Tanta University

Department: Computers and Automatic Control Eng.
Total Marks: 60 Marks

Faculty of Engineering

Course Title: Experiments and Measurements (B)	Course Code: ---	Year: 4th
Date: June 29th 2011 (Second term)	Allowed time: 3 hrs	No. of Pages: (1)

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

Problem number (1) **(25 Marks)**

1- (a) Show how can enter 4x4 matrices into MATLAB and perform the following tasks:-

a- Get the transpose and diagonal of matrix.

b- Sum over each column and over each row.

c- Deleting row number 3 in matrix.

d- Find the elements in second row and third column.

2- Write a program for plotting y1=sin(t) and y2=cos(t) in the same figure. While y1 with color green, linestyle are ':' and common marker type '+'. Y2 with color blue, linestyle are '-' and common marker type 'o'.

3- What do we mean by Digital Image Processing?

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

1- Write program to converts an image named F from uint8 to double, reading, writing image files and check that the variable indeed was converted into uint8.

2- Write program to load the image file and store it as the variable I, find the size, class of all stored variables and save the variable I.

3- Write program to load the variable I, display the image, convert the variable into double and cuts out the upper left corner of the image and stores the reduced image as Ifinal.

Problem number (3) **(15 Marks)**

1- What is definition of Artificial Neural Networks and basic model of a neuron?

2- What is the different between:-

a- Supervised learning and unsupervised learning.

b- Off-line or On-line learning methods.

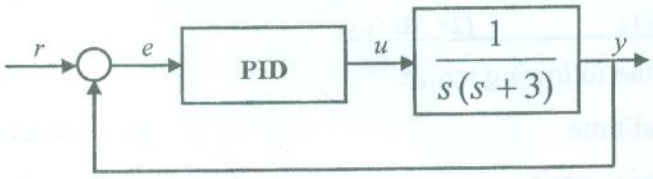
3- Construct network contain 2 input, 5 neuron in hidden layer and 1 output with sigmoid function in hidden layer and hard limiter in output layer.

Good Luck all,

Course Coordinator: **Assoc.** Prof. Dr. Amany Sarhan

(d) For the following block diagram, design a PID controller such that the closed loop system poles have the values [8 Marks]

$$s = -2,\ s = -1,\ s = -1$$



Problem number (3) (20 Marks)

(a) Write short notes about the following: [10 Marks]

(i) Position sensors
(ii) Relay contact types
(iii) DC motor switching and control
(iv) Active and passive sensors
(v) Manipulated and controlled variables
(vi) Centralized control

(b) What is meant by data acquisition system. Draw a typical computer-based data acquisition Diagram. Draw signals type in each stage of the diagram. [5 Marks]

(c) Plot a graph of the following readings for a pressure sensor to determine if there is hysteresis, and if so, what is the hysteresis as a percentage of FS? [2 Marks]

True pressure (kPa)	0	20	40	60	80	100	80	60	40	20	0
Gauge pressure (kPa)	0	15	32	49.5	69	92	87	62	44	24	3

(d) What is the difference between sensors, actuators, and transducers? [3 Marks]

Problem number (4) (25 Marks)

(a) Write short notes about the following: [10 Marks]

- Signal conditioning
- Smart sensors
- Static and dynamic characteristic of sensors
- Process facility considerations
- Types of data acquisition systems

(b) What are the differences between scada and distributed control systems? In your answer you should concentate on the features, advantages and disadvantages of each one. [8 Marks]

(c) Explain the effects of each term of PID controller on the system response. Can the derivative controller be used alone in control systems? Why? [3 Marks]

(d) Explain the main components that are used in desgining a simple scada system. [4 Marks]

GOOD LUCK

Dr. Ali Abu Tahoun

Tanta University

Department: Computer and Control Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Control and Instrumentation in Industrial Processes Course Code: CCE4237 Year: 4th
Date: June 22nd 2011 (Second term) Allowed time: 3 hrs No. of Pages: (2)

Remarks: (Answer the following questions)

Problem number (1) **(25 Marks)**

(a) For sensors, define the following terms: [12 Marks]

(i) Dead band/time
(ii) Non-linearity error
(iii) Accuracy
(iv) Hysteresis
(v) Sensitivity
(vi) Resolution

(b) A spring balance has a span of 30 to 150 kg and the absolute accuracy is ±3 kg. What is its %FS accuracy and span accuracy? [5 Marks]

(c) State whether the following are true or false, why? [8 Marks]

1- Sensors are "input" devices ( )
2- An example of input devices is the switch or pushbutton ( )
3- All sensors produce a straight linear output ( )
4- Both sensors and actuators are collectively known as transducers ( )
5- The measurement device can have 0.3% accuracy and 0.5% error ( )
6- The thermometer that is used to measure the body temperature is active device ( )
7- The thermocouple is passive device ( )
8- Relays provide good separation of the low voltage electronic control signals and the high power load circuits. ( )

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

(a) Consider the following specification of a strain gauge pressure transducer. Explain the meaning of each term in it. [3 Marks]

Ranges	70 to 1000 kPa, 200 to 7000 kPa
Supply voltage	10 V d.c. or a.c. r.m.s.
Full range output	40 mV
Temperature range	-54°C to +120°C when operating
Thermal zero shift	0.030% full range output/°C

(b) Explain the main methods that are available for tuning PID controllers. [3 Marks]

(c) In process control, define the following terms [6 Marks]

(i) simple ON/OFF action
(ii) differential ON/OFF action
(iii) continuous control

23. A one-way function is one that maps a domain into a range such that every function value has a unique inverse, with the condition that the calculation of the function is easy whereas the calculation of the inverse is infeasible:
24. An authenticator is a cryptographic function of both the data to be authenticated and a secret key.
25. A hash function, by itself, does not provide message authentication. A secret key must be used in some fashion with the hash function to produce authentication.
26. A MAC uses a secret key to calculated a code used for authentication.
27. In weak collision resistance, for any given block x, it is computationally infeasible to find $y \neq x$ with $H(y) = H(x)$.
28. In strong collision resistance, It is computationally infeasible to find any pair (x, y) such that $H(x) = H(y)$.
29. A typical hash function uses a compression function as a basic building block, and involves repeated application of the compression function.
30. Nonrepudiation provides protection against denial by one of the entities involved in a communication of having participated in all or part of the communication.

