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：資管所、工管所
科目：計算機概論

Part I: (15%) Given the following 15 terms, choose one of the best description (from A to T) for each term. (答錯不倒扣)

1. Archie	2. Telnet	3. ISP	4. DNS	5. RPC
6. VOD	7. DHCP	8. HTTP	9.URL	10. HTTPS
11. IPX	12. NFS	13. PCMCIA	14. SMTP	15. SSL

A. A highly reliable packet network technology. Extensive error checking at each hop contributes to great reliability but introduces high latency and limits bandwidth.
B. A concept whereby cable television companies would transmit programs when subscribers asked for them.
C. The address to a specific resource's location.
D. A specification that supports IP traffic over serial connections.
E. A security service inserted between an application and the network stack.
F. The accepted standard for transmitting Electronic Mail over the Internet.
G. An interface specification for input/output devices.
H. A subroutine call made on one computer but satisfied on another.
I. A specification for credit-card-sized expansion cards used mostly in laptop computers.
J. A transparent network file sharing system most often used on UNIX systems.
K. An enterprise that sells Internet connectivity and related services.
L. A credit card encryption and verification system combining technology from SEPP and STT.
M. The network layer protocol used natively by Novell Netware.
N. The means by which browsers on the World Wide Web get pages from servers.
O. A specification for authenticating and encrypting HTML requests and responses.
P. An application that maintains a database of file names located on various FTP sites.
Q. A distributed database system that translates hierarchical host names to IP addresses (and vice versa).
R. An extended version of BOOTP that supports more configuration parameters and doesn't require configuring settings in advance for each data link address.
S. A device that segregates two networks based on data link address.
T. An application that opens remote terminal sessions over a TCP/IP network.

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Part II: (35%) The following questions are multiple choice questions. There is only one correct solution. (答錯不倒扣)

1. (1%)Which is an object-oriented language?
   (A). C (B). CGI (C). HTML (D). DEPHI (E). none of these answers.
2. (1%)Which of the following is NOT the key property of object-orientation?
   (A). hashing (B). data abstraction (C). polymorphism (D). inheritance (E). none of these answers.
3. (1%)How many bits would be in the memory of a computer with a 4KB memory?
   (A). 32,768 (B). 4,096 (C). 40,000 (D). 4,000 (E). none of these answers.
4. (1%)Which of the following is NOT the basic information that the CPU must supply to the main memory circuitry to write a value into a memory cell?
   (A). address of the cell (B). type of the value (C). the command to write (D). value to be written (E). none of these answers.
5. (1%)The following two constructs are equivalent:
   while (test) do { actions } vs. do { actions } while (test);
   (A). TRUE (B). FALSE (C) depends on test (D). depends on actions (E). none of these answers
6. (1%)The most appropriate definition for the term "kernel" is:
   (A). the parts of the OS code concerned with security.
   (B). the entire software shipped as OS by the manufacturer.
   (C). program running at all times on the computer.
   (D). architecture dependent parts of the OS code.
   (E). none of these answers.
7. (1%)A processor in the context of computing is:
   (A). A set of instructions to be executed on a computer.
   (B). A program in execution.
   (C). A piece of hardware that executes a set of instructions.
   (D). The main procedure of a program.
   (E). none of these answers.
8. (1%)A multiprogramming system may be defined as one in which:
   (A). Programs are divided into procedures.
   (B). Input is accepted in batches of many jobs.
   (C). Several programs can reside in memory at the same time.
   (D). Many processes may share the same program residing in main memory.
   (E). none of these answers.

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9. (1%)The main distinction between a multiprocessor system and a multiprogramming system is that in a multiprocessor system:
(A). The main storage is shared by several programs.
(B). The input is accepted in batches of many jobs.
(C). Processor time is shared among several processes.
(D). Many processors may be active simultaneously.
(E). none of these answers.

10. (2%)What is the largest numeric value that could be represented with 3 bytes if each digit were coded using one ASCII pattern per byte?
(A). 9999 (B). 999 (C). 16,777,215 (D). 32,768 (E). none of these answers.

11. (2%)What is the value of 5.625 in binary notation?
(A). 101.0101 (B). 101.1001 (C). 110.1010 (D). 101.110 (E). none of these answers.

12. (2%)Suppose you want to complement the 3 middle bits of a 7-bit string while leaving the other 4 bits undisturbed. What mask must you use together with what operation?
(A). 0011100, XOR (B). 0000000, AND (C). 1111111, NOT
(D). 1100011, OR (E). none of these answers.

13. (2%)What is the maximum number of entries that must be interrogated when applying the binary search to a list of 200 entries?
(A). 100 (B). 10 (C). 50 (D). 20 (E). none of these answers.

