \in \mathbb{C}$.
 (a) \leq (b) \geq (c) $=$ (d) \neq

- (5) $\lim_{z \rightarrow \infty} \exp(-z) = \dots\dots\dots$
 (a) 0 (b) 1 (c) ∞ (d) -1
- (6) $\lim_{z \rightarrow -\infty} \exp z = \dots\dots\dots$
 (a) ∞ (b) 1 (c) 0 (d) -1
- (7) if e^z is real then $Imz = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) 2π (b) $n\pi$ (c) π (d) n
- (8) if e^z is purely imaginary then $Imz = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $(2n+1)\pi$ (b) $2n\pi$ (c) π (d) $(2n+1)\pi/2$
- (9) $e^{z_1} = e^{z_2}$ then $z_1 - z_2 = \dots\dots\dots$
 (a) $2n\pi i$ (b) $2n\pi$ (c) $n\pi i$ (d) $(2n+1)\pi i$
- (10) $e^{z_1} = e^{-z_2}$ then $z_1 = \dots\dots\dots$
 (a) $-z_2 + 2n\pi i$ (b) $z_2 + 2n\pi$ (c) $-z_2$ (d) z_2
- (11) e^z is periodic function with period $\dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $n\pi i$ (b) $2n\pi$ (c) $2n\pi i$ (d) $(2n+1)\pi i$
- (12) $\overline{\exp(iz)} = \exp(i\bar{z})$ iff $z = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $2n\pi i$ (b) $2n\pi$ (c) $n\pi$ (d) $(2n+1)\pi$
- (13) $\sin iy = \dots\dots\dots$
 (a) $\sinh y$ (b) $i \sinh y$ (c) $-i \sinh y$ (d) $\cos iy$
- (14) $i \sin iy = \dots\dots\dots$
 (a) $-\sinh y$ (b) $i \sinh y$ (c) $-i \sinh y$ (d) $\cos iy$
- (15) $\cos iy = \dots\dots\dots$
 (a) $i \cosh y$ (b) $i \cos y$ (c) $-\cosh y$ (d) $\cosh y$
- (16) $\sin x \cosh y + i \cos x \sinh y = \dots\dots\dots$
 (a) $\sin z$ (b) $\sinh z$ (c) $\sin y$ (d) $\cos z$
- (17) $\cos x \cosh y - i \sin x \sinh y = \dots\dots\dots$
 (a) $\sin z$ (b) $\sinh z$ (c) $\cos z$ (d) $\cosh z$
- (18) For $z = x + iy$, $|e^z| = \dots\dots\dots$
 (a) e^z (b) e^y (c) e^x (d) $e^{|z|}$
- (19) For $z = x + iy$, $Arg(e^z) = \dots\dots\dots$
 (a) $y + n\pi$ (b) y (c) $n\pi$ (d) $y + 2n\pi$
- (20) Period of $e^{z/2} = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $n\pi i/2$ (b) $2n\pi i$ (c) $n\pi/2$ (d) $n\pi i$
- (21) If $e^z = -1$ then $z = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $(2n+1)\pi i$ (b) $2n\pi i$ (c) $(2n+1)\pi$ (d) $2n\pi i$
- (22) If $e^z = -1 + \sqrt{3}i$ then $Re(z) = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $\ln 2$ (b) 2 (c) 4 (d) -1
- (23) If $e^z = -1 + \sqrt{3}i$ then $Im(z) = \dots\dots\dots$, $n \in \mathbb{Z}$.
