	Sanjay Ghodawat University, Kolhapur Established as State Private University under Govt. of Maharashtra. Act No XL, 2017	**2020-21** EXM/P/09/00

M.Sc. I	**School of Science**	**Department: Physics**
PHS 507	**Mathematical Methods in Physics**	**Semester : I**
	End Semester Examination	**Time:2 Hrs.** **Max Marks:50**

Instructions: 1) All Questions are compulsory.

		Marks	Bloom's Level	CO
Q.1	**Answer / Solve the following**			
a)	Find the nth order derivative using Cauchy integral formula.	8	L1	CO1
b)	Derive the Cauchy's Residue Theorem.	8	L2	CO2
	OR			
b)	Using Cauchy Residue Theorem solve the following $\int_{-\infty}^{\infty} \frac{x}{(z^2+a^2)(z^2+b^2)}$.	8	L2	CO2
Q.2	**Answer / Solve the following**			
a)	Find Fourier Series of $f(x) = x^2 \quad -\pi < x < \pi$.	8	L3	CO3
b)	Derive the sine and cosine series of Fourier function.	8	L3	CO3
	OR			
b)	Obtain the Fourier integral for even function.	8	L3	CO3
Q.3	**Answer / Solve the following**			
a)	Using Generating function for Hermite Polynomial $H_n\ (x)$, show that: i) $\frac{1}{e}\cosh 2x = \sum_{n=0}^{\infty} \frac{1}{(2n)!} H_{2n}(x)$. ii)$e \sin 2x = \sum_n (-1)^n \frac{H_{2n+1}(x)}{(2n+1)!}$.	9	L2	CO4
b)	Give solution of Schrodinger Equation for One-Dimensional Linear Harmonic Oscillator using Hermite Polynomial.	9	L4	CO4

OR

b)	Using Bessel's Differential function deduce the equation for first and second choice of k.	9	L4	CO4

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