Course Title: Fuzzy Control (التحكم المبهم)
Date: Feb 3rd 2010 (First term)

Course Code: CCE4128
Allowed time: 3 hrs

Year: 4th (Comp. & Control Eng.)
No. of Pages: (4)

Remarks: (Attempt **ALL** the following problems and assume any missing data)

Problem number (1) **[20 Marks]**

a) Consider three finite fuzzy sets of X defined by three linguistic qualifiers positive big (PB), positive medium (PM) and positive small (PS) on the finite universe of real numbers [0, 6]:

$PS = \{0/1, 1/1, 2/0.7, 3/0.3, 4/0, 5/0, 6/0\}$

$PM = \{0/0, 1/0.3, 2/0.7, 3/1, 4/0.7, 5/0.3, 6/0\}$

$PB = \{0/0, 1/0, 3/0, 3/0.3, 4/0.7, 5/1, 6/1\}$

Find and **represent graphically** the membership function of:

i) *PM and PS*,
ii) *Not* (PB or *PM*),
iii) *More or less PM*,
iv) *Very PS*,
v) For *PB* and *PS* defined above, find the relational matrix R corresponding to the rule:

R: IF (*error* is *PB*) THEN (*regulator position* is *PS*)

where *error* and *regulator position* are two arbitrary linguistic variables.

[8 Marks]

b) Let $A = \{-7/0.2, -4/0.5, 0/0.85, 4/0.6, 7/0.9\}$ be a fuzzy set defined in the Universe of Discourse X. Let $B = \{-3/0.25, -1/0.45, 0/0.75, 1/0.8, 3/0.95\}$ be another fuzzy set defined in the Universe of Discourse Y. Find the fuzzy set C defined in the Universe of Discourse Z such that $z = f(x, y) = x + y$.

[8 Marks]

c) To the best of your knowledge, list the advantages and disadvantages of the Mamdani-and Sugeno Fuzzy rule processing methods.

[4 Marks]

Problem number (2) **[20 Marks]**

a) Given a fuzzy mapping f between U and V via the following relational matrix:

$$R = \begin{bmatrix} 0.5 & 1 & 0.3 & 0 \\ 0.5 & 0.8 & 0.3 & 0 \\ 0.5 & 0.6 & 0.3 & 0 \\ 0.5 & 0.5 & 0.3 & 0 \end{bmatrix}$$

Find the fuzzy output B in V if a fuzzy input A in U is defined as follows:

$A = \{1/0.9, 2/0.7, 3/0.4, 4/0\}$. Assume that the fuzzy set B is defined in the same Universe of Discourse as the fuzzy set A. Defuzzify this set using the Maximum Membership.

[8 Marks]

P.T.O.

b) Defuzzify the fuzzy set A in Figure (1) in the Universe of Discourse $X = [0, 8]$ using the Mean of Maxima and Centroid of Gravity Defuzzification methods. For the Centroid of Gravity method, use continuous as well as discrete definitions for the fuzzy set A.

[12 Marks]

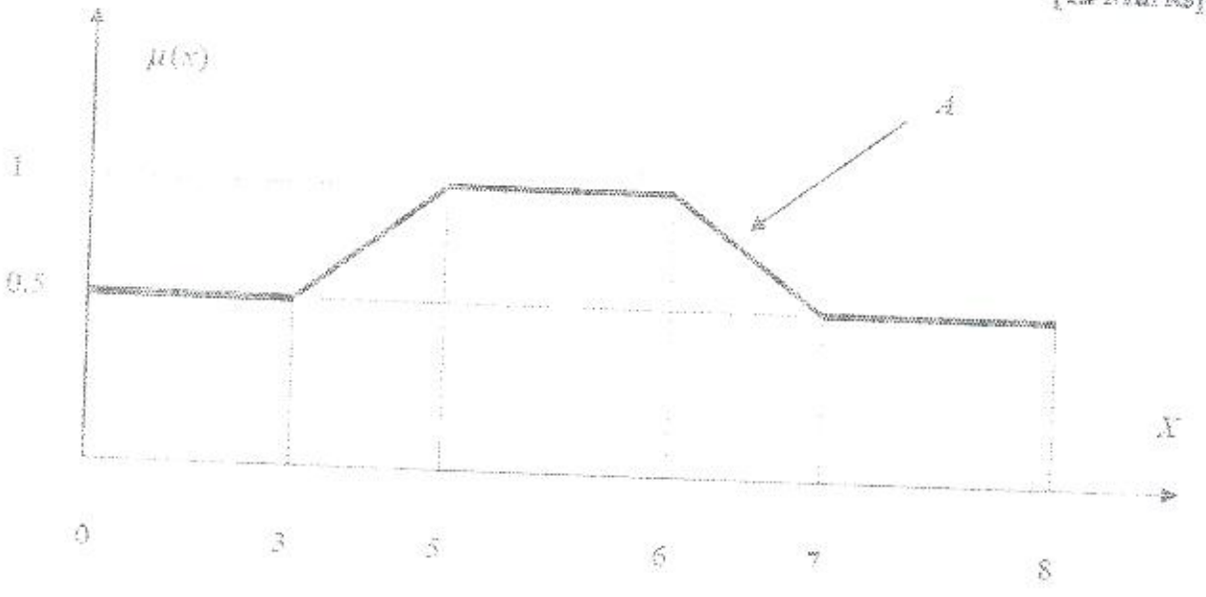


Figure (1)

Problem number (3) [20 Marks]

a) In order to simulate a dynamic control system relating to an automatic cutting machine the following discrete time equation is considered:

$x_{n+1} = \frac{7}{k_1 + 1} x_n + k_2 z_n + 3^{k_2} z_n$, where k_1 and k_2 are constants.

The membership functions for x, y and z are given as in Figure (2).

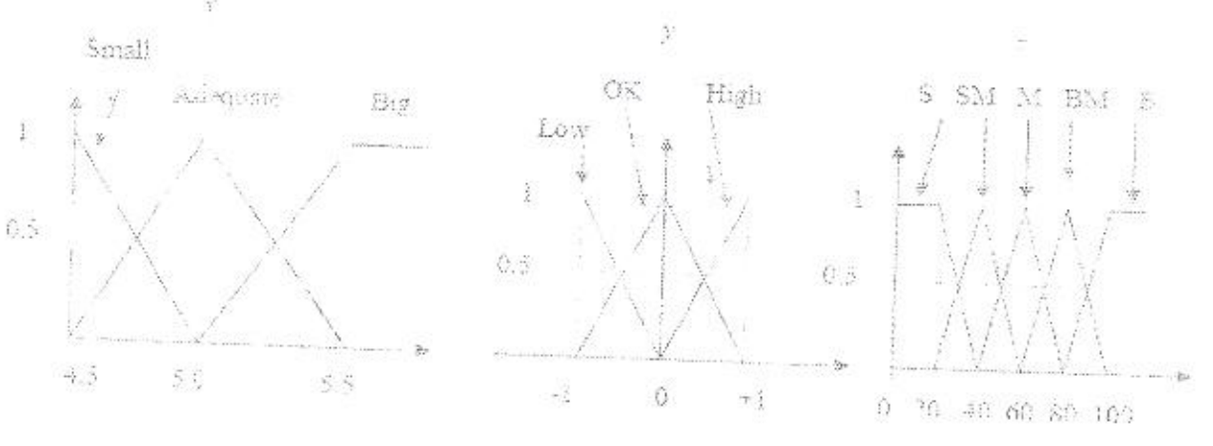


Figure (2)

P.T.O.

