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CMR Institute of Technology, Bangalore
DEPARTMENT OF MECHANICAL ENGINEERING
II - INTERNAL ASSESSMENT

Semester: 4-CBCS 2018
Subject: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS (18MAT41)
Faculty: Ms Girisha . A

Date: 22 Jun 2021
Time: 09:00 AM - 10:00 AM
Max Marks: 50

Instructions to Students :

Attempt all questions

PART A

Answer All Questions

Q.No		Marks	CO	PO	BT/CL
1	Choose the correct option. If f(z)= u+iv is analytic then a) Only u is harmonic. b) Only v is harmonic. c) Both u and v are harmonic. d) None of the above.	2	CO1	PO1	L2
2	Choose the correct option. 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. c) Both a and b are true. d) None of the above.	2	CO1	PO1	L2
3	Choose the correct option. 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.	2	CO2	PO1	L1
4	Choose the correct option. 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.	2	CO2	PO2	L3
5	Choose the correct option. *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.*	2	CO2	PO2	L3
6	Choose the correct option. *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.*	2	CO2	PO2	L3
7	Choose the correct option. *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.*	2	CO2	PO2	L3
8	Choose the correct option. *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)*$w = z + \frac{1}{z}$ *d)None of the above.*	2	CO2	PO2	L3

9	Choose the correct option. *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.* *d) None of the above*	2	CO1	PO1	L1
10	Choose the correct option. *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*	2	CO2	PO2	L1

PART B

Answer All Questions

Q.No		Marks	CO	PO	BT/CL
11	Choose the correct option. *If* $\emptyset = u^2 + v^2$ *and f(z)=u+iv is analytic then* $\emptyset_{xx} + \emptyset_{yy} =$ *a)* 0 *b)* $\lvert f'(z)\rvert^2$ *c)* $4\lvert f'(z)\rvert^2$ *d) None of the above.*	3	CO1	PO2	L3
12	Choose the correct option. *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)* $c + e^x siny - x$ *d)* $c - e^x cosy - x$	3	CO1	PO2	L3
13	Choose the correct option. $u = \frac{\cos 2\sigma}{r^2}, r \neq 0$ *is* *a) U is Harmonic.* *b) U is not harmonic.* *c) can't conclude since v is not given.* *d) None of the above*	3	CO1	PO2	L3
14	Choose the correct option. *when* $w = \frac{1+iz}{1-iz}$ *under this Bilinear Transformation what is the image of* $\lvert z\rvert < 1$. *a) u=0* *b)* $u < 0$ *c)* $u > 0$ *d)None of the above*	3	CO2	PO2	L3
15	Choose the correct option. *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) $w = \frac{3z-5}{z+1}$ c) $w = \frac{3z}{z+1}$ d) $w = \frac{3z-1}{z-2}$	3	CO2	PO2	L3
16	Choose the correct option. 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) $-2 \pm \sqrt{3}$	3	CO2	PO2	L3
17	Choose the correct option. 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) $I = \frac{5}{3}(2+2i)$	3	CO2	PO2	L3

18	Choose the correct option. Evaluate $\int_C \lvert z\rvert^2 dz$ where c is the line joining the points (1,1) to (0,1) a) $\frac{2}{4}$ b) $-\frac{4}{3}$ c) $-\frac{4i}{3}$ d) $\frac{4}{3}$	3	CO2	PO2	L3
19	Choose the correct option. Evaluate $\int_C (z - z^2)$dz where 'c' is the upper half of the $\lvert z\rvert = 1$ 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.	3	CO2	PO2	L3
20	Choose the correct option. Evaluate $\int_C \lvert z\rvert$ dz in the following case where 'c' is the Left half of the circle $\lvert z\rvert = 1$ from $-i$ to i a) 2i b) 2 c) -2i d) none of the above.	3	CO2	PO2	L3