 (a) $\frac{\pi}{3} + 2n\pi$ (b) $\frac{2\pi}{3} + n\pi$ (c) $\frac{-2\pi}{3} + 2n\pi$ (d) $\frac{2\pi}{3} + 2n\pi$

- (24) If $e^z = 1 + \sqrt{3}i$ then $Im(z) = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) $\frac{\pi}{3} + 2n\pi$ (b) $\frac{2\pi}{3} + n\pi$ (c) $\frac{-2\pi}{3} + 2n\pi$ (d) $\frac{2\pi}{3} + 2n\pi$
- (25) $e^{2z-1} = 1$ then $z = \dots\dots\dots$
 (a) $n\pi i/2$ (b) $\frac{1}{2} + n\pi i$ (c) $2 + n\pi i$ (d) $\ln \frac{1}{2} + n\pi i$
- (26) $|e^{-2z}| < 1$ iff $\dots\dots\dots$
 (a) $Re z = 0$ (b) $Re z < 0$ (c) $Re z > 0$ (d) $Im z > 0$
- (27) Period of $\sin 2z = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) 2π (b) $2n\pi$ (c) $n\pi$ (d) $2n\pi i$
- (28) Period of $\cosh 2z = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) πi (b) $2n\pi$ (c) $n\pi$ (d) $2n\pi i$
- (29) $\sin(z_1 + z_2) + \sin(z_1 - z_2) = \dots\dots\dots$
 (a) $2 \sin z_1 \sin z_2$ (b) $2 \cos z_1 \cos z_2$ (c) $2 \cos z_1 \sin z_2$ (d) $2 \sin z_1 \cos z_2$
- (30) $\sin(z_1 + z_2) - \sin(z_1 - z_2) = \dots\dots\dots$
 (a) $2 \sin z_1 \sin z_2$ (b) $2 \cos z_1 \cos z_2$ (c) $2 \cos z_1 \sin z_2$ (d) $2 \sin z_1 \cos z_2$
- (31) $-2 \sin\left(\frac{z_1 + z_2}{2}\right) \sin\left(\frac{z_1 - z_2}{2}\right) = \dots\dots\dots$
 (a) $\cos z_1 - \sin z_2$ (b) $\cos z_1 - \cos z_2$ (c) $\cos z_1 - \sin z_2$ (d) $\sin z_1 - \cos z_2$
- (32) $\cos(z_1 - z_2) - \cos(z_1 + z_2) = \dots\dots\dots$
 (a) $2 \sin z_1 \sin z_2$ (b) $2 \cos z_1 \cos z_2$ (c) $2 \cos z_1 \sin z_2$ (d) $2 \sin z_1 \cos z_2$
- (33) $|\sin z|^2 = \dots\dots\dots$
 (a) $\sin^2 x - \sinh^2 y$ (b) $\sin^2 x + \sinh^2 y$ (c) $\sinh^2 x + \sin^2 y$ (d) $\sinh^2 x + \sin^2 y$
- (34) $|\cos z|^2 = \dots\dots\dots$
 (a) $\cos^2 x - \sinh^2 y$ (b) $\sin^2 x + \sinh^2 y$ (c) $\cos^2 x + \sinh^2 y$ (d) $\sinh^2 x + \sin^2 y$
- (35) Zeros of $\sin \frac{z}{2}$ are $z = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) $n\pi$ (b) $2n\pi$ (c) $n\pi i$ (d) $n\pi/2$
- (36) Zeros of $\cos \frac{z}{2}$ are $z = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) $(n+1)\pi$ (b) $(2n+1)\pi/2$ (c) $2n\pi i$ (d) $(2n+1)\pi$
- (37) Zeros of $\sinh \frac{z}{2}$ are $z = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) $n\pi$ (b) $2n\pi i$ (c) $n\pi i$ (d) $n\pi i/2$
- (38) Zeros of $\cosh \frac{z}{2}$ are $z = \dots\dots\dots, n \in \mathbb{Z}$.
