Total No. of Questions : 09

M.Sc (Physics) (Sem.–1) MAHTEMATICAL PHYSICS-I Subject Code : MSPH-411-21 M.Code : 91409 Date of Examination : 23-01-2023

Time: 3 Hrs.

Max. Marks : 60

Total No. of Pages : 02

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

- 1. Write briefly :
 - a) State Cauchy Riemann conditions.
 - b) What is an analytic function?
 - c) Define poles.
 - d) What is a Dirac delta function.
 - e) Find the value of $\Gamma\left(-\frac{3}{2}\right)$
 - f) State Dirichlet boundary conditions.
 - g) Find the value of $\int_0^{\pi/2} \sqrt{\tan\theta} \ d\theta$
 - h) What is a Laguerre function?
 - i) Write two orthogonal relations of Legendre Polynomial.
 - j) Discuss the role of random variables in statistics.

SECTION-B

2. Prove that
$$\Gamma(2m) = 2^{2m-1} \frac{\Gamma(m) \Gamma\left(m + \frac{1}{2}\right)}{\sqrt{\pi}}$$

- 3. Solve the differential equation y'' + 4y = 0, y(0) = -2, $y(2\pi) = -2$.
- 4. State and prove Dirichlet's boundary conditions.
- 5. Obtain the expression for generating function of Bessel polynomial.
- 6. Differentiate between Poisson and Normal distribution.

SECTION-C

7. Let
$$f(z) = \frac{1}{\sin(z)'}$$
 find its poles and residues.

- 8. Prove two recurrence relations of Legendre polynomials.
- 9. Evaluate $\int_0^1 \frac{dx}{\sqrt{1-x^n}}$ in terms of Gamma function.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.