



K16P 0427

Reg. No. :

Name :

Second Semester M.Sc. Degree (Regular/Supplementary/Improvement)
Examination, March 2016

(2014 Admn. Onwards)

PHYSICS

PHY 2C07 : Mathematical Physics – II

Time : 3 Hours

Max. Marks : 60

SECTION – A

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

(2×12=24)

1. a) Explain Raabe's test and Cauchy's root test for convergence. Test for convergence of $\sum n^3 / 3^n$ by Cauchy's method.
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 first shifting and change of scale properties of Laplace transforms. Find $L(e^{at} \sin bt)$.
b) What are reducible and irreducible representations ? Show that every representation of a group is equivalent to a unitary representation.

SECTION – B

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

(4×9=36)

3. a) What is meant by uniform convergence of a series ?
b) What is the Leibniz criterion for convergence of an alternating series ?
c) Discuss the convergence of $1 - 1/\sqrt{2} + 1/\sqrt{3} - 1/\sqrt{4} + \dots$
4. a) Define Green's function.
b) Prove that symmetry of Green's function.
c) Obtain the eigen function expansion of Green's function.

P.T.O.

5. a) What is the Kernel of Laplace' transform ?
b) If $f(s)$ is the transform of $f(t)$ show that $L \{f'(t)\} = s f(s) - f(0)$.
c) Find the inverse Laplace' transform of $(s^2 + 3s + 4)/s^3$.
6. a) Write down a second order non linear PDE.
b) Give an example for a boundary value problem.
c) Solve Laplace' equation in polar coordinates r and θ .
7. a) Define discrete Fourier transform.
b) What is the role of Fourier transform in DSP ?
c) Find the Fourier transform of $f(x) = \exp(-a^2x^2)$, $a > 0$.
8. a) What are conjugate elements of a group ?
b) Explain homomorphism.
c) Show that the groups $SU(2)$ and $SO(3)$ are homomorphic.
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