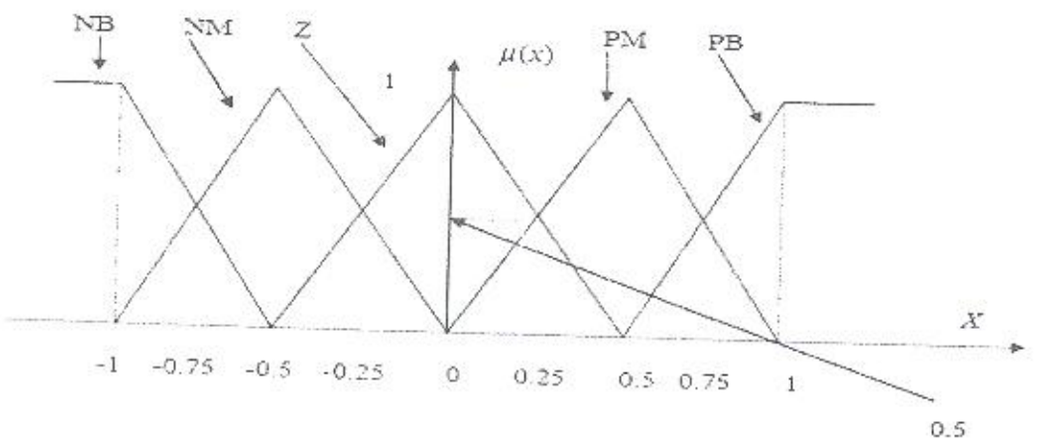
The rule-base for the fuzzy controller is given in the table below:

x \ y	Low	OK	High
Big	Small Medium	Small Medium	Small
Adequate	Big Medium	Medium	Small Medium
Small	Big	Big Medium	Big Medium

z

Taking initial conditions $x_0 = 5.1$ and $y_0 = -0.5$, demonstrate **graphically** how you would simulate **one** cycle of this closed loop fuzzy control system. For Defuzzification, use Mean of Maxima and Centroid of Gravity methods. (**Only estimates are required**). **[10 Marks]**

b) Consider the following fuzzy partitioning of the variables 'x' and 'y' in a normalized Universe of Discourse 'X' and 'Y' respectively as shown in Figures (3) and (4):



Figure(3)

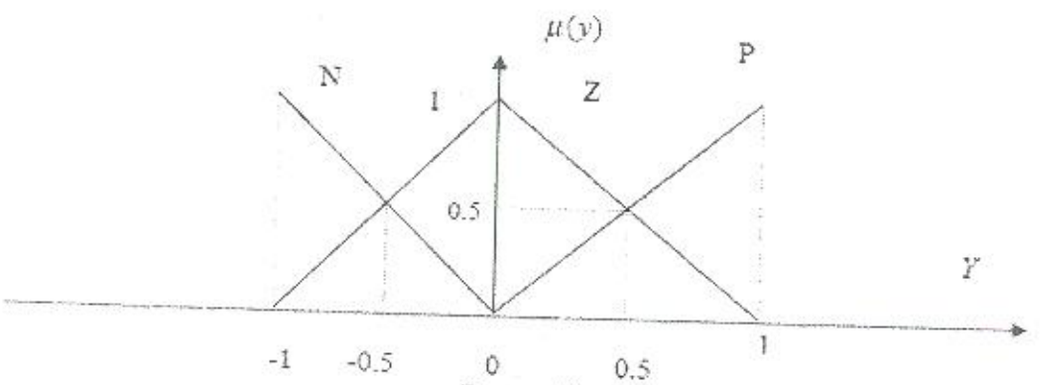


Figure (4)

P.T.O.

Let us assume the following set of 4 Takagi-Sugeno-Kang (TSK) fuzzy rules:

IF 'x' is NB AND 'y' is N THEN $z = a_1 x + b_1 + c_1 y$ **RULE 1**
IF 'x' is NM AND 'y' is N THEN $z = a_2 x + b_2 + c_2 y$ **RULE 2**
IF 'x' is Z AND 'y' is Z THEN $z = a_3 x + b_3 + c_3 y$ **RULE 3**
IF 'x' is PM AND 'y' is P THEN $z = a_4 x + b_4 + c_4 y$ **RULE 4**

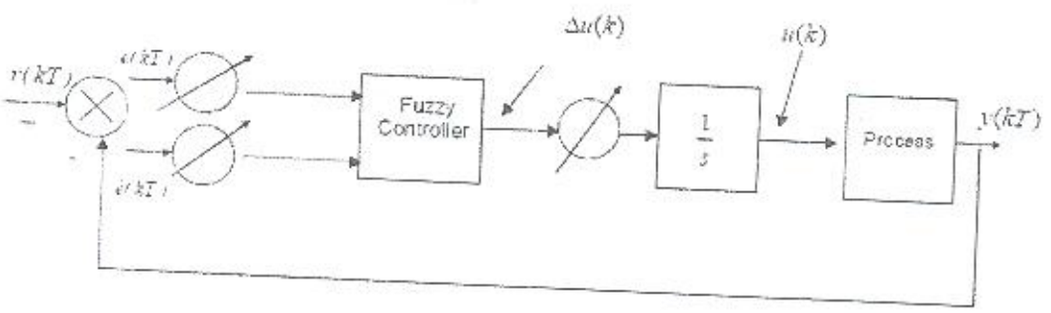
i) Is the above rule-base complete? Why?
ii) Find the defuzzified values of the output 'z' if the recorded crisp values of 'x' and 'y' are:
   1) $x = -0.75$ AND $y = -0.5$,
   2) $x = -0.25$ AND $y = -0.75$.

Propose your answer in terms of a, b, and c.

[10 Marks]

Problem number (4) **[15 Marks]**

a) Consider the following closed-loop control diagram and fuzzy rule-base representative of a Proportional-Integral (PI) structure are shown in Figure (5):



e \ ė	NB	Z	PB
NB	NB	NB	Z
Z	Z	Z	Z
PB	PB	PB	PB

NB: Negative Big
Z: Zero:
PB: Positive Big

Figure (5)

At steady-state the input signal $u(k)$ normally reaches a level of 0.67 in an overall input range of [0, 1]. Identify the essential amendments that need to be made to the diagram and the fuzzy rule-base so that the closed-loop control structure above is representative of a Proportional-Derivative (PD) system instead.

[5 Marks]

b) If you have been asked to design a fuzzy controller to a vacuum cleaner, what would be the controller inputs and output, the fuzzy rules, and the block diagram of the controller?

[10 Marks]

—(With Best Wishes)—

Course Examination Committee

Dr. Ahmed Nassef

بسم الله الرحمن الرحيم
التاريخ : 3-2-2010
الزمن : 2 ساعة

المادة/ دراسات الجدوى للمشروعات
الفرقة/ الرابعة (لائحة قديمة)

جامعة طنطا
كلية الهندسة
هندسة الحاسبات والتحكم الآلى

أجب عن الأسئلة الآتية:- *(40 درجة)*

السؤال الأول:-

1- وضح باختصار المراحل التي يمر بها المشروع المقترح للاستثمار؟
2- عرف : ما هو المشروع ؟ وما هي المراحل التي يمر بها المشروع المقترح للاستثمار؟
3- عرف : ما هي دراسات الجدوى ؟ وما هي مراحل دراسات الجدوى؟

السؤال الثاني:-

1- تختلف المشروعات وفقا للأنشطة الاقتصادية التي تقوم بتنفيذها .. أكتب باختصار ما تعرفه عن أنواع تلك المشروعات؟
2- عرف التخطيط ؟ وما هي العناصر التي تشتمل عليها عملية التخطيط؟
3- عرف المقصود بعملية التنظيم؟ - عملية التوجيه؟ وما الغرض من عمليتي التنظيم والتوجيه؟

السؤال الثالث:-

1- يمكن تقسيم المصنع على حسب طرق عمليات الإنتاج والتخطيط إلى ثلاثة أقسام رئيسية اكتب نبذة مختصرة عن هذه الأقسام.
2- تكلم عن أهم:-
(أ)- العوامل المؤثرة في حجم مرونة الطلب.
(ب)- العوامل التي يترتب عليها نقصان أو زيادة العرض.

