Mid-West University

Examinations Management Office

Final Examinations-2079

Master level/M.Sc. Physics /2nd Semester — Full Marks: 37.50

Time: 3 hours — Pass Marks: 18.75

Subject: Mathematical Physics (PHY551)

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

1. Define analytic function. State and prove necessary and sufficient conditions for the Cauchy-Riemann condition of analyticity. Also, express the Cauchy-Riemann equation in polar form. **[10]**

OR

a) Find the Laurent series expansion of f(z) analytic function. **[5]**

b) Define the singularity of a function. Describe various types of singularities. **[5]**

2. What do you mean by Normal distribution? Find the moment-generating function of Normal distribution. Also, find the mean and variance of Normal distribution using the moment generating function. A data from an experiment is **[10]**

X	1	1.2	1.4	1.6	2	1.8	1.9	2.2	2
t	0	1	2	3	4	5	6	7	8

Find the standard error of data Y. And obtain the linear fit of the plot Y and t.

3. Give the concept of interpolation. Derive the interpolation formula. Also derive the necessary error formula. **[5]**

4. What are integral equations? Define the Neumann series and find the Neuman series of $\emptyset(x) = x + \frac{1}{2}\int_{-1}^{1}(t-x)\emptyset(t)dt$. **[5]**

OR

Transfer the equation $u(x) = x + \int_0^x xyu(y)dy$ into differential equation. Also, discuss Wiener-Hopf technique. **[5]**

5. Integrate by the method of residue $\int_0^\infty \frac{dx}{1+x^3}$ **[5]**

6. Find mean and variance of binomial distribution using moment generating function. **[2.5]**

OR

Derive Simpson's rule for integration. **[2.5]**

THE END