UNIVERSITY OF MALTA
Faculty of Information and Communication Technology
Department of Computer Information Systems

CIS1001 Electronic Commerce 1

Date: 22nd January 2015                Time: 09.15-10.45 hrs
CIS1001 - Electronic Commerce I

Instructions.

1. Answer all questions.
2. Read all questions carefully.
3. Put answers in spaces provided.
4. No calculators or other electronic devices.

<table>
<thead>
<tr>
<th>Section</th>
<th>Points</th>
<th>Your Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Choice</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Short Answer</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Fill In The Blank</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Section 1: Multiple Choice  [40 marks]

**CIRCLE** the letter of the **BEST** answer.

[2] (a) The group of logical, related, and sequential activities and transactions in which businesses engage are often collectively referred to as business _________.
   A. Services  
   B. Processes  
   C. Logistics  
   D. Communications

[2] (b) One force driving the growth in global online sales to consumers is the ever-increasing number of people who have access to _________.
   A. Higher Education  
   B. Health Care  
   C. Legal Counsel  
   D. The Internet

[2] (c) Which of the following statements is correct?
   A. The first wave of electronic commerce was predominantly a U.S. phenomenon.
   B. In the second wave of electronic commerce, Internet technologies are being integrated into B2B transactions and internal business processes by using bar codes and scanners to track parts, assemblies, inventories, and production status.
   C. In the first wave of electronic commerce, radio-frequency devices and smart cards were combined with biometric technologies.
   D. The use of e-mail in the second wave was used as a tool for relatively unstructured communication.

[2] (d) The _________ of a website is its ability to keep visitors at the site and attract repeat visitors.
   A. Image  
   B. Presence  
   C. Stickiness  
   D. Usability

[2] (e) Newspapers such as The Times use the _________ revenue model.
   A. Advertising-Subscription Mixed  
   B. Advertising-Supported  
   C. Fee-For-Service  
   D. Information Sales

[2] (f) _________ is an important element of creating an effective Web presence.
   A. Mass Media  
   B. Usability  
   C. Disintermediation  
   D. Cannibalization

[2] (g) The level of interest, emotion and activity the consumer is prepared to expend on a particular purchase is called the _________.
   A. Cognitive Dissonance  
   B. Level of Involvement  
   C. Routinised Response Behaviour  
   D. Motivational Structure
(h) An unplanned buying behaviour resulting from a powerful urge to buy something immediately is called ____________.
   A. Compulsive Responsive Behaviour
   B. Non-problem Solving
   C. Habitual Buying
   D. Impulse Buying

(i) A consumer’s buying decisions are affected in part by the people around him or her. Such people and the forces they exert on an individual buyer are called ____________.
   A. Motivational Influences
   B. Roles
   C. Social Influences
   D. Personality Influences

(j) ____________ are used to stimulate consumers to try a new or established product, to increase sales volume quickly, to attract repeat purchasers or to introduce new package sizes or features.
   A. Trigger Words
   B. Coupons
   C. Spam
   D. Pop-up Ads

(k) ____________ stands for marketing via a mobile device, such as a smartphone, to provide customers with time and location-sensitive, personalised information that promotes goods, services and ideas.
   A. Mobile Marketing
   B. Active Ads
   C. Pop-Behind Ads
   D. Spam

(l) Most ____________ transactions depend heavily on the role of personal selling.
   A. C2C
   B. B2B
   C. B2C
   D. G2C

(m) The four Ps of marketing include:
   A. Product, Principle, Place, and Price
   B. Product, Price, Promotion, and Place
   C. Product, Principle, Promotion, and Price
   D. Principle, Place, Price, and Promotion

(n) The ____________ is the part of a Web site that keeps track of selected items for purchase and automates the purchasing process.
   A. Trigger Word
   B. Shopping Cart
   C. Marketspace
   D. Padlock
[2] (o) Some Web pages have banner ads that continue to load and reload as long as the page is open in the visitor’s Web browser. Each time the banner ad loads is a(n) ____________.
   A. View
   B. Count
   C. Click
   D. Impression

[2] (p) ____________ are the prices potential buyers in an auction are willing to pay for an item.
   A. Inquiries
   B. Reserves
   C. Proposals
   D. Bids

[2] (q) The practice of bringing buyers and sellers together in a social network to facilitate retail sales is called ____________.
   A. Social Shopping
   B. Facebooking
   C. Peer to Peer Marketing
   D. Social Advertising

[2] (r) ____________ observes auction progress until the last second or two of the auction clock and places a bid high enough to win the auction.
   A. Targeted Software
   B. Escrow Service
   C. Sniping Software
   D. People with way too much time on their hands

[2] (s) A(n) ____________ is a statement declaring that the seller will not honour some or all implied warranties.
   A. Invalid Contract
   B. Unsigned Warranty
   C. Warranty Disclaimer
   D. Warranty Negation

[2] (t) A(n) ____________ is assessed on the amount of value added at each stage of production.
   A. VAT
   B. Import Tariff
   C. Property Tax
   D. Transaction Tax
Section 2: Short Answer [32 marks]

(a) When conducting SWOT analysis, what are some of the questions that one should ask to identify strengths and weaknesses (provide 2 for each)?

(b) Many websites opt to use the web-catalogue revenue model. Describe this model of website [2]. What are the advantages over a traditional print catalogue [3]? Give 4 examples of the types of consumer items that can be sold using this model [4].

(c) What are the three broad categories of customer buying behaviour? Briefly define each.
(d) Discuss how to put together (taking into account design/content for the potential customers) a website that is effective in sales promotions.