3- كيف يمكن لصاحب المشروع أن يزيد من كفاءة عوامل الإنتاج؟
4-تكلم باختصار عن أهم مراحل تطبيق نظام إدارة الجودة الشاملة.

مع التمنيات بالتوفيق
أ.د/عبد الفتاح مصطفى خورشد

١/٣٠ ٤ حاسبات حديد

Tanta University
Faculty of Engineering
Computers and Control Department

Fourth Year Students
First Term Exam
January 30, 2010

Neural Networks — ***Code : CCE 4129***

Answer the following *four* questions. Time allowed : 3 hours.

Question 1 (21 Marks)

(a) Prove that a logic XNOR operation can be expressed as

$$x_1 \odot x_2 = (x_1 + x_2)' + x_1 x_2$$

that is, a NOR operation ORed with an AND operation.

(b) Use the relation of part(a) to construct a 3-layer neural network that implements the XNOR function.

Question 2 (21 Marks)

(a) A neuron has an activation y and output s. Sketch, on the same s-y coordinate axes, the graphs of y(s), y as a function of s, considering the following two cases:

i) The neuronal output is of the binary sigmoidal type. Verify that

$$y(1-s) = -y(s) \qquad 0 < s < 1$$

ii) The neuronal output is of the bipolar sigmoidal type. Verify that

$$y(-s) = -y(s) \qquad -1 < s < 1$$

(b) In a 3-layer neural network, the input layer has two neurons N1 and N2 receiving two inputs $x_1 = 3.2$ and $x_2 = 4.4$, respectively. The hidden layer has two neurons N3 and N4 with binary sigmoidal functions. The output layer has a single neuron N5 with a bipolar sigmoidal function. The weights (including bias) are :

$$w_{13} = 1.5\,,\ w_{14} = -2\,,\ w_{23} = -2.2,\ w_{24} = 3,$$
$$w_{35} = 2\,,\ w_{45} = -2\,,\ w_{03} = 1.5\,,\ w_{04} = -1.5,\ w_{05} = 1.5$$

Determine the response signal of the network.

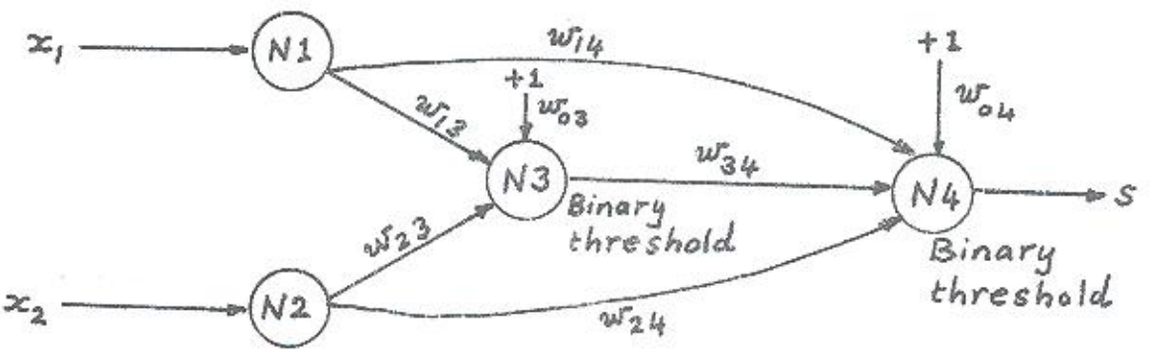
Question 3 (21 Marks)

(a) State a mathematical formula for calculating the number of linear dichotomies, L(p,n), that can be induced on p points (in general position) in an n-dimensional space.

(b) Use the formula of part(a) to verify that

$$L(4,3) = L(4,2) + 2$$

(c) In view of the result of part(b), demonstrate that the logic XOR function can be implemented by the neural network shown below, where the space



dimension increases form 2 to 3. Specify the role played by neuron N3, and determine the various weights of the network.

(d) In part(c), portray the separating plane in the 3-dimensional space. Comment on this situation from the dichotomization viewpoint.

Question 4 (22 Marks)

(a) State and prove the Perceptron convergence theorem.

(b) Use the theorem of part(a) in the training of a binary threshold neuron to learn the logic OR pattern classification. Make, at least, the calculations of eight iterations.

Prof. Dr. Mahmoud M. Fahmy

Tanta University

Department: Computers and Automatic Control Eng.
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Artificial Intelligence	Course Code: EC4103	Year: 4th
Date: Jan. 30th 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

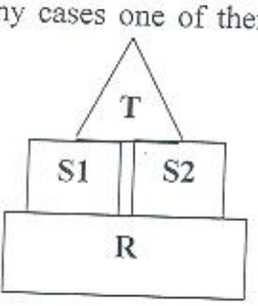
Remarks: (answer the following questions… assume any missing data)

Problem number (1) (20 Marks)

a) If you have the following 4 components: (11 Marks)

You wish to organize them in way to be balanced. There are many cases one of them is shown beside.

a) Find other two possible goal states.
b) What search technique can you use to reach the goal?
c) What will be the goal test?
d) Give two possible non-goal states?
e) Use the chosen search technique to perform the search.



b) **Fill in the spaces:**

1) When insert the knowledge in a KB, we use a function called ----- and when we search it we use a function called ------ . The answer must be from ----------.
2) In dynamic environment, the action effect is not known because ---------.
3) Among the NLU problems are ----------, ----------, and ----------.
4) In supervised learning we give the learning agent -------- to guide the learning process, while in reinforcement learning we give ----------.

(9 Marks)

Problem number (2) (25 Marks)

a) **Define the following terms:**
i) Agent ii) learning iii) multi-agent environment

(9 Marks)

b) **Compare between the following pairs:**
i) Inductive and deductive learning ii) Greedy and A* search techniques
iii) Problem generator and learning element

(12 Marks)

c) What is the role of dialogue component in the expert system? (4 Marks)

Problem number (3) (25 Marks)

a) Use FOL inference rules to prove Happy(Bob) from the following knowledgebase. (Hint: put x in the first line with any name you want assuming the KB has no names). (13 Marks)

1. $\exists x$ Student(x)

2. $\forall x \forall y$ Thinker(x) $\rightarrow$ Interests(y, x)

P.T.O.

3. $\forall$ x Student(x) → Thinker(x)

4. $\forall$ x Interests(Bob, x) → Happy(Bob)

b) Write the following statements in FOL: (12 Marks)

1- Every fourth-grade student is smart.
2- Mona likes Ola's sister.
3- Fareed is a poet.
4- Some people think wisely while others think irrationally.

Problem number (4) **(15 Marks)**

A) "While working under uncertainty, we use believe networks to represents the facts and relationships", Explain this sentence mentioning what is meant by uncertainty, give example of it then explain what are the components of the belief network.

(8 Marks)

B) Write the steps required to build any knowledgebase, then specify the role of knowledgebase engineer and what experience should he have to work in such field.

(7 Marks)

Good Luck all

ع حاسبات قديم ١١ ك

Tanta University

Department: Automatic control and computer science
Total Marks: Marks

Faculty of Engineering

Course Title: control & meas. In induct. Process	Course Code:	Year: 4th
Date: 1/2/2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions)

Problem number (1) (Marks)

For the system shown in Fig 1

a) Obtain the transfer function?

b)

c) Draw the equivalent block diagram?

