國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電機所、電子所
科目：電子學

1. Assuming that the diodes in the circuit of Figure 1 are ideal, find and sketch the transfer characteristic $v_O$ versus $v_I$. (20%)

2. For the circuit in Figure 2, assuming all transistors to be identical with β infinite. (30%)
   (a) Derive an expression for the output $I_O$, and show that by selecting $R_1 = R_2$ and keeping the current in each junction the same, the current $I_O$ will be $I_O = \dfrac{\alpha V_{CC}}{2R_E}$.
   (b) What must the relationship of $R_E$ to $R_1$ and $R_2$ be?
   (c) For $V_{CC} = 15$ V, and assuming $\alpha \cong 1$ and $V_{BE} = 0.7$ V, design the circuit to obtain an output current of 1 mA. What is the lowest voltage that can be applied to the collector of $Q_3$?

3. The differential amplifier circuit of Figure 3 utilizes a resistor connected to the negative power supply to establish the bias current $I$.(30%)
   (a) For $v_{B1} = v_d/2$ and $v_{B2} = -v_d/2$, where $v_d$ is a small signal with zero average, find the magnitude of the differential gain, $|v_o/v_d|$.
   (b) For $v_{B1} = v_{B2} = v_{CM}$, find the magnitude of the common-mode gain, $|v_o/v_{CM}|$.
   (c) If $v_{B1} = 0.1\sin 2\pi \times 60t + 0.005\sin 2\pi \times 500t$ volts, $v_{B2} = 0.1\sin 2\pi \times 60t - 0.005\sin 2\pi \times 500t$ volts, find $v_o$.

4. The BJTs (bipolar-junction transistors) in the Darlington follower of Figure 4 having $\beta_0$=100. If the follower is fed with a source having a 100 kΩ resistance and is loaded with 1 kΩ, find the input resistance and the output resistance (excluding the load) and the overall voltage gain (both open circuited and with load). (20%)

