V.P & R.P.T.P.SCIENCE COLLEGE

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B.Sc.(MATHEMATICS) SEMESTER - 6

Multiple Choice Questions Of US06CMTH21

(Complex Analysis)

By

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Unit-1

Que. Fill in the following blanks.

(1) Domain of $f(z) = \dfrac{1}{z^2+1}$ is ....
(a) $\mathbb{C} - \{i\}$ (b) $\mathbb{C} - \{-i\}$ (c) $\mathbb{C} - \{\pm 1\}$ **(d)** $\mathbb{C} - \{\pm i\}$

(2) Domain of $f(z) = z + \dfrac{1}{z}$ is ....
(a) $\mathbb{C} - \{0\}$ (b) $\mathbb{C} - \{i\}$ (c) $\mathbb{C} - \{\pm 1\}$ (d) $\mathbb{C} - \{\pm i\}$

(3) Domain of $f(z) = \dfrac{z}{z+\bar{z}}$ is ....
(a) $\{z \in \mathbb{C} \ / \ Imz = 0\}$ **(b)** $\{z \in \mathbb{C} \ / \ Rez \neq 0\}$ (c) $\{z \in \mathbb{C} \ / \ Imz \neq 0\}$ (d) $\{z \in \mathbb{C} \ / \ Rez \neq 1\}$

(4) Domain of $f(z) = \dfrac{z}{z-\bar{z}}$ is ....
(a) $\{z \in \mathbb{C} \ / \ Imz \neq 0\}$ (b) $\{z \in \mathbb{C} \ / \ Rez \neq 0\}$ (c) $\{z \in \mathbb{C} \ / \ Imz = 0\}$ (d) $\{z \in \mathbb{C} \ / \ Rez \neq 1\}$

(5) Domain of $f(z) = \dfrac{1}{1-|z|^2}$ 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 $f(z) =$ ....
(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 $f(z) =$ ....
(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 $f(z) =$.........................
(a) $\bar{z}^2+2z$ (b) $\bar{z}^2+iz$ (c) $\bar{z}^2-2iz$ **(d)** $\bar{z}^2+2iz$

(9) $f(z) = \left(x + \dfrac{x}{x^2+y^2}\right) + i\left(y - \dfrac{y}{x^2+y^2}\right)$ can be expressed as $f(z) =$.........................
(a) $\bar{z}-z^{-1}$ (b) $z-z^{-1}$ **(c)** $z+z^{-1}$ (d) $\bar{z}+z^{-1}$

(10) $\lim\limits_{z\to 0} \dfrac{z}{\bar{z}} =$ ....
(a) -1 (b) 0 (c) 1 **(d)** does not exist

(11) $\lim\limits_{z\to z_0} f(z) = \infty$ iff .... $= 0$
(a) $\lim\limits_{z\to z_0} \dfrac{1}{f(z)}$ (b) $\lim\limits_{z\to 0} \dfrac{1}{f(z)}$ (c) $\lim\limits_{z\to z_0} f\left(\dfrac{1}{z}\right)$ (d) $\lim\limits_{z\to 0} \dfrac{1}{z}$

(12) $\lim\limits_{z\to\infty} f(z) = w_0$ iff .... $= w_0$
(a) $\lim\limits_{z\to\infty} \dfrac{1}{f(z)}$ (b) $\lim\limits_{z\to 0} \dfrac{1}{f(z)}$ **(c)** $\lim\limits_{z\to 0} f\left(\dfrac{1}{z}\right)$ (d) $\lim\limits_{z\to 0} \dfrac{1}{z}$

(13) $\lim_{z\to\infty} f(z)=\infty$ iff .... $=0$
(a) $\lim_{z\to\infty}\frac{1}{f(z)}$ **(b)** $\lim_{z\to 0}\frac{1}{f\left(\frac{1}{z}\right)}$ (c) $\lim_{z\to 0} f\left(\frac{1}{z}\right)$ (d) $\lim_{z\to 0}\frac{1}{z}$

(14) $f(z)=|z|^2$ is differentiable only at ....
(a) $z=1$ (b) $z\neq 0$ **(c)** $z=0$ (d) $z\neq 1$