Problem number (2) (Marks)

For block diagram shown in Fig 2

a) Determine the overall transfer function based on block diagram reduction?

b) Determine the overall transfer function using Manson's formula?

Problem number (3) (Marks)

Write some notes on:

a) Difference between switch and sensor?

b) Difference between open loop and closed loop control system

b) Dynamic and static characteristic of sensors?

c) Type for non contact switch

Problem number (4) (Marks)

a) What is the structure of data acquisition system?

b) Draw the block diagram for data acquisition system?

c) What are the different methods for signal conditioning in data acquisition system?

P.T.O.

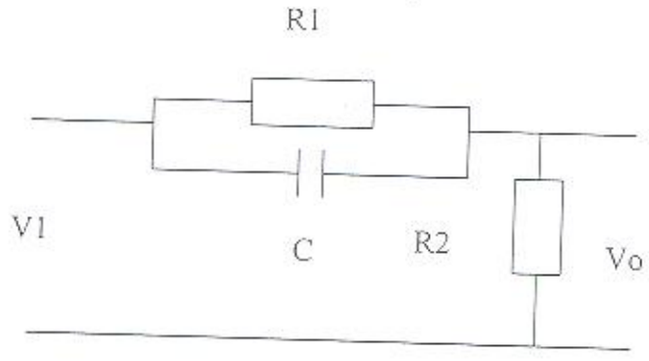


Fig1

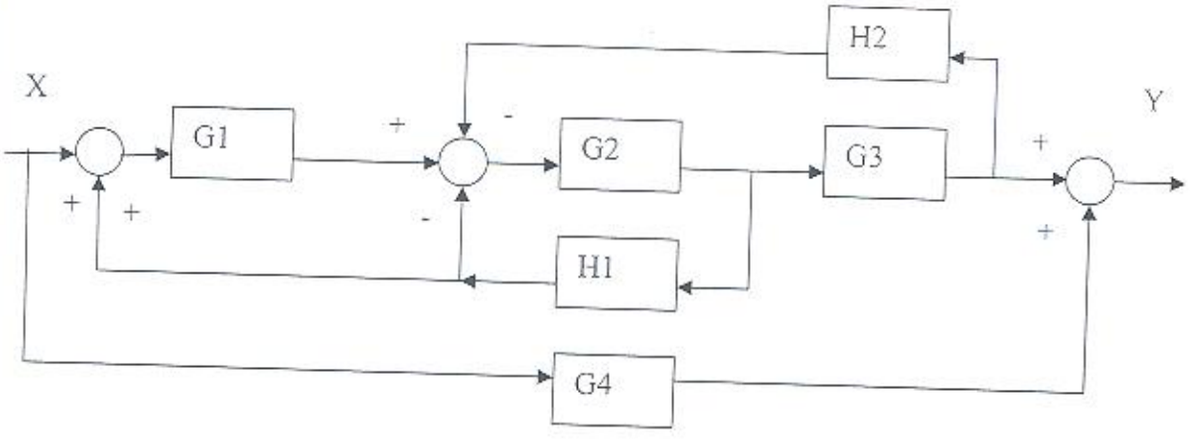


Fig 2

Greeting sentence (Optional)

Course Examination Committee

Prof.
Dr.

Prof.
Dr.

Course Coordinator:

Dr. Magdy G. El-ghatwary

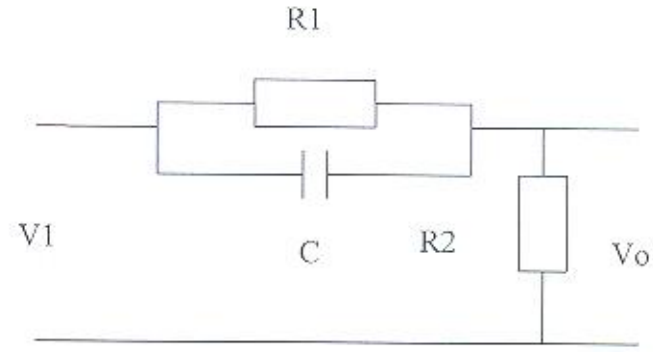


Fig1

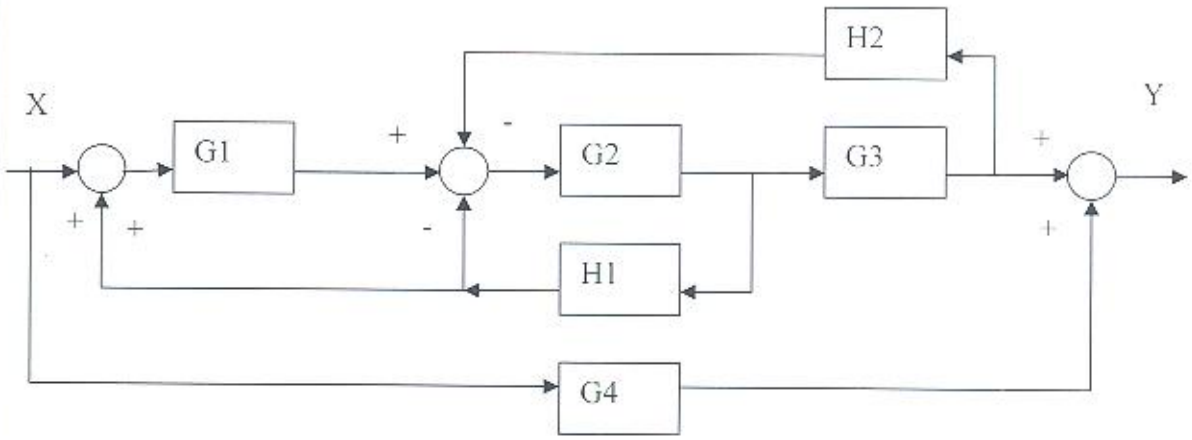


Fig 2

Greeting sentence (Optional)

Course Examination Committee

Prof.
Dr.

Prof.
Dr.

Course Coordinator:

Dr. Magdy G. El-ghatwary

حلسات مدينة ١/٢

Tanta University
Faculty of Engineering
Department of Computer & Control Eng.
Subject: Pattern Recognition & Image Processing (4th year)

Date: 1/2/2010
Time allowed: 180 Min.
Full Mark: 85 Mark
Final Term Exam (First Semester)

Answer All the Following Questions

The First Question

a) Compare between low level processing, mid-level processing, and high level processing.
b) One of the several HDTV formats is 1080p24, which means video stream of full frames of 1920 1080 pixels at frame rate 24 fps. If each pixel has 24 bits of intensity resolution (8 bits each for red, green and blue channels), how many gigabytes are needed for 2 hours of HDTV video without compression?
c) A common measure of transmission for digital data is the baud rate, defined as the number of bits transmitted per second. Generally, transmission is accomplished in packets consisting of a start bit, a byte (8-bits) of information, and a stop bit. Using these facts, answer the following:
   1. How many minutes would it take to transmit a 1024*1024 binary image using a 112 K baud modem?
   2. What would the time be a 1500 K baud, a representative speed of a phone DSL (digital subscriber line) connection?