14. (2%)Let T be a binary tree. If the postorder sequence of T = GDBHIEFCA and the inorder sequence of T = DGBAHEICF . What is the preorder sequence of T?
(A). ABDGCEHIF (B). CEABDIHFG (C). BAFGCHIDE (D). DHIEAFGBC
(E). none of these answers.

15. (2%)Let a=2, b=3, c=4, d=5, e=6. What is the value of the following postfix expression? abc-d +/ea-*c*
(A). 4 (B). 8 (C). 10 (D). 12 (E). none of these answers.

16. (2%)Let R be the number of rows in the matrix. Given a formula for finding the entry in the Ith row and Jth column of a two-dimensional array if it is stored in column major order.
(A). R(J-1)+(I-1) (B). R(J+1)-(I+1) (C). R(J-I) (D). R(J-1)+(I+1) (E). none of these answers.

17. (2%)Consider the following program fragment for a single address computer with one accumulator register:

```
LOAD    B
MUL     B
STORE   T1
LOAD    C
DIV     D
SUB     T1
STORE   Z
```

Which arithmetic expression is implemented by the above fragment?

(A). $Z= B^2-D/C$ (B). $Z=T1-C/D$ (C). $Z=C/D-B^2$ (D). $Z=(C/D)^2-B$

(E). none of these answers.

18. (2%)Which of the following is NOT a conflict serializable schedule?

(A). T1: R(x) W(x)
T2: R(x) W(y)

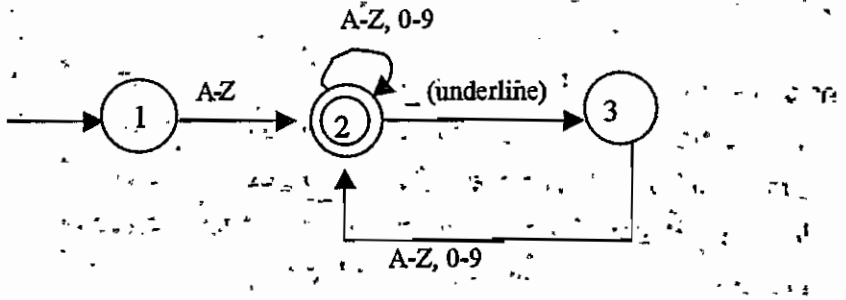
(B). T1: R(x) R(y) W(x) W(y)
T2: R(x) W(x)

(C). T1: R(x) W(x)
T2: R(x) W(y)
T3: R(x) W(y)

(D). T1: R(x) W(x)
T2: R(x) W(y)

(E). none of these answers.

19. (2%)Considering the following finite automation for string's input:



Which of the following string cannot be recognized?

(A). TEST_NO1 (B). MIS87 (C). NOT_A_GOOD_VAR (D). AAA_999

(E). none of these answers.

20. (2%)Considering the following program segment:

```
procedure TTestForm.TestButtonClick(Sender: TObject);
  var J, K: integer;
begin
  K := 3;
  For J := 1 to 5 do
    begin
      K := K + J;
      K := K + 2;
    end;
  J := K*10;
  Y.text := IntToStr(J);
  X.text := IntToStr(K);
end;
```

Give the results of X and Y.

(A). X= 110, Y= 11 (B). X=300, Y=30 (C). X= 220, Y=22 (D). X=280, Y=28

(E). none of these answers.

21. (2%)The major distinction between lightweight(thread) and heavyweight processes centers around:

(A). The amount of memory that must be allocated to the process.

(B). The average number of instructions executed by the process.

(C). The amount of overhead associated with process creation and context switching.

(D).The number of I/O requests made by the process.

(E). none of these answers.

22. (2%)The main difference between binary semaphores and counting semaphores is that:

(A). Binary semaphores can only take the values 0 and 1, while counting semaphores can take any non-negative integer values.

(B). Binary semaphores can only be used to solve problems involving up to two processes sharing the same resource, while counting semaphores can be used to solve problems involving more than two processes sharing the same resource.

(C). Binary semaphores cannot solve all the problems that can be solved by counting semaphores.

(D). Counting semaphores must be controlled by a monitor, while binary semaphores are called directly by user processes.

(E). none of these answers.

