Reg. No.: .....

Name : .....

Sixth Semester B.Sc. Degree (CBCSS - OBE - Regular/Supplementary/ Improvement) Examination, April 2025

(2019 to 2022 Admissions) CORE COURSE IN MATHEMATICS 6B11MAT : Complex Analysis

Time: 3 Hours

Max. Marks: 48

PART - A

Answer any 4 questions. Each question carries 1 mark. Define a region in complex plane.

- 2. Evaluate  $\oint e^z dz$  where C is the unit circle in counter clockwise direction.
- State ML inequality for a complex function f(z).
- 4. What do you mean by singular point of a complex function ?
- PART B
- Answer any 8 questions. Each question carries 2 marks.

Define residue of a function f(z) at a singular point z<sub>0</sub>.

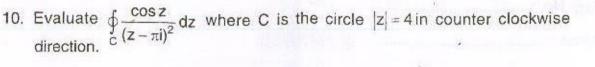
 $(4 \times 1 = 4)$ 

6. What do you mean by complex continuous function? Give an example.

- 7. Show that  $w = e^z$  is analytic everywhere.
- 8. Solve the equation  $\cos z = 5$ .
- Evaluate ∮ z̄dz where C is the unit circle in clockwise direction.

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- Explain the idea of convergence of complex sequences. Give an example for a convergent complex sequence.
- Prove that every absolutely convergent series is convergent. Discuss the convergence of
- $\sum_{n=0}^{\infty} \frac{(100 + 75i)^n}{n!} \cdot$

14. Find the radius of convergence of the power series 
$$\sum_{n=0}^{\infty} \frac{(2n)!}{(n!)^2} (z-3i)^n.$$

function.

Prove that the zeros of a non-zero analytic function f(z) are isolated.

the negative real axis. Also find its derivative.

State Laurent's theorem for a complex function f(z).

Answer any 4 questions. Each question carries 4 marks.

18. Prove that the function w = In z analytic everywhere except at zero and on

17. Prove that an analytic function whose absolute value is a constant, is a constant

19. Evaluate  $\int (z-z_0)^m dz$  where C is a circle with center at  $z_0$  and radius r in counter clockwise direction.

Discuss the convergence of geometric series. 22. Find all the power series expansions of  $\frac{1}{1-7}$  with center 0.

of f(z) is independent of path in D.

to be analytic at a point zn-

State and prove Cauchy's integral formula.

 $(4 \times 4 = 16)$ 

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23. Integrate  $f(z) = \frac{\sin z}{z^4}$  counter clockwise around the unit circle. Answer any 2 questions. Each question carries 6 marks.

24. State and prove the necessary condition for a function f(z) = u(x, y) + iv(x, y)

20. If f(z) is analytic in a simply connected domain D, then prove that the integral

- 26. Find the Taylor's series for the function  $f(z) = \frac{2z^2 + 9z + 5}{z^3 + z^2 8z 12}$  at the point z = 1
- 27. Find all Taylor and Laurent series of  $f(z) = \frac{-2z+3}{z^2-3z+2}$  with center 0. (2×6=12)