The Second Question

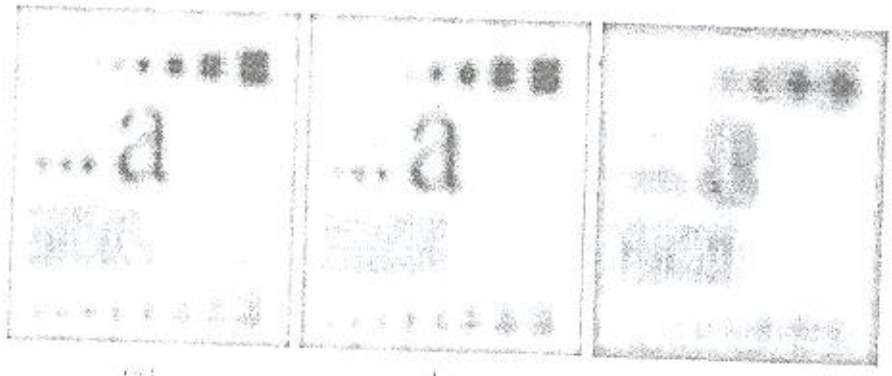
a) Consider the image segment shown.
   (1) Let V = {0,1}; and compute the lengths of the shortest 4-, 8-, and m-path between p and q.

   If a particular path does not exist between these points, explain why.

   (2) Repeat for V = {1,2}.
b) An automobile manufacturer is automating the placement of certain components on the bumpers of a limited-edition line of sports cars. The components are color coordinated, so the robots need to know the color of each car in order to select the appropriate bumper component. Models come in only four colors: blue, green, red, and white. You are hired to propose a solution based on imaging. How would you solve the problem of automatically determining the color of each car, keeping in mind that cost is the most important consideration in your choice of components?
c) High-definition television (HDTV) generates images with a resolution of 1280 horizontal TV lines interlaced (where every other line is painted on the tube face in each of two fields, each field being 1/60th of a second in duration). The width to height aspect ratio of the images is 5 : 3.The fact that the horizontal lines are distinct fixes the vertical resolution of color images. A company has designed an image capture system that generates digital images from HDTV images. The resolution of each TV (horizontal) line in their system is in proportion to vertical resolution, with the proportion being the width-to-height ratio of the images. How many bits would it take to store a 3-hour HDTV program?

The Third Question

a) why the discrete histogram equalization technique does not, in general, yield a flat histogram Digital Image processing requires images to be obtained in the form of electrical signals.
b) Two images, f(x, y) and g(x, y), have histograms hf and hg. Give the conditions under which you can determine the histograms of
   1) f(x, y)+g(x, y)
   2) f(x, y)-g(x, y)
   in terms of hf and hg. Explain how to obtain the histogram in each case.
c) The three images shown in Fig. 1 were blurred using square averaging masks of sizes n=23, 25, and 45, respectively. The vertical bars on the left lower part of (a) and (c) are blurred, but a clear separation exists between them. However, the bars have merged in image (b), in spite of the fact that the mask that produced this image is significantly smaller than the mask that produced image (c). Explain this.



(a) (b) (c)

The Fourth Question

a) Draw a block diagram showing Lossless and lossy compression coding framework..

b) Consider Fig. 2 that shows histogram of the four basic gray-level characteristics: dark, light, low contrast, and high contrast as shown in Figs.(2-b) to (2-d). For each figure idenify the type of gray level characteristic. Which of the Fig. (2-e) and (2-f) is the histogram after equalization and before equalization? Justify your choices.

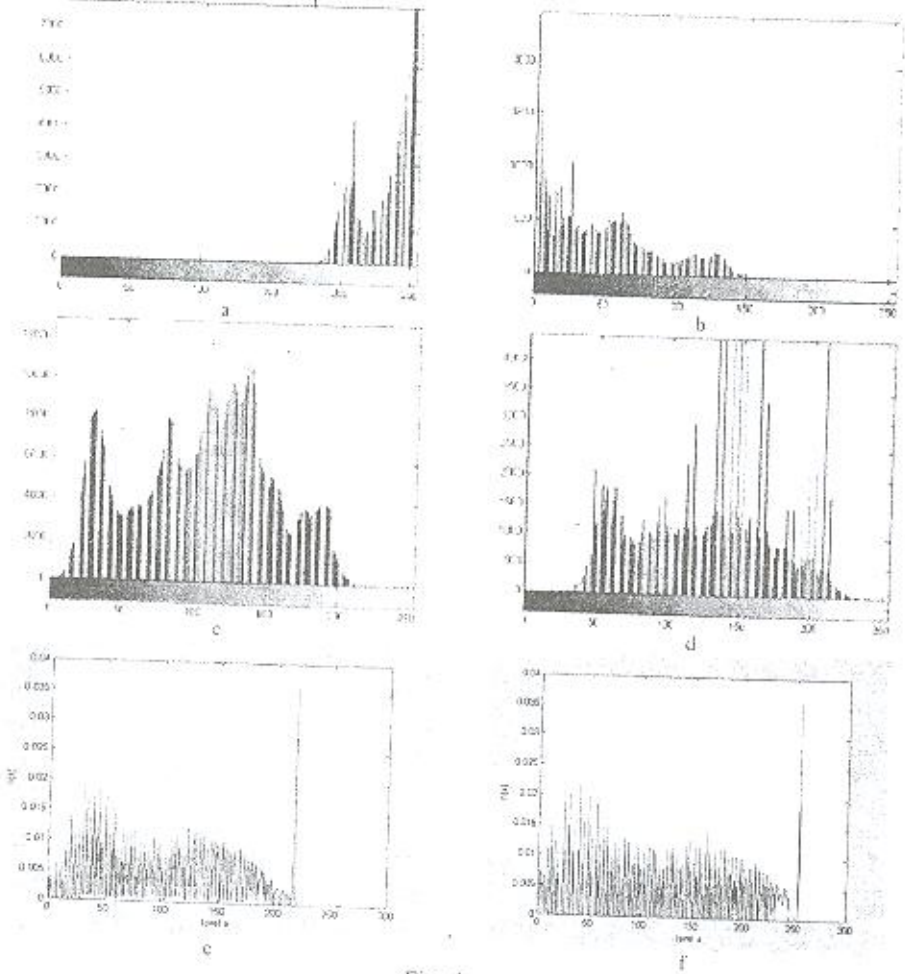


Fig. 4

c) Compare between single and multiple-sample-based compression

The Fifth Question

a) Why all parts of the file header are excluded before image encryption/decryption.

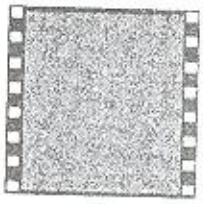
b) Fig. 3 demonstrates the effects of different modes of operation ((ECB, CBC) on image encryption as shown Figs.(3-b) to (3- c).

1- Identify the mode of operation used in each encryption.

2- Which are the best modes of operations to be used when information needs to be completely secure.

a- Original Image

b

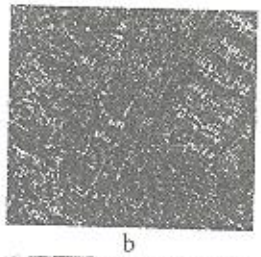


c

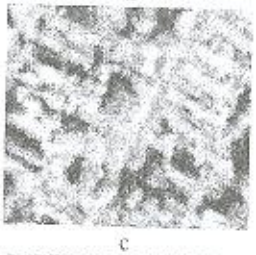
Fig. 3. An image color encrypted in ECB, CBC modes.

c) Fig. 4 gives a satellite image and the operations of low pass filtering, high pass filtering, edge detection, median filtering and histogram equalization are carried on this image in Figs.(4-b) to (4-f). What operation is carried in each figure? What is the filter mask used if there is a filter mask. Justify your choices.

a



b



c

d

e

f

Fig. 4

With my best wishes

لائحة قديمة حاسبات ١/١

Tanta University

Department: Automatic control and computer science
Total Marks: Marks

Faculty of Engineering

Course Title: control & meas. In induct. Process
Date: ١/٢/٢٠١٥ (First term)

Course Code:
Allowed time: 3 hrs

Year: 4th
No. of Pages: (2)

Remarks: (answer the following questions)

Problem number (1) (Marks)

For the system shown in Fig 1

a) Obtain the transfer function?

b)

c) Draw the equivalent block diagram?

