IAT @ M4 questions

2 marks

1) If f(z)=u+iv is analytic then
   a) Only u is harmonic.
   b) Only v is harmonic. CO1 L2 ANS C
   c) Both u and v are harmonic.
   d) None of the above.
2) If f(z)=u+iv then which of the following is true
   a) If f(z) is analytic then u and v are orthogonal.
   b) If u and v are orthogonal then f(z) is analytic. CO1 L2 ANS A
   c) Both a and b are true.
   d) None of the above.
3) If a transformation is conformal then
   a) Only magnitude of the angle is preserved.
   b) Always we get the same image in both z and w plane under any given function.
   c) Both magnitude and sense are preserved under the transformation.
   d) All transformations are conformal.

   CO2 L1 ANS C

4) Y=-c (a constant) under the transformation $w = z^2$transformed in to
   a) A parabola symmetrical about imaginary axis.
   b) A parabola symmetrical about real axis with vertex $(-c^2, o)$
   c) A parabola symmetrical about real axis with vertex (c^2, o)
   d) A circle with center as origin.
   CO2 L3 ANS B

5) *The straight line parallel to y axis in the z-plane maps onto a circle with center origin and radius r in w-plane under the transformation.*
   a) $w = z^2$
   b) $w = e^z$
   c) $w = z + \frac{1}{z}$
   d) None of the above.
   CO2 L3 ANS B
6) *A circle with center zero and radius r mapped in to what under the transformation*$w = z + \frac{1}{z}$
   a) Ellipse with foci (c^2, o)
   b) Ellipse with foci $(\pm 2\ , o)$
   c) Hyperbola with foci $(\pm 2\ , o)$
   d) None of the above.
   CO2 L3 ANS B
7) *A circle with center zero and radius r mapped in to what under the transformation*$w = z^2$
   a) A circle with center at a and radius r
   b) A circle with center at 0 and radius r
   c) A circle with center at 0 and radius r^2
   d) A parabola.
   CO2 L3 ANS C

8) *The straight-line y=c in the z-plane maps onto a straight line passing through origin in w-plane under the transformation.*

a) $w = z^2$

b) $w = e^z$

c) $w = z + \frac{1}{z}$CO2 L3 ANS B

d)None of the above.

9) *The harmonic property in polar form is*

a) $u_{xx} + u_{yy} = 0$

b) $u_{rr} + u_{\sigma\sigma} = 0$

*c) Both a and b are correct.*CO2 L1 ANS D

d) None of the above

10) *Which of the following is false if* $w = \frac{az+b}{cz+d}$*?*

a) Bilinear transformations are conformal if $ad - bc \neq o$.

b) Bilinear transformations are not conformal if $ad - bc \neq o$.

c) Bilinear transformation is called as Mobius transformation.

d) In $w = \frac{az+b}{cz+d}$ *here a,b,c,d are all real or complex constants*CO2 L1 ANS B

3-mark questions

11) *If* $\emptyset = u^2 + v^2$ *and f(z)=u+iv is analytic then* $\emptyset_{xx} + \emptyset_{yy} =$

a) 0

b) $|f'(z)|^2$

c) $4|f'(z)|^2$CO2 L3 ANS C

d) None of the above.

12) *If* $u = y + e^x cosy$ *is harmonic then the harmonic conjugate is*

a) $c + e^x cosy$

b) $c + e^x cosy + x$

c) $c + e^x siny - x$CO2 L3 ANS C

d) $c - e^x cosy - x$

13) $u = \frac{\cos 2\sigma}{r^2}, r \neq 0$ *is*

a) U is Harmonic.

*b) U is not harmonic.*CO2 L3 ANS A

c) can't conclude since v is not given.

d) None of the above

14) *when* $w = \frac{1+iz}{1-iz}$ *under this Bilinear Transformation what is the image of* $|z| < 1$.

a) u=0

b) $u < 0$

c) $u > 0$CO2 L3 ANS C

d)None of the above

15)*Find the Bilinear Transformation which maps the points 0,1,* ∞ *onto the points* $-5,-1,3$ *respectively*.

a) $w = \frac{3z+2}{z+1}$

b) $w = \frac{3z-5}{z+1}$ CO2 L3 ANS B

c) $w = \frac{3z}{z+1}$

d) $w = \frac{3z-1}{z-2}$

16)If the Bilinear Transformation is $w=\frac{1-z}{z+1}$ what are the invariant points

a) $-1\pm\sqrt{2}$ b) $-2\pm\sqrt{2}$ c) $-1\pm\sqrt{3}$ d) $-2\pm\sqrt{3}$ CO2 L3 ANS A

