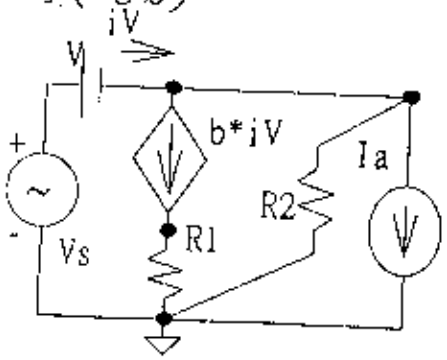
國立中央大學九十一學年度碩士班研究生入學試題卷

1.(25分)



(1)試利用這個電路來說明"加成定理成立"。
(2)假設 b=7,R1=2,R3=3, 試求電流源 Ia 所感受到的電路的等效電路，亦即電路中除了Ia之外的元件對Ia而言的等效電路。

2.(25分)

Design the bandpass filters with the bandwidth B = 500 Hz, low half-power frequency f_L = 100 Hz, and high half-power frequency f_H = 600 Hz by

(a) (20%) Connecting a first-order lowpass filter and highpass filter in cascade. Show the overall circuit and transfer function. Sketch the Bode magnitude and phase plot.

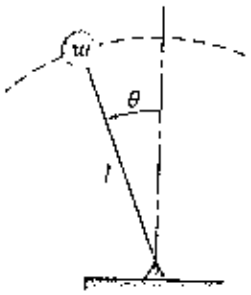
(b) (20%) Using a *RLC* resonant circuit. Show the overall circuit and transfer function. Sketch the Bode magnitude plot.

3.(25分)

The bob of a simple pendulum of length l=800 mm is released from rest when θ= 5°. Assuming simple harmonic motion, determine 1.6 s after release

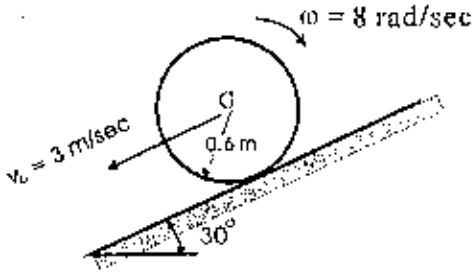
(a) the angle θ, (12%)

(b) the magnitude of the velocity and acceleration of the bob. (13%)



4.(25分)

The thin ring has a mass of *5 kg* and is released down the inclined plane such that it has a backspin ω =8 *rad/sec* and its center has a velocity v_G=*3 m/sec* as shown. If the coefficient of friction between the ring and the plane is μ_k =0.6, determine how long (in *sec*) the ring rolls before it stops slipping. (除了寫出解題過程外，請務必以幾行文字具體說明處理此問題的原則或原理)



參考用