The Second Question (10 Mark)

(a) Decipher the following **ciphertext**: GETMYMONEYBACK with **Caesar cipher** using **K=5**.

(b) A ciphertext has been generated with an affine cipher. The most frequent letter of the ciphertext is 'C', and the second most frequent letter of the ciphertext is 'G'. Break this code. **Hint**: Assume that the most frequent plaintext letter is e and the second most frequent letter is t. Note that the numerical values are e = 4; t = 19.

The Third Question (15 Mark)

(a) Consider a Playfair cipher

1) Construct a Playfair matrix with the key Hassan. Make a reasonable assumption about how to treat redundant letters in the key.
2) Using this Playfair matrix Encrypt this message: How are you.
3) How many possible keys does the Playfair cipher have? Ignore the fact that some keys might produce identical encryption results. Express your answer as an approximate power of 2.
4) Now take into account the fact that some Playfair keys produce the same encryption results. How many effectively unique keys does the Playfair cipher have?
5) What substitution system results when we use a 25 x 1 Playfair matrix

(b) Compare between DES, double DES, triple DES.

The Fourth Question (15 Mark)

(a) With the ECB mode of DES, if there is an error in a block of the transmitted ciphertext, only the corresponding plaintext block is affected. However, in the CBC mode, this error propagates. For example, an error in the transmitted C1 Fig. 1 obviously corrupts P1 and P2.

1. Are any blocks beyond P_2 affected?
2. Suppose that there is a bit error in the source version of P_1. Through how many ciphertext blocks is this error propagated? What is the effect at the receiver ?

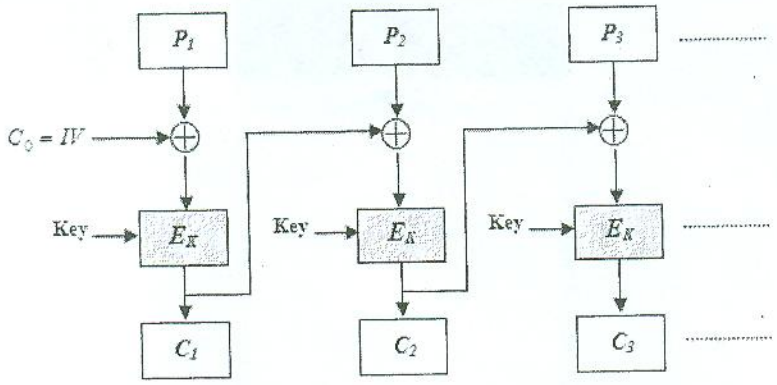


Fig. 1. Cipher Block Chaining (CBC) Mode

(b) Consider the following cipher: The key is a stream of random numbers between 0 and 26. For example, if the key is 2 10 6 ..., then the first letter of plaintext is encrypted with a shift of 2 letters, the second with a shift of 10 letters, the third with a shift of 6 letters, and so on.

1- Encrypt the **plaintext howareyou** with the key stream **19 6 15 20 11 22 12 10 18 22 4.**

2- Using the ciphertext produced in part a, find a key so that the cipher text decrypts to the plaintext **goodwork.**

The Fifth Question (15 Mark)

a. For the RC5 block cipher algorithm:

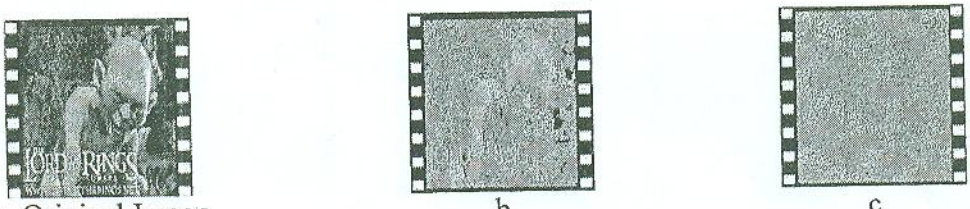
1- What are the main parameters of RC5 Block cipher. Is there exist many variations of RC5.

2- Suppose that we have two encryption algorithms **RC5-32/16/16** and **RC5-32/20/32** What is the best of the two algorithms in terms of **Security** and **Speed. Justify** your answer.

b. Fig. 2 demonstrates the effects of different modes of operation (ECB, CBC) on image encryption as shown Figs. (2-b) to (2-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. 2. An image encrypted in ECB, and CBC modes.

With my best wishes

Tanta University
Faculty of Engineering
Department of Computer & Control Eng.
Subject: Information Security (4th year)

Date: 15/6/2011
Time allowed: 180 Min.
Full Mark: 85 Mark
Final term Exam (Second Semester)

Answer All the Following Questions ملحوظة هامة: الأسئلة فى ثلاث ورقات

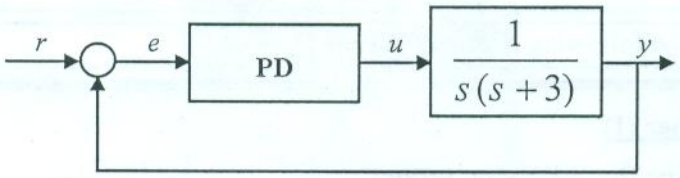
The First Question (30 Mark)

State whether each of the following statements is true or false.