(e) You’ve been hired as the new marketing manager for B2C Bakery. They specialise in baked goods and catering services. It has been suggested that perhaps a social media profile would be useful for this company in order to raise their profile/awareness. Suggest how you would go about doing this and what benefits and responsibilities you would have. Give specific examples (social media platform and what you would do with it + pros/cons).
Section 3: Fill in the blank  [28 marks]
For the following questions, fill in the blanks by selecting the best word or words from the list provided at the bottom of the page. Not all the words provided are used, but no word is used more than once.

[2] (a) The group of technologies that have emerged that have combined to make new business possible on the web is generally described as ____________.

[2] (b) The total of all costs that a buyer and seller incur as they gather information and negotiate a purchase-and-sale transaction are called ____________.

[2] (c) The set of characteristics that marketers use to group visitors is called ____________.

[2] (d) A ____________ can occur whenever sales activities on a company's Web site interfere with its exiting sales outlets.

[2] (e) A group is referred to as a ____________ when an individual identifies with it so much that he or she takes on many of the values, attitudes or behaviour of group members.

[2] (f) ____________ can occur after the purchase of an item: that is, doubts that occur because the buyer questions whether the best purchase decision was made.

[2] (g) ____________ stands for marketing via a mobile device, such as a smartphone, to provide customers with time and location-sensitive, personalised information that promotes goods, services and ideas.

[2] (h) ____________ is the process of informing customers and persuading them to purchase products through personal communication in an exchange situation.

[2] (i) ____________ prompt visitors to stay and investigate the products or services offered on a Web site.

[2] (j) A(n) ____________ is a banner ad that is designed to span the top or bottom of a Web page.

[2] (k) The practice of bringing buyers and sellers together in a social network to facilitate retail sales is called ____________.

[2] (l) A(n) ____________ service is an independent party that holds a buyer's payment until the buyer receives the purchased item and is satisfied that the item is what the seller represented it to be.

[2] (m) ____________ is the agreed-upon exchange of something valuable, such as money, property, or future services.

[2] (n) A Web site user can agree to a site's end-use license agreement or its terms and conditions by clicking a button on the Web site (called a ____________).

<table>
<thead>
<tr>
<th>auction</th>
<th>authority to bind</th>
<th>bargainers</th>
<th>behavioural</th>
<th>bidders</th>
</tr>
</thead>
<tbody>
<tr>
<td>cannibalisation</td>
<td>channel conflict</td>
<td>click-wrap acceptance</td>
<td>cognitive dissonance</td>
<td>consideration</td>
</tr>
<tr>
<td>copyright</td>
<td>demographic information</td>
<td>diminishing</td>
<td>Dutch</td>
<td>e-business</td>
</tr>
<tr>
<td>e-procurement</td>
<td>escrow</td>
<td>exploration</td>
<td>familiarity</td>
<td>intellectual property</td>
</tr>
<tr>
<td>Italian</td>
<td>infrastructure</td>
<td>leaderboard ad</td>
<td>marketing</td>
<td>mass-media</td>
</tr>
<tr>
<td>meetup</td>
<td>mobile marketing</td>
<td>occasion</td>
<td>partner</td>
<td>patent</td>
</tr>
<tr>
<td>personal selling</td>
<td>pop-up</td>
<td>presence</td>
<td>procurement</td>
<td>property</td>
</tr>
<tr>
<td>reference group</td>
<td>routines</td>
<td>segmentation</td>
<td>service mark</td>
<td>Six Degrees</td>
</tr>
<tr>
<td>snipe</td>
<td>social shopping</td>
<td>stakeholders</td>
<td>statutory law</td>
<td>strategic alliance</td>
</tr>
<tr>
<td>stickiness</td>
<td>transaction costs</td>
<td>terms of service</td>
<td>trigger words</td>
<td>value-chain</td>
</tr>
<tr>
<td>vertical</td>
<td>Web Directory</td>
<td>Web 2.0</td>
<td>WIPO</td>
<td>XML</td>
</tr>
</tbody>
</table>
Calculators are allowed
SMART devices are NOT allowed

UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems

January/February 2015 Assessment Session

CIS1021 Fundamentals of Information Systems

23rd January 2015

17:30-19:30

This paper contains SIX questions, you are to attempt any FOUR questions.

1. a) With the help of a diagram show how data is converted into information in a typical system.

[5 marks (3-marks for diagram, 2-marks for explanation)]

b) Discuss any five benefits that a Management Information System can offer to managers in a business organization.

[5 marks (1-mark each)]

c) Explain the term ‘Transaction Processing’ and explain any two types of transaction processing.

[5 marks (3-marks for transaction processing, 2-marks for examples (1-mark each))]

d) Discuss the use of functional information systems and give two examples of such systems.

[5 marks (3-marks for use, 2-marks for examples (1-mark each))]

e) Compare the different needs of an operations manager with those of an executive manager. Suggest the type of information system that would be useful for the executive manager.

[5 marks (3-marks for compare, 2-marks for suggested type)]

2. a) Explain the term ‘Automation’. Explain any two advantages and any two disadvantages of automation.

[5 marks (1-marks for automation, 2-marks for advantages, 2-marks for disadvantages)]
b) Discuss the usefulness of an OAS (Office Automation System).

[5 marks (1-mark for each valid point)]

c) Briefly explain several advantages of modern technologies when automating work processes.

[5 marks (1-mark for each valid point)]

d) Briefly explain why contingency planning is important for IT systems used in business organizations.

[5 marks (1-mark for each valid point)]

e) Explain the term 'Virtual Organization' and discuss its implications on the workers.

[5 marks (2-marks for explaining virtual org., 3-marks for discuss (1-mark for each valid pt.))]

3. a) Describe how it is possible to analyse a work system.

[5 marks (1-mark for each valid point)]

b) Describe and explain the 'Work Systems Framework' (WSF).

[10 marks (5-marks definition, 5-marks for use)]

c) Explain what is 'Business Process Re-Engineering' (BPR). Why is a BPR exercise important before planning a new information system in a large business organization?

