ELNG 208 – ELECTROMAGNETIC FIELD THOERY
MIDSEM EXAMINATION, 2017/2018
Answer ANY question [10 Marks Each] 20 mins

1. a) The current density in cylindrical coordinate is given by

$$\vec{J} = \begin{cases} 4.5e^{-2r}\hat{a}_z, & 0 < r < 0.5\,\text{m} \\ 0, & \text{Elsewhere} \end{cases}$$

Use Ampere's law to find **H**.

b) State Ampere's law

2. The electron beam in a certain cathode ray tube possesses a cylindrical symmetry, and the charge density is represented by $\rho_v = -0.1/\left(\rho^2 + 10^{-8}\right)$ pC/m^3 for $0 < \rho < 3\times10^{-4}$ m and $\rho_v = 0$ for $\rho > 3\times10^{-4}$ m. Find the total charge per meter along the length of the beam.