1. The Playfair algorithm is based on the use of a 4 x 4 matrix of letters constructed using a keyword.
2. The Caesar cipher involves replacing each letter of the alphabet with the letter standing k places further down the alphabet, for k in the range 1 through 26.
3. A transposition cipher involves a substitution of the plaintext letters.
4. A block cipher is one that encrypts a digital data stream one bit or one byte at a time.
5. A stream cipher is one in which a block of plaintext is treated as a whole and used to produce a ciphertext block of equal length.
6. Linear Differential cryptanalysis is a technique in which chosen plaintexts with particular XOR difference patterns are encrypted.
7. DES allows for block lengths of 128, 192, or 256 bits. AES allows only a block length of 128 bits.
8. Double encryption can be used with three distinct keys for the three stages; alternatively, the same key can be used for the first and third stage.
9. Content modification does not provide changes to the contents of a message, including insertion, deletion, transposition, and modification.
10. Differential cryptanalysis is based on finding linear approximations to describe the transformations performed in a block cipher.
11. In a connection-oriented application, an individual message (e.g., datagram) could be delayed or replayed.
12. Message encryption, message authentication code, hash function are approaches to producing message authentication
13. The OSI Security Architecture is a framework that provides a systematic way of defining the requirements for security.
14. Active attacks include the modification of transmitted data and attempts to gain unauthorized access to computer systems.
15. Authentication is the assurance that the communicating entity is the one that it claims to be.
16. Access control is the prevention of unauthorized use of a resource.
17. Data integrity includes the assurance that data received are exactly as sent by an authorized entity.
18. The essential ingredients of a symmetric cipher include Plaintext, encryption algorithm, secret key, ciphertext, decryption algorithm.
19. The two basic functions used in encryption algorithms are Permutation and substitution.
20. The two general approaches to attacking a cipher are Cryptanalysis and brute force.
21. A monoalphabetic substitution cipher maps a plaintext alphabet to a ciphertext alphabet.
22. A polyalphabetic substitution cipher uses a separate monoalphabetic substitution cipher for each successive letter of plaintext, depending on a key.

(d) For the following block diagram, design a PD controller such that the closed loop system poles have the values

$$s = -2,\ s = -2$$



Problem number (3)

(a) Write short notes about the following:

(i) Position sensors

(ii) DC motor switching and control

(iii) Active and passive sensors

(iv) Centralized control

(b) What is meant by data acquisition system. Draw a typical computer-based data acquisition Diagram. Draw signals type in each stage of the diagram.

(c) Plot a graph of the following readings for a pressure sensor to determine if there is hysteresis, and if so, what is the hysteresis as a percentage of FS?

True pressure (kPa)	0	20	40	60	80	100	80	60	40	20	0
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(d) What is the difference between sensors, actuators, and transducers?

Problem number (4)

(a) Write short notes about the following:

- Signal conditioning
- Smart sensors
- Static and dynamic characteristic of sensors
- Process facility considerations
- Types of data acquisition systems

(b) What are the differences between scada and distributed control systems? In your answer you should concentate on the features, advantages and disadvantages of each one.

(c) Explain the effects of each term of PID controller on the system response. Can the derivative controller be used alone in control systems? Why?

(d) Explain the main components that are used in desgining a simple scada system.

GOOD LUCK

Dr. Ali Abu Tahoun

Tanta University

Department: Computer and Control Engineering
Total Marks: Marks
(لائحة قديمة)

Faculty of Engineering

Course Title: تصميم نظم التحكم
Date: June 22nd 2011 (Second term) Allowed time: 3 hrs Year: 4th
No. of Pages: (2)

Remarks: (Answer the following questions)

Problem number (1)

(a) For sensors, define the following terms:

(i) Dead band/time
(ii) Accuracy
(iii) Hysteresis error
(iv) Rersolution

(b) A spring balance has a span of 10 to 150 kg and the absolute accuracy is ±2 kg. What is its %FS accuracy and span accuracy?

(c) State whether the following are true or false, why?

1- Sensors are "input" devices ( )
2- An example of input devices is the switch or pushbutton ( )
3- All sensors produce a straight linear output ( )
4- Both sensors and actuators are collectively known as transducers ( )
5- The measurement device can have 0.3% accuracy and 0.5% error ( )
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8- Relays provide good separation of the low voltage electronic control signals and the high power load circuits. ( )

Problem number (2)

(a) Consider the following specification of a strain gauge pressure transducer. Explain the meaning of each term in it.

Ranges	50 to 2000 kPa, 100 to 8000 kPa
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Full range output	30 mV
Temperature range	-54°C to +120°C when operating
Thermal zero shift	0.030% full range output/°C

(b) Explain the main methods that are available for tuning PID controllers.

(c) In process control, define the following terms

(i) simple ON/OFF action
(ii) differential ON/OFF action

P.T.O.

Tanta University
Faculty of Engineering
Computers & Automatic Control Dept.

Computer Systems Design
2nd Sem., 2010-2011
Final Exam; 4th year students

Attempt all questions:

1. Discuss the following:
   a) CADD tools.
   b) Formal Methods.
   c) Design For Testability (DFT).

2. Draw a Petri net model for describing the dynamic behavior of the following multiprocessor system (Fig.1). In your model, you should describe the following situations:
   a) Each (Processor-1/ Processor-2) executes (Task-1/Task-2).
   b) Once a processor completes its task, the results should be written in a common Database.

Conditions:

- Only one processor can use the Database at a time.
- Both processors can work parallel/concurrently.