[10 marks (5-marks for BPR, 5-marks for importance of BPR exercise (1-mark for each valid pt.))]

4. a) Briefly explain any five types of expert system (ES).

[5 marks (1-mark for each)]

b) Compare any two differences between an ES and a Decision Support System.

[5 marks (2.5-marks each)]

c) Discuss any five limitations of Simon’s model for decision taking.

[5 marks (1-mark each)]

d) Explain the use of Information technology in supporting ‘Value Chains’.

[5 marks (1-mark each valid point)]

e) Briefly explain how Business Process Reengineering (BPR) differs fundamentally from Total Quality Management (TQM).

[5 marks (1-mark each valid point)]
5. a) Briefly explain any five of the following:
   i) Cloud Computing and Distributed Information Systems
   ii) Accounting Information Systems
   iii) Critical Success Factors (CSF) and their relationship to ICT planning
   iv) Professional Support Systems (PSS)
   v) Management Reporting Systems (MRS)
   vi) Security risks associated with Information Systems
   vii) Automation of Workflow processes

   [25 marks (5-marks each)]

6. a) Explain what is the 'Value Chain' analysis method. What is the difference between i) primary activities and ii) secondary activities.
   [5 marks (3-marks for value chain, 2-marks for primary and secondary act.)]

b) What is the difference between a data driven (Decision Support System) DSS and a model based DSS. Give a basic example of each.
   [5 marks (3 marks for differences, 2 marks for examples)]

c) List and describe any five IT related jobs.

   [5 marks (1 mark each)]

d) Information stored in Information Systems comes at a price and it has several qualities that make it useful. List and describe any five qualities of good information.

   [5 marks (1 mark each)]

e) Explain the differences between the internet and intranets and their i) advantages and, ii) disadvantages in a business environment.
   [5 marks (1 mark for differences, 2 marks for advantages, 2 marks for disadvantages)]
Calculators are allowed
SMART devices are NOT allowed

UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems

January/February 2015 Assessment Session

CIS1023 Information Systems

30th January, 2015

13:00-15:00

This paper contains SEVEN questions, you are to attempt ANY FOUR questions

1. a) Explain the term `Automation`. Explain any two advantages and any two disadvantages of automation. [5 marks (1-marks for automation, 2-marks for advantages, 2-marks for disadvantages)]

   b) Discuss the usefulness of a Management Information System (MIS) in a business organization. [5 marks (1-mark for each valid point)]

   c) Briefly explain several advantages and disadvantages of modern technologies for automating work processes. [5 marks (1-mark for each valid point)]

   d) Briefly explain the concept of virtualization with reference to the `virtual office`. [5 marks (1-mark for each valid point)]

   e) Briefly describe how an IT system can add value to work processes. [5 marks (1-mark for each valid point)]

2. a) List and explain any five types of expert system (ES). [5 marks (1-mark for each)]

   b) Discuss how unstructured decision making problems can be improved through the use of information systems. Which type of MIS do you suggest for this purpose? [5 marks (4-marks for unstructured prob., 1- mark for system type)]

   c) Draw and explain Simon’s model for decision taking. Describe and explain any five limitations of this model. [10 marks (5-marks for simon’s model, 5-marks for limitations (1-mark each))]
d) What is an integrated Decision Support System (DSS)? Briefly explain.  
[5 marks (2.5 -marks for dss , 2.5 - marks for explain)]

3. a) When is it preferable to use an Optimisation Based Decision Support System (DSS) rather than a data driven DSS? [10 marks (2.5 -marks for optimization DSS, 2.5-marks for data driven DSS , 5 - marks for when pref.)]

b) If a business organization lacks knowledge in a certain area is it suggested to use a DSS or an Expert System (ES)? Clearly explain why.  
[5 marks (2.5 -marks for correct identification, 2.5-marks for explain)]

c) For top level management in an organization is a DSS or an EIS Executive Information System (EIS) suggested? Clearly explain why.  
[5 marks (1-mark for correct identification, 4-marks for explain)]

d) Explain and describe the cost of transforming data into information.  
[5 marks (1-mark for each valid point)]

4. a) Why is there a need to maintain different Ledgers in an Accounting Information System?  
[5 marks]

b) The General ledger module is the core module through which the principal financial reports (i.e. the profit and loss report and the balance sheet) are generated. Mention three examples of other ledger modules (not including the General Ledger) and give a brief description of their main purpose.  
[12 marks: 4 per ledger module]

c) Explain in brief how data in the General Ledger module is updated by data from the modules of subsidiary ledgers.  
[5 marks]

d) Distinguish between a financial transaction and an electronic transaction.  
[2 marks]

e) What is the relationship between a transaction record and a master record?  
[1 mark]
5. a) There are a number of important issues related to the design and development of a computerized information system in separate but interoperating modules.

Discuss any three of the following aspects related to such a modular approach to the design of information systems:

- Reduction in data entry
- Maintainability
- Scalability
- Data consistency
- Up-to-date reporting

[12 marks: 4 marks per aspect]

b) Indicate ways in which each of the three aspects chosen in a) may be of an advantage either for the developer, the vendor and/or the client. [3 marks: 1 mark per advantage]

c) What do you understand by traceability in the context of interoperating modules, as in a computerised accounting system? [4 marks]

d) How can traceability be maintained across different ledger modules? Give a practical example to support your explanation. [6 marks: 3 explain + 3 example]