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Part III: (20 分)
有關世界網、物件導向語言的是非題。對的打○，錯的打 X。每題兩分。(答錯不倒扣)

___1．物件導向程式的執行效率比 C 的程式要快而且也易於維護。

___2．在 Unix 系統執行的 CGI 程式不能顯示於 Windows95 的瀏覽器中。

___3．Instance variable 是物件儲存資料的地方。

___4．Java 能支援 write once runs everywhere 的主要原因是 Java 有支援許多不同硬體平台的編譯器。

___5．HTML 是--撰寫 WWW 應用軟體的程式語言。

___6．HTML 具備編輯基本的人機界面如按鈕 (button)，選單 (menu)等的功能。

___7．Java 不支援 pointers，而且一個 Java 的 class 最多只能直接繼承一個 super class。

___8．純物件導向的語言無法撰寫遞迴（recursion）的程式。

___9．物件導向的程式語言亦可支援 ADT (abstract data type) 的觀念。

___10．CGI 程式比 Java 更容易撰寫檢查輸入資料是否正確的人機界面。

Part IV: (30 分) 這部份資訊管理研究所考生**不必作答**，工業工程與管理研究所考生**要作答** (答錯不倒扣)

是非題，每題一分

___1．C 語言陣列的大小在程式執行時可以改變

___2．C 語言的陣列在 function 間是用地址傳遞

___3．C 語言的陣列可以存放其他陣列的地址

____4．C 語言的 register 是存取速度最快的變數型態

____5．C 語言的 #define 在程式編譯時會產生適當的機器碼 (machine code)

____6．全域變數 (global variable) 的 scope 可以不包含程式的全部

____7．C 語言的區域變數 (local variable) 與全域變數不可同名

____8．關連式資料庫表格內的資料必須按序排列

____9．Unix 與 Windows/NT 都是支援多人多工的作業系統

____10．Prolog 語言與 Lisp 語言均適合於人工智慧的應用

填空題，每空格兩分。

11．列舉三種合理的 CPU scheduling 的方法。
a. _____ b. _____ c. _____

12．列舉三種排序的演算法。
a. _____ b. _____ c. _____

13．列舉四種能支援搜尋的資料結構。
a. _____ b. _____ c. _____ d. _____

Part V: (30 分) 這部份資訊管理研究所考生**要作答**，工業工程與管理研究所考生**不必作答**。

如果您想使用網路技術（含 www, e-mail 等）設計一可以大幅改進目前文字型 bbs 系統的「超級 bbs」，使得某討論群組的參予者不但能在線上溝通，還能透過網路與居住在地理區域相近或興趣相同的網友進一步的組織成社團，以發揮一般社團組織的功能，請問您有哪些想法與創意？需要使用哪些技術才能達到您的理想？您的答案需包含以下兩點：

a．使用者（包括：管理者，一般用戶）功能設計。15%

b．系統架構應如何？需要哪些技術才能達到您的理想？15%

請最多以一頁的答案紙清楚的表達您的想法，多出的部份不予計分。計分標準包括：表達能力、創意及技術面的合理性與正確性。

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第一部分（共計50分）

1. 已知$P(A)=0.45$，$P(B)=0.32$，$P(\overline{A}\,B)=0.2$，請計算$P(A\,\overline{B})$與$P(\overline{A},\overline{B})$。（6分）

2. 型I誤差（Type I Error）與顯著水準α（Significance）有何差異？說明之。（5分）

3. 設$X\sim N(2,1)$，請計算X的第95個百分位數。（5分）

4. 味全龍與時報鷹爭奪職棒總冠軍，辦法是7戰4勝制。假定每一場味全龍贏球的機率爲0.6，且每一場比賽皆是獨立的。請問，至多打完6場，味全龍就可獲得總冠軍的機率？（8分）

5. 設$f(x,y)=\frac{1}{4}$，$0\le x\le 2$，$0\le y\le 2$，
（a）求X之邊際分配？　（b）判斷X與Y是否獨立？（8分）

6 設有二組樣本用來檢定$Ho:\mu 1=\mu 2$，已知$N1=10$，$N2=10$，$S1=1$，$S2=2$，$\overline{X}1=4$，$\overline{X}2=6$。若利用ANOVA來檢定，則其檢定統計量F的值爲何？（8分）

7. 設A事件在第i次試驗時發生的機率等於Pi，求事件A在n次試驗中發生的期望值與變異數。（5分）

8. 設X與Y皆爲二項分配，且互爲獨立。請問X+Y是否爲二項分配？若否的話，則需在何種條件下，X+Y才會是二項分配。（5分）

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第二部分（共計50分）

一、雲林縣政府欲調查下列三事項，以作爲制定該縣社會福利政策之依據：
(1)雲林縣平均GNP；(2)雲林縣縣民平均死亡率；(3)雲林縣縣民吸煙比率，試分別就以上(1)、(2)、(3)項，請問：
(a) 母體各應如何界定？(3分)
(b) 參數(parameter)各爲何？(2分)

二、聯合科技公司現有員工48位，其中員工平均薪資爲60,000元，標準差5,000元，請問：
(a) 是否可能有3位員工薪資在90,000元以上，爲什麼？(請敘明理由)。(5分)
(b) 若上題的答案爲否定時，請問，你認爲最多有幾位員工薪資在90,000元以上？(3分)
(c) 又員工薪資在70,000元以上至多有幾位？(2分)