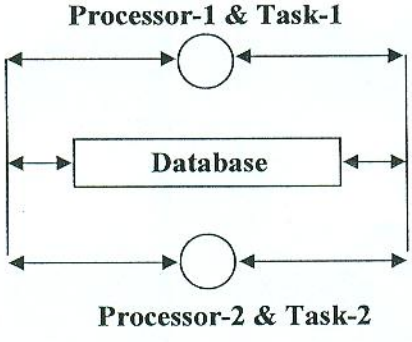


Figure 1: Multiprocessor System

3. Design a suitable Data Structures for the Petri net and represent the Petri net of question 2 in the designed data structures.

4. Design an Algorithm to generate the Reachability Graph from the Petri net and use the designed algorithm to draw the reachability graph for the Petri net model of question 2.

With my best wishes

Dr. Ahmad Shehab Al-Dean

Tanta University | **Fourth Year Students**
Faculty of Engineering | **Second Term Exam**
Computers and Control Department | **June 2011**

INFORMATION SYSTEM DESIGN

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

Question 1

(a) Discuss the life cycle of an information system. Why is it called a ' cycle ' ?

(b) It is database design that plays the pivotal role in information system design. Give reasons.

(c) With reference to database modeling, explain how the top-down and bottom-up design strategies can be employed. Is a 'mixed' strategy advantageous in this respect? Justify.

Question 2

(a) Give a formal definition for the Entity-Relationship (E-R) model. What is it used for in database design?

(b) Through practical examples and brief description, show how an E-R model illustrates the concepts of:

- Recursive relationship
- One-to-many relationship
- External identifier
- Ternary relationship
- Composite attribute
- Partial generalization

(c) Construct an E-R model that simply, but adequately, describes the E-R model itself.

Question 3

(a) Why is the E-R model often restructured before the logical design phase begins?

(b) Clarify how generalizations are treated in restructuring an E-R model, via :

- Collapsing the child entities into the parent entity.
- Collapsing the parent entity into the child entities.
- Representing the generalization by relationships.

(c) An E-R model consists of two entities E1 and E2 connected by means of a single relationship R. The cardinalities of R for E1 and E2 are (X, Y) and (U, V), respectively. E1 has two attributes A11 (identifier) and A12, and E2 has two attributes A21 and A22 (identifier). Translate this E-R model into a relational data model in each of the cases:

- $X = Y = 1 ; U = V = 1$
- $X = Y = 1 ; U = 0, V = 1$
- $X = 0, Y = 1 ; U = 0, V = 1$

Determine the keys of the relations and the attributes that may have null values.

Question 4

Consider a company with several branches. Each branch is situated in a city and has its address. It is organized into departments, and each department has a name and a telephone number. The employees of the company are affiliated to these departments, starting on a specific date. The departments are managed by certain employees. Each employee has his or her surname, salary, age, and SSN (social security number). Some of the employees work on industrial projects, starting on a specific date, and each project has a name, budget, and release date.

(a) Construct an E-R model for the company. Assume reasonably the cardinalities of the relationships and attributes, and choose appropriate identifiers for the entities.

(b) Translate the E-R model obtained in part (a) into a relational data model. Specify, in particular, the referential constraints involved.

Prof. Dr. Mahmoud M. Fahmy

Old Bylaw

Tanta University
Faculty of Engineering
Computers and Control Dept.

Fourth Year Students
Second Term Exam
June 2011

NEW TRENDS IN SOFTWARE ENGINEERING

Answer the following *five* questions. Time allowed : 3 hrs.

Question 1

(a) Describe the 'life cycle' of an information system.

(b) Discuss briefly the top-down, bottom-up, inside-out, and mixed design strategies.

Question 2

(a) A 'good' conceptual schema should possess a number of properties, which are used to verify the 'quality' of the schema itself. Explain this assertion in some detail.

(b) Construct a conceptual schema for the trainees in a training company. For each trainee, identified by a code, you will hold the social security number, surname, age, town of birth, current employer, previous employers (along with the start date and end date of the period employed), the editions of the courses the trainee is attending at present and those he or she attended in the past, with the final marks out of ten. For a trainee who is a self-employed professional, you will hold the area of expertise and, if appropriate, the professional title. For a trainee who is an employee, you will hold the level and position held.

Question 3

(a) What is meant by 'restructuring' of a conceptual schema? Why is restructuring essential before developing a logical schema?

(b) Give a definition for the 'redundancy' in a conceptual schema, mentioning two illustrative examples. Is the redundancy considered a merit or drawback? Why?

(c) How can 'generalizations' of a conceptual schema be represented using entities and relationships? Suggest three different solutions.

Question 4

Consider the conceptual schema shown in Fig.1. Restructure the schema, supposing the most important operations are as follows, each carried out ten times per day:

- Operation 1 : Read access to attributes A_{21}, A_{22}, A_{11}, A_{12}, A_{13} for all the occurrences of entity E_2.
- Operation 2 : Read access to attributes A_{41}, A_{42}, A_{31}, A_{11}, A_{12}, A_{13} for all the occurrences of entity E_4.
- Operation 3 : Read access to attributes A_{51}, A_{52}, A_{31}, A_{11}, A_{13} for all the occurrences of entity E_5.

Question 5

Consider the conceptual schema shown in Fig.2.

(a) Explain, in your own words, the information implied by the schema.

(b) Translate the schema into a logical schema.

Prof. Dr. Mahmoud M. Fahmy

2. Determine the homogeneous transformation matrix to represent the following sequence of operations:
   a. Rotation of 45° OZ-axis.
   b. Translation of 8 units along OX-axis.
   c. Translation of -6 units along OB-axis
   d. Rotation of 90° about OB-axis

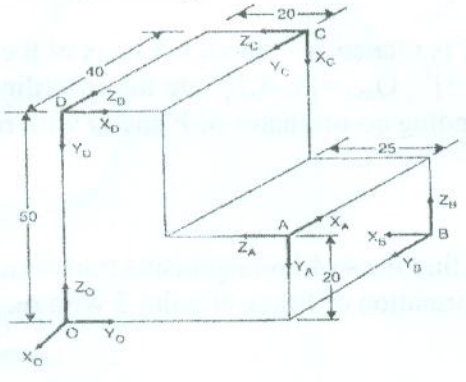
3. The co-ordinates of point Q with respect to base reference frame is given by $[4,2,5]^T$. Determine the co-ordinates of Q with respect to mobile rotated frame of the robot if the angle of rotation with the OX is 60°.