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題　所別：電機所、電子所　科目：電子學

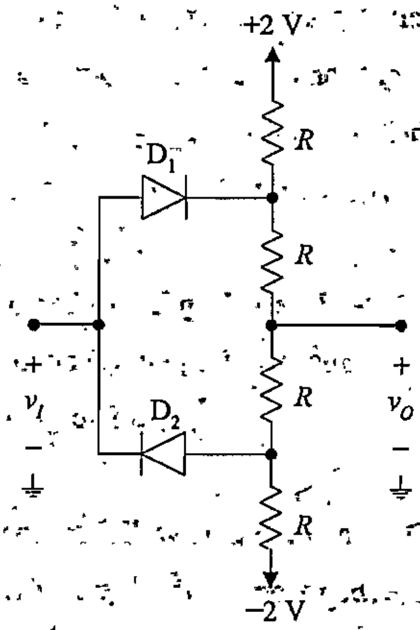



Figure 1

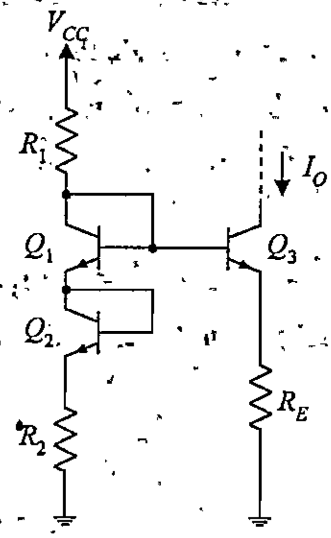



Figure 2

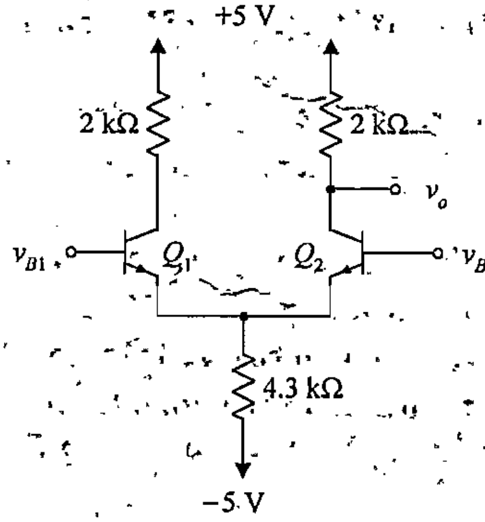



Figure 3

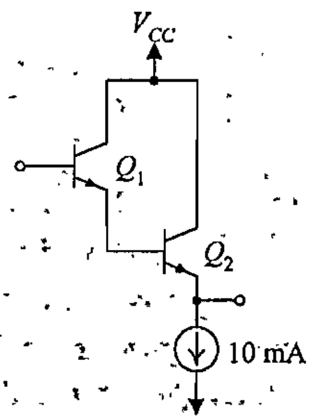



Figure 4

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：工程數學

1. Label the following statements as being true or false. (18%)

(a) The rank of a matrix is equal to the number of its nonzero columns.

(b) If $S$ generates the vector space $V$, then every vector in $V$ can be written as a linear combination of elements of $S$ in only one way.

(c) Any system of $n$ linear equations in $n$ unknowns has at least one solution.

(d) The matrices $A, B \in M_{n\times n}(F)$ are called similar if $B = Q^t A Q$ for some $Q \in M_{n\times n}(F)$.

(e) If Q is an invertible matrix, then $\det(Q^{-1}) = [\det(Q)]^{-1}$.

(f) If $B$ is a matrix obtained form $A$ by interchanging two rows, then $det(B) = -det(A)$.

2. Solve the linear equations using Gaussian elimination (16%)

$$\begin{cases} 2x_1 - 2x_2 - x_3 + 6x_4 - 2x_5 = 1 \\ x_1 - x_2 + x_3 + 2x_4 - x_5 = 1 \\ 4x_1 - 4x_2 + 5x_3 + 7x_4 - x_5 = 1 \end{cases}$$

3. Compute $\lim_{m\to\infty} A^m$ for the following matrices A. (16%)

(i) $\begin{pmatrix} -1.8 & 0 & -1.4 \\ -5.6 & 1 & -2.8 \\ 2.8 & 0 & 2.4 \end{pmatrix}$ (ii) $\begin{bmatrix} -2 & -1 \\ 4 & 3 \end{bmatrix}$

4. Determine the frequency of oscillation of the pendulum of length L in Fig. A. Neglect air resistance and the weight of the rod. Assume that θ is small enough. (10%)

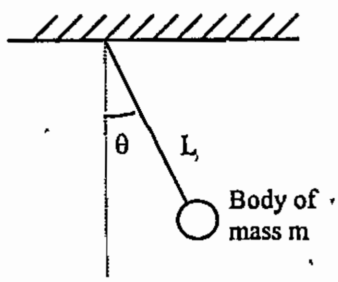


Fig. A

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：工程數學

5. Given the equation $xy''+2y'+xy=0$, if $y_1=\frac{\sin x}{x}$ is a solution of the given equation. Find another linearly independent solution $y_2$. (10%)

6. Find the general solution of the following equation:

(a) $y''-2y'+y=\frac{e^x}{x^3}$ (10%)

(b) $x^2y''-xy'=2x^3e^x$ (10%)

(c) $y''+4y=8xe^{-2x}+4x^2+2$ (10%)

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：計算機概論 (乙)

10 points 1. Simulate the function SelectionSort on an array containing the elements 25, 34, 14, 16, 29, 30. How many **comparisons** and **swaps** of elements are made?

10 points 2. Let array A[-1:3,2:5,-1:4,-2:2] store data by row-major order. If the starting address of array A is 100 and each element of array A requires 2 memory unit, compute the address of A[3,4,3,0].

