# M.Sc.DEGREE EXAMINATION,APRIL 2020
## I Year I Semester
## Mathematical Physics

**Time : 3 Hours** **Max.marks :75**

### Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Check whether the following vectors are linearly dependent or independent (1,2,-3),(2,5,1),(-1,1,4)
2. What is Inner product?
3. State Cayley - Hamilton theorem?
4. Write the Hermite differential equation.
5. Define analytic function.
6. Find the poles of the function $\frac{z}{cosz}$.
7. What are single and multivalued functions?
8. Find the sine transform of $e^{ax}$.
9. What is homomorphism?
10. What is a cyclic group?
11. Find the Laplace transform of sin(t).
12. What is isomorphism.

### Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Derive eigenfunction expansion of Green's function.
14. Derive orthogonality of eigenfunction with Legendre polynomial.
15. Determine the analytic function f(z) = u+iv where v=6xy-5x+3 express the result as a function of z.
16. Find the Laplace transform of $t^2 cosat$.
17. Explain the construction of $C_{2V}$ character table.
18. Show that the function $e^x(cosy + isny)$ in an analytic function, find its derivative.
19. Derive schur's lemma I & II.

## **Section C** $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Derive Gram Schmidt's orthogonalization process.
21. Derive one dimensional green's function.
22. Apply calculus of residues to show that:
    $\int_0^{2\pi} \frac{d\theta}{a + bcos\theta} = \frac{2\pi}{\sqrt{a^2 - b^2}}$ a $> b > 0$.
23. Fine the Fourier size transform of $f(x) = \frac{e^{-ax}}{x}$.
24. Explain Great orthogonality theorem in group theory.

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