 (a) $(n+1)\pi i$ (b) $(2n+1) i \pi/2$ (c) $2n\pi i$ (d) $(2n+1)\pi i$
- (39) $Re(\log(-1 - \sqrt{3}i)) = \dots\dots\dots$
 (a) $\ln 2$ (b) 2 (c) 4 (d) -1
- (40) $Im(\log(-1)) = \dots\dots\dots$
 (a) $\ln 1$ (b) $(2n+1)\pi$ (c) $2n\pi$ (d) $(n+1)\pi$
- (41) $Re(\log(1-i)) = \dots\dots\dots$
 (a) $\ln \sqrt{2}$ (b) $\sqrt{2}$ (c) 2 (d) 1
- (42) $Im(\text{Log}(1-i)) = \dots\dots\dots$
 (a) $\ln \sqrt{2}$ (b) $\pi/4$ (c) π (d) $-\pi/4$

- (43) $Im (Log(-e i)) = \dots\dots\dots$
 (a) $\pi/2$ (b) $\pi/4$ (c) $-\pi/2$ (d) $-\pi/4$
- (44) $Re (Log(-e i)) = \dots\dots\dots$
 (a) $\pi/2$ (b) 1 (c) 0 (d) $-\pi/4$
- (45) $Log(i) = \dots\dots\dots$
 (a) $i/2$ (b) $\pi/2$ (c) π (d) $i \pi/2$
- (46) $Im (Log(1 - \sqrt{3} i)) = \dots\dots\dots$
 (a) 2 (b) $\pi/3$ (c) $-\pi/3$ (d) $-\pi/4$
- (47) $Im (Log(-1 + i)) = \dots\dots\dots$
 (a) $3\pi/4$ (b) $\pi/3$ (c) $-3\pi/4$ (d) $-\pi/4$

UNIT-4

- (1) Image of rectangle $0 < x < 1$ under the transformation $w = iz$ is
 (a) $0 < u < 1$ (b) $0 < v$ (c) $0 < v < 1$ (d) $0 < v < 2$
- (2) Image of $y > 0$ under the transformation $w = (1 + i)z$ is
 (a) $u < v$ (b) $v < u$ (c) $0 < v$ (d) $v = u$
- (3) Image of $y < 0$ under the transformation $w = (1 + i)z$ is
 (a) $u < v$ (b) $v < u$ (c) $u < -v$ (d) $u > -v$
- (4) Image of $x > 0$ under the transformation $w = (1 + i)z$ is
 (a) $u < v$ (b) $v < u$ (c) $u < -v$ (d) $u > -v$
- (5) Image of $x < 0$ under the transformation $w = (1 + i)z$ is
 (a) $u < v$ (b) $v < u$ (c) $u < -v$ (d) $u > -v$
- (6) Image of $y > 1$ under the transformation $w = (1 - i)z$ is
 (a) $u + v < 2$ (b) $v + u > 2$ (c) $u - v > 2$ (d) $u - v < 2$
- (7) Fixed point of $w = \frac{z - 1}{z + 1}$ are
 (a) $\pm i$ (b) i (c) -1 (d) 3
- (8) Fixed point of $w = \frac{6z - 9}{z}$ are
 (a) 0 (b) i (c) 2 (d) 3
- (9) The image of line $x = c_1$, $c_1 \neq 0$ under the transformation $w = 1/z$ is
 (a) circle (b) square (c) rectangle (d) hyperbola
- (10) If $z = x + iy, w = u + iv, w = 1/z$ then $x = \dots\dots\dots$
 (a) $\frac{v}{u^2 + v^2}$ (b) $\frac{-u}{u^2 + v^2}$ (c) $\frac{u}{u^2 + v^2}$ (d) $\frac{-v}{u^2 + v^2}$
- (11) If $z = x + iy, w = u + iv, w = 1/z$ then $y = \dots\dots\dots$
 (a) $\frac{v}{u^2 + v^2}$ (b) $\frac{-u}{u^2 + v^2}$ (c) $\frac{u}{u^2 + v^2}$ (d) $\frac{-v}{u^2 + v^2}$
- (12) If $z = x + iy, w = u + iv, w = i/z$ then $y = \dots\dots\dots$
 (a) $\frac{v}{u^2 + v^2}$ (b) $\frac{-u}{u^2 + v^2}$ (c) $\frac{u}{u^2 + v^2}$ (d) $\frac{-v}{u^2 + v^2}$
- (13) If $z = x + iy, w = u + iv, w = i/z$ then $x = \dots\dots\dots$
 (a) $\frac{v}{u^2 + v^2}$ (b) $\frac{-u}{u^2 + v^2}$ (c) $\frac{u}{u^2 + v^2}$ (d) $\frac{-v}{u^2 + v^2}$

- (14) If $T(z) = \frac{az+b}{cz+d}$, $(ad-bc \neq 0)$. Then $\lim_{z \rightarrow \infty} T(z) = \infty$, if $c = \dots\dots\dots$
 (a) ∞ (b) i (c) 0 (d) 1
- (15) If $T(z) = \frac{az+b}{cz+d}$, $(ad-bc \neq 0)$. Then $\lim_{z \rightarrow \infty} T(z) = \dots\dots\dots$, if $c \neq 0$.
