19001688

19001688

Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2019

Second Semester

Faculty of Science

Branch I (A)—Mathematics

MT 02 C08—ADVANCED COMPLEX ANALYSIS

(2012 Admission onwards)

Time : Three Hours

Maximum Weight : 30

Part A

Answer any **five** *questions.*
Each question has weight 1.

1. Write down the development of e^z. Deduce the developments of cos z and sin z.

2. Find the circle of convergence of $\sum \frac{1}{n^p} z^n$.

3. Define Zeta function. What do you know about its number of zeros ?

4. Define totally bounded set with an example.

5. Give an example of a subharmonic function which is not harmonic. Justify.

6. State the Schwarz-Christoffel formula.

7. Explain "Permanence of functional relations".

8. Define automorphic function and modular function.

(5 × 1 = 5)

Part B

Answer any **five** *questions.*
Each question has weight 2.

9. State and prove Hurwitz theorem.

10. State and prove Abel's limit theorem.

Turn over

11. State Hadamard's theorem. Use it to show that an entire function of fractional order assumes every finite value infinitely many times.

12. Explain the concepts of equicontinuous and normal families. Also state Arzela's theorem.

13. State the Schwarz-Christoffel formula. Also state another version of it.

14. Discuss the Dirichlet problem and its solution.

15. Obtain the differential equation satisfied by the $\mathcal{P}$-function.

16. Explain the period module. Also state the theorem to determine the canonical basis.

(5 × 2 = 10)

Part C

Answer any **three** *questions.*
Each question has weight 5.

17. Obtain the Laurent series expansion of an analytic function and establish its uniqueness.

18. Characterise (i) A normal family ; (ii) Totally bounded family of function.

19. State and prove the Riemann mapping theorem.

20. Characterise a subharmonic function and establish its properties.

21. (i) Show that any *two* bases of the same module are connected by a unimodular transformation.

    (ii) Determine all discrete modules.

22. Discuss the Weierstrass theory of analytic continuation. Further explain "Sheaf".

(3 × 5 = 15)