10 points 3. For each of the expressions

a) ((x-y)*z+(y-w))*x

b) ((((a*x+b)*x+c)*x+d)*x+e)*x+f

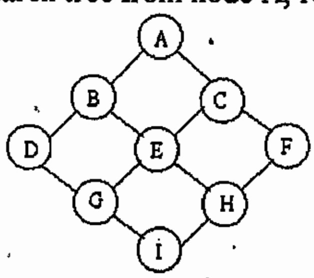
do the followings:

a) Find the equivalent prefix expression. (5 points)

b) Find the equivalent postfix expression. (5 points)

10 points 4. Apply heapsort to the list of elements 3, 1, 4, 1, 5, 9, 2, 6, 5. First give the intermediate results after heapifying the array, and then sort the array step by step.

10 points 5. For the following graph, construct the depth-first search tree and breadth-first search tree from node A, respectively.




10 points 6. Consider the following C program segment, where ***i, j,*** and ***k*** are integer variables.

```
for (i = 1;   i <= 10;   i++)
   for (j = 1;   j <= i;   j++)
      for (k = 1;   k <= j;   k++)
            printf ("%d\n", i*i+j-k);
```

How many times is the ***printf*** statement executed in this program segment?

10 points 7. Suppose that the C language does not provide the assignment operator =. Write a function that perform the assignment operation. This function's prototype has this form:

```
/* assign q to p,   i.e.   p = q */
void   assignment( int *p, int q)
```

We assume that ***q*** is a positive integer variable. You can use any C instructions or operators except the assignment operator to complete this question. (Hint: the C language provides the increment operator ++ and the decrement operator --.)

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：計算機概論（乙）

10 points 8. Describe the concept of the John von Neumann Machines.

10 points 9. From the list: 2, 5, 7, 10, 24, 32, extract a collection of numbers where sum is 41. What is the complexity of your method for solving this problem? Does this appear to be a polynomial problem or a nonpolynomial problem?

10 points 10. Identify three software utilities that normally accompany an operating system.

**國立雲林科技大學**
**八十七學年度研究所碩士班入學考試試題**

所別：電子所
科目：微電子學

1. Determine the electron and hole concentrations in a silicon sample at room temperature containing $2.0 \times 10^{17}$ phosphorus atoms/cm$^3$ and $8.0 \times 10^{15}$ boron atoms/cm$^3$. **(15%)**

2. Describe briefly the fabrication process sequence of a silicon enhancement -mode N-channel MOSFET using the planar IC technology. **(15%)**

3. Sketch the circuit diagram of a CMOS inverter and explain its operation. **(20%)**

4. Figure 1 shows that a p-type Si semiconductor (with $10^{17}$/cm$^3$, $\mu_p$=300 and $\mu_n$=800 cm$^2$/V-s) where the electron-hole pairs are created from one side as a result of incoming photon flux ($10^{14}$ photons/s-cm$^2$ and $h\nu \gg E_g$). Fine the total current at the surface. **(10%)**

5. The differential amplifier in Fig.2 uses transistors with $\beta$=100. Evaluate the following: (1) The input differential resistance $R_{id}$. (2) The overall voltage gain $v_o/v_s$ (neglect the effect of $r_o$). (3) The worst-case common-mode gain if the two collector resistors are accurate to within ±1%. (4) The CMRR, in dB. (5) The input common-mode resistance (assuming that the Early voltage $V_A$=100 V and that $r_\mu = 10\beta r_o$ ). **(25%)**

6. For an emitter follower, as shown in Fig.3, biased at $I_C$=1mA and having $R_s = R_E = 1\text{k}\Omega$, and using a transistor specified to have $f_T$ = 400MHz, $C_\mu$=2pF, $r_x$=100, and $\beta_o$=100, evaluate the midband-gain $A_M$ and the frequency of the dominant high-frequency pole. **(15%)**