6. a) What do you understand by a Supply Chain and a Supply Chain Management System (SCM)? [4 marks: 2 + 2]

b) Discuss how can a SCM benefit a i) manufacturer, ii) retailer and the iii) consumer respectively? [12 marks: 4 + 4 + 4]

c) How does the Internet contribute to an efficient and effective SCM? [5 marks]

d) Briefly discuss two problems that can negatively effect the successful operation of an SCM system. [4 marks: 2 + 2]
7) a) Define a Work System. Give two examples of Work Systems. Outline the challenges in the Work Systems Framework. [10 marks: 5 marks for work system, 5 marks for challenges]

b) Draw a Work System Framework for the business process of revamping the internet presence of an organisation that prides itself in offering all of its services on-line, seamlessly but securely. The revamp aims at offering its services on wider range of platforms. You are required to list any assumptions taken in the articulation of the WSF business processes. [10 marks: 5 marks for diagram, 5 marks for explanation, labelling & assumptions]

c) Identify the product/service position for the above system. Identify two changes in the business process that would and would not effect the product/service positioning. [5 marks (1 mark for product/service position, 4 marks for changes 1 mark each)]
1. a) Explain what is meant by the term ‘Value Chain’. Clearly distinguish between support activities and primary activities. How does IT fit in the value chain model?
   [10 marks (5 marks for value chain, 2.5 marks for support vs primary, 2.5 marks for IT)]

   b) Discuss the usefulness of a Management Information System (MIS) in a business organization.
   [5 marks (1 mark for each valid point)]

   c) Define the term ‘Automation’. Briefly explain several advantages and disadvantages of modern technologies for automating work processes. [5 marks (1 mark for automation, 4 marks for adv./dis. valid point)]

2. a) Briefly explain the concept of virtualization with reference to the ‘virtual office’.
   [5 marks (1 mark for each valid point)]

   b) Explain what is an Integrated Decision Support System (IDSS). List several components or sub-systems that are part of the IDSS.
   [5 marks (2.5 marks for IDSS, 2.5 marks for components)]

   c) List and explain any i) five advantages and any ii) five disadvantages of Simon’s model for decision taking.
   [5 marks (2.5 marks for adv., 2.5 marks for dis.)]
d) Explain the main components of a typical information system.
   [5 marks (1-mark for each valid component)]

3. a) List and explain any five types of expert system (ES). [5 marks (1-mark for each)]

b) Which type of Information System supports the decision making policies and strategies of top level managers in a business organization? Clearly explain.
   [5 marks (2-marks for correct IS system, 3-marks for explain)]

c) Discuss how semi structured and unstructured decision making problems can be improved through the use of information systems. Which types of Management Information Systems (MIS) do you suggest for this purpose?
   [5 marks (2-marks for semi/ unstructured, 3-marks for MIS types and explain)]

d) Explain the key differences between Business Process Reengineering (BPR) and TQM Total Quality Management (TQM).
   [5 marks (1-mark for each valid point)]

4. a) Define and explain the term ‘Transaction Processing’.
   [5 marks (2-marks for define, 2-marks for explain)]

b) Explain any two major types of Transaction Processing and give examples of their intended use.
   [5 marks (2.5-marks each)]

c) Briefly discuss the advantages of Corporate Information Systems in modern business organizations.
   [5 marks (1-mark for each valid point)]

d) Briefly describe how modern information systems help at the different levels in a business organization.
   [5 marks (1-mark for each valid point)]

   [5 marks (1-mark for work system, 2-marks for examples, 2-marks for challenges)]

b) Draw a Work System Framework for the business process of revamping the internet presence of an organisation that prides itself in offering all of its services on-line, seamlessly but securely. As part of the transition the organisation wishes to strengthen its customer relations model through personalized support for its esteemed client base. You are required to list any assumptions taken in the articulation of the WSF business processes.
   [10 marks (5-marks for diagram, 5 marks for assumptions and explain)]
c) Identify the product/service position for the above system. Identify two changes in the business process that would and would not affect the product/service positioning.

[5 marks (1-mark for product/service position, 4-marks for changes)]

6.

a) Why is there a need to maintain different Ledgers in an Accounting Information System? [5 marks]

b) The General ledger module is the core module through which the principal financial reports (i.e. the profit and loss report and the balance sheet) are generated. Mention three examples of other ledger modules (not including the General Ledger) and give a brief description of their main purpose. [9 marks]

c) Explain in brief how data in the General Ledger module is updated by data from the modules of subsidiary ledgers. [2 marks]

d) Distinguish between a financial transaction and an electronic transaction. [2 marks]

e) What is the relationship between a transaction record and a master record? [2 marks]

7.

There are a number of important issues related to the design and development of a computerized information system in separate but interoperating modules.

a) Discuss any three of the following aspects related to such a modular approach to design of information systems:
   - Reduction in data entry
   - Maintainability
   - Scalability
   - Data consistency
   - Up-to-date reporting

[9 marks: 3 marks per aspect]

b) Indicate ways in which each of the three aspects chosen in a) may be of an advantage either for the developer, the vendor and/or the client.

[3 marks: 1 mark per advantage]

c) What do you understand by traceability in the context of interoperating modules, as in a computerised accounting system? [3 marks]
d) How can traceability be maintained across different ledger modules? Give a practical example to support your explanation. [5 marks: 3 explain + 2 example]

8. a) What do you understand by a Supply Chain and a Supply Chain Management System? [4 marks: 2 + 2]

b) Discuss how a Supply Chain Management System (SCM) can benefit a manufacturer, a retailer and the consumer respectively? [9 marks: 3+ 3+3]

c) How does the Internet contribute to an efficient and effective SCM? [3 marks]

d) Briefly discuss two problems that can negatively affect the successful operation of a SCM system. [4 marks: 2 + 2]

9. A company has over the years implemented a number of separate independent software systems in a number of key functions including sales, purchasing and accounts. The company has experienced a phase of rapid growth resulting in an increase in activity in all functional areas. This has overloaded the current information systems and information is getting to be slow to obtain while containing inconsistencies between the different sections. The company’s management is now thinking of embarking on a project to automate two other functions, namely stores and accounts, consolidate the reporting between systems and share important information between different sections. One solution being considered is that of implementing an Enterprise Resource Planning System (ERP).