(15) $Re(z+z^{-1})=$ ....
(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) $Im(z+z^{-1})=$ ....
(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) $Re(z+z^{-1})=$ ....
(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) $Im(z+z^{-1})=$ ....
(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) $Re(z^3+z+1)=$ ....
(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) $Im(z^3+z+1)=$ ....
(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) $Re(z^3+z+1)=$ ....
(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) $Im(z^3+z+1)=$ ....
(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 $f(z)=z^2$, $u_{xx}=$ ....
(a) 0 **(b)** 2 (c) 1 (d) $2z$

(24) For $f(z)=z^2$, $v_x=$ ....
(a) 0 (b) 2 (c) 1 (d) $2z$

(25) Derivative of $(2z^2+i)^5$ is ....
(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 ....
(a) $24z(1-4z^2)^2$ (b) $-24(1-4z^2)^2$ (c) $-24z(1-8z)^2$ **(d)** $-24z(1-4z^2)^2$

(27) $f(z)=\frac{x^3y(y-ix)}{z(x^6+y^2)}$, $\lim_{z\to 0} f(z)$ along the line $y=x$ is ....
(a) $-i/2$ **(b)** 0 (c) 1 (d) $i/2$

(28) $f(z) = \dfrac{x^3y(y-ix)}{z(x^6+y^2)}$, $\lim\limits_{z\to 0} f(z)$ along the line $y = x^3$ is ....
(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 ....
(a) z (b) 1 (c) 0 **(d)** z_0 .

(2) If C-R equations are not satisfied at z_0 then f(z) is .... 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 .... 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 ....
(a) 2 (b) 1 (c) 0 **(d)** none of these

(5) Singular point of $f(z) = \dfrac{z^3+4}{(z^2-3)(z^2+1)}$ are $z =$ ....
(a) $\sqrt{3}$, i (b) $\pm\sqrt{3}$ (c) $\pm\sqrt{3}$, $\pm i$ **(d)** none of these

(6) Singular point of $f(z) = \dfrac{z^3+4}{(z^2+3)(z^2+1)}$ are $z =$ ....
(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 $f(z) = \dfrac{z^3+i}{(z^2-3z+2)}$ are $z =$ ....
(a) 1 , 2 (b) 1 , i (c) 1 , 3 , i (d) 1 , 2 , i

(8) Singular point of $f(z) = \dfrac{2z}{z(z^2+1)}$ are $z =$ ....
(a) 0 , 1 (b) $2, i$ (c) 0 , i **(d)** 0 , $\pm i$

(9) $f(z) = \dfrac{z^3+4}{(z^2-3)(z^2+1)}$ is analytic in ....
(a) $\{\pm\sqrt{3}\ ,\ \pm i\}$ (b) $\mathbb{C} - \{\sqrt{3}\ ,\ i\}$ (c) $\mathbb{C} - \{\sqrt{3}\ ,\ \pm i\}$ **(d)** none of these

(10) $f(z) = \dfrac{z^3+i}{(z^2-3z+2)}$ is analytic in ....
(a) $\{\pm\sqrt{1}\ ,\ \pm 2\}$ **(b)** $\mathbb{C} - \{1\ ,\ 2\}$ (c) $\mathbb{C} - \{3\ ,\ \pm 2\}$ (d) $\{\ 1\ ,\ 2\ \}$

(11) $f(z) = \dfrac{2z}{z(z^2+1)}$ is analytic in ....
(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 ....
(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 ....
(a) $u_{xx} + u_{xy} = 0$ **(b)** $u_{xx} + u_{yy} = 0$ (c) $u_{xx} + u_{yy} = 1$ (d) none of these

(14) For $u = \dfrac{x^3 - 3xy^2}{x^2 + y^2}$, $u_x =$ ....
(a) 0 (b) i (c) -1 **(d)** 1

(15) For $u = \dfrac{x^3 - 3xy^2}{x^2 + y^2}$, $u_y =$ ....
(a) 0 (b) i (c) -1 (d) 1

(16) For $u = \dfrac{y^3 - 3yx^2}{x^2 + y^2}$, $u_x =$ ....
(a) 1 (b) i (c) -1 **(d)** 0

(17) For $u = \dfrac{y^3 - 3yx^2}{x^2 + y^2}$, $u_y =$ ....
(a) 0 (b) i (c) -1 **(d)** 1

(18) For $u = \dfrac{x^3 - y^3}{x^2 + y^2}$, $u_x =$ ....
(a) 0 (b) i (c) -1 **(d)** 1

(19) For $u = \dfrac{x^3 - y^3}{x^2 + y^2}$, $u_y =$ ....
(a) 0 (b) i **(c)** -1 (d) 1