國立雲林科技大學 八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：微電子學

Fig.1


Fig.2

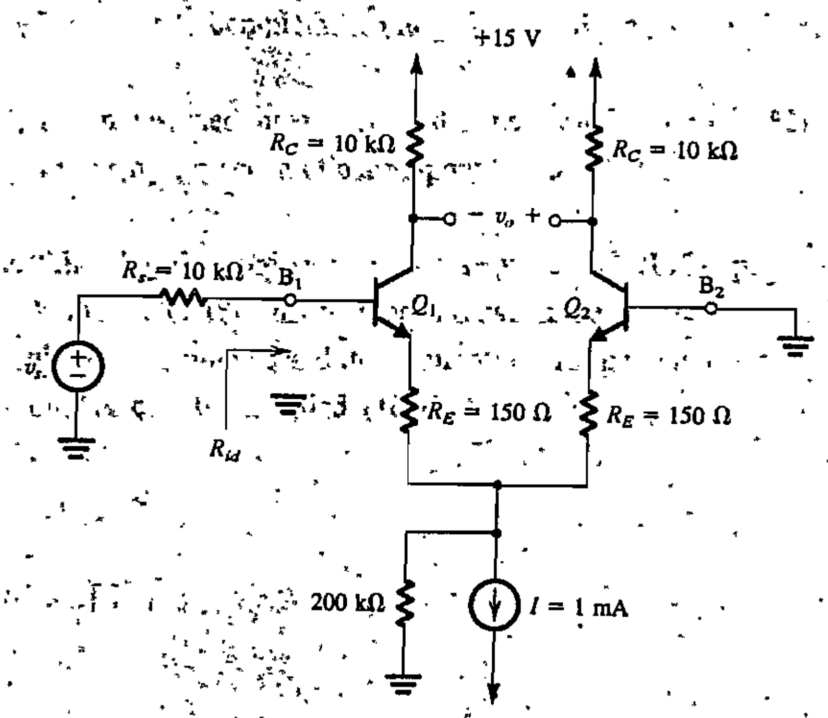
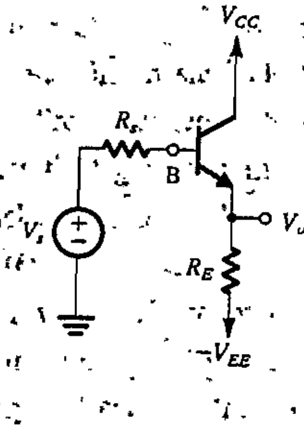



Fig.3



國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：計算機系統

1. A string of address references given as byte addresses is listed as follows: 1, 5, 8, 3, 40, 17, 19, 56, 49, 11, 14, 43, 20, 48, 79, 107. Consider a two-way set associative cache with a total of 8 lines and the line size is 4 bytes. Label each reference in the list as a hit or miss and show the final contents of the cache. Assuming that the lines are initially empty, the LRU replacement policy is used, and way 0 is allocated first. (10%)

2. What does the following bit pattern represent? 1100 0000 0000 0000 0000 0000 0000 0000
   a. Assuming it is a two's complement integer? (give the answer in hex form) (3%)
   b. Assuming it is an unsigned integer? (give the answer in hex form) (3%)
   c. Assuming it is a single precision floating-point number? (4%)

3. Translate the following C expressions into a sequence of RISC-type assembly instructions. Define each RISC instructions you use in the register transfer form. Each line should have comments and the assumptions for passing the parameters in registers should be clearly identified. (10%)

```
While (A[i] == j)
    {   i++;
        A[i] = A[i] - j;
    }
```

4. Design the memory system for a microprocessor. The processor uses 32-bit logical address and 32-bit external data bus.
   a). Show the design of a direct-mapped TLB. This TLB has 16 entries. The page size is 4KB. Assuming that the physical address is also 32-bit long. (6%)
   b). Show the design of a direct-mapped cache of 8KB. The line size is 32 bytes. It uses physical address for tags. Show the relationship of this cache with the TLB above. This cache uses the MESI protocol. Assuming the cacheable memory area is 4GB. (6%)
   c). Show the design of a two-way interleaving DRAM main memory system for this processor. The memory size is 512MB using 16Mx4 DRAM chips. Assuming this memory is located at the lowest address space. The processor uses little endian mode. (8%)