 (a) a (b) a/c (c) c/a (d) c
- (16) If $T(z) = \frac{az+b}{cz+d}$, $(ad-bc \neq 0)$. Then $\lim_{z \rightarrow -d/c} T(z) = \dots\dots\dots$, if $c \neq 0$.
 (a) ∞ (b) i (c) 2 (d) 0
- (17) If $T(z) = \frac{az+b}{cz+d}$ then $T^{-1}(z) = \dots\dots\dots$
 (a) $\frac{-dz+b}{cz+a}$ (b) $\frac{dz+b}{cz-a}$ (c) $\frac{-dz+b}{cz-a}$ (d) $\frac{dz-b}{cz-a}$
- (18) If $z = x + iy, w = u + iv, w = \sin z$ then $u = \dots\dots\dots$
 (a) $\sinh x \cos y$ (b) $\sin x \sinh y$ (c) $\cos x \sinh y$ (d) $\sin x \cosh y$
- (19) If $z = x + iy, w = u + iv, w = \sin z$ then $v = \dots\dots\dots$
 (a) $\sinh x \cos y$ (b) $\cos x \sinh y$ (c) $\sin x \sinh y$ (d) $\sin x \cosh y$
- (20) Image of $0 < y < 2$ under the transformation $w = iz + 1$ is $\dots\dots\dots$
 (a) $0 < u < 1$ (b) $0 < v$ (c) $-1 < u < 1$ (d) $0 < v < 2$
- (21) Image of $0 < x$ under the transformation $w = iz + 1$ is $\dots\dots\dots$
 (a) $0 < u$ (b) $0 < v$ (c) $0 < u < 1$ (d) $0 < v < 2$
- (22) Image of $x = c_1$, $(c_1 \neq 0)$ under the transformation $w = 1/z$ is circle with centre $\dots\dots\dots$
 (a) $(0, 1/2c_1)$ (b) $(c_1, 0)$ (c) $(1/c_1, 0)$ (d) $(1/2c_1, 0)$
- (23) Image of $x = c_1$, $(c_1 \neq 0)$ under the transformation $w = 1/z$ is circle with radius $\dots\dots\dots$
 (a) $1/c_1$ (b) c_1 (c) $1/2c_1$ (d) $(1/2c_1, 0)$
- (24) Image of $y = c_1$, $(c_1 \neq 0)$ under the transformation $w = 1/z$ is circle with centre $\dots\dots\dots$
 (a) $(0, -1/2c_1)$ (b) $(c_1, 0)$ (c) $(-1/c_1, 0)$ (d) $(1/2c_1, 0)$
- (25) Image of $y = c_1$, $(c_1 \neq 0)$ under the transformation $w = 1/z$ is circle with radius $\dots\dots\dots$
 (a) $1/c_1$ (b) c_1 (c) $1/2c_1$ (d) $(1/2c_1, 0)$
- (26) Image of $x < 0$ under the transformation $w = 1/z$ is $\dots\dots\dots$
 (a) $Re w > 0$ (b) $Im w < 0$ (c) $Re w < 0$ (d) $Im w > 0$
- (27) Image of $y > 0$ under the transformation $w = 1/z$ is $\dots\dots\dots$
 (a) $Re w > 0$ (b) $Im w < 0$ (c) $Re w < 0$ (d) $Im w > 0$
- (28) Image of $y < 1$ under the transformation $w = i/z$ is $\dots\dots\dots$
 (a) $u < u^2 + v^2$ (b) $u > u^2 + v^2$ (c) $v < u^2 + v^2$ (d) $v > u^2 + v^2$
- (29) Image of $x > 0$ under the transformation $w = i/z$ is $\dots\dots\dots$
 (a) $u < 0$ (b) $u > 0$ (c) $v < 0$ (d) $v > 0$
- (30) Image of $y > 0$ under the transformation $w = i/z$ is $\dots\dots\dots$
 (a) $u < 0$ (b) $u > 0$ (c) $v < 0$ (d) $v > 0$