Question No. 4 *(23 marks)*

1. A robotic work cell has a camera with in the setup. The origin of the six joint robot fixed to a base can be seen by the camera. The homogeneous transformation matrix H_1 maps the camera with the cube centre. The origin of the base co-ordinate system as seen from the camera is represented by the homogeneous transformation matrix H_2.

$$H_1 = \begin{bmatrix} 0 & 1 & 0 & 2 \\ 1 & 0 & 0 & 4 \\ 0 & 0 & -1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad H_2 = \begin{bmatrix} 1 & 0 & 0 & -4 \\ 0 & -1 & 0 & 5 \\ 0 & 0 & -1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

2. Write down the homogeneous transformation matrices for the co-ordinate frames attached to the corners A,B,C and D with respect to the base co-ordinate frame "0". Also write down the transformation matrix for A with respect to "C" frame and verify the same by finding the inverse.



problem 2. of Question No.4

3. A six joint robotic manipulator equipped with a digital TV camera is capable of continuously monitoring the position and orientation of an object. The position and orientation of the object with respect to the camera is expressed by a matrix $[T_1]$, the origin of the robot's base co-ordinate with respect to the camera is given by $[T_2]$, and the position and orientation of the gripper with respect to the base co-ordinate frame is given by $[T_3]$. Where

$$T_1 = \begin{bmatrix} 0 & 1 & 0 & 5 \\ 1 & 0 & 0 & 10 \\ 0 & 0 & -1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}, \quad T_2 = \begin{bmatrix} 1 & 0 & 0 & -4 \\ 0 & -1 & 0 & 5 \\ 0 & 0 & -1 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix} \text{ and } T_3 = \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Determine: i-the position and orientation of the object with respect to the base co-ordinate.
ii- the position and orientation of the object with respect to gripper.

Best wishes *Dr. Eng. Alasyed Sallam*

Tanta University	**Second Term – Final Exam**
Faculty of Engineering	**Subject: Mobile Computing**
Computer and Control Dep.	**Allowed Time: 3 Hours**
Forth Year	**Date: June 26, 2011**

Answer the following questions and assume any missing data

Question 1:

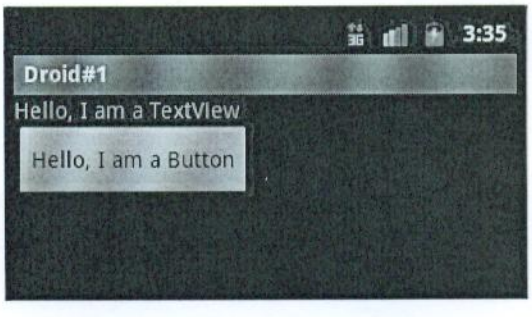
1. What are the different tiers in the three – tier architecture of mobile computing? Describe the function of these tiers? (8 Marks)
2. What are the steps you need to follow during the design of an application development using voice? (8 Marks)
3. In GSM, Describe briefly the function of the following: BTS, GMSC, EIR, MS, and BSC. (8 Marks)

Question 2:

1. Explain the carrier frequencies and TDMA frames in GSM System. (8 Marks)
2. What is the role of AUC? How is authentication done in a GSM network? What are the different algorithms used for security in GSM? (8 Marks)
3. In mobile computing applications, user interfaces can be designed using one of two methods. State these methods and briefly differentiate between them. Which of them do you recommend? Why? (10 Marks)
4. Every Android application runs in its own process, with its own instance of the virtual machine which differs from the normal java virtual machine. State the name of that virtual machine and the difference between it and the normal JAVA virtual machine. (10 Marks)

Question 3:

1. Write a short notes about: (11 Marks)
   a) AndroidManifest.xml
   b) ./src folder
   c) R.java
   d) ./res folder
   e) ./res/layout/main.xml
   f) ./res/values/string.xml
   g) AVD
   h) Intents
   i) Services
   j) Content providers.
   k) Broadcast Receivers
2. Write the XML file corresponding to the following interface: (7 Marks)



3. You are making a simple application that contains two activities the **main Activity** and the **play_music Activity**.
   1. The main Activity is correctly developed and tested.
   2. For the ***play_music Activity*** you've correctly created the ***res/layout/play_music.XML*** and the ***play_music class*** with all necessary code. After that you've correctly linked the ***main Activity*** with the ***play_music Activity*** through a bottom in the ***main Activity***.

   While testing your application as the main Activity interface appear when trying to start the ***play_music Activity*** you get the following error. What possibly caused such error? (7 Marks)

Good Luck

Dr. Tarek El.Ahmady El.Tobely

Course Title: **Robotics** تخصصي ٤ ربوت رابعة حاسبات
Course Code: CCE4242 4th year
Date: 26.6.2011 (Second term)
Allowed time: 3 hrs No. of Pages: (2)

Answer all the following questions:

Question No. 1

(18 marks)

1. Discuss the advantages and disadvantages of using robots in industry.
2. What are various types of reference frames attached to a robotic? Explain with example.
3. Briefly discuss the various robot components.
4. What are the Robot classification?
5. What is workspace? Give the functional diagram with the workspace for the following robots i-3R-robot. ii-2RP robot.
6. Draw any two Euler angle systems and show rotations and angles.