5. Use an one-pass assembler described by Beck to assemble the following SIC program.
   a). List the symbol table content after the assembler has processed line 4. (5%)
   b). List the symbol table content after the assembler has processed line 9. (5%)
   c). List the symbol table content after the assembler has processed line 12. (5%)

```
Line
1   SUM     START 4000
2   FIRST   LDX    ZERO
3           LDA    ZERO
4   LOOP    ADD    T1,X
5           TIX    CNT
6           JLT    LOOP
7           STA    TAL
8           RSUB
9   T1      RESW   2
10  CNT     RESB   1
11  ZERO    WORD   0
12  TAL     RESW   1
13          END    FIRST
```

6. By using two semaphores initially set S1=3 and S2=0, how can you synchronize two processes, one (producer) filling a buffer and the other (consumer) emptying it? It is assumed that the system has three buffers. (15%)

7. Describe the differences between Unix swapping systems and Unix demand paging systems. (10%)

8. Compare and contrast the Window95 terms: "DLL", "OLE" and "DDE". (10%)

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：半導體元件

1. Starting with the continuity equations for electrons and holes, please derive the Ambipolar transport equation. (20%)

2. Please describe in details the two major physical mechanisms giving rise to the reversed-bias breakdown in a p-n junction semiconductors. (15%)

3. Assume that the donor concentration in an n-type semiconductor at $T = 300$ K is given by

$$N_d = 10^{16} - 10^{19}x$$

where $x$ is given in cm and ranges between 0 and 1 μm.

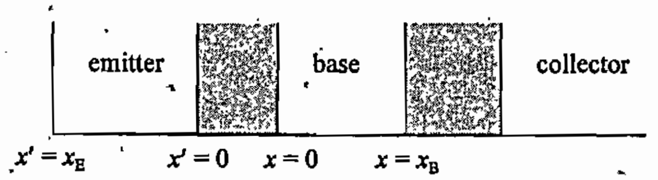
Please determine the induced electric field in a semiconductor in thermal equilibrium. (15%)

4. Consider a contact between Al and n-Si doped at $N_d = 10^{16}$ cm$^{-3}$.
   (a) Draw the ideal energy band diagram at zero bias after the junction is formed. (5%)
   (b) Determine the theoretical barrier height $\phi_{B0}$ and the built-in potential barrier $V_{bi}$. (5%)
   (c) Another type of metal is used to form an ohmic contact with the same n-Si. Draw the ideal energy-band diagram with a positive voltage applied to the metal. (5%)

   Al work function: 4.28 volts. $T = 300$ K.

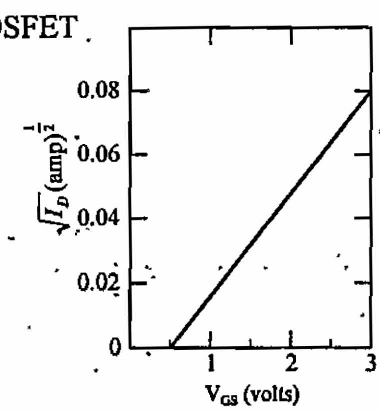
5. The following currents are measured in a uniformly doped npn bipolar transistor:

   $J_{nE} = 1.20 \times 10^3$ A/cm$^2$ (due to the electron diffusion at $x = 0$)
   $J_{nC} = 1.19 \times 10^3$ A/cm$^2$ (due to the electron diffusion at $x = x_B$)
   $J_{pE} = 0.02 \times 10^3$ A/cm$^2$ (due to the hole diffusion at $x' = 0$)
   $J_R = 0.05 \times 10^3$ A/cm$^2$ (due to the recombination in the forward-biased B-E junction)




   (a) Determine the ratio of emitter doping to base doping in order to achieve this result. Assuming $x_B << L_B$ and $x_E << L_E$, $x_B = x_E$, and $D_E = D_B$. (5%)
   (b) Determine the small-signal common base current gain $\alpha$ and common emitter current gain $\beta$. (10%)
   (c) If the base width $x_B$ is reduced by 50%, what is the new value of $\alpha$? (5%)

