

20P208

(Pages: 2)

Name.....

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2021

(CUCSS - PG)

(Regular/Supplementary/Improvement)

CC19P PHY2 C06 - MATHEMATICAL PHYSICS - II

(Physics)

(2019 Admission onwards)

Time: Three Hours

Maximum: 30 Weightage

Section A

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

1. Define z plane and w plane. Establish a relation between both.
2. Explain Cauchy principal value.
3. Discuss the conditions that define a group.
4. Describe the significance of SU(3) flavour symmetry.
5. Show that centrifugal force is a real force using equation of motion of a moving particle in circular cylindrical coordinate system.
6. Explain the importance and need of integral equations.
7. Explain the separable kernel method for solving integral equations.
8. Derive the eigen function expansion of Green's function.

(8 × 1 = 8 Weightage)

Section B

Answer any *two* questions. Each question carries 5 weightage.

9. Explain contour integral and discuss different Cauchy's integral theorems.
10. Discuss the properties of generators of continuous groups and derive the generators of SU(2) and SO(3).
11. Derive the Euler equation with constraints and discuss any two applications.
12. Derive the Green's function integral solution of differential equations and explain the eigen value and eigen function equations.

(2 × 5 = 10 Weightage)

Section C

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

13. Find the Laurent series expansion of $f(z) = [z(z-1)]^{-1}$.
14. Show that every subgroup of a cyclic group is cyclic.

15. Form the group multiplication table from the rotation symmetry operations of an equilateral triangle.

16. Using Euler equation find the extremals for the following functional

$$\int_a^b x + y(x)^2 + 3 \left(\frac{\partial y(x)}{\partial x} \right) dx$$

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

$$y''(x) - 3y'(x) + 2y(x) = 5\sin x, \quad y(0) = 1, \quad y'(0) = -2$$

18. Using Laplace transform, solve the integral equation

$$y(x) = x - \int_0^x (x-t)y(t) dt$$

19. Find the Green's function for

$$Ly(x) = \frac{d^2y(x)}{dx^2} + y(x) \quad \begin{cases} y(0) = 0 \\ y'(1) = 0 \end{cases}$$

(4 × 3 = 12 Weightage)