(20) For $u = \dfrac{x^3 + y^3}{x^2 + y^2}$, $u_x =$ ....
(a) 0 (b) i (c) -1 **(d)** 1

(21) For $u = \dfrac{x^3 + y^3}{x^2 + y^2}$, $u_y =$ ....
(a) 0 (b) i **(c)** 1 (d) -1

(22) For $f(z) = iz + 2$, $u_x + iv_x =$ ....
(a) 0 **(b)** i (c) $-i$ (d) -1

(23) For $f(z) = e^{-z}$, $u_x + iv_x =$ ....
(a) e^{-z} (b) i **(c)** $-e^{-z}$ (d) -1

(24) For $f(z) = z^3$, $u_x + iv_x =$ ....
(a) 1 **(b)** $3z^2$ (c) $-i$ (d) z^2

(25) For $f(z) = z^3$, $u_{xx} + iv_{yy} =$ ....
(a) $6z$ (b) $3z^2$ (c) z (d) z^2

(26) For $f(z) = z\ Im(z)$, $u_x + iv_x =$ ....
(a) x **(b)** y (c) $x + i2y$ (d) $2y$

(27) For $f(z) = z\ Im(z)$, $u_y + iv_y =$ ....
(a) x (b) y **(c)** $x + i2y$ (d) $x - i2y$

(28) For $f(z) = 1/z$, $u_x + iv_x =$ ....
(a) $-1/z$ (b) z (c) $1/z^2$ **(d)** $-1/z^2$

(29) Harmonic conjugate of $x^2 - y^2$ is ....
(a) $xy + C$ (b) $xy^2 + C$ (c) $x^2 + y^2 + C$ **(d)** $2xy + C$

(30) Harmonic conjugate of $2x(1 - y)$ is ....
(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 ....
(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 $\dfrac{y}{x^2 + y^2}$ is ....
(a) $\dfrac{x}{x^2 + y^2} + C$ (b) $\dfrac{xy}{x^2 + y^2} + C$ (c) $\dfrac{2x}{x^2 + y^2} + C$ (d) $\dfrac{-x}{x^2 + y^2} + C$

(33) Harmonic conjugate of $2x - x^3 + 3xy^2$ is ....
(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 ....
(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) $exp\left(\dfrac{2 + \pi i}{4}\right) =$ ....
(a) $\sqrt{e/2}\,(1 - i)$ **(b)** $\sqrt{e/2}\,(1 + i)$ (c) $\dfrac{\sqrt{e}\,(1 + i)}{2}$ (d) none of these

(2) $exp(2 \pm 3\pi i) =$ ....
(a) $-e^2$ (b) e^2 (c) e^{-2} (d) $-e$

(3) $exp(z + \pi i) =$ ....
(a) $-e^{-z}$ (b) e^z **(c)** $-e^z$ (d) $-e$

(4) $expz$..............0 , $\forall\ z \in \mathbb{C}$.
(a) $\leq$ (b) $\geq$ (c) $=$ **(d)** $\neq$

(5) $\lim_{z \to \infty} exp(-z) =$ ....
(a) 0 (b) 1 (c) ∞ (d) -1

(6) $\lim_{z \to -\infty} expz =$ ....
(a) ∞ (b) 1 **(c)** 0 (d) -1

(7) if e^z is real then $Imz =$ .... , $n \in \mathbb{Z}$.
(a) 2π **(b)** $n\pi$ (c) π (d) n

(8) if e^z is purely imaginary then $Imz =$ .... , $n \in \mathbb{Z}$.
(a) $(2n+1)\pi$ (b) $2n\pi$ (c) π **(d)** $(2n+1)\pi/2$

(9) $e^{z_1} = e^{z_2}$ then $z_1 - z_2 =$ ....
(a) $2n\pi i$ (b) $2n\pi$ (c) $n\pi i$ (d) $(2n+1)\pi i$

(10) $e^{z_1} = e^{-z_2}$ then $z_1 =$ ....
(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 .... , $n \in \mathbb{Z}$.
(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 $z =$ .... , $n \in \mathbb{Z}$.
(a) $2n\pi i$ (b) $2n\pi$ **(c)** $n\pi$ (d) $(2n+1)\pi$