6. The experimental characteristics of an ideal n-channel MOSFET biased in the saturation region are shown in the figure.
   (a) If $W = 20$ μm and $L = 2$ μm, and $t_{ox} = 100$Å, determine the threshold voltage and the inversion carrier mobility. (10%)
   (b) If the source bias is zero and the substrate bias is changed from zero to negative, how does the threshold voltage change? Explain. (5%)



國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：半導體元件

Silicon, gallium arsenide, and germanium properties ($T = 300°K$)

| Property | Si | GaAs | Ge |
|---|---|---|---|
| Atoms ($cm^{-3}$) | $5.0 \times 10^{22}$ | $4.42 \times 10^{22}$ | $4.42 \times 10^{22}$ |
| Atomic weight | 28.09 | 144.63 | 72.60 |
| Crystal structure | Diamond | Zincblende | Diamond |
| Density ($g/cm^{-3}$) | 2.33 | 5.32 | 5.33 |
| Lattice constant (Å) | 5.43 | 5.65 | 5.65 |
| Melting point (°C) | 1415 | 1238 | 937 |
| Dielectric constant | 11.7 | 13.1 | 16.0 |
| Bandgap energy (eV) | 1.12 | 1.42 | 0.66 |
| Electron affinity, $\chi$, (volts) | 4.01 | 4.07 | 4.13 |
| Effective density of states in conduction band, $N_c$, ($cm^{-3}$) | $2.8 \times 10^{19}$ | $4.7 \times 10^{17}$ | $1.04 \times 10^{19}$ |
| Effective density of states in valence band, $N_v$, ($cm^{-3}$) | $1.04 \times 10^{19}$ | $7.0 \times 10^{18}$ | $6.0 \times 10^{18}$ |
| Intrinsic carrier concentration ($cm^{-3}$) | $1.5 \times 10^{10}$ | $1.8 \times 10^{6}$ | $2.4 \times 10^{13}$ |
| Mobility ($cm^2/V\text{-}s$) | | | |
| Electron, $\mu_n$ | 1350 | 8500 | 3900 |
| Hole, $\mu_p$ | 480 | 400 | 1900 |
| Effective mass, $\left(\frac{m^*}{m_0}\right)$ | | | |
| Electrons | $m_l^* = 0.98$<br>$m_t^* = 0.19$ | 0.067 | 1.64<br>0.082 |
| Holes | $m_{lh}^* = 0.16$<br>$m_{hh}^* = 0.49$ | 0.082<br>0.45 | 0.044<br>0.28 |
| Effective mass (density of states) | | | |
| Electrons, $\left(\frac{m_n^*}{m_0}\right)$ | 1.08 | 0.067 | 0.55 |
| Holes, $\left(\frac{m_p^*}{m_0}\right)$ | 0.56 | 0.48 | 0.37 |

Physical constants

| | |
|---|---|
| Avogadro's number | $N_A = 6.02 \times 10^{+23}$ atoms per gram molecular weight |
| Boltzmann's constant | $k = 1.38 \times 10^{-23}$ J/K<br>$= 8.62 \times 10^{-5}$ eV/K |
| Electronic charge (magnitude) | $e = 1.60 \times 10^{-19}$ C |
| Free electron rest mass | $m_0 = 9.11 \times 10^{-31}$ kg |
| Permeability of free space | $\mu_0 = 4\pi \times 10^{-7}$ H/m |
| Permittivity of free space | $\epsilon_0 = 8.85 \times 10^{-14}$ F/cm<br>$= 8.85 \times 10^{-12}$ F/m |
| Planck's constant | $h = 6.625 \times 10^{-34}$ J-s<br>$= 4.135 \times 10^{-15}$ eV-s<br>$\frac{h}{2\pi} = \hbar = 1.054 \times 10^{-34}$ J-s |
| Proton rest mass | $M = 1.67 \times 10^{-27}$ kg |
| Speed of light in vacuum | $c = 2.998 \times 10^{10}$ cm/s |
| Thermal voltage ($T = 300°K$) | $V_t = \frac{kT}{e} = 0.0259$ volt<br>$kT = 0.0259$ eV |