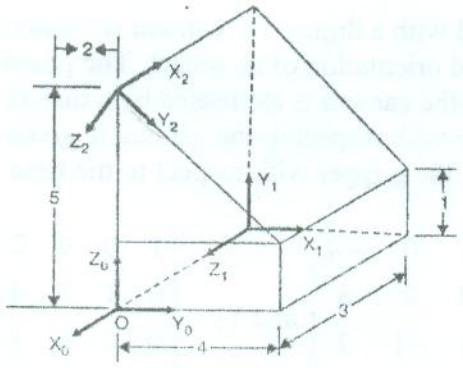
Question No. 2

(22 marks)

1. The co-ordinates of a point P_{abc} in the mobile frame OABC is given by $[2,4,5]^T$. If the frame OABC is rotated 60° with respect to OX of the OXYZ frame , find the co-ordinates of P_{xyz} with respect to the base frame.

2. A mobile body reference frame OABC is rotated 30° about OY-axis of the fixed base reference frame OXYZ. If $P_{xyz} = [-2,2,5]^T$, $Q_{xyz} = [3,-3,2]^T$ are the co-ordinates with respect to OXYZ plane, what are the corresponding co-ordinates of P and Q with respect to OABC frame?

3. For the the object shown in the figure ,find the 4x4 homogeneous transformation matrices ${}^0A_i$ for i= 1,2 and thus find the transformation of frame at point 2 with respect to the frame at point 1 (i.e. ${}^1A_2$).



problem 3. of Question No.2

Question No. 3

(22 marks)

1. Determine the homogeneous transformation matrix to represent a rotation of 60° about OX-axis and a translation of 10 units along the OA-axis of the mobile frame.

