

KATHMANDU UNIVERSITY

First Internal Examination

2024

Level : UNG (GE)

Year : 1

Time : 50 mins.

Course : PHYS 102

Semester: II

F. M. : 15

SECTION "B"

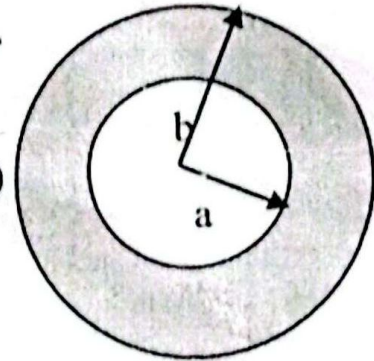
[2 Q × 2.5 = 5 marks]

1. If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ is the position vector. Find the value of $\nabla(r^n)$.

OR

Let $\vec{F}_1 = x^2\hat{k}$ and $\vec{F}_2 = x\hat{i} + y\hat{j} + z\hat{k}$. Calculate the divergence and curl of \vec{F}_1 and \vec{F}_2 . Which one can be written as gradient of scalar and curl of a vector?

2. A metal sphere of radius a carries a charge Q . It is surrounded, out to radius b , by linear dielectric material of permittivity ϵ . Find the potential at the center (relative to infinity)



SECTION "C"

[2 Q × 5 = 10 marks]

3. What is Polarisation? Develop an expression for the electric field at the center of a spherical cavity inside a polarized dielectric due to the charges on the wall of the cavity
4. Find the electric field a distance z above the center of a uniformly charged circular loop of radius r . Use the result to find the electric field a distance z above the of a uniformly charged circular disc of radius R and charge density σ ,

OR

Define electric potential energy. Find the energy in a uniformly charged solid sphere of radius R and charge q .