Properties of $SiO_2$ and $Si_3N_4$ ($T = 300°K$)

| Property | $SiO_2$ | $Si_3N_4$ |
|---|---|---|
| Crystal structure | [Amorphous for most integrated circuit applications] | |
| Atomic or molecular density ($cm^{-3}$) | $2.2 \times 10^{22}$ | $1.48 \times 10^{22}$ |
| Density ($g\text{-}cm^{-3}$) | 2.2 | 3.4 |
| Energy gap | ≈9 eV | 4.7 eV |
| Dielectric constant | 3.9 | 7.5 |
| Melting point (°C) | ≈1700 | ≈1900 |

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：光電概論

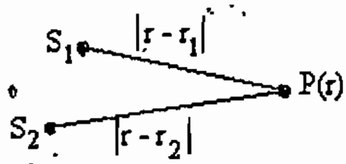
本試卷共有六大題，總分 100 分。

一、試設計一實驗步驟以量測多模光纖的數值孔徑(numerical aperture; N.A.)，並說明其學理？ (20 分)

二、設有二同一波長之單色光源 $S_1$ 及 $S_2$，其發出的光波到達 P 點時，其電場分別為(參考圖一)

$E_1 = E_{10}\sin(kr_1-\omega t)$

$E_2 = E_{20}\sin(kr_2-\omega t+\delta)$




其中 k 為波數， ω 為角頻率， δ 為光源 $S_1$ 與 $S_2$ 間的相角差，可能為時間的函數 δ(t)。 已知光強度 I 正比於電場之平方值 $E^2$，試求於 P 點量測出的光波平均總強度？ (15 分)

三、試以三能階系統說明紅寶石雷射操作之基本原理，並以圖示解釋之？ (15 分)

四、已知以波長 1849 埃(Å)紫外光照射於鉬金屬板上，量測得到光電子的阻尼電位(retarding potential) 為 2.72 伏特(V)，試計算鉬金屬之低限頻率(threshold frequency)及功函數(work function)？(已知蒲朗克常數為 $6.625\times10^{-34}$ 焦耳-秒) (15 分)

五、試說明如何利用光吸收的實驗結果，以求得直接(direct)半導體之能隙(energy gap)，並以圖示解釋之？ (15 分)

六、解釋名詞 (20 分)

(a) 量子效率(quantum efficiency) (5 分)
(b) 布魯斯特角 (Brewster angle) (5 分)
(c) 黑體輻射(black body radiation) (5 分)
(d) 全反射(total reflection) (5 分)

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：通信系統

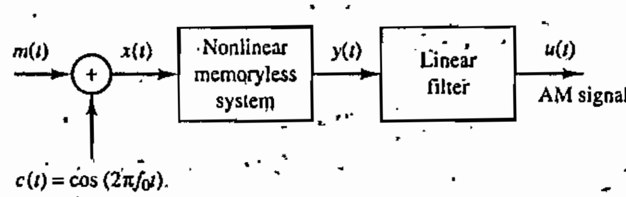
1. (15%)
For the zero-order-hold sampling scheme, sampling is done by sampling at $nT_s$ and holding the result until the time of the next sample $(n+1)T_s$. Derive the relation between $X_s(f)$ and $X(f)$ which are the Fourier transform of the sampled signal $x_s(t)$ and the original signal $x(t)$, respectively.

2. (10%)
Find the value of

$$\int_{-\infty}^{\infty} \text{sinc}^3(t)dt$$

3. (15%)
The system shown in the following figure is used to generate an AM signal. The modulating signal $m(t)$ has zero mean and its maximum (absolute) value is $A_m = \max|m(t)|$. The nonlinear device has an input-output characteristic

$$y(t) = ax(t) + bx^2(t)$$




(a) Express $y(t)$ in terms of the modulating signal $m(t)$ and the carrier $c(t) = \cos(2\pi f_c t)$.