a) Discuss three benefits that the company and its management could derive from implementing an ERP solution in such a context? [6 marks: 2 per benefit]

b) What would be the five main steps towards developing and implementing an ERP successfully? [10 marks: 2 per step]

c) Discuss two types of difficulties that may be encountered when implementing an ERP solution in such an environment compared with an ERP implementation project for a company which is being newly set up. [4 marks: 2 per difficulty]
This paper contains SIX questions. You are to attempt any Four Questions

1. a) Define the terms: \textit{filesystem} and \textit{root directory}. [4 marks (2-Per term)]

   b) i) List the three types of file access supported by Linux and Unix-Like OS’s.
      ii) Explain briefly the result for a normal user granted access: a) \texttt{r-}, b) \texttt{w-x}
          and c) \texttt{r-x}. [6 marks (3-1: 1-a; 1-b; 1-c)]

   c) i) List the access classes under Unix-Like OS’s. [1 mark]
      ii) Which command is used to specifically to add the write permission for all
          classes? How can this be done recursively? [5 marks (3-Command; 2-Recursive Syntax)]
      iii) What is a \textit{umask} value, and how is it calculated? [4 marks (1-Definition; 3-How to calculate umask)]

   d) Why is mounting done under a Unix-Like OS? Discuss an advantage of mounting filesystems. [5 marks (1-Why is mounting; 4-Discuss an advantage..)]

2. a) i) What are the Windows filesystems \textit{FAT16}, \textit{FAT32} and \textit{NTFS} respectively
called under Linux? [3 marks (1-Per Filesystem)]

   ii) How can a Linux directory listing be displayed with complete details of
       every file? [1 mark]

   iii) How is the first partition of the second drive on a Linux system referenced
       (using the new style). [2 marks]

   iv) List two advantages and a disadvantage of a Linux VM ramdisk. [6 marks (2-Per advantage;2-Disadvantage )]

b) \textit{Inodes} can have an important effect in Linux-powered shared web hosting.
   Discuss. [13 marks (5-Definition of an inode;7-Discussion of issues)]
3
   a) What is a Computer Platform? List two different Computing Platforms which you are aware of.
      [3 marks (1-What is; 1-Per Computing Platform)]
   
b) i) Discuss the differences between soft and hard links.
      ii) List six features of the ext4 filesystem.
      [8 marks (2-Discuss.; 1-Per feature)]
   
c) Define the term distribution as used in Linux. List four distributions you are aware of.
      [6 marks (2-Define the term distribution; 1-Per Distribution)]
   
d) How are command-line parameters accessed under Linux? Give an example using C or Java notation.
      [8 marks (5-Explanation; 3-Example)]

4
   a) List and describe any six major services provided by a typical operating system.
      [6 marks: (1 mark per valid point)]
   
b) Explain any two categories of operating system.
      [4 marks: (2 marks each)]
   
c) Explain what is meant by a 'platform independent' application. Give an example of this.
      [4 marks: (2 marks for OS p. ind., 2 marks for examples)]
   
d) Explain what is a scripting language. Explain any two categories of scripting languages and give examples of their use in a particular OS platform and discuss their main features.
      [10 marks: (2.5 marks for scripting language explanation, 2.5 marks for two categories, 5 marks for examples and discuss (3,2))] 
   
e) Explain very briefly the term Network operating system (NOS).
      [1 mark]
5

a) Explain what can be used for two processes to communicate at the command or shell level of a typical operating system.
[2 marks: (1 mark for correct identification, 1 mark for explanation)]

b) Describe the main components of an OS process. What is a process composed of at a lower level?
[4 marks: (2 marks for process components, 2 marks for lower level composition)]

c) What is the major difference between an OS pipe and redirection? Clearly explain giving simple examples explaining what is happening.
[4 marks: (2 marks for pipe and redir, 2 marks for examples)]

d) Explain the difference between i) symmetric and ii) asymmetric multiprocessing in terms of load balancing. [2 marks: (1 mark each)]

e) Describe the use of an access control list in a typical networked operating system that has several users. [2 marks: (2 marks for explanation)]

f) List and briefly explain any two scripting languages.
[4 marks: (2 marks for scripting languages, 2 marks for explaining)]

g) Briefly describe why modern operating systems are structured using a multi layered approach?
[4 marks: (2 marks for multi layered, 2 marks for discussion)]

h) Why is ‘Virtual memory’ used in modern operating systems such as windows? Clearly explain. [2 marks: (1 mark for virtual memory, 1 mark for explain)]

i) Very briefly explain what is meant by ‘paging’ with reference to an operating system’s memory management mechanism. [1 mark]

6

a) Briefly explain what the Microsoft Power shell is. [2 marks]

b) Briefly describe the use of the following windows commands: i) IPCONFIG, ii) NET, iii) DIR, iv) MORE, v)FC [5 marks (1 mark each)]

c) Explain the result of the following command used at command prompt in windows.
d) What is the use of Cascading Style Sheets (CSS) when creating web pages? [1 mark]

e) Explain the difference between i) kernel mode and ii) user mode in Windows operating systems. [4 marks, (2 marks each)]

f) Discuss the use of the Hardware Abstraction Layer (HAL) and its significance in a typical OS such as Windows. [4 marks, (2 marks for HAL, 2 marks for significance)]

g) Why do processes residing in main memory require protection? [2 marks]

h) When does the ‘fragmentation problem’ occur in memory? What solution is suggested? [4 marks, (2 marks for fragmentation, 2 marks for solution)]

i) Very briefly explain the difference between the i) logical and ii) physical address of a program residing in memory. [1 mark]
This paper has five questions. Answer any three.