三、王五、趙六是公司的一對活寶，平時喜歡互相抬槓，但平日兩人在作決策時，有下列之行爲：
(1)令王五之決策行爲爲隨機變數X，其觀察值爲X=-1 代表反對；X=0 代表無意見；X=1 代表贊成；且其機率質量函數爲
P(X=-1)=P(X=0)=P(X=1)=1/3
(2) 令趙六之決策行爲爲隨機變數Y，其觀察值爲Y=0 若X≠0；Y=1 若X=0，
請問：
(a) 王五、趙六兩者決策行爲是否相關？(2分)
(b) 常言道：若X與Y獨立，則cov(x,y)=0；反之，逆敘述是不對的。請就以上敘述，試證明之。(3分)

四、雲林縣某企管顧問公司舉辦研討會，公司依學員報名先後次序編號，從1號編至N號，但N爲多少並未對外公佈；本縣稅捐單位欲估計學員人數，以作爲課稅之依據，隨機抽取9位學員其編號爲：
13，52，26，60，43，32，75，81，8
試以平均數、中位數、全距三個統計量爲基礎估計N。(5分)

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五、康雅公司想了解不同職業階層(白領階層、藍領階層、學生階層、自營企業負責人及其他)對紅酒飲用量有無顯著差異，該公司欲利用下列方式蒐集資料與檢定方法：

(a) 隨機抽取100人，訪問不同職業階層各20人，得100筆資料，並檢定其平均飲用量有無顯著差異，請問如何分析(請寫出檢定假設及統計量)？若想用此種分析，請問資料須符合什麼假設？(3分)

(b) 若分析結果得知，職業階層不同對紅酒飲用量有顯著不同，請問你如何進一步分析(請寫出檢定統計量)？以瞭解差異原因。(3分)

(c) 若分析結果得知，白領階層與自營企業負責人對紅酒飲用量無顯著差異；且藍領階層、學生階層與其他對紅酒飲用量亦無顯著差異，請問你如何進一步分析(請寫出檢定假設及檢定統計量)？並寫出你的看法。(3分)

六、大眾公司欲調查家庭擁有信用卡張數之情況，下列爲八個家庭之資料：

家庭編號	信用卡張數y	家庭人口數x
1	4	2
2	6	2
3	6	4
4	7	4
5	8	5
6	7	5
7	8	6
8	10	6

(a) 試求算信用卡張數之平均數及變異(variation)。(3分)

(b) 請分別說明當信用卡張數若變異等於0；變異很小；變異很大時，你的看法各爲何？(3分)

(c) 請問信用卡張數與家庭人口數有何關係？(3分)

(d) 試建立信用卡張數與家庭人口數之關係方程式。(4分)

(e) 請將以上之變異分解，據此說明家庭人口數對信用卡張數之解釋能力。(3分)

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所別：資管所
科目：資料結構

一、a) 電腦內部處理陣列(Array)之方式有幾種？ (2分)
b) 試說明 a)中之處理方式爲何？並舉例說明之。 (4分)

二、a) 何謂 Queue，Deque(Double Queue)，Priority Queue？ (6分)
b) 試說明 a)中之 3 種 Queue 各可應用在那些方面呢？ (6分)

三、試各寫出將一個 Singly Linked List 倒轉(reverse)之非遞迴(nonrecursive)及遞迴(recursive)的演算法(algorithm)。 (16分)

四、a) 試比較 Bubble Sort、Insertion Sort 及 Heap Sort 之優缺點？ (6分)
b) 常見之 Sorting 方式有 Binary Sort、Bubble Sort、Selection Sort、Insertion Sort、Quick Sort、Radix Sort、Merge Sort 及 Heap Sort 等，如果你被要求設計一種不在上述中之新的 Sorting 方式時，你將會設計怎麼樣的 Sorting 方式？並試說明此種 Sorting 方式之優缺點爲何？ (10分)

五、如果從 0 到 999 之間隨機挑出 50 個整數來建立一個二元搜尋樹，試問採用鏈結方式或者是循序方式來實作何者較好呢? 並說明其理由。 (10分)

六、已知具有 0、1、2 與 3 個節點的二元樹分別有 0、1 、2 與 5 顆。
a) 試問具有 4 個節點的二元樹有幾顆？並劃出所有 4 個節點的二元樹。 (5分)
b) 是否能夠找出一個公式來表示具有 n 個節點的二元樹之顆數呢？試說明其理由。 (5分)

七、試利用Huffman algorithm (霍夫曼演算法)於英文字母的編碼，假設英文字母出現的機率如以下所示: (10分)

