NATIONAL INSTITUTE OF TECHNOLOGY

Department of Physics

B. Tech. Minor I Examination, Session 2017

Semester I
Phy101

Max. Marks: 30

Time 1.5 hours

Note: Attempt ~~any~~ all three.

1. (a) How do the components of vector transform under a rotation of coordinates. Obtain the two dimensional rotation matrix. (b) Generalize the result to three dimensions. (c) How do components of vector transform under an inversion of coordinates Differentiate between pseudo and polar vectors. (3,3,4)

2. (a) State and explain Gauss's divergence theorem. (b) Obtain Green's theorem using Gauss's divergence theorem. (c) Find $\int \mathbf{r} \cdot \mathbf{ds}$, where r is the position vector (2,4,4)

3. (a) Express unit vectors $\hat{\rho}, \hat{\phi}, \hat{z}$ in terms of $\hat{x}, \hat{y}, \hat{z}$. (b) Verify that $\hat{\rho}, \hat{\phi}, \hat{z}$ constitute an orthonormal set of base vectors. (c) Find volume element in cylindrical coordinate. (4,4,2)