C 63095 (Pages : 2) Name..............................

Reg. No..............................

5C

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, JUNE 2014

(CUCSS)

Physics

PHY 2C 06—MATHEMATICAL PHYSICS—II

(2012 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Section A

Answer **all** *questions.*
Each question carries weightage of 1.

1. What are the Cauchy — Riemann Conditions for analyticity ?
2. What is meant by continuity of a function ?
3. Find the poles of the function $f(z) = \tan z$.
4. What are Co sets of a group ?
5. Prove Lagrange's theorem regarding the order of a group and that of its sub group.
6. What are the properties of Lie group ?
7. State Hamilton's principle.
8. What is meant by transversality condition ?
9. Explain the concept of variance.
10. Prove the symmetric property of Green's function.
11. What is the advantages of using Green's function technique in solving boundary value problems.
12. Define integral equation.

(12 × 1 = 12 weightage)

Section B

Answer any **two** *questions.*
Each question carries a weightage of 6.

13. State and prove Cauchy residue theorem. Find the residue at the poles of

$$f(z) = \frac{e^z}{z^2 + a^2}.$$

14. Explain homomorphism of the groups SU(2) and SU(3).

Turn over

15. Formulate the Green's function for Sturm —Liouvelle differential operator in one dimens

16. Apply the Rayleigh–Ritz variation Principle for the computation of Eigenvalues and Eigenfu of the ground state of Helium atom.

(2 × 6 = 12 weig

Section C

Answer any **four** *questions.*
Each question carries 3 weightage.

17. Find the analytic function whose imaginary part is V = – Cos X Sin hy

18. Integrating over a suitable contour evaluate $\int_0^{2\pi} \frac{d\theta}{a+b\sin\theta}$

19. Show that the matrices $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ form a group.

20. Apply Euler equation to find the shortest distance between two points in Euclidean space.

21. Find the integral equation corresponding to the boundary value problem

$Y''(x) + \lambda Y(x) = 0,\ Y(0) = Y(1) = 0.$

22. Determine the Green's function in terms of the Eigenvalues and Eigenfunctions of operator the differential equation $\frac{d^2\psi}{dx^2} = f(x)$ $0 \le x \le \lambda$ with the boundary condition $\psi(0) = 0 = \psi$

(4 × 3 = 12 weight