

Roll No. .

Total No. of Questions : 05]

[Total No. of Printed Pages : 03

RJ-111

B.Sc.-B.Ed. (Secondary) Examination, 2024

(First Semester)

PHYSICS

Mathematical Physics-I

DC-I

Time : 3 Hours]

[Maximum Marks : 60

Note : Attempt all questions. Each question is provided with internal choice and carries equal marks.

1. (a) What is meant by gradient of a scalar field ? Derive its expression in terms of the operator $\vec{\nabla}$.
- (b) Define divergence of a vector field. Obtain its value in Cartesian coordinates and prove that $\text{div } \vec{A} = \vec{\nabla} \cdot \vec{A}$. Where $\vec{\nabla}$ is a vector operator.

(3-M24-50/19) N-RJ-111

P.T.O.

Or

- (a) Explain the meaning of scalar field and vector field. Give examples of each field. How are they graphically represented ?
 - (b) Explain the meaning of curl of a vector field. Write its significance. Show that curl of a conservative force field is zero.
2. (a) What do you mean by first order ODE equations ? Explain with examples.
 - (b) Explain separable ODE's with example.

Or

- (a) What do you mean by exact ODEs ? Write its applications in physics. <https://www.onlinebu.com>
 - (b) Explain linear ODE's with examples.
3. (a) Explain second-order linear ODEs with constant coefficients.
 - (b) Write application of second order ODE's for spring mass system.

N-RJ-111

2

Or

- (a) Explain Homogeneous and non-homogeneous equations in detail.
- (b) Write application of second order ODE's for pendulum.

4. Write short notes on the following :

- (a) Bessel Functions
- (b) Legendre Functions.

Or

Write short notes on the following :

- (a) Applications of Fourier series in physics
- (b) Rodriques representation.

5. Write short notes on any two of the following :

- (i) Basic theorem of Laplace transform
- (ii) Fourier transform-inverse theorem
- (iii) Integral Transforms
- (iv) Application of Fourier and Laplace transform in physics.