The total number of marks obtainable in this assessment is 99. This will be scaled up to 100%.

1) a. What are the relationships between morals, ethics and law? How does a country’s religion affect these? Discuss.
   [relationships-4; discussion-7 = 11 marks]

b. Your religion is different to that which is dominant in the country in which you live, and hence conflicts with the law in certain instances. You expect to practice your religion and abide by its laws, and think that the law of the country should come secondary. Why might some people argue that this a fair expectation? Why might others disagree? Discuss.
   [why-2; why not-2; discussion-7 = 11 marks]

c. *Ignorantia juris non excusat* — Ignorance of the law is no excuse. The laws of a country are usually quite voluminous — is it fair to always expect people to behave according to the law? Why or why not? Discuss.
   [why-2; why not-2; discussion-7 = 11 marks]

   [Total: 33 marks]

2) a. Why is it that people working in technology domains cannot always fall back on the law for guidance on what they should or should not do? Discuss.
   [5 marks]

b. In the film *Jurassic Park*, scientists find a way of recovering dinosaur DNA from mosquitoes that were encased in amber, and thus preserved, shortly after having bitten their victims. This is used to clone dinosaurs and to set up a ‘wildlife park’. A mathematician, Dr Ian Malcolm, is engaged as an ‘expert’ to certify that the park is safe. Whilst his scientist colleagues are in awe of what has been achieved, he surprises everyone by expressing his disapproval, telling their sponsor that: “Your scientists were so preoccupied with whether or not they *could*, they didn’t stop to think if they *should!*” In Dr Malcolm’s view, did the scientists who recreated dinosaurs act in an ethical way? Why or why not? Do you agree with him? Discuss.
   [6 marks]
c. Technology develops at a very fast pace and fairly independently of national boundaries. The law, on the other hand, often lags behind, and develops at different rates in different countries. Some companies make a lot of money by exploiting these national differences. In your view, is this ethical? Why or why not? [5 marks]

d. As a professional with such a company, your company asks you to work on something that cannot be used in the country where you are working, but which can be exploited in some other country where this is not illegal. Initially you are unaware that what you have been asked to do cannot legally be used in the country where you are working. Are you doing something wrong? What do you do when you find out that the use of what you have been working on is illegal in the country where you are working – but not in others? Why? [6 marks]

e. It is acceptable for you to do something in one country even if it is illegal in another? Why might you argue in favour of this, and why against? Discuss. [6 marks]

f. What is the purpose of professional associations? How can they help guide behaviour when dealing with professional issues? In your view, do ICT professionals need a professional association? Discuss. [5 marks]

[Total: 33 marks]

3) 

a. “The end justifies the means” is a popular expression which is often frowned upon. From an ethical perspective, discuss if this can be justified:
   i. for a specific issue;
   ii. as a more general philosophy.
   [specific issue-6; as a general philosophy-9 = 15 marks]

b. Among others, ethics can be Utilitarian or Deontological.
   i. What are the differences between the two? What are the problems associated with each? [6 marks]

   ii. When faced with an ethical issue, why should one be conscious of which ethical viewpoint one is taking? [6 marks]

   iii. Does it make sense for a person to sometimes subscribe to one viewpoint and sometimes to the other? Is this being inconsistent? Could one even subscribe to both? Discuss. [6 marks]

[Total: 33 marks]
A major UK supermarket chain installed Face Scanners at the entrance to their stores. These can recognise the individual – linking them to their loyalty card and hence their previous purchases – and, in combination with tracking devices on the supermarket trolleys, target him/her with personalised advertising and promotional offers on screens distributed throughout the store.

a. Some customers have been vociferously against this development. The supermarket’s message was that anybody who does not wish to be bothered by this technology can hand in their loyalty card. Is this an ethical response? Why or why not? Discuss.

[5 marks]

d. Given the continued unpopularity of this system among some of its customers, the supermarket chain has decided to provide an ‘opt-out’ mechanism to those who do not wish to be included in the scheme. Is this a reasonable way to deal with the issue? Discuss.

[5 marks]

c. Despite the ‘opt-out’ mechanism, many customers who were opposed to the introduction of this system have made it clear that they are still very concerned about it. The supermarket chain has decided to ‘downgrade’ the system, so that it does not recognise the individual, but instead estimates the age and gender of the shopper (hence generating anonymous data) and uses this information to provide targeted (but no longer personalised) advertising and promotional offers on the store screens. Is this a reasonable compromise? Discuss.

[6 marks]

d. The solution of switching the system to generating anonymous data has not been enough to address the concerns of some of the supermarket’s customers. Why might this be, and might their concerns be reasonable?

[5 marks]

e. Given the PR disaster that this system has caused, the concerns that some customers still have, and the number of customers that have shown their disapproval by moving to the competition, the supermarket’s management have decided to officially withdraw the system. However, since it cost the company a lot of money, and since the supermarket is within its rights to install cameras at the entrances to its stores for security reasons, someone in senior management has made the suggestion that the system could still operate in ‘stealth mode’ – behind the scenes. The decision was made to, for a few months, switch the in-store monitors over to provide randomised advertising/promotional offers, and then to switch the system back on in ‘stealth mode’. Thus when the final changeover was made, shoppers would not realise that the advertising on the screens had been made more ‘intelligent’ so as to now fit their profiles. Is this a reasonable solution? Is it an ethical solution? Discuss.

[6 marks]

f. Could this whole issue have been avoided in the first place? How? Discuss.

[6 marks]

[Total: 33 marks]
5) 

a. Why are ethics important in ICT practice, and even more importantly, in Software Development? Discuss. 

[5 marks]

b. Quality costs money! Why, therefore – both from an ethical and a business perspective – should one avoid poor software quality? 

