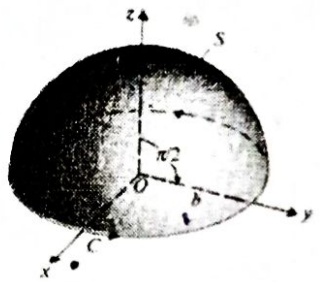
Field and Waves(ECPC-31) **Test-I (MM:20)** **Dated:20.9.2022**

1. What is the practical significance of a right-handed, general orthogonal curvilinear coordinate systems. Make the neat sketches of elemental area on all possible surfaces and elemental volume for each of the three coordinate systems. Also write the expression for each of them. 6

2. Given the vector function $\mathbf{A} = \mathbf{a}_\phi \sin(\phi/2)$, verify Stokes's theorem over the hemispherical surface and its circular contour that are shown in Fig. 5



3. Obtain a formula for the electric field intensity on the axis of a circular disk of radius b that carries a uniform surface charge density ρ_s. The determination of this intensity at an off-axis point would be more difficult, explain why? Also give the large distance approximation of this expression. 5

4. What do you understand by polarization in dielectrics in the presence of electric field. How does its extent affect the field distribution inside the material.

OR

Explain the significance of boundary conditions in general and in electrostatics in particular with the help of suitable examples and illustrations. Also give the relevant mathematical expressions. 4