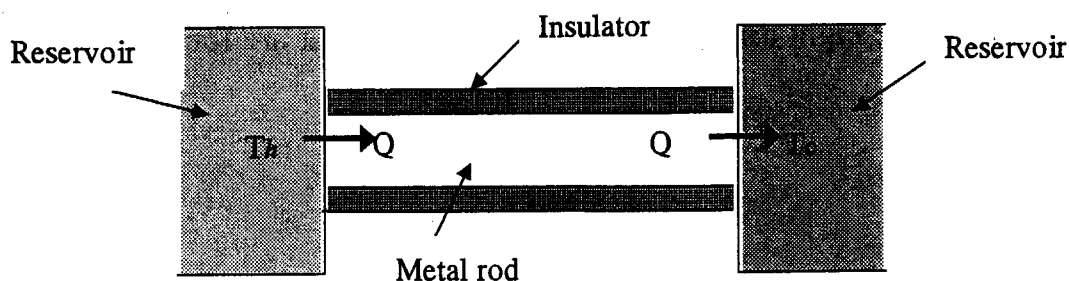


- Please describe and explain (a) Reversible process, (b) Coefficient of volume expansion (c) Wheatstone Bridge, (d) Newton's second law for rotation, (e) Young's double slit experiment. (20%)
- The angular displacement of a simple pendulum is given  

$$\theta = 0.1\pi \sin(2\pi t + \pi/6) \text{ rad}$$
 The mass of the bob is 0.8 kg. Calculate: (a) the length of the simple pendulum; and (b) the velocity of the bob at  $t = 0.25 \text{ s}$ . (10%)
- Light of wavelength 450 nm is incident normally on a slit of width of 0.1 mm. (a) What is the angular position of the first minimum? (b) What is the position of the second -order minimum on a screen 3 m from the slit? (10%)
- An electron with a kinetic energy of  $10^4 \text{ eV}$  move perpendicular to the lines of a uniform field  $B = 1 \text{ G}$  (a) What is the period of its orbit? (b) What is the radius of the orbit? (10%)
- A speaker emits 0.8 W of acoustic power. Assume that it behaves as a point source which emits uniformly in all direction. At what distance will the intensity level be 85 dB? (10%)
- A 5000 kg car requires 60 hp to cruise at a steady 60 km/h on a level road. What would be the power required to move up to a  $10^\circ$  incline at the same speed? Assume that the total frictional force due to the road and air resistance is fixed. (10%)
- The figure shows an insulated metal rod whose ends are in thermal contact with two reservoirs. When a steady state has been reached, during a certain time interval a quantity of heat  $Q = 200 \text{ J}$  is transferred from the hot reservoir at  $T_h = 60^\circ \text{ C}$  to the cold reservoir at  $T_c = 5^\circ \text{ C}$ . What are the changes in entropy (a) of each reservoir; (b) of the universe? (10%)



(背面仍有題目,請繼續作答)

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科目：普通物理學

8. The point mass theorem derived by Newton states: A uniform spherical mass distribution attracts an external point particle as if all its mass were concentrated at its center. Prove this problem by finding the force exerted by a uniform spherical shell, of radius  $R$  and surface mass density  $\sigma$  kg/m<sup>2</sup>, on a point particle of mass  $m$ . (10%)
9. A copper wire carries a current of 10 A. It has a cross-sectional area of 0.1 cm<sup>2</sup>. Estimate the drift velocity of the electrons. (Cu: density = 8.9 g/cm<sup>3</sup>, atomic mass = 63.5 g/mol) (10%)