SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)

Chromepet, Chennai — 600 044.

M.Sc. - END SEMESTER EXAMINATIONS APRIL - 2022

SEMESTER - I

08PPHCT1001 - Mathematical Physics

Total Duration : 3 Hrs.   **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks$)$

1. Show that the vectors (1,2,-3),(1,3,-2)and (2,-1,5) are linearly independent

2. Prove that $P_2m(0) = (-1)^m \dfrac{2m!}{2^{2m}2m!^2}$

3. Determine the analytic function whose real part is x^3-$3xy^2$+$3x^2$+1

4. Find the fourier series of the function ex in the interval -π<x>π.

5. Explain the construction of C_{4V} character table

6. S.T. (i) $H_2n(0) = (-1)\dfrac{n^{2n!}}{n!}$ (ii) $H_{2n+1}(0) = 0$

7. Find the residue of $\dfrac{Ze^{iz}}{a^4 + z^4}$ at its poles

8. Find the Laplace transform of the sawtooth wave function $f(t) = \dfrac{at}{T}$ $0 < t > T$ and f(t+T)=f(t)

Section B

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks$)$

9. Explain Schmidt orthogonalization method

10. Show that $\displaystyle\int_{-1}^{+1} P_m(x)\, P_n(x)dx = \frac{2}{2n+1}\delta_{mn}$

11. Apply calculus of residues to show that $\displaystyle\int_0^{\infty} \frac{dx}{(x^2 + 1)(x^2 + 4)} = \frac{\pi}{24}$

12. Explain great orthogonality theorem

Part B

Compulsory question $(1 \times 10 = 10$ Marks$)$

13. Show that a periodic function f(x) can be expressed as Fourier series. Derive the expression for coefficients a_0,a_n,b_n

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