(b) Specify the filter characteristics that yield and AM signal at its output.

(c) What is the modulation index?

4. (15%) Consider a lowpass signal $m(t)$ with the Fourier transform

$$M(f) = \begin{cases} 2 - |f|, & |f| < 2 \\ 0, & |f| \geq 2 \end{cases}$$

We construct a bandpass signal $x(t) = 6m(t)cos(2\pi f_0 t) + 6\hat{m}(t)sin(2\pi f_0 t)$, where $f_0 > 2$ and $\hat{m}(t)$ is the Hilbert transform of $m(t)$.

(a) Find $m(t)$.

(b) Find the lowpass equivalent signal of $x(t)$.

(c) Sketch the Fourier transform of $x(t)$.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：通信系統

5. (10%) In an analog communication system, the demodulation gain, $G$, is defined as the ratio of the SNR at the output of the demodulator to the SNR at the output of the noise-limiting filter at the receiver front end. Find the demodulation gain in each of the following cases.

(a) SSB (single sideband).

(b) FM with modulation index $\beta_f$.

6. (15%) A souce has an alphabet $\{a, b, c, d\}$ with corresponding probabilities $\{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}\}$.

(a) Find the entropy of the source (in bits/symbol).

(b) Design a Huffman code for the source.

(c) What is the average length of the Huffman code?

7. (20%) Consider an M-ary modulator with M=5 signals

$$s_m(t) = \begin{cases} \cos(\omega_0 t - \frac{m}{2}\pi); & m = 0, 1, 2, 3 \\ 0 & m = 4 \end{cases}$$

$$0 \le t \le T, \quad \omega_0 T = 100\pi.$$

(a) Find the orthonormal basis functions.

(b) Find the signal constellation.

(c) Sketch the decision regions.

(d) Sketch the optimum receiver for an AWGN channel, using $s_m(t)$, $m = 0, 1, 2, 3, 4$, as the reference signals.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：電子所
科目：計算機概論（甲）

1. (20pts) Assume that A and B are two 4-bit unsigned integers. Please

   a. design a 4×4 bit multiplier based on the 2×2 bit multipliers. (5pts) (**Note:** you can use a black box to represent a 2×2 bit multiplier and include other components if necessary)

   b. design a 4×4 bit multiplier if only full adders and AND gates are available in your design, i.e., to implement an 4×4 bit array multiplier for unsigned numbers. (5pts)

   c. show the critical path in (b) and find the worst-case execution time of your design. (5pts)

   d. compare the performance of radix-2 and radix-4 implementation. (5pts)

2. (20pts) For the following three 4-input functions

   $f_1(a, b, c, d) = \Sigma(0, 1, 2, 7, 8, 9)$

   $f_2(a, b, c, d) = \Sigma(0, 2, 6, 7, 8, 9, 10, 13, 15)$

   $f_3(a, b, c, d) = \Sigma(0, 2, 6, 7, 8, 10)$

   a. please use the tabular (Quine-McCluskey) method to minimize the two-level sum-of-product expression of the function $f_2$. (10pts)

   b. derive a two-level all-NAND circuit that realizes $f_1$, $f_2$, and $f_3$ with the minimum cost. (10pts) (**Note:** You can use either K-maps or the tabular method for the multiple-output realization)

3. (20pts) For an expression tree as shown in Figure 1.

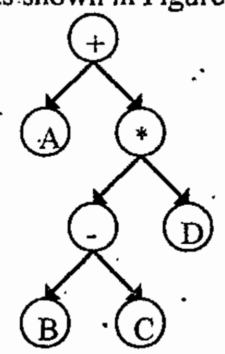



Figure 1

Using C (or whatever language you are familiar with), please

   a. define the data structure of a tree node (6pts)

   b. write down the prefix, infix and postfix expressions (7pts)

   c. code a function "prefix(root_of_tree)" which can traverse the tree and print out its prefix expression (7pts)