[5 marks]

c. What measures can be taken to improve Software Quality, and yet maintain cost effectiveness? Explain. 

[6 marks]

d. You are a software developer working on your company’s flagship product. A major new version of the product, with various new features much awaited by your customers (and much promoted by your company) is to be released in just two weeks. Sales are forecast to double with the release of the new version, and the stock market has reacted extremely positively to this news.

The bad news is that you have just discovered a number of very tricky bugs in your code. The good news is that nobody knows about them but yourself, and that they are in parts of the code that are very rarely used. Do you raise the alarm by inserting the bugs into the bug reporting system – knowing that it is likely that you get fired for not having detected these earlier, and now jeopardising the next release and hence the company’s reputation? Or do you say nothing, knowing that it is unlikely that the bugs are discovered and attributed to you? Why? 

[6 marks]

e. You are a software developer working on your company’s flagship product. A major new version of the product, with various new features much awaited by your customers (and much promoted by your company) is to be released in just two weeks. Sales are forecast to double with the release of the new version, and the stock market has reacted extremely positively to this news.

You have just discovered a number of very tricky bugs in a colleague’s code – a colleague that you think is very full of himself, is highly valued by the company, is very arrogant towards you, and that you really don’t like! Nobody, as yet, knows about the bugs but you, and they are in parts of the code that are very rarely used. Do you raise the alarm by inserting the bugs into the bug reporting system – knowing that it is likely to get your colleague fired for negligence, since this will jeopardise the next release and hence the company’s reputation? Or do you say nothing, knowing that it is unlikely that the bugs are discovered? Why? 

[6 marks]

f. You are the project manager working on your company’s flagship product. A major new version of the product, with various new features much awaited by your customers (and much promoted by your company) is to be released in just two weeks. Sales are forecast to double with the release of the new version, and the stock market has reacted extremely positively to this news.
There is just one problem: two key features promised to customers in the new release have turned out to be plagued with bugs which could severely limit the software’s usefulness. You estimate that at least six weeks are needed to find and fix the problems. In addition, another 15 additional, less severe bugs have just been discovered by the Quality Assurance (QA) team. As the person responsible for the success or otherwise of the project, what do you recommend to the company’s senior management and why?

[5 marks]

[Total: 33 marks]
Examination Instructions

This is an open book examination. You may use any hardcopy written reference material, including hard copy course notes, textbooks and dictionaries with any annotations. Digital equipment is not permitted.

This paper contains 2 Sections.
Answer ALL questions from SECTION A and ANY TWO questions from SECTION B.
SECTION A – ANSWER ALL QUESTIONS

QUESTION 1. This is a compulsory question related to C programming constructs. You are only required to write code snippets as shown in the example below:

Sample Question: Write code that outputs on the screen fifteen asterisks on the same line.
Sample Answer: 

```c
for(i = 0; i < 15; i++)
{
    printf("*");
}
```

Answer the following questions:

a) Using only one `printf` statement, write the required code to produce the following output:
   
The overall length of an A320 aircraft is 123' 3"
   The wing span is 117' 5"

b) A variable of type `double` named `pi` holds the value `3.141592653589`. Write a statement to output on the screen the contents of `pi` to five decimal places of accuracy.

c) Write the required code to output on separate lines the even numbers between 1 and `n`, where `n` is a variable of type `int`.

d) Write the required code to ask the user to enter an examination mark between 0 and 100. If the mark entered by the user is not within the range of 0 to 100 then the user should be asked to re-enter the mark. This should be repeated until a valid mark is entered.

e) A variable `ch` of type `char` contains a digit. Write the required code to convert the contents of this variable to an actual integer. The integer should be stored in a variable `num` of type `int`.

[3 marks each]
[15 Marks]

QUESTION 2. This is a compulsory question. You are required to provide a descriptive answer for each question.

Answer the following questions:

a) The aim of the program snippet below is to display the contents of array `nums`. However the program is not giving the expected outcome. Explain what is wrong, what the program will do when executed, and what should be done in order to fix the problem (write only a code snippet).

```c
int main(void)
{
    int i;
    int nums[8] = {55 , 3 , 44 , 93 , 23 , 38 , 12 , 54};
    for(i = 1; i <= 8; i++)
    {
        printf("%d\n", nums[i]);
    }
}
```

Page 2 of 7
b) A programmer wants to write a program that continuously asks the user to enter a name until the user types "zzz". The following is the code that the programmer has written. When this program is executed it never halts, even when the user types "zzz".

```c
int main(void)
{
    char name[20];
    do
    {
        printf("What is your name? [Type zzz to stop] - ");
        gets(name);
    } while(name != "zzz");
}
```

What is wrong with the above program and what should be done in order to fix the issue?

c) What will the output of this program be when executed?

```c
int main(void)
{
    float avg = (4 + 3 + 3) / 3;
    printf("%f\n", avg);
}
```

**QUESTION 3. This is a compulsory question. You are required to write a complete C program.**

A die is a small throwable object with six resting positions that is used to generate a random number (between 1 and 6) when playing tabletop games. All positions have the same probability of appearing and in fact it is said that if the die is thrown for a large number of times and a counter for each die position is used to record the number of times that that particular position appeared, all counters should roughly have the same values.

Write a program to simulate the above experiment to show the results of when a die is thrown for 40000 times. The following is a sample output of what your program should output as a result of its execution:

![Sample output](image)

**[Correct include statements 1] [Correct use of variables 2 marks] [Correct use of random function 3 marks] [Correct: program logic 7 marks] [Overall program correctness 2 marks] [15 Marks]**
QUESTION 4. This is a compulsory question related to pointers. You are required to provide a descriptive answer for parts a and b and a code snippet for part c.

