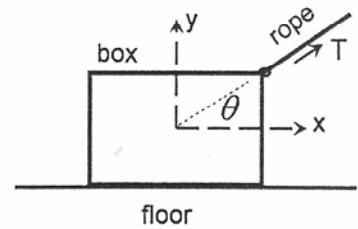
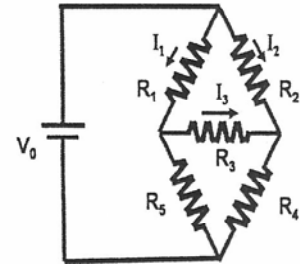


Q1.(20%) A worker pull a box of mass m across a level floor using a massless rope that makes angle θ with the horizontal. The coefficient of static and kinetic friction between box and floor is μ_s and μ_k separately. What rope tension is required to move the box at constant velocity along x-direction?

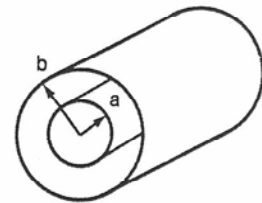


Q2.(20%) A Carnot engine extracts 240 J of the heat from a high temperature reservoir (with temperature T_h) during each cycle. It rejects 100 J of the heat to a reservoir at 15°C . (a)What is Carnot cycle? (b) How much work does the engine do in one cycle? (c) What is its efficiency? (d) What is the value of T_h ($^\circ\text{K}$)?

Q3.(20%) In the circuit as shown in the figure, there are five resistor (R_1, R_2, R_3, R_4, R_5) and one voltage source (V_0) in the circuit. (a) Find the value of I_3 . (b) In what condition does I_3 equal to zero. (i.e. There is no current flow through R_3 in this case)



Q4.(20%) A coaxial cable consists of an inner conductor of radius a and outer conductor of radius b . The permittivity constant is ϵ_0 and the permeability is μ_0 . (a) What is the capacitance per unit length of the cable? (b) If the current flows along inner conductor and back along the outer. What is the inductance per unit length of the cable?



Q5.(20%) Finish the table in terms of m, kg, sec. and Coul.

Power ^(example)	Magnetic field	Inductance	Capacitance	Newton	Magnetic field
1 Watt	1 Tesla	1 Henry	1 Farad	1 N	1 Gauss
$= 1 \frac{m^2 \times kg}{sec^3}$	=	=	=	=	=

國立高雄大學九十五學年度轉學招生考試試題

科目：微積分
 考試時間：90 分鐘

系所：電機工程學系二年級
 資訊工程學系二年級
 本科原始成績：滿分 100 分

可
 否

使用計算機

1. Find the limit of the following questions, and give your reason. (每題 8 分)

(a) $\lim_{x \rightarrow \infty} \frac{4x^2}{1+3x^2}$

(b) $\lim_{x \rightarrow 2} \frac{|\sin(x-2)|}{x-2}$

(c) $\lim_{x \rightarrow \infty} (x^{\frac{1}{3}}(x+1)^{\frac{2}{3}} - x)$

(d) $\lim_{x \rightarrow 0} \left(\frac{4}{x^2} - \frac{2}{1-\cos x} \right)$

(e) $\lim_{x \rightarrow 0} \frac{2x^2 - 7x}{3x}$

2. (a) Find the curve of $r = 4 \cos \theta$ (8 分)

(b) Find the area bounded by the graphs of $x^2 + y^2 = 4$ and $r = 4 \cos \theta$ (12 分)

3. Find the answer of following questions: (每題 10 分)

(a) $\int \frac{1}{\sqrt{4+e^x}} dx = ?$

(b) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = ?$

(c) $f(x) = \cos^4(x^3 + 3x)$, find $f'(x) = ?$

4. Determine series $\sum_{n=1}^{\infty} \frac{1}{n(n+2)}$ is Convergence or Divergence? give your reason.

And, if series is convergence, find the sum of this infinite series. (10 分)