大葉大學九十三學年度研究所碩士班招生考試試題紙 P3-1					
系 所 別	組別	考 試 科 目 （中 文 名 稱）	考 試 日 期	節 次	備 註
機電自動化研究所碩士班	甲組	電子學或動力學	3 月 28 日	第 三 節	可使用計算機 共三頁

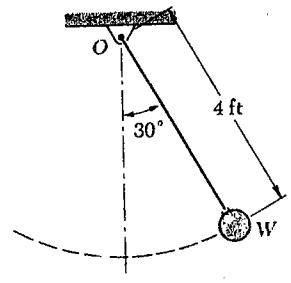
註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶） 13:30 ~ 15:00

(電子學及動力學任選五題作答，詳列計算步驟，否則一概不給分，答題數不可超過五題，第六題以上不予計分，每題 20 分)

[1] a. What is Newton's law? Please draw a free body diagram to explain it.

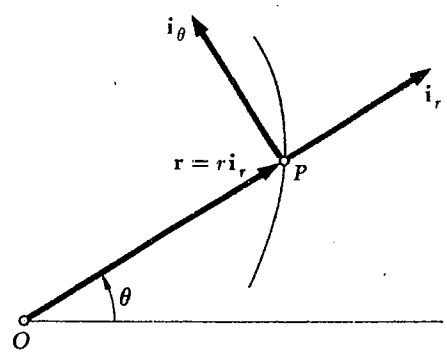
b. What is D'Alemberts' principle? Please draw another free body diagram to explain it.

[2] The bob of a 4-ft pendulum describes an arc of circle in a vertical plane. If the tension in the cord is 2.5 times the weight of the bob for the position shown, find the velocity and acceleration of the bob in 30 degree position.

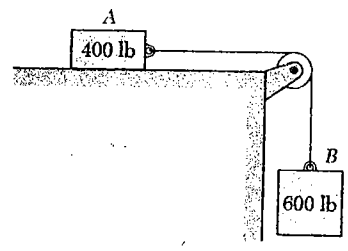


[3] The position vector $\vec{r}$ r of the particle P was expressed as the product of the scalar r and the unit vector $\vec{i}_r$, and written as $\vec{r} = r\vec{i}_r$. Please differentiate equation $\vec{r} = r\vec{i}_r$ with respect to t to find the velocity and acceleration.

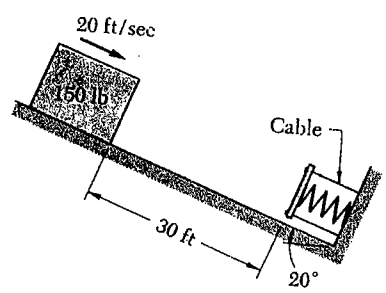
[Hint: $d\vec{i}_r / dt = \dot{\theta}\vec{i}_\theta$, $d\vec{i}_\theta / dt = -\dot{\theta}\vec{i}_r$]



[4] Two blocks are joined by an inextensible cable as shown. If the system is released from rest, determine the velocity of block A after it has moved 5 ft. Assume that coefficient of the friction is 0.25 between block A and the plane and that the pulley is weightless and frictionless.



[5] A spring is used to stop a 150 lb package which is moving down a 20^0 incline. The spring has a constant k = 150 lb/in. and is held by cables so that it is initially compressed 4 in. If the velocity of the package is 20 ft/sec when it is 30 ft from the spring, determine the maximum additional deformation of the spring in bringing the package to rest. Assume coefficient of the friction is 0.20.

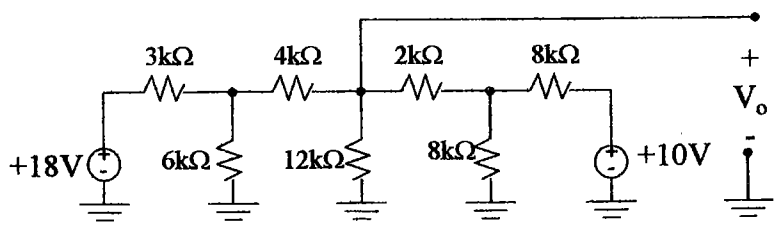


大葉大學九十三學年度研究所碩士班招生考試試題紙 P3-2					
系 所 別	組別	考 試 科 目 (中 文 名 稱)	考 試 日 期	節 次	備 註
機電自動化研究所碩士班	甲組	電子學或動力學	3 月 28 日	第 三 節	可使用計算機 共三頁

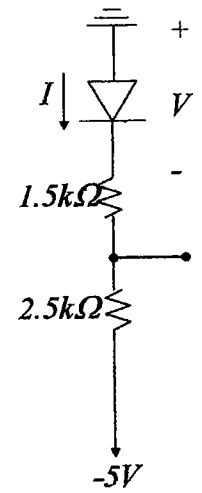
註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶） 13:30 ~ 15:20

(電子學及動力學任選五題作答，詳列計算步驟，否則一概不給分，答題數不可超過五題，第六題以上不予計分，每題 20 分)

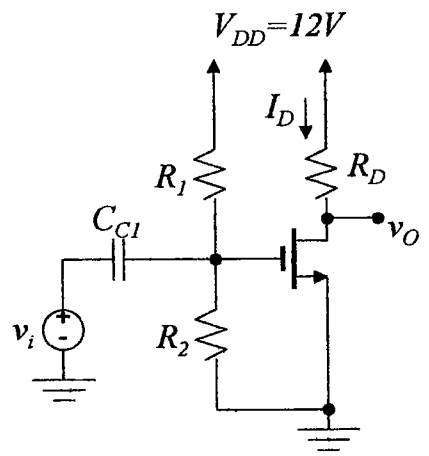
[6] Find the output voltage V_o of the circuit shown below.



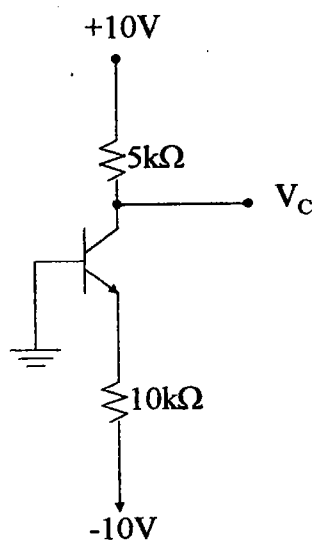
[7] Let V_D=0.7V. Find I and V in the following circuits using the Constant-Voltage-Drop model.



[8] Consider the circuit in the following with transistor parameters V_t=1 V, $\frac{1}{2}k_n'\frac{W}{L}=1mA/V^2$, $r_o=\infty$, R_1= 497kΩ, R_2=125 kΩ, R_D=2.5 kΩ and $I_D = 2mA$. Determine the small signal voltage gain v_o/v_i.



[9] Assuming that the BJT is in the active mode. The voltage at the emitter was measured and found to be –0.7V. If β=50, find the emitter current and the collector voltage.



大葉大學九十三學年度研究所碩士班招生考試試題紙　P3-3					
系　所　別	組別	考　試　科　目 （中 文 名 稱）	考　試 日　期	節　次	備　　註
機電自動化研究所碩士班	甲組	電子學或動力學	3 月 28 日	第 三 節	可使用計算機 共三頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）13:30～15:00

(電子學及動力學任選五題作答，詳列計算步驟，否則一概不給分，答題數不可超過五題，第六題以上不予計分，每題 20 分)

[10] Consider the following ideal operation amplifier circuit. If $v_o = k_1 v_1 + k_2 v_2 + k_3 v_3$, determine the constant gains k_1, k_2 and k_3.