A: .078	B: .013	C: .030	D: .042	E: .107	F: .025
G: .018	H: .058	I: .075	J: .006	K: .009	L: .038
M: .029	N: .072	O: .072	P: .018	Q: .005	R: .057
S: .073	T: .082	U: .032	V: .016	W: .020	X: .003
Y: .020	Z: .002				

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八、以下爲 Hanoi Tower 問題的部份虛擬程式碼

```
hanoi (no_of_disk, from_disk, to_disk, temp_disk)
{
  if (no_of_disk == 0)
      return
  else
  {
      hanoi (n-1, from_disk, temp_disk, to_disk);
      列印 「從木樁 from_disk 上搬移最上層的圓盤到木樁 to_disk」
      hanoi (n-1, temp_disk, to_disk, from_disk);
  }
}
```

例如，當程式呼叫爲hanoi (3, 1, 2, 3) [no_of_disk 等於3，from_disk等於1，to_disk等於2，temp_disk等於3」時，上述程式碼將列印出如以下所示，

從木樁 1 上搬移最上層的圓盤到木樁 2
從木樁 1 上搬移最上層的圓盤到木樁 3
從木樁 2 上搬移最上層的圓盤到木樁 3
從木樁 1 上搬移最上層的圓盤到木樁 2
從木樁 3 上搬移最上層的圓盤到木樁 1
從木樁 3 上搬移最上層的圓盤到木樁 2
從木樁 1 上搬移最上層的圓盤到木樁 2

a) 當程式呼叫爲hanoi (4, 1, 2, 3)時，上述程式碼的列印情形爲何？ (7分)

b) 試寫出上述程式碼的時間複雜度(Big-Oh)。 (3分)

c) 假設有一台 "1-giga Hz" 的電腦(每秒可以執行10^{12}個指令)，又假設此電腦沒有記憶體限制。試問當程式呼叫爲hanoi (100, 1, 2, 3)時，電腦大約需要多久的時間可以執行結束(請給予一個約略的數目，例如，一個小時，一天，一個月，一年，一百年，一億年，一千億年，一千倍的一千億年，…)？並說明其理由。 (5分)

d) 是否能夠改善上述程式碼以減少其時間執行呢？並說明其理由。 (5分)

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科目：資訊管理實務

一、試問你該如何評估企業資訊部門所提供服務的品質？試就所提方法作一優缺點比較。(25%)

二、近年來商業應用軟體的蓬勃發展對資訊部門專業人員所扮演的角色有何衝擊？試從系統開發與維護兩方面探討之。(25%)

三、請舉出任一你所熟知的案例，簡述該公司是以何種策略及作法徹底改變傳統的經營方式，進而創造優越的競爭優勢？如果您是一家中小企業的主管，面對資訊科技快速變遷的環境，您將以何種策略爲自己的公司獲取優越的競爭優勢？ (25%)

四、爲免除企業在軟、硬體選擇及維護上的困擾，ISP 公司提供了各式的代管服務，以幫助企業在最短的時間完成 Intranet 的設計，企業虛擬網路(Virtual Private Network；VPN)服務即在此種環境下因應而生。請說明什麼是 VPN，VPN 對於企業有哪些好處，又當企業考量採用 VPN 時應考量哪些因素？(25%)

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所別：資管所
科目：經濟學

Part I. 選擇題(單選，每題四分，答錯倒扣兩分)

1. The fundamental reason people must choose which goods to buy and consume is because of
   a. scarcity.
   b. specialization.
   c. people engaging in exchange.
   d. the fact that there are many economic agents.
   e. the great abundance of free resources.

2. An equilibrium price is established when
   a. the number of sellers equal the number of buyers.
   b. everyone who wants the good gets it.
   c. sellers are unable to sell any more of the good.
   d. buyers cannot find sellers willing to sell to them.
   e. none of the above.

3. The principle of substitution suggests that
   a. every individual endeavors to employ his or her capital so that what it produces has the greatest value.
   b. prices will always be equilibrium prices.
   c. no single person need to know all prices to function in daily economic life.
   d. users are usually able to switch from one good to another as relative prices change.
   e. changes in relative prices signal what goods are cheap and what goods are expensive.

4. A factor that causes the demand curve for a good to shift to the right also causes
   a. the supply curve of the good to shift to the right.
   b. the supply curve of the good to shift to the left.
   c. no shift in the supply curve.
   d. the demand curve to shift to the left.
   e. none of the above, because there is no general relationship.

5. The futures price of wheat is lower than the spot (current) price of wheat when
   a. people think that wheat will be relatively scarce in the future because of a bad harvest in Russia.
   b. people believe that the demand for wheat will rise in the future as foreigners demand more wheat.
   c. the government lifts restrictive regulations so that farmers can grow more wheat in the future.
   d. people know that farmers will want more wheat in the future to feed to their livestock because the price of corn has risen.
   e. there is an exceptionally good current harvest of wheat that is unlikely to be repeated soon.