Answer the following questions:

a) Explain the meaning of the following three lines of code:

```c
int *pNum;
int num = 28;
pNum = &num;
```

[1 Mark for each line of code]
[3 Marks]

b) The memory sketch below illustrates what happens when the program written below is executed. (It is assumed that variable pNum is stored at memory location 102).

```c
int main(void)
{
    int *pNum;
pNum = (int*)malloc(sizeof(int));
pNum = 27;
    printf("Variable pNum is pointing to location \%d ",pNum);
    printf("that is holding value \%d.\n",*pNum);
}
```

![Memory Sketch](image)

What will the output of the above program be when executed (with respect to the memory sketch)?

[2 marks for each variable output]
[4 Marks]

c) An array `numbers` of type `int` has a length of 5. Using pointer techniques (do not use array indexing with `[..]`) and a `for` loop, write the required code in order to display the contents of this array on the same line, separated by a comma (,). You are not required to write the whole program but only the missing part shown in the code snippet below:
#include <stdio.h>

int main(void)
{
    int i;
    int numbers[5] = {76, 34, 56, 14, 28};
    int *ptrNumbers;

    printf("\n");

}

[8 Marks]

[Total of 15 Marks]
SECTION B – ANSWER ANY 2 QUESTIONS FROM THIS SECTION

QUESTION 5. This is an optional question. You are required to write a complete C program by answering the given questions.

The program that you are required to implement is related to single linked lists and square numbers. Remember, that a square number is the product of the same number (e.g. \(1 \times 1 = 1, 2 \times 2 = 4, 3 \times 3 = 9\)).

Write a program that when executed would first ask the user to enter any integer greater than 1 so that it can find out all the square numbers up to that number and stores them in a single linked list.

Then a menu with 3 options should be displayed as shown below:

1. Display all squares in list
2. Check if number is in square list
3. Exit

If option 1 is selected, all the square numbers that are stored in the linked list should be displayed. If option 2 is selected then the user should be asked to enter a number so that this number will be checked with the list of square numbers so that the program will output whether that particular number is a square or not. Option 3 should stop and quit the program.

As the number of square numbers is unknown, you are required to use a linked list to store the square numbers. By answering the following questions, you will be able to implement this program:

a) Define the \textit{struct} that is required to represent the nodes for the required linked list and declare also all the global variables that might be required for this program.

\[2 \text{ Marks}\]

b) Write a function to add a square number to the list.

\[3 \text{ Marks}\]

c) Write a function to search for a square number in the list.

\[3 \text{ Marks}\]

d) Write a function to display the whole list of square numbers.

\[2 \text{ Marks}\]

e) Write a function to calculate all the square numbers between 1 and the number initially entered by the user and store all the square numbers in the linked list.

\[3 \text{ Marks}\]

f) Write the main function of the program and other functions (if any) that you think are necessary to finalise the implementation of this program.

\[7 \text{ Marks}\]

[Total of 20 Marks]
QUESTION 6. This is an optional question. You are required to write a complete C program.

Write a menu driven program that is going to be used by primary school teachers to calculate some statistics about the performance of their students during the school annual examinations.

Students sit for three exams, namely: Maltese, English and Mathematics. Each teacher will have a class with a maximum of 25 students however usually the number of students is less than the allowed maximum. Your program should allow the user (i.e. the teacher) to enter the amount of students in the class. Then the following menu should be displayed:

1. Enter Student Names and Marks
2. Show Minimum Marks
3. Show Maximum Marks
4. Calculate Averages
5. Exit

If option 1 is selected, the program should allow the teacher to enter the student names and their respective Maltese, English and Mathematics marks. If option 2 is selected, the program should display on the screen the minimum marks together with the names of the students that obtained that mark for each subject. Option 3 should do the same functionality as option 2 however this time the maximum marks shall be displayed. Option 4 should calculate and display the average marks for the 3 subjects. Option 5 should stop and quit the program.

[3 marks for correct use of a struct and an array]
[3 marks for option 1]
[4 marks for option 2 & 3]
[3 marks for option 4]
[3 marks for menu implementation]
[3 marks for overall correctness]
[Total of 20 Marks]

QUESTION 7. This is an optional question. You are required to write a complete C program.

Write a program (possibly using a greedy algorithm) that after allowing the user to enter an integer amount of money in Euros, it displays on the screen the minimum number of €500, €200, €100, €50, €20, €10, €5, €2 and €1 notes and coins that make up this amount.

[8 marks for the technique used to solve the problem]
[5 marks for the correct use of programming constructs]
[7 marks for overall correctness]
[Total of 20 Marks]

END OF PAPER
Answer question 1 (40 marks) and any other three questions (20 marks each).

1. MaltaSend are a delivery service company based in Marsa. The company was registered in 2013 with the aim of providing a delivery service that is focused on delivering to Maltese clients goods which they purchased from the UK over the Internet. Packages are collected from a London address which clients indicate to sellers as their delivery address.

Although the company originally only delivered parcels from the UK by airfreight to Malta addresses, they now deliver large items using a container truck service which crosses the European road network five times a week.

Malta Delivery Information Allocation (MDIA) is to be developed as a dispatch and trucking management system. It is also to be utilised to allocate a booking to the most appropriate container or air freight unit. The company makes delivery in Malta through an appropriate delivery service and vehicle fleet. Local delivery couriers are informed of their local delivery addresses through their phablet. MDIA also has a facility to keep track of and maintain statistics of deliveries.

Truckers are motivated with high pay for the service levels they provide, supported by the latest technology, thus rendering a courier service that is reliable, trustworthy and transparent. This industrial and organisation culture is reckoned as complex to inculcate, requiring extensive training to be given to the couriers and truckers and freight handlers.

Customers are provided with a real time trucking facility of their purchases on a map right from pickup to dispatch, utilising GPS technology. Once the parcel is delivered to a client a Proof of Delivery e-mail is sent