Problem number (2) (Marks)

For block diagram shown in Fig 2

a) Determine the overall transfer function based on block diagram reduction?

b) Determine the overall transfer function using Manson's formula?

Problem number (3) (Marks)

Write some notes on:

a) Difference between switch and sensor?

b) Difference between open loop and closed loop control system

b) Dynamic and static characteristic of sensors?

c) Type for non contact switch

Problem number (4) (Marks)

a) What is the structure of data acquisition system?

b) Draw the block diagram for data acquisition system?

c) What are the different methods for signal conditioning in data acquisition system?

P.T.O.

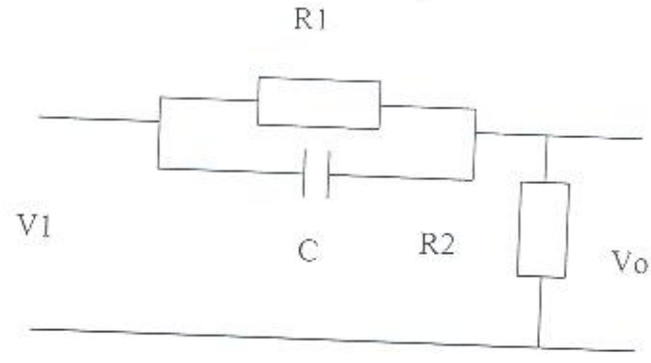


Fig1

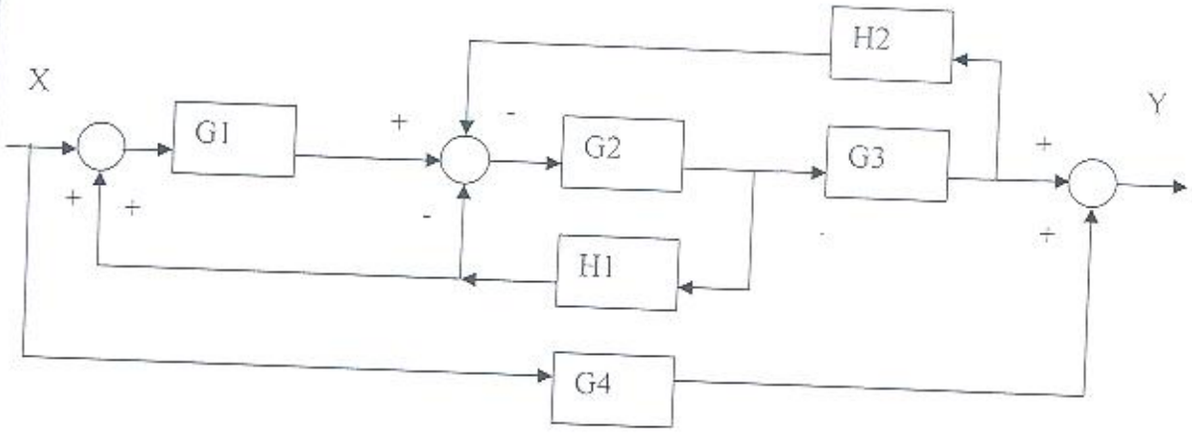


Fig 2

Greeting sentence (Optional)

Course Examination Committee

Prof.
Dr.

Prof.
Dr.

Course Coordinator:

Dr. Magdy G. El-ghatwary

حاسبات حديث

Tanta University
Faculty of Engineering
Computers and Control Department

Fourth Year Students
First Term Exam
January 30, 2010

Neural Networks — ***Code : CCE 4129***

Answer the following *four* questions. Time allowed : 3 hours.

Question 1 (21 Marks)

(a) Prove that a logic XNOR operation can be expressed as

$$x_1 \odot x_2 = (x_1 + x_2)' + x_1 x_2$$

that is, a NOR operation ORed with an AND operation.

(b) Use the relation of part(a) to construct a 3-layer neural network that implements the XNOR function.

Question 2 (21 Marks)

(a) A neuron has an activation y and output s. Sketch, on the same s-y coordinate axes, the graphs of y(s), y as a function of s, considering the following two cases:

i) The neuronal output is of the binary sigmoidal type. Verify that

$$y(1-s) = -y(s) \qquad 0 < s < 1$$

ii) The neuronal output is of the bipolar sigmoidal type. Verify that

$$y(-s) = -y(s) \qquad -1 < s < 1$$

(b) In a 3-layer neural network, the input layer has two neurons N1 and N2 receiving two inputs $x_1 = 3.2$ and $x_2 = 4.4$, respectively. The hidden layer has two neurons N3 and N4 with binary sigmoidal functions. The output layer has a single neuron N5 with a bipolar sigmoidal function. The weights (including bias) are :

$$w_{13} = 1.5,\ w_{14} = -2,\ w_{23} = -2.2,\ w_{24} = 3,$$
$$w_{35} = 2,\ w_{45} = -2,\ w_{03} = 1.5,\ w_{04} = -1.5,\ w_{05} = 1.5$$

Determine the response signal of the network.

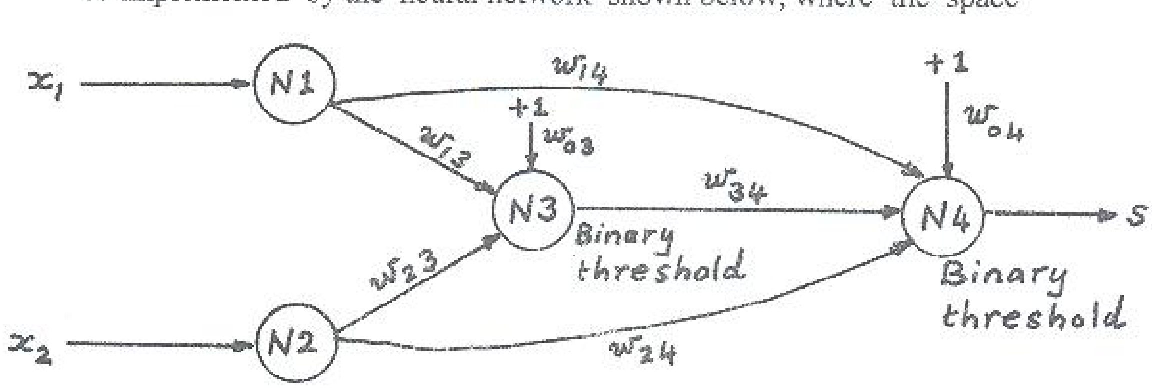
Question 3 (21 Marks)

(a) State a mathematical formula for calculating the number of linear dichotomies, L(p,n), that can be induced on p points (in general position) in an n-dimensional space.

(b) Use the formula of part(a) to verify that

$$L(4,3) = L(4,2) + 2$$

(c) In view of the result of part(b), demonstrate that the logic XOR function can be implemented by the neural network shown below, where the space



dimension increases form 2 to 3. Specify the role played by neuron N3, and determine the various weights of the network.

(d) In part(c), portray the separating plane in the 3-dimensional space. Comment on this situation from the dichotomization viewpoint.

Question 4 (22 Marks)

(a) State and prove the Perceptron convergence theorem.

(b) Use the theorem of part(a) in the training of a binary threshold neuron to learn the logic OR pattern classification. Make, at least, the calculations of eight iterations.

