Physics Department/The University of Jordan

Second Exam/20April/2015 (3:30 – 4:30)

Student's Name: عمر عبد الرحمن عبد ربه **Student's Number:** 0144364

Section Number: **Lecturer's Name:** Dr. Ziad

$e = -1.6 \times 10^{-19}$ C, $m_e = 9.11 \times 10^{-31}$ kg, $g = 9.8$ m/s^2

Q1) The quantity of charge (in Coulombs) that has passed through a surface area of 2.0 cm^2 varies with time as $q = 4t^3 + 11t + 6$ where t is in seconds. The instantaneous current (in A) through the surface at $t = 1.0$ s is

a) 12 b) 23 c) 0 d) 17 e) 31

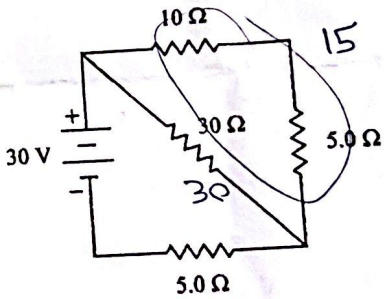
Q2) A light bulb is rated at 30 W when operated at 150 V. How much charge (in Coulombs) passes through this bulb in 1.0 min?

a) 17 b) 15 c) 12 d) 30 e) 60

Q3) A conductor of radius r, length L and resistivity ρ has resistance R. What is the new resistance if it is stretched to 2 times its original length **keeping its volume constant**?

a) $4R$ b) $R/4$ c) R d) $2R$ e) $R/2$

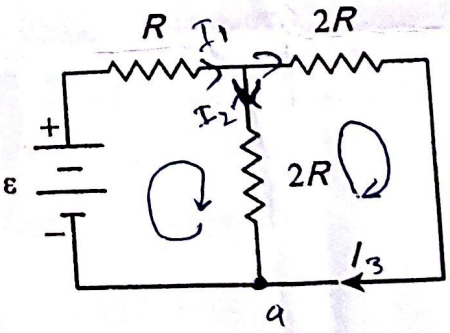
Q4) What is the rate at which thermal energy is generated in the 30 Ω resistor shown?



a) 13 W b) 27 W c) 60

d) 20 W e) 30 W

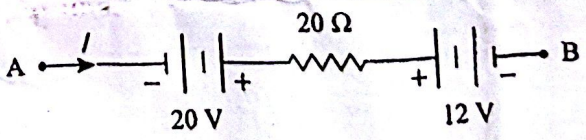
Q5) In the figure shown, if $I = 0.50$ A and $R = 8\Omega$, determine ϵ (in Volt).



a) 12 b) 24 c) 30

d) 15 V e) 16.0

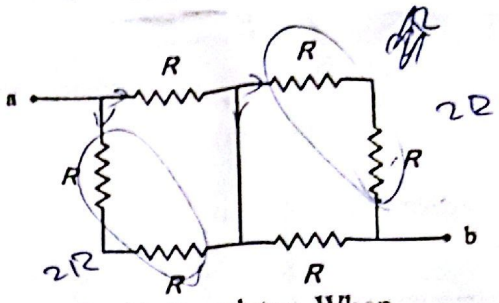
Q6) In the figure, if $I = 3.0$ A in the circuit segment shown, what is the potential difference $V_B - V_A$ (in volt)?



a) +28 b) -52 c) -28

d) +52 e) +2.0

Q7) In the figure, if $R = 15\ \Omega$, what is the equivalent resistance between points a and b



a) 16 b) 28 c) 24
d) 20 e) 6.0

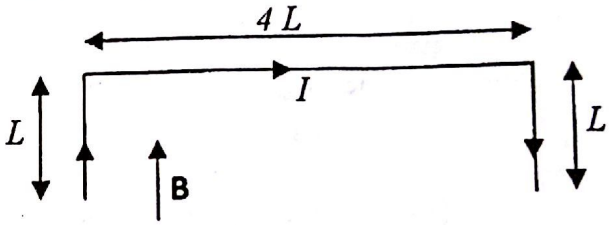
8) An RC circuit consists of uncharged $50\mu F$ capacitor, 30 V battery and a 10 Ω resistor. When the switch is closed the initial current (in A) in the circuit is

a) 30 b) 15 c) 6.0 d) 10.0 e) 3.0

Q9) An electron has a velocity of 6×10^6 m/s in the positive x direction at a point where the magnetic field has the components, $B_x = 3$ T, $B_y = B_z = 0$. What is the magnitude of the magnetic force acting on the electron (in N)?

a) 4.1 b) 1.6 c) 3.6 d) 0 e) 2.9

Q10) A straight wire is bent into the shape shown. Determine the net magnetic force on the wire.



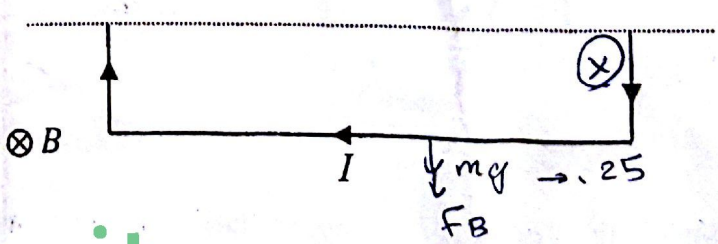
a) $2IBL$ into the page b) $2IBL$ out of the page
c) $4IBL$ out of the page d) $4IBL$ into the page
e) zero

Q11) A circular loop (radius = 0.50 m) carries a current of 3.0 A and has unit normal vector of $(2\mathbf{i} - \mathbf{j} + 2\mathbf{k})/3$. What is the x component of the torque (in N.m) on this loop when it is placed in a uniform magnetic field of $(2\mathbf{i} - 6\mathbf{j})$ T ?

a) 4.7 b) 9.4 c) 19 d) 3.1 e) 12 N

Q12) A horizontal wire (mass = 25 g, length = 40 cm) is suspended by two massless vertical wires which conduct a current $I = 4.0$ A, as shown in the figure. The horizontal wire is subjected to a magnetic field of magnitude 60 mT into the paper. What is the value of the tension (in N) in each of the vertical wires?

a) 0.39 b) 0.32 c) 0.13
d) 0.08 e) 0.17



power unit

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
b	c	a	a	e	b	d	e	d	c	b	e