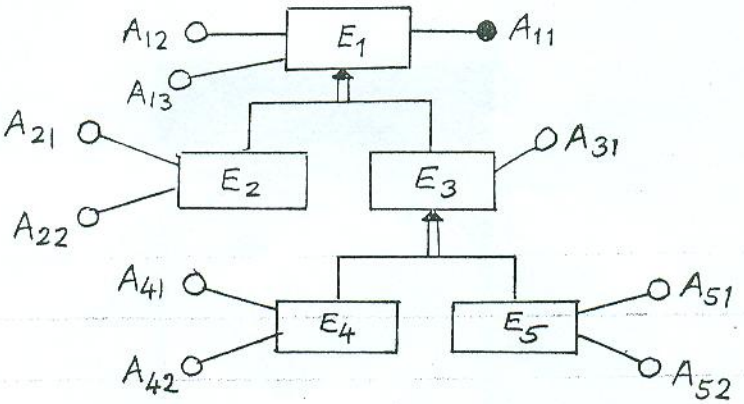


Fig.1: Conceptual schema for Ques. 4

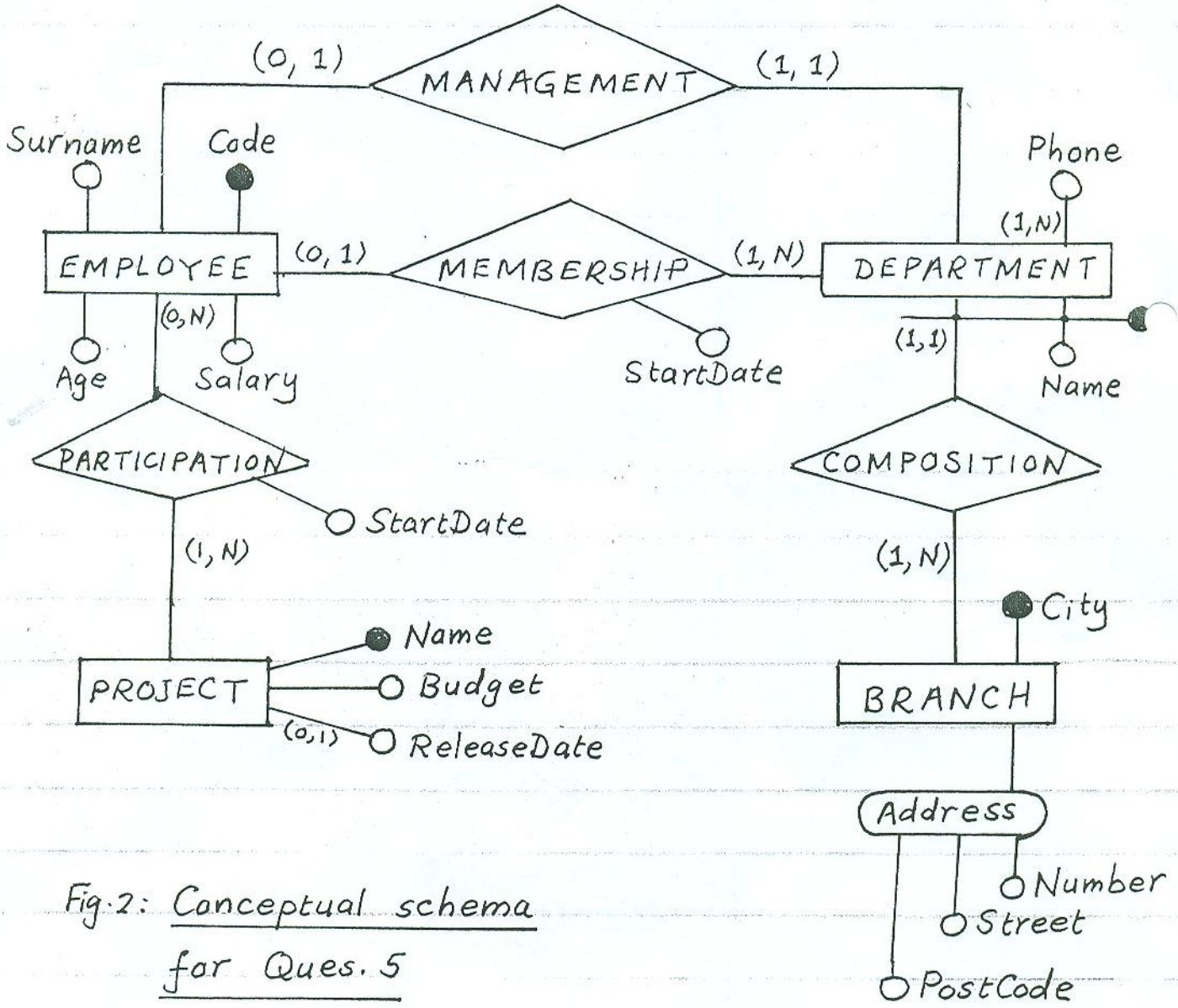


Fig.2: Conceptual schema for Ques. 5

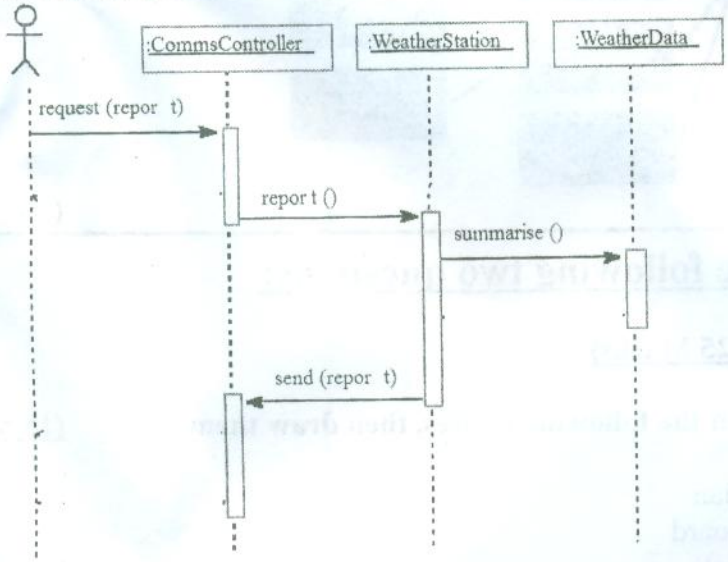
User Action	system response
1.This use-case begins when the Customer comes to the clerk and ask to rent a car	
2. The clerk enters the customer ID to the system	3. the system displays the customer's information
4. the clerk enters the car's ID	5- the system displays the car's information
6. Repeat no 4 if there are more than one car	7. repeat no 5 for each car
8. Clerk will issue a bill	9. the system will print the bill
10. The clerk will collect the payment and enter it the system	11. the system records the payment
11. The clerk gives the customer the tape with the bill	

Problem number (3) (25Marks)

(a) State true or false, and for the false statements rewrite it correctly and whether true of false make a small explanation on your answer: (15 Marks)

i. **In the real use cases, we abstract the description from any technical details.**
ii. **System sequence diagram is a static diagram that shows the relationship between classes.**
iii. **In the class diagram, we illustrate the concepts, attributes and functions.**

(b) Describe the role of the *Sequence Diagram* in UML. Given the following example of a Sequence Diagram, define its components.



Convert the above sequence diagram into its corresponding collaboration diagram and obtain the following information from it (I mean the collaboration diagram):

1- **The controller class.**
2- **The collaborating classes.**
3- **The operation it describes.**
4- **The sequence of methods execution**
5- **The part of the class diagram you can deduce.**

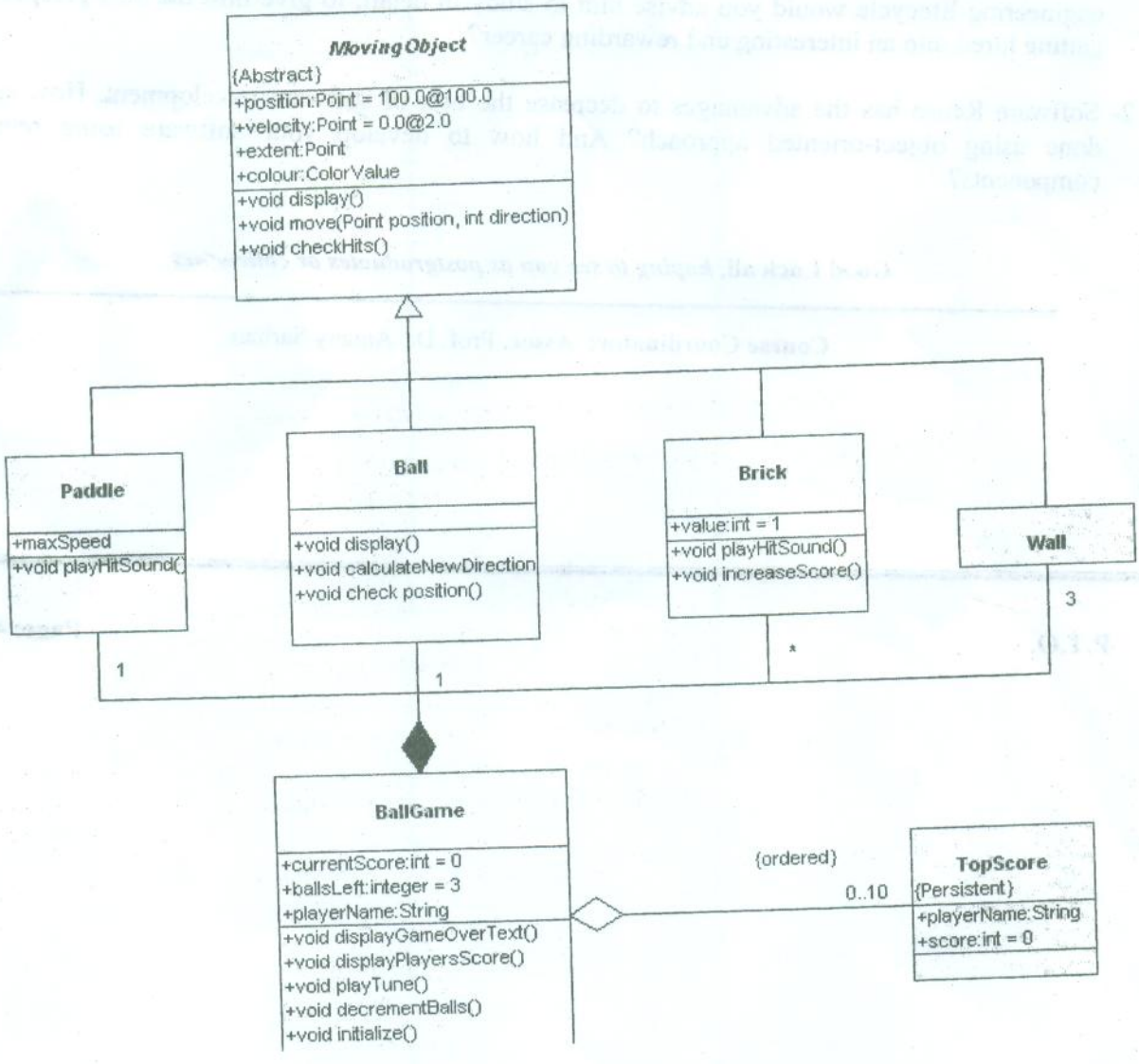
Choose only one of the following two questions:

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

(a) Quick questions: (15 Marks)

I. What is a design pattern?
II. What type of UML diagram is used to describe a specific scenario of a use case?
III. For a single system, determine:
   a. How many use cases would you introduce?
   b. How many class diagrams will you deliver?
   c. How many sequence diagrams (or collaboration diagrams) will you draw?
   d. What are needed to draw the conceptual diagram?

(c) Describe the various elements and relationships of this diagram in your own words. (10 Marks)



Problem number (5) **(25 Marks)**

(a) Draw a use case diagram for: (17 Marks)

A factory website allows administrator to login to the site. Administrator can add products to the store, update products, delete a product and view statistics of sale on the website. Factory manger can login to view statistics of sale, view any customer details, browse product and add new administrator. Finally, customers can browse product, buy product, pay by credit card or by digicash, and track his order. (Note: Try to make the diagram efficient.)

Then choose one use case (expect login) for each user's category and describe it in an expanded way.

(b) What are two advantages and two disadvantages of the object-oriented approach to software construction? (4 Marks)

(c) How to attract customer to your web page? (4 Marks)

Problem number (6) **(10 Marks)**

General knowledge questions (choose only one of them):

1- A friend is enrolled in a software engineering course, but has missed most of the lectures. He hopes to get hired by a large software company that is recruiting specialists in all different parts of the software lifecycle. Unfortunately his interview is in two days! What parts of the software engineering lifecycle would you advise him to study in detail, to give him the best prospects of getting hired into an interesting and rewarding career?

2- Software Reuse has the advantages to decrease the cost of software development. How is this done using object-oriented approach? And how to develop your software using reusable components?

Good Luck all, ***hoping to see you as postgraduates or colleagues***

Course Coordinator: **Assoc.** Prof. Dr. Amany Sarhan

Tanta University

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

Faculty of Engineering

Course Title: Elective Course 3 (E-Commerce)	Course Code: CCE4340	Year: 4th
Date: June 12th 2011 (Second term)	Allowed time: 3 hrs	No. of Pages: (4)

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

Problem number (1) **(25 Marks)**

(a) **Design an e-commerce web page for a TV company. Show in your design the following:** ***Buying facility, search facility, different payment methods, login and register facility.***

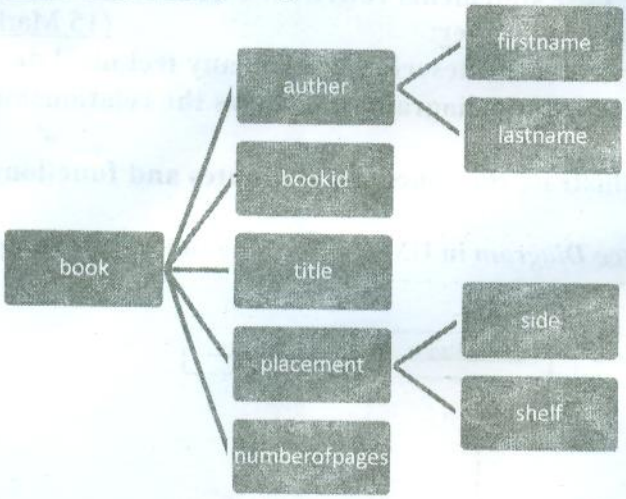
(i) What are the benefits of allowing the user to:

1- Login when making payment.
2- Have various payment methods.
3- Browse his cart.
4- Track his order.

(ii) What are the possible administrator functions that you must add to such sites in order to make your site dynamic?

(15 Marks)

(b) **What are the benefits of using XML? For the following XML tree, build the XML document using two sets of data for your own.**



(10 Marks)

Choose only one of the following two questions:

Problem number (2) **(25 Marks)**

(a) **What is the relation between the following classes, then draw them:** (15 Marks)

1- Book , book catalog
2- Manager, person, librarian
3- Computer, screen, keyboard
4- Student, studentcourselist

(b) **For the following use case description, identify the concepts and draw the conceptual model.** (10 Marks)

Name: **Rent a car**
Description: This use case begin when the customer come to the clerk and ask to rent a car.
Actors: customer (Initiator), clerk.

P.T.O.