Prof. Dr. Mahmoud M. Fahmy

Tanta University

Department: Computers and Automatic Control Eng.
Total Marks: 85 Marks

Faculty of Engineering

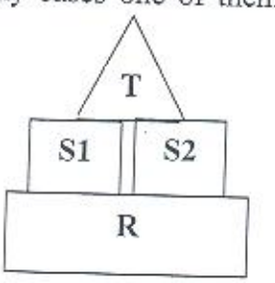
Course Title: Artificial Intelligence	Course Code: EC4103	Year: 4th
Date: Jan. 30th 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data)

Problem number (1) (20 Marks)

a) If you have the following 4 components: (11 Marks)

You wish to organize them in way to be balanced. There are many cases one of them is shown beside.



a) Find other two possible goal states.
b) What search technique can you use to reach the goal?
c) What will be the goal test?
d) Give two possible non-goal states?
e) Use the chosen search technique to perform the search.

b) **Fill in the spaces:**

1) When insert the knowledge in a KB, we use a function called ----- and when we search it we use a function called ------ . The answer must be from ----------.
2) In dynamic environment, the action effect is not known because ---------.
3) Among the NLU problems are ----------, ----------, and ----------.
4) In supervised learning we give the learning agent -------- to guide the learning process, while in reinforcement learning we give ----------.

(9 Marks)

Problem number (2) (25 Marks)

a) **Define the following terms:**

i) Agent ii) learning iii) multi-agent environment

(9 Marks)

b) **Compare between the following pairs:**

i) Inductive and deductive learning ii) Greedy and A* search techniques
iii) Problem generator and learning element

(12 Marks)

c) What is the role of dialogue component in the expert system? (4 Marks)

Problem number (3) (25 Marks)

a) Use FOL inference rules to prove Happy(Bob) from the following knowledgebase. (Hint: put x in the first line with any name you want assuming the KB has no names). (13 Marks)

1. $\exists$ x Student(x)

2. $\forall x \forall y$ Thinker(x) $\rightarrow$ Interests(y, x)

P.T.O.

3. $\forall$ x Student(x) → Thinker(x)

4. $\forall$ x Interests(Bob, x) → Happy(Bob)

b) Write the following statements in FOL: (12 Marks)

1- Every fourth-grade student is smart.
2- Mona likes Ola's sister.
3- Fareed is a poet.
4- Some people think wisely while others think irrationally.

Problem number (4) **(15 Marks)**

A) "While working under uncertainty, we use believe networks to represents the facts and relationships", Explain this sentence mentioning what is meant by uncertainty, give example of it then explain what are the components of the belief network.

(8 Marks)

B) Write the steps required to build any knowledgebase, then specify the role of knowledgebase engineer and what experience should he have to work in such field.

(7 Marks)

Good Luck all

Tanta University

Department: Computers & Automatic Control Engineering
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Microcontroller Systems
Date: Jan 25th 2010 (First term)

Course Code: CCE4127
Allowed time: 3 hrs

Year: 4th
No. of Pages: (1)

Remarks: All questions are for the 8051 microcontroller.

Question (1) (22 Marks)

a) What is the result of the following code and where is it kept? (3 marks)

```
MOV A, #15
MOV R5, #15
ADD A, R5
```

b) Find the CY flag value after each of the following codes. (3 marks)

(i)	(ii)	(iii)
MOV A, #54H ADD A, #0C4H	MOV A, #00 ADD A, #00FH	MOV A, #250 ADD A, #05

c) Write a simple assembly program in which the value 55H is added 5 times. (4 marks)

d) For the 8051 microcontroller, state whether true or false. Explain if false. (8 marks)

i. The target of a short jump is within -128 to +127 bytes of the current PC.
ii. All 8051 jumps are short jumps.
iii. All conditional jumps are short jumps.
iv. LCALL is a 2-byte instruction.

e) Show code for a nested loop to perform an action 100,000 times. (4 Marks)

Question (2) (16 Marks)

a) Which ports of the 8051 are bit-addressable? What is the advantage of bit-addressability of the 8051 ports? (2 Marks)

b) True or false. Explain if false. (6 marks)

i. Upon RESET, all the bits of ports are configured as input.
ii. In the 8051, only P1 needs pull-up resistors in order to be used as I/O.
iii. The instruction "CPL P1" is a valid instruction.

c) Write an assembly program to toggle P1.3, P1.7 and P2.5 continuously without disturbing the rest of the bits. Assume a delay subroutine DELAY that can be called (you don't have to write the delay code). (4marks)

d) Write an assembly program to continuously send out to port 0 the alternating values 55H and AAH. Assume a delay subroutine DELAY that can be called (you don't have to write the delay code). (4marks)

Question (3) (14 Marks)

a) What are the advantage and disadvantages of writing 8015 programs in C? (4 marks)

b) Write a C program to read a data item byte on port P2 continuously and show the number of zeros in it on port P1. (10 marks)

Question (4) (18 Marks)

a) List the steps to program an 8051 timer in: (6 marks)

i. Mode 1
ii. Mode 2

b) Program Timer 1 in C to be an event counter. Use mode 1 and display the binary count on P1 and P2 continuously. Set the initial count to 20000. (6 marks)

c) Write an 8051 C program to create a frequency of 2500 Hz on pin 2.7. Use Timer 1, mode 2 to create the delay. XTAL=11.0592 MHz. (6 marks)

GOOD LUCK

Course Examination Committee

Dr. Ahmed Eltahawy
Course Coordinator: Prof. Dr. Sayed Salam

(قديم)

Tanta University | Department: Computer and Control Engineering | Faculty of Engineering

Total Marks: 80 Marks

Course Title: Tests (bylaw) اختبارات وقياسات رابعة حاسبات(قديم) | Course Code: EC4102 | 4th year computer

Date: 25.1.2010 (First term) | Allowed time: 3 hrs | No. of Pages: (2)

Answer ALL the following questions and assume any missing data

Problem Number (1)

(17 marks)

a. Discus briefly OSI model *(6 marks)*

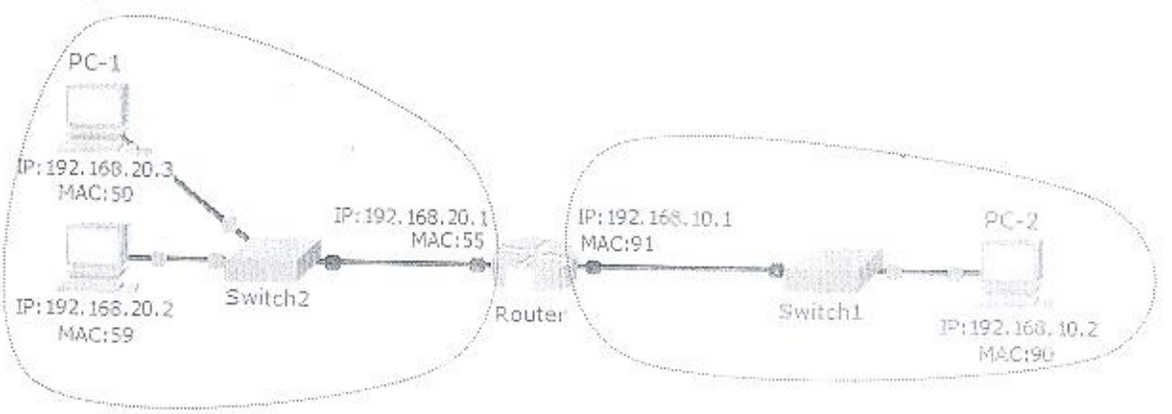
b. Encapsulation process in TCP/IP model *(6 marks)*

c. Compare between TCP and UDP protocols used in transport Layer of OSI model *(5 marks)*

Problem Number (2)

(13 marks)

In the figure below, assume that the communication is between a process running at computer **PC-1** with port address *i* and a process running at computer **PC-2** with port address *j*. show the contents of packets and frames at the network, data link, and transport layer for each hop.



