18MAB102T-Surprise Test 4-July 10

* Required

Answer ALL Questions

Each question carries ONE mark.

1 *

Cauchy – Riemann equations in Cartesian co-ordinates are	
(A) $u_x = v_y, u_y = -v_x$	(B) $u_x = -v_y, u_y = v_x$
(C) $u_x = v_y, u_y = v_x$	(D) $u_x = -v_y, u_y = -v_x$

- (●) A
- ( ) B
- ( ) C
- ( ) D

2 *

If a function $u(x,y)$ satisfies the equation $u_{xx} + u_{yy} = 0$, then u is called	
(A) analytic function	(B) harmonic function
(C) differential function	(D) continuous function

- ( ) A
- (●) B
- ( ) C
- ( ) D

3 *

An analytic function with constant imaginary part is	
(A) analytic	(B) zero
(C) harmonic	(D) constant

- ○ A
- ○ B
- ○ C
- ◉ D

4 *

If $w = f(z) = u + iv$ is analytic, then the family of curves $u = C_1$ and $v = C_2$ where C_1 and C_2 are constants	
(A) intersect each other	(B) cut orthogonally
(C) are parallel	(D) coincide

- ○ A
- ◉ B
- ○ C
- ○ D

5 *

If $w = f(z) = u + iv$ is an analytic function, then

(A) $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$

(B) $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f'(z)|^2 = 4|f(z)|^2$

(C) $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f'(z)| = 2|f(z)|$

(D) $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 2|f'(z)|^2$

- (●) A
- ( ) B
- ( ) C
- ( ) D

6 *

If the image of a point z under the transformation $w = f(z)$ is itself, then the point is called

(A) critical point (B) fixed point

(C) singular point (D) regular point

- ( ) A
- (●) B
- ( ) C
- ( ) D

7 *

The critical point of the transformation $w = z^2$ is	
(A) $z = 0$	(B) $z = -i$
(C) $z = 1$	(D) $z = -1$

- (●) A
- ( ) B
- ( ) C
- ( ) D

8 *

A transformation that preserves angles between every pair of curves through a point only in magnitude, but not in direction is said to be _____ at that point.	
(A) conformal	(B) isogonal
(C) regular	(D) formal

- ( ) A
- (●) B
- ( ) C
- ( ) D

9 *

The transformation $w = a\,z$, where a is a real constant represents

(A) magnification (B) rotation

(C) reflection (D) inversion

- (●) A
- ( ) B
- ( ) C
- ( ) D

10 *

The condition for the transformation $w = \frac{az+b}{cz+d}$ where a, b, c, d are complex constants to be bilinear is

(A) $ad - bc = 0$ (B) $ad - bc \neq 0$

(C) $ad - bc < 0$ (D) $ad - bc > 0$

- ( ) A
- (●) B
- ( ) C
- ( ) D

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