KATHMANDU UNIVERSITY
First In-semester Examination
2025

Level : B.E.(CE)
Year : I
Time : 50

Course : PHYS 102
Semester : II
F. M : 11

SECTION "B"
2Q × 3 = 6marks

1. State and prove Gauss's law of electrostatic and hence show that $\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0}$.

OR

Define divergence of a vector. Show that divergence of curl of a vector function always equals to zero.

2. Find the electric potential inside and outside of a spherical shell of radius R which carries a uniform surface charge density σ.

SECTION "C"
1Q × 5 = 5marks

3. Derive the electric potential at any point due to a short in term of Cartesian and polar coordinate. Obtain the expresson for magnitude of electric using the expressions of both potentials seperately.

OR

Derive an expression for work done to assemble a system of charge and hence obtain the expression for energy density in an electric field as $\frac{\varepsilon_0}{2} E^2$.