所別：太空科學研究所碩士班 科目：普通物理

1. A 1 kg ball is dropped into a swinging pool from a diving board 5.0 meters abo water. The ball sinks in the water at the same speed with which hits the water. reaches the bottom in a total time of 1.5 seconds. How deep is the pool? What the drag force on the ball by the water? (10%)
2. During a mission to Mars a spaceship traveling at 500 m/s must increase its spe by 10 m/sec. The exhaust speed of rocket engine is 1200 m/s relative to the shi What fraction of the initial mass must be ejected as exhaust to accomplish this tas (10%)
3. A disk of rotational inertia 1.6×10^{-3} kg m^2 is attached to a motor which can devel 20.0 nt m of torque. 50 milliseconds after the motor is turned on what are (a) t angular momentum and (b) the angular speed. (10%)
4. A positive ion beam consists of 4×10^{6} double charged ions per cubic centimeter. the diameter of the beam is 2.4 cm and the ions are traveling at 5×10^{7} m/s, what a (a) the ion flux and (b) the current in the beam? (10%)
5. A tungsten wire resistor, with coefficient of resistivity 4.5×10^{-3}/ °C, dissipates watts when in the lab at 20 °C. It is flown in a spacecraft to the surface of Ven where the temperature is 470°C. If the same voltage is applied, what power do the resistor now developed? What is the associated current? (10%)
6. A square wave generator is placed across a series of resistor and capacitor. T width of the square wave is 10 time constants. Sketch the potential across t resistor as a function of time for 20 time constraints. (10%)
7. The active element in a Hall-Effect Gausementer is a slab of semiconductor 1 millimeters thick, 12.0 millimeters wide and 3.0 cm long. A current of 0.50 am is lengthwise in the slab. The density of electron is 1.5×10^{24} el/m^3. T instrument is rotated until a maximum voltage of 0.80 millivolts is measured acrc the strip. What is the magnetic filed? Find the drift velocity of electron. (10%
8. The magnetic filed of the earth in Taiwan is 50 microtesla north and 30 degre below the horizontal. The radio antenna on an automobile is vertical and 1 meter long. If the automobile is moving east at 50 km/hr what is the induced EM in the antenna? (10%)
9. A thin layer of water (n=1.33) is adhered to the surface of a lens (n=1.