Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

M.Sc (Physics) (Sem.–2)

MATHEMATICAL PHYSICS - II

Subject Code : MSPH-421-21

M.Code : 91902

Date of Examination : 12-12-22

Time : 3 Hrs. **Max. Marks : 60**

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) What is a cyclic group?

b) What do you understand by isomorphism in group theory?

c) '*A coset is not a group'*. Discuss.

d) What are infinite Fourier sines and cosine transforms?

e) Write down Parseval's identity for Fourier series.

f) What are Neumann boundary conditions?

g) Define Quotient rule of tensors.

h) Write two properties of Laplace transform.

i) Define Gibbs phenomenon.

j) State Hilbert-Schmidt theory.

SECTION-B

2. Find the Fourier transform of a Gaussian distribution function $f(x) = Ne^{-\alpha x^2}$ where N and α are constants.

3. Find fourier series of the function e^x in the interval $-\pi < x < \pi$.

4. What are Topological groups and Lie groups? Give examples to explain.

5. State and prove four properties of inverse Laplace transforms.

6. Discuss the importance of Green's function in one dimension.

SECTION-C

7. Obtain Fourier series for the expansion $f(x) = x \sin x$ in the interval $-\pi < x < \pi$. Hence prove that $\frac{\pi}{4} = \frac{1}{2} + \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \ldots\ldots$

8. a) Obtain expressions for a_0, a_n & b_n in Fourier series expansion of a function.

   b) Prove that the Fourier transform of a Gaussian is another Gaussian.

9. a) Prove that symmetric transformation of square form a group.

   b) What are conjugate classes? Discuss the multiplication of two classes.

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.