6. Which cost does not change in the short run as output increases?
   a. Marginal costs.
   b. Variable costs.
   c. Fixed costs.
   d. Opportunity costs.
   e. Explicit plus implicit costs.

7. The supply curve of a perfectly competitive industry is the horizontal summation of each firm's
   a. MC curve above the average variable cost curve.
   b. long run ATC curve below the MC curve.
   c. P curve.
   d. MR curve.
   e. none of the above.

8. An important difference between a monopoly and an oligopolistic industry is
   a. oligopolistic firms face horizontal (perfectly elastic) demand curves for their products.
   b. MR = P for monopolies.
   c. oligopolistic firms always produce a homogeneous product.
   d. monopoly firms are price takers while ologopolistic firms are price searchers.
   e. the barriers to entry tend to be somewhat lower in oligopolistic industries.

9. Which of the following is best described as an investment in human capital?
   a. The purchase of a new machine tool that only skilled workers can use.
   b. Saving an additional $20,000 in a savings account that pays a higher interest rate.
   c. Learning how to use a word processing program on a computer.
   d. Quitting work to take a vacation.
   e. None of the above are examples of acquiring human capital.

10. At the natural rate of unemployment, real GDP ____ the natural level of real GDP and the inflation rate is ____.
   a. is greater than; rising
   b. is greater than; falling
   c. is equal to; rising, constant, or falling, depending on other factors
   d. is equal to; not changing
   e. is less than; falling

11. A decrease in investment, I, causes the
   a. AD curve to shift to the right.
   b. AD curve to shift to the left.
   c. Keynesian AS curve to shift to the left.
   d. Classical AS curve to shift to the left.
   e. SRAS curve to shift to the left.

12. Which of the following statements about the Federal Reserve is *false*?
    a. The Federal Reserve sets required reserve ratios commercial banks must meet.
    b. The Federal Reserve is overseen by the seven member Board of Governors.
    c. Federal Reserve actions can change the amount of the nation's money supply.
    d. The Federal Reserve can increase or decrease the monetary base.
    e. None of the above; that is, they are all true statements.

13. An adverse supply shock
    a. does not cause a lasting inflation.
    b. causes persistent inflation.
    c. causes wages to rise more rapidly than prices.
    d. can cause persisting inflation only if it raises velocity.
    e. causes wages and prices to rise by the same amount.

14. Nonactivists believe that
    a. the private sector is not stable.
    b. it is easy to conduct correct activist policy.
    c. government policy is necessary to stabilize the economy.
    d. activist policies are the reason why business cycles have been milder after World War II.
    e. activist policies may destabilize the economy.

15. There is currently general agreement about which of the following:
    a. The government should not use activist policies.
    b. The economy eventually returns to the natural rate of unemployment.
    c. The Great Depression is proof that activist policies are desirable.
    d. The self- correcting mechanism works rapidly.
    e. Running government policy according to rules is better than trying to use discretionary policy.

16. The cost of restricting imports into a country is
    a. a loss of jobs in export industries.
    b. a fall on the standard of living.
    c. a decrease in the number of goods that can be consumed.
    d. a fall in average income.
    e. all of the above.

17. Demand for foreign exchange in America is increased by all of the following *except*
    a. an increase in demand by Americans for imported commodities.
    b. an increase in American exports.
    c. an increase in the number for Americans traveling abroad.
    d. an increase in the desire of Americans to invest abroad.
    e. an increase in the profits sent by companies in America to their foreign owners.

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18. If the exchange rate depreciates, imported goods are ____ for domestic residents and domestic exports are ____ for foreign citizens.
    a. cheaper; cheaper
    b. cheaper; more expensive
    c. more expensive; more expensive
    d. more expensive; cheaper
    e. any of the above could be correct depending on other factors

19. Suppose when your income was $20,000 you paid $1,000 in taxes. If your income rose to $21,000 and you paid $1,500 in taxes, what is the marginal tax rate?
    a. 10%
    b. 15%
    c. 13.6%
    d. 9.1%
    e. 50%

20. Which of the following is an example of a pure public good?
    a. A municipal sewer system.
    b. Government provided flood insurance for people living in a flood prone area.
    c. The public school system.
    d. National defense.
    e. All of the above are pure public goods.

Part II. 簡答題(每題十分)

1. Suppose Pat's Taco and Chow Mein Shoppe had revenues of $300,000 and total explicit costs of $250,000. Say that Pat worked 1000 hours in the shop without pay. If Pat could earn $10 per hour managing another fast-food stand, what is Pat's economic profit? Finally, assume that in addition to managing the stand, Pat invested $400,000 in the business. If the $400,000 could have earned a return of 15 percent in another investment, what now is Pat's economic profit?

