	UNIVERSITY OF GAZIANTEP **DEPARTMENT OF ENGINEERING PHYSICS** **EP 106 General Physics II** **Final Exam Questions**	**??/06/2003** **TIME 100 min.**

[1]. A circular wire of radius a carriers a non-uniform current distribution. The current density is given as

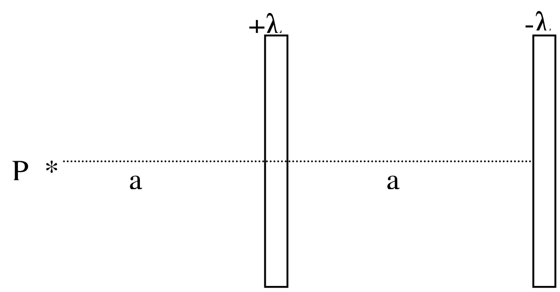
$$J(r)=\left(\frac{J_0}{r}\right)$$

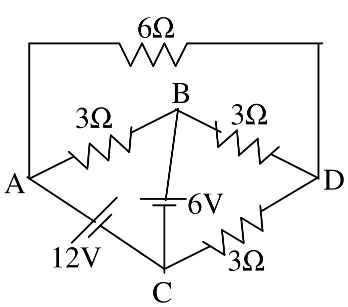
where r is the variable distance from the center of the wire and J_0 is a constant. Find:
(a) the total current in the wire.
(b) the magnetic field ***inside*** the wire as a function of r.

[2]. A copper wire ($\rho = 8.93 \times 10^3$ kg/m^3 ; $M = 64$ gr/mol) 50 cm long and 0.4 mm in diameter has a resistance 75 Ω. If a potential difference of 40 volts is applied between the ends of the wire. (Note that there is one free electron per atom in the copper element) Determine;
(a) the current
(b) the current density,
(c) the resistivity and
(d) the electron drift speed in the copper wire.

[3]. Determine the electric field at point P perpendicular bisector plane of the two long-straight wires of the length L=2l with a uniform line charge density |λ|.
Assume that $l >> a$.

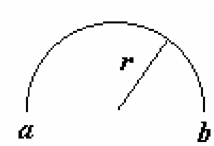
Hint: $\displaystyle\int_{-l}^{l}\frac{dx}{(a^2+x^2)^{3/2}}=\frac{2l}{a^2(a^2+l^2)^{1/2}}$





[4]. In thegiven electrical circuit, what are the potential differences between the points;
(a) AD,
(b) BD and
(c) AC ?

[5]. A conducting wire, whose resistance *R*, has a semi-circular shape of radius *r* as shown in Figure. If the potential difference between *a* and *b* is *V*;
(a) Express the magnetic field, *B*, at the center of the wire as a function of *V* and *R*
(b) Plot the magnetic field B as a function of *V*.



Useful Constants: $k=9\times10^{9}\ Nm^2/C^2$ $e=1.602\times10^{-19}C$ $m_e= 9.11\times10^{-31}kg$ $\mu_0=4\pi\times10^{-7}N/A$