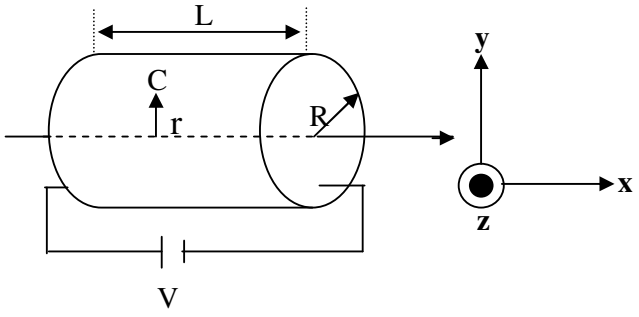
| | | |
|---|---|---|
| | **UNIVERSITY OF GAZIANTEP**<br>**DEPARTMENT OF ENGINEERING PHYSICS**<br>**EP 106 General Physics II**<br>**Final Exam Questions** | **15/08/2003**<br>**TIME 100 min.**<br><br>**SUMMER SCHOOL** |

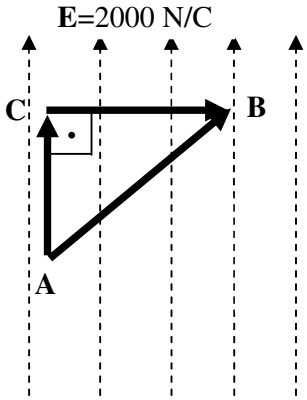
**Q-1)** A battery of 50 volts is connected across the ends of a cylindirical conductor of length L= 50 cm and resistivity $\rho$ = 0.25Ωm and radius R= 4cm, as shown in figure. The number of the free electrons per unit volume of this conductor is $20x10^{17}$. Find the magnitude and direction ( according to the given axis) of
(a) the current density J in the conductor,
(b) the drift velocity $V_D$ of the free electrons in the conductor,
(c) the magnetic field B at C, inside the conductor, at radial distance r = 3cm from the axis.



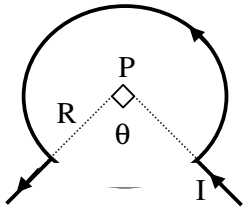

**Q-2)** A long non-conducting solid cylinder (length L) having a uniform charge distribution $\rho_1$ with radius $r_1$ is surrounded by a thick cylindirical shell that has a uniform charge distribution $\rho_2$ with inner radius $r_2$ and outer radius $r_3$. Determine the electric field in terms of $r_1$, $r_2$, $r_3$, r and, $\varepsilon_0$ for following regions; a) $r_1>r$, b) $r_2>r>r_1$, c) $r_3>r>r_2$ and, d) $r>r_3$.

**Q-3)**
(a) Compute $V_{AB}$, $V_{BC}$, and $V_{CA}$ in Figure given right.
(b) Using these results, show that the work required to carry a charge q from A to B to C and back to A is zero (i.e. $W_{A—B—C—A}$=0).

Assume that: |AC| = 60 cm, |CB| =80 cm




**Q-4)** The wire shown in Figure carries a current of 40A. Find the magnetic field at point P.




R =2cm
I = 40 A
θ= $90^0$

*Useful constants:* $e = 1.602x10^{-19}$ $\mu_0= 4\pi x10^{-7} N/A$ $\varepsilon_0= 8.85x10^{-12} C^2/Nm^2$