17) Evaluate $I=\int_0^{2+i}(\bar{z})^2 dz$ along the straight Line $y=x/2$

a) $I=\frac{5}{3}(2+i)$ b) $I=\frac{5}{3}(2-i)$ c) $I=\frac{5}{3}(2-2i)$ d) $I=\frac{5}{3}(2+2i)$ CO2 L3 ANS B

18)Evaluate $\int_C |z|^2 dz$ where c is the line joiningthe points (1,1) to (0,1)

a) $\frac{2}{4}$ b) $-\frac{4}{3}$ c) $-\frac{4i}{3}$ d) $\frac{4}{3}$ CO2 L3 ANS B

19)Evaluate $\int_C (z-z^2)$dz where 'c' is the upper half of the $|z|=1$ where the angle increasing from 0 to π

a) $\frac{4}{3}$ b) $-\frac{2}{3}$ c) $\frac{2}{3}$ d) none of the above.

CO2 L3 ANS C

20)Evaluate $\int_C |z|$ dz in the following case where 'c' is the Left half of the circle $|z|=1$ from $-i$ to i

a) 2i b) 2c) -2i d) none of the above. CO2 L3 ANS A

IAT @ M4 Scheme of evaluation

2 marks

1) If f(z)=u+iv is analytic then CO1 L2 ANS C

Both u and v are harmonic.

2) If f(z)=u+iv then which of the following is true
   If f(z) is analytic then u and v are orthogonal.CO1 L2 ANS A
3) If a transformation is conformal then

   Both magnitude and sense are preserved under the transformationCO2 L1 ANS C

4) Y=-c (a constant) under the transformation $w = z^2$transformed in to
   A parabola symmetrical about real axis with vertex $(-c^2, o)$
   CO2 L3 ANS B

5) *The straight line parallel to y axis in the z-plane maps onto a circle with center origin and radius r in w-plane under the transformation.*
   $$w = e^z$$
   CO2 L3 ANS B
6) *A circle with center zero and radius r mapped in to what under the transformation* $w = z + \frac{1}{z}$
   Ellipse with foci $(\pm 2\ , o)$
   CO2 L3 ANS B
7) *A circle with center zero and radius r mapped in to what under the transformation* $w = z^2$
   A circle with center at 0 and radius r^2CO2 L3 ANS C

8) *The straight-line y=c in the z-plane maps onto a straight line passing through origin in w-plane under the transformation.*
   $$w = e^z$$
   CO2 L3 ANS B
9) *The harmonic property in polar form is*
   None of the above

   CO1L1 ANS D
10) *Which of the following is falseif* $w = \frac{az+b}{cz+d}$*?*

Bilinear transformations are not conformal if $ad - bc \neq o$CO2 L1 ANS B

3-mark questions

11) If $\emptyset = u^2 + v^2$ *and f(z)=u+iv is analytic then* $\emptyset_{xx} + \emptyset_{yy} =$
$4|f'(z)|^2$CO1L3 ANS C

12) If $u = y + e^x cosy$ *is harmonic then the harmonic conjugate is*
$c + e^x siny - x$CO1L3 ANS C

13) $u = \frac{\cos 2\sigma}{r^2}, r \neq 0$ *is*
U is Harmonic.
.CO1 L3 ANS A

14) when $w = \dfrac{1+iz}{1-iz}$ *under this Bilinear Transformation what is the image of* $|z|<1$.

$u>0$ CO2 L3 ANS C

15)Find the Bilinear Transformation which maps the points 0,1, ∞
onto the points $-5,-1,3$ *respectively*.

$w = \frac{3z-5}{z+1}$ CO2 L3 ANS B

16)If the Bilinear Transformation is $w = \dfrac{1-z}{z+1}$ what are the invariant points

a) $-1\pm\sqrt{2}$ CO2 L3 ANS A

17) Evaluate$I = \int_0^{2+i}(\bar{z})^2 dz$along the straight Line $y = x/2$

b) $I = \dfrac{5}{3}(2-i)$ CO2 L3 ANS B

18)Evaluate $\int_C |z|^2 dz$ where c is the line joiningthe points (1,1) to (0,1)

b) $-\dfrac{4}{3}$ CO2 L3 ANS B

19)Evaluate $\int_C (z-z^2)\,dz$ where 'c' is the upper half of the $|z|=1$ where the angle increasing from 0 to π

c) $\dfrac{2}{3}$

CO2 L3 ANS C

20)Evaluate $\int_C |z|\,dz$ in the following case where 'c' is the Left half of the circle $|z|=1$ from $-i$ to i

a) 2i CO2 L3 ANS A