

Physics 31B 2nd Test Part I (MC)
Spring, 2003

1. If the current through a long solenoid is doubled while the coil's length is also doubled, keeping the total number of turns constant, the magnetic field at a point inside near the axis is (a) four times larger (b) half the original size (c) unchanged (d) one-quarter the size (e) none of these.
2. Just wrap 150 turns of a heavy (#22) insulated wire around an iron rod (for example, a door hinge pin) and attach the leads to a 1.5-V D-cell via a switch and you have (a) a radio (b) an electromagnet (c) a galvanometer (d) an ammeter (e) none of these.
3. A circular flat coil of N turns and enclosed area A , carrying a current I , has its symmetry z -axis parallel to a uniform B -field in which it is immersed. The torque on the coil is (a) zero (b) $NIBA$ (c) NBA (d) IBA (e) none of these.
4. The net force on a magnetic dipole in a uniform magnetic field is (a) toward the north pole (b) toward the south pole (c) zero (d) not enough information giving (e) none of these.
5. A battery attached to a load supplies 2 A with a terminal voltage of 12.0 V. If the battery dissipates 0.4 W, its emf is (a) 11.8 V (b) 12 V (c) 12.2 V (d) 12.4 V (e) none of these.
6. In Fig. MC19, (a) the battery with an emf of 12 V is being charged (b) the battery with an emf of 6 V is being charged (c) the battery with an emf of 6 V is being discharged (d) neither battery is being charged (e) none of these.
7. A metal wire has a resistance of 1.0Ω . What will be the resistance of a wire made of the same material but twice as long and with half the cross-sectional area? (a) 0.40Ω (b) 2.00Ω (c) 0.02Ω (d) 40.0Ω (e) none of these.
8. Referring to Fig. MC9, the voltage at point B is (a) $+12 \text{ V}$ (b) -12 V (c) 0 V (d) -6 V (e) none of these.

9. The emf of a voltaic cell (a) is independent of the chemical interactions taking place within it (b) is dependent on the size of the cell (c) is dependent on its amp-hour rating (d) is independent of the plate size (e) none of these.
10. If 10 amperes circulate in a closed circuit, how much charge passes any point therein 2 s? (a) 10 C (b) 5 C (c) 20 C (d) 200 C (e) none of these.
11. The quantity $1 \text{ C}\cdot\text{V}$ is equivalent to (a) 1 V/m (b) $1 \text{ N}\cdot\text{m}$ (c) 1 C/N (d) 1 V/N (e) none of these.
12. Generally, when any conductor is connected to ground (a) nothing happens (b) charge flows so that the conductor takes on a potential above zero (c) charge flows so that the conductor takes on a potential below zero (d) charge flows so that the conductor takes on the potential of the ground (e) none of these.
13. The electrostatic potential everywhere inside a hollow conductor is (a) always zero (b) never positive (c) always a nonzero constant (d) constant, provided there are no enclosed isolated charges (e) none of these.
14. If the charge on a capacitor is halved, its stored energy (a) is halved (b) is quartered (c) is unchanged (d) is doubled (e) none of these.
15. The electrostatic force between a negative electron and a neutral neutron is (a) negative and attractive (b) positive and repulsive (c) zero (d) sometimes attractive and sometimes repulsive (e) none of these.
16. The SI units of electric flux are (a) N/C^2 (b) $\text{N}\cdot\text{m/C}$ (c) $\text{N}\cdot\text{m}^2/\text{C}$ (d) $\text{C/N}\cdot\text{m}$ (e) none of these.
17. A metal sphere is grounded through a switch, and a positively charged balloon is brought near it. The balloon is then taken away and the switch is opened. The sphere is now (a) neutral (b) negatively charged (c) positively charged (d) charged, but we cannot know its polarity (e) none of these.
18. If you are stretched out in a bathtub full of water, you are likely (a) not to be grounded because the water is in a tub (b) to be grounded if the tub has metal feet (c) not to be grounded because you are inside a conductor (d) to be grounded because the water connects you electrically to the pipes (e) none of these.
19. Suppose we have three identical conducting spheres and one of them carries a charge of Q . If they are all brought into contact and then separated (a) they will each have a charge of $Q/3$ (b) they will each have a charge of Q (c) only one will be charged with Q (d) they will all be discharged (e) none of these.
20. A nonconductor is charged and then brought near a conductor. Consequently (a) the two electrostatically repel each other (b) the two electrostatically attract each other (c) only the nonconductor is repelled (d) there is no electrostatic interaction at all (e) none of these.