Problem Number (3)

(18 marks)

Write a short Note about each of the following:

a. LAN, MAN and WAN *(5 marks)*

b. DNS Name Resolution process *(5 marks)*

c. DHCP *(5 marks)*

d. Client Server Model *(3 marks)*

Problem Number (4)

(16 marks)

a. State the Use for the following Commands on your PC *(4 marks)*

- Nslookup
- ipconfig /displaydns
- ipconfig /flushdns

b. State to Which OSI layer each of the following Protocols belong

[just stat the OSI layer that contain each the following] *(12 marks)*

SMTP	ICMP	Ethernet	HDLC	EIGRP
FTP	ARP	IPX	PPP	HTTP
Telnet	IPv6	RIP	X.25	POP3
TCP	OSPF	FDDI	ATM	UDP

Problem Number (5)

(8 marks)

Put (True) or (False) for each of the Following statements and Correct the false ones:

- DHCP allows a user to remotely access another device (.....)
- Telnet supports user authentication, and encrypt data transferred (.....)
- UDP is a simple, connection-oriented protocol (.....)
- Applications that use UDP include DNS, Video Streaming, and VoIP (.....)
- UDP Establish their connections using a 3-way handshake (.....)
- IP Protocol multiplexes upper layer application using port numbers (.....)
- The DNS Protocol Uses Port 53 while HTTP Uses Port 80 for their Communication (.....)
- Data link layer controls how data is placed onto the media (.....)
- Application layer offers ordered data reconstruction services (.....)
- Attenuation degradation of a signal as it travels along the medium (.....)

Problem Number (6)

(8 marks)

Write the HTML code needed to generate the following table and data

Brand	Item	Price
HP	**PC**	300$
	Printer	200$
Lenovo	**PC**	250$
	Printer	150$
	Case	20$

Best wishes *Dr. Eng. Alasyed Sallam*

حاسبات حديد

Tanta University

Department: Computers and Automatic Control Eng.
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Elective Course 2 (Distributed Systems) | Course Code: CCE4240 | Year: 4th
Date: Jan. 27th 2010 (First term) | Allowed time: 3 hrs | No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data)

Problem number (1) **(20 Marks)**

(a) "Multiprocessors suffer from major problem". What is this problem and how it can be solved? (5 Marks)

(b) "Multicomputers too suffer from major problem". What is this problem and how it can be solved? (5 Marks)

(c) "Database distribution on multiple machines has many advantages over centralized databases". Mention these advantages and state different methods to distribute this database to several machines. How will they be connected? How will a query be executed on such system? (10 Marks)

Problem number (2) **(20 Marks)**

(a) If you have the following four tasks: (T1, T2, T3 and T4). The number of operations in each task is: (50, 100, 75 and 125) respectively.

1- What will be the time of execution of the whole four tasks sequentially on a single machine that works at speed 200 operations/second?
2- What will be the time of execution of the four tasks in parallel on four machines that works at same speed of 200 operations/second?
3- If we have four heterogeneous speed machines that work on (200, 400, 350 and 100) operations/second speed, what will be the minimum and maximum parallel execution time for the four tasks on these machines?
4- Can you think of an allocation algorithm by which we can allocate these tasks to those machines to achieve minimum execution time? (Write down the methods in steps in a general way) (15 Marks)

(b) Compare the P2P model to the client/server model from the point of view of: roles played, services and data storage, effect of scalability and disadvantages. (5 Marks)

Problem number (3) **(20 Marks)**

(a) What does each of following abbreviations stand for (i.e. full name)? Then discuss in brief the idea of each of them:

1- XML 2- RMI 3- MISD (9 Marks)

(b) Why do we need time synchronization between two processes? What are the types of synchronization? How can we synchronize ourselves through the Internet and what type of synchronization is this? (11 Marks)

Problem number (4) **(25 Marks)**

(a) You, ***as a computer engineer***, are faced with the following problems. Identify each source of problem then find a solution to solve it.

1- The users are receiving not up-to-date version of the web page through the proxy server.
2- Parts of the services provided by your site are not available to the users.
3- The server is not able to track (i.e., know the details of) its file users.

P.T.O.

4- Your computation is taking long time to run in spite of that you are distributing it to a grid of computers.

(12 Marks)

(b) Give reasons for the following:

1- Upload/download file server model is only suitable for some types of users.
2- We are moving towards power saving applications.
3- We use different port numbers for different processes.

(9 Marks)

(c) Write down the C# instruction required to do the following tasks: (3 marks)

1- Declare new output and input streams
2- Server waiting for input from client
3- Returning data from server to client

(d) Explain what each statement of the following do: (3 marks)

1- worker_thread=new Thread(new ThreadStart(do_work));
2- Thread.Sleep(1000);
3- FileStream fs = new FileStream(file_name, FileMode.Create);

Problem number (5) **(5 Marks bonus)**

Answer **only one** of the two questions in **clear handwriting and organization**:

1- We have discuss the idea of power saving in many lectures, can you propose an algorithm which can be used to choose the appropriate machines to run a distributed computation on them?

2- Describe the difference between Client/Server RPC model based on non-blocking and blocking. Drive an equation that can be used in calculating the time enhancement ratio of Client/Server RPC model based on non-blocking over blocking one.

Good Luck all

حاسبات قديم

Old Bylaw

Tanta University
Faculty of Engineering
Computers and Control Department

Fourth Year Students
First Term Exam
January 27, 2010

Elective Specialized Course (3) ***Database Systems***

Answer the following *four* questions. Time allowed : 3 hours.

Question 1

(a) Give a definition for the database management system (DBMS). What are the merits and drawbacks (if any) of DBMSs.
(b) Specify the task of the database administrator (DBA).
(c) What is meant by a ' key', ' superkey ', and ' primary key ' in relational data models ? What do you understand from the expression ' key by chance '?
(d) Verify that every relation has a key.
(e) Discuss the problem of NULL values.
(f) Write a short account on relational catalogues.

Question 2

Consider the four-relation database given in Fig. 1.
(a) Describe, in words, the information involved.
(b) Determine the keys and referential constraints.
(c) What are the attributes on which NULL values are allowed?

Question 3

Consider the two-relation database given in Fig. 2. Use relational algebra to write expressions for the following queries, showing the result in each case:
(a) Find the numbers of the supervisors of the employees earning more than 40000 pounds.
(b) Find the names, ages, and salaries of the supervisors of the employees earning more than 40000 pounds.
(c) Find the employees who earn more than their respective supervisors, giving the numbers, names, and salaries of both the employees and the supervisors.
(d) Find the numbers and names of the supervisors whose employees all earn more than 40000 pounds.

Question 4

Consider the relation STUDENTS given in Fig. 3. Write SQL instructions for the following queries, showing the result of the each case.
(a) Find the faculties of the students whose surname is Refaat. Rename the attribute Faculty as College.
(b) Find the first names and surnames of the students enrolled in year 2 of the faculty of engineering.
(c) Find the first names, surnames, and ages of the students enrolled in the faculty of engineering or the faculty of science.
(d) Find the first names of the students whose surname is Mostafa and who are enrolled in the faculty of medicine or the faculty of pharmacy.
(e) Find the information relevant to the students whose first names have an ' a ' as the second letter and an ' m ' as the last letter.