(13) $siniy =$ ....
(a) $sinhy$ **(b)** $isinhy$ (c) $-isinhy$ (d) $cosiy$

(14) $i \sin iy =$ ....
(a) $-\sinh y$ (b) $isinhy$ (c) $-isinhy$ (d) $cosiy$

(15) $cosiy =$ ....
(a) $icoshy$ (b) $icosy$ (c) $-coshy$ **(d)** $coshy$

(16) $sinxcoshy + icosxsinhy =$ ....
(a) $sinz$ (b) $sinhz$ (c) $siny$ (d) $cosz$

(17) $cosxcoshy - isinxsinhy =$ ....
(a) $sinz$ (b) $sinhz$ **(c)** $cosz$ (d) $coshz$

(18) For $z = x + iy$, $|e^z| =$ ....
(a) e^z (b) e^y **(c)** e^x (d) $e^{|z|}$

(19) For $z = x + iy$, $Arg(e^z) =$ ....
(a) $y + n\pi$ (b) y (c) $n\pi$ **(d)** $y + 2n\pi$

(20) Period of $e^{z/2} =$ .... ,$n \in \mathbb{Z}$.
(a) $n\pi i/2$ **(b)** $2n\pi i$ (c) $n\pi/2$ (d) $n\pi i$

(21) If $e^z = -1$ then $z =$ .... ,$n \in \mathbb{Z}$.
(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 $Re\ (z) =$ .... ,$n \in \mathbb{Z}$.
(a) $ln\ 2$ (b) 2 (c) 4 (d) -1

(23) If $e^z = -1 + \sqrt{3}i$ then $Im\ (z) =$ .... ,$n \in \mathbb{Z}$.
(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 $Im\ (z) =$ .... ,$n \in \mathbb{Z}$.
(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 $z =$ ....
(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 ....
(a) $Re\ z = 0$ (b) $Re\ z < 0$ **(c)** $Re\ z > 0$ (d) $Im\ z > 0$

(27) Period of $\sin 2z =$ .... ,$n \in \mathbb{Z}$.
(a) 2π **(b)** $2n\pi$ (c) $n\pi$ (d) $2n\pi i$

(28) Period of $\cosh 2z =$ .... ,$n \in \mathbb{Z}$.
(a) πi (b) $2n\pi$ (c) $n\pi$ **(d)** $2n\pi i$

(29) $\sin(z_1 + z_2) + \sin(z_1 - z_2) =$ ....
(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) $\sin(z_1 + z_2) - \sin(z_1 - z_2) =$ ....
(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) $-2 \sin\left(\frac{z_1 + z_2}{2}\right) \sin\left(\frac{z_1 - z_2}{2}\right) =$ ....
(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) $\cos(z_1 - z_2) - \cos(z_1 + z_2) =$ ....
(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) $|\sin z|^2 =$ ....
(a) $\sin^2 x - \sinh^2 y$ **(b)** $\sin^2 x + \sinh^2 y$ (c) $\sinh^2 x + \sinh^2 y$ (d) $\sinh^2 x + \sin^2 y$

(34) $|\cos z|^2 =$ ....
(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 $z =$ .... , $n \in \mathbb{Z}$.
(a) $n\pi$ **(b)** $2n\pi$ (c) $n\pi i$ (d) $n\pi/2$

(36) Zeros of $\cos \frac{z}{2}$ are $z =$ ...., $n \in \mathbb{Z}$.
(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 $z =$ ...., $n \in \mathbb{Z}$.
(a) $n\pi$ **(b)** $2n\pi\ i$ (c) $n\pi i$ (d) $n\pi\ i/2$

(38) Zeros of $\cosh \frac{z}{2}$ are $z =$ ...., $n \in \mathbb{Z}$.
(a) $(n + 1)\pi\ i$ (b) $(2n + 1)\ i\ \pi/2$ (c) $2n\pi i$ **(d)** $(2n + 1)\pi\ i$

(39) $Re\ (\log(-1-\sqrt{3}\ i)) =$ ....
(a) $ln\ 2$ (b) 2 (c) 4 (d) -1

(40) $Im\ (\log(-1)) =$ ....
(a) $ln\ 1$ **(b)** $(2n+1)\pi$ (c) $2n\pi$ (d) $(n+1)\pi$

(41) $Re\ (\log(1-\ i)) =$ ....
(a) $ln\ \sqrt{2}$ (b) $\sqrt{2}$ (c) 2 (d) 1

(42) $Im\ (Log(1-\ i)) =$ ....
(a) $ln\ \sqrt{2}$ (b) $\pi/4$ (c) π **(d)** $-\pi/4$

