Reg. No. : .....B6PSPH1609.....

Name : .....Shreya. K.....

Second Semester M.Sc. Degree (Regular/Supplementary/Improvement) Examination, March 2017
PHYSICS
PHY2C07 : Mathematical Physics – II
(2014 Admission Onwards)

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **both** questions (Either **a** or **b**) :

1. a) Explain uniform convergence and absolute convergence

   Show that the series $1/(1 + x^2) - 1/(2 + x^2) + 1/(3 + x^2)$ _____ converges uniformly.

   b) Set up the partial differential equation for transverse vibrations in a stretched string and solve it by the method of separation of variables.

2. a) Derive the convolution theorem of Fourier transforms. Find the Fourier transform of the function defined by $f(x) = 1$ for $|x| < 1$ and $f(x) = 0$ for $|x| > 1$.

   b) Derive Schur's Lemmas. (2×12=24)

SECTION – B

Answer **any four**. **1** mark for Section **a**, **3** marks for Section **b** and **5** marks for Section **c**.

3. a) State binomial theorem.

   b) Give an example for an oscillatory series.

   c) Discuss the convergence of $1 - 1/\sqrt{2} + 1/\sqrt{3} - 1/\sqrt{4} + \ldots$

4. a) Define Green's function.

   b) Prove the symmetry of Green's function.

   c) Obtain the Green's function solution of Poisson's equation.

5. a) Define Laplace' transform.

   b) Explain the change of scale property of Laplace' transform.

   c) Find the Laplace' transform of $t \cos at$.

P.T.O.

6. a) Write down a second order linear P D E.

b) Mention a few contexts in Physics where Laplace' equation occurs.

c) Solve the wave equation in three dimensions by the method of separation of variables.

7. a) Define discrete Fourier transform.

b) What is meant by Fourier cosine transform.

c) If f(s) is the Fourier transform of f(x) show that $F\{f(x) \cos ax\} = 1/2 [f(s + a) + f(s - a)]$.

8. a) What are conjugate classes.

b) Show that the identity element is a class by itself.

c) Prove that a group of prime order is cyclic. **(4×9=36)**

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