2. Suppose a nation has initially 10,000 unemployed people and 90,000 employed workers. If 5,000 of the unemployed people decide they cannot find a job and stop searching for work, what will be the size of the officially measured labor force? The officially measured unemployment rate?

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所別：資管所
科目：資訊管理導論

一. 近年來通路革命導致國內流通產業結構呈現巨大轉變，傳統經營管理方式已漸難在競爭激烈的市場佔有一席之地，各類資訊系統(如 POS、EOS、EDI、VAN..)的運用遂成為流通業發展之必然趨勢，試問：

(1) 何謂 EDI? [4%]

(2) EDI 系統的組成要素及其作用為何? [8%]

(3) EDI 應用的成本及效益為何? [8%]

二. 目前國內企業在面臨國際化的經營模式及競爭壓力下，為能充分的運用有限資源，發揮最大的效益以增加生產力及提昇服務品質，並能專注於核心業務，減少在時間、人力及金錢投資的情況下，紛紛將資訊系統外包給資訊服務業者，試問：

(1) 資訊系統外包的範疇為何? [5%]

(2) 企業選擇資訊服務業者時評估要點為何? [7%]

(3) 外包後，企業對內部各類資訊人員技能需求有何變化? [12%]

三. 李先生是某家公司的總經理而王先生是該公司的作業現場領班，他們所需資訊的內容特性有何不同，請簡述之? [6%]

四. 【個案】Metpath 醫療檢驗公司處在競爭激烈、生存不易的臨床實驗室產業中，由於提供服務的差異化有限，而有顧客忠誠度極低及經常要削價拉攏生意的現象。醫生們將標本送到實驗室進行處理，而期待得到適時與正確的分析。

Metpath 的因應之道是以在醫生的診療室安裝連至實驗室電腦的終端機的方式來提昇對顧客的服務水準。只要付出很有限的月租費，醫生們可以在標本完成分析任務後，以最快進度得到結果報告。

【問題】1、從傳統觀點與策略性觀點而言，Metpath 所建立的資訊系統種類(例如，TPS、MIS、DSS、...)分別為何[4%]? 2、此種資訊系統可產生的策略性效益為何[6%]?

五. 請認定與說明企業可用以取得競爭優勢的策略[5%]。資訊系統可經由何種途徑為企業取得競爭優勢[5%]?

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六. 請定義「資訊系統基礎建設」(Information Systems Infrastructure)，並認定其成分[4%]。何謂組織的「資訊科技架構」(Information Technology Architecture)[4%]?「資訊系統基礎建設」與「資訊科技架構」間的關係為何[2%]?

七. 請說明與比較「程序合理化」(Rationalization of Procedures)與「企業再造工程」(Business Process Reengineering；BPR)的主要精神[7%]。在 BPR 中，企業應重視的核心經營程序有哪些[3%]?

八. 影響資訊系統專案風險程度的因素有哪些[4%]?何種專案管理技巧可用來控制專案的風險[6%]?

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所別：資管所
科目：資料庫系統

1. Suppose we decompose relation $R(A, B, C, D, E)$ into relation $S(A, B, C)$ and other relations. Give the functional dependencies that hold in S if the dependencies for R are:

   $AB \rightarrow DE$, $C \rightarrow E$, $D \rightarrow C$, and $E \rightarrow A$. (15%)

2. Consider a database of warships. Each warship has the following information associated with it:

   A. Its name.
   B. Its displacement (weight), in tons.
   C. Its type, e.g., battleship, destroyer.

   In addition, there are the following special kinds of ships that have some other information:

   A. Gunships are ships that carry large guns, such as battleships or cruisers. For these ships, we wish to record the number and bore of the main guns.
   B. Carriers hold aircraft. For these we wish to record the length of the flight deck and the set of air groups assigned to them.
   C. Submarines, which can travel under water. For these we wish to record their maximum safe depth. You may assume no gunship or carrier is a submarine.
   D. Battlecarriers are both gunships and carriers, and have all the information associate with either.

   Give an E/R design for this hierarchy of classes. (15%)

3. Consider the following database schema.

   ```
   Product(maker, model, type)
   PC(model, speed, ram, hd, cd, price)
   Laptop(model, speed, ram, hd, screen, price)
   Printer(model, color, type, price)
   ```

   The `Product` relation gives the manufacturer, model number and type (PC, laptop, or printer) of various products. We assume for convenience that model numbers are unique over all manufacturers and product types. The `PC` relation gives for each model number that is a PC the speed (of the processor, in megahertz), the amount of RAM (in megabytes), the size of hard disk (in gigabytes), the speed of the CD reader (e.g., 4x), and the price. The `Laptop` relation is similar, except that the screen size (in inches) is recorded in place of the CD speed. The `Printer` relation records for each printer model whether the printer produces color output (true, if so), the process type (laser, ink-jet, or dry), and the price.