(43) $Im\ (Log(-e\ i)) =$ ....
(a) $\pi/2$ (b) $\pi/4$ **(c)** $-\pi/2$ (d) $-\pi/4$

(44) $Re\ (Log(-e\ i)) =$ ....
(a) $\pi/2$ **(b)** 1 (c) 0 (d) $-\pi/4$

(45) $Log(i) =$ ....
(a) $i/2$ (b) $\pi/2$ (c) π **(d)** $i\ \pi/2$

(46) $Im\ (Log(1-\sqrt{3}\ i)) =$ ....
(a) 2 (b) $\pi/3$ **(c)** $-\pi/3$ (d) $-\pi/4$

(47) $Im\ (Log(-1+\ i)) =$ ....
(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 $w = \dfrac{z-1}{z+1}$ are ....
(a) $\pm\ i$ (b) i (c) -1 (d) 3

(8) Fixed point of $w = \dfrac{6z-9}{z}$ 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 $x =$ ....
(a) $\dfrac{v}{u^2+v^2}$ (b) $\dfrac{-u}{u^2+v^2}$ **(c)** $\dfrac{u}{u^2+v^2}$ (d) $\dfrac{-v}{u^2+v^2}$

(11) If $z = x + iy, w = u + iv, w = 1/z$ then $y =$ ....
(a) $\dfrac{v}{u^2+v^2}$ (b) $\dfrac{-u}{u^2+v^2}$ (c) $\dfrac{u}{u^2+v^2}$ **(d)** $\dfrac{-v}{u^2+v^2}$

(12) If $z = x + iy, w = u + iv, w = i/z$ then $y =$ ....
(a) $\dfrac{v}{u^2+v^2}$ (b) $\dfrac{-u}{u^2+v^2}$ **(c)** $\dfrac{u}{u^2+v^2}$ (d) $\dfrac{-v}{u^2+v^2}$

(13) If $z = x + iy, w = u + iv, w = i/z$ then $x =$ ....
(a) $\dfrac{v}{u^2+v^2}$ (b) $\dfrac{-u}{u^2+v^2}$ (c) $\dfrac{u}{u^2+v^2}$ (d) $\dfrac{-v}{u^2+v^2}$

(14) If $T(z) = \dfrac{az+b}{cz+d}$, $(ad - bc \neq 0)$.Then $\lim\limits_{z\to\infty} T(z) = \infty$, if $c =$ ....
(a) ∞ (b) i **(c)** 0 (d) 1

(15) If $T(z) = \dfrac{az+b}{cz+d}$, $(ad - bc \neq 0)$.Then $\lim\limits_{z\to\infty} T(z) =$ .... , $if\ c \neq 0$.
(a) a **(b)** a/c (c) c/a (d) c

(16) If $T(z) = \dfrac{az+b}{cz+d}$, $(ad - bc \neq 0)$.Then $\lim\limits_{z\to -d/c} T(z) =$ .... , $if\ c \neq 0$.
(a) ∞ (b) i (c) 2 (d) 0

(17) If $T(z) = \dfrac{az+b}{cz+d}$ then $T^{-1}(z) =$ ....
(a) $\dfrac{-dz+b}{cz+a}$ (b) $\dfrac{dz+b}{cz-a}$ **(c)** $\dfrac{-dz+b}{cz-a}$ (d) $\dfrac{dz-b}{cz-a}$

(18) If $z = x + iy, w = u + iv, w = \sin z$ then $u =$ ....
(a) $sinhx \cos y$ (b) $\sin x sinhy$ (c) $\cos x sinhy$ **(d)** $\sin x coshy$

(19) If $z = x + iy, w = u + iv, w = \sin z$ then $v =$ ....
(a) $sinhx \cos y$ **(b)** $\cos x sinhy$ (c) $\sin x sinhy$ (d) $\sin x coshy$

(20) Image of $0 < y < 2$ under the transformation $w = iz + 1$ is ....
(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 ....
(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 ....
(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 ....
(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 ....
(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 ....
(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 ....
(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 ....
(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 ....
(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 ....
(a) $u < 0$ (b) $u > 0$ (c) $v < 0$ **(d)** $v > 0$

(30) Image of $y > 0$ under the transformation $w = i/z$ is ....
(a) $u < 0$ **(b)** $u > 0$ (c) $v < 0$ (d) $v > 0$