C 23368 (Pages : 2) Name.....

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE [REGULAR/SUPPLEMENTARY] EXAMINATION, APRIL 2022

(CBCSS)

Physics

PHY 2C 06—MATHEMATICAL PHYSICS—II

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

(8 short questions answerable within 7.5 minutes)
(Answer all questions, each question carries weightage 1.

1. How can a function $f(z)$ be expanded where $f(z)$ is singular ? Briefly explain.
2. Show that three cube roots of unity form an abelian group under multiplication.
3. Discuss about the generators of the SU (2) group.
4. Using the variation principle discuss the problem on curve of shortest length connecting two points in a plane.
5. Explain the role of Lagrange Multipliers.
6. Define an integral equation and explain its significance.
7. Explain the symmetry property of Dirac-delta function.
8. State and provide proof of Cauchy's integral formula.

(8 × 1 = 8 weightage)

Turn over

Section B

(4 essay questions answerable within 30 minutes)

Answer any **two** *questions, each question carries weightage 5.*

9. Obtain the solution to the Poisson's equation using Green's function.

10. Show that a twofold homomorphism exists between the group of 2 × 2 unitary matrices and (3) group.

11. Explain the Rayleigh-Ritz variation technique for the computation of approximate solu partial differentiation equations.

12. Deduce the Cauchy-Reimann condition for a function to be analytic.

(2 × 5 = 10 wei

Section C

(7 problems answerable within 15 minutes)

(Answer any **four** *questions, each carry Weightage 3)*

13. Find Laurent series of function $f(z)=\dfrac{1}{(1-z^2)}$ with centre at $z = 1$.

14. Construct the group multiplication table for the Vierrer group.

15. Find the residues of $f(z)=\dfrac{ze^z}{(z=a)^3}$ at $z = a$.

16. Obtain the eigen functions for Green's function.

17. Find the extremals of the functional $\int_{x_0}^{x_1}\dfrac{y'^2}{x^3}\,dx$.

18. Prove that the inverse of the product of two elements of a group is the product of the in reverse order.

19. Solve the integral equation $s=\int_0^s e^{s-t}\,g(t)\,dt$.

(4 × 3 = 12 we