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Write expressions of relational algebra to answer the following queries. (20%)

a) Find those hard-disk sizes that occur in two or more PCs.

b) Find those manufacturers of at least two different computers (PCs or laptops) with speeds of at least 133.

4. The following six rules are well-known inference rules for functional dependencies.

(Reflexive rule) If $X \supseteq Y$, then $X \rightarrow Y$.

(Augmentation rule) $\{ X \rightarrow Y \} \models XZ \rightarrow YZ$

(Transitive rule) $\{ X \rightarrow Y, Y \rightarrow Z \} \models X \rightarrow Z$.

(Decomposition rule) $\{ X \rightarrow YZ \} \models X \rightarrow Y$.

(Additive rule) $\{ X \rightarrow Y, X \rightarrow Z \} \models X \rightarrow YZ$.

(Pseudotransitive rule) $\{ X \rightarrow Y, WY \rightarrow Z \} \models WX \rightarrow Z$.

a. Prove the augmentation rule. (10%)

b. Prove the additive rule. (10%)

5. Given a relation R with a set of attributes, $V=\{A_1, \ldots, A_m\}$, and a set, F, of functional dependencies over V, describe a method to determine a key of R and justify your method. (15%)

6. a. What are database security issues? (5%)

b. Describe as many as mechanisms that you can think of to protect the database. (10%)

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科目：離散數學

下列 1～10 題，每題 10分，合計 100分。

1. 某甲以年利率 9% 向銀行借貸 S元，約定期限 20年，試以遞迴關係求解每月應攤還多少元？

2. 若 $S \neq \phi$，試問如何在 P(S)，冪集合上建構一布氏環 (Boolean ring)；又 $(P(S), \cup, \cap)$ 是否為一格狀體 (lattice)？

3. 試繪出 $K_{3,3}$，又 $K_{3,3}$ 是否為一平面圖 (planar)？

4. 共有 25隊參加某一籃球錦標賽，若採單淘汰賽，問共需比賽幾場以產生冠軍？

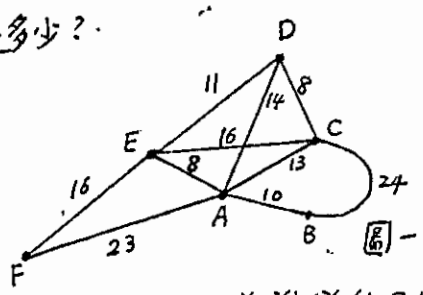
5. 設 G 為一非方向圖，λ 為著色數，試問何謂著色多項式 $P(G,\lambda)$，又若 G 為一具 n 個頂點的路徑 (path)，試問 $P(G,\lambda)=?$

6. 董月花正在解 $x_1+x_2+x_3+x_4<100$，求其該有幾組正整數解？

7. 4對夫婦圍圓桌而坐，若規定男女相間隔，夫婦不相鄰，則其坐法共有幾種？

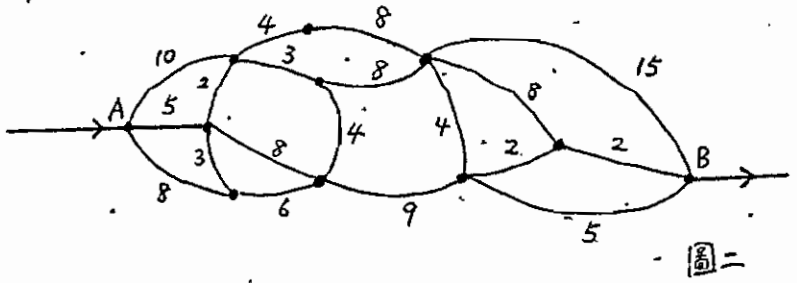
8. 5封不同內容的信分別寄給5個人，1人各寄1封，若將此5封信任意放入5個打好的信封內，則沒有一封信放對的機率是多少？

9. 一位從事直銷的銷售員佳加從她家（如圖一的A點）出發欲前往5個顧戶的家（如圖一的 B.C.D.E.F 5個點）中拜訪，在圖一中所標示的數字為兩點之間的里程數，若出發點與終點皆是A點，則最短路線的里程數是多少？



圖一

10. 在交通工程的問題中，若如圖二中，秀琴開車由A地的主幹道上向右前進欲往B地的主幹道後再向右離開，在圖中的數字表示城市中各地的道路每小時可容納的最大車流量，單位是百輛；求由A地到B地可能的最大車流量是多少？（假設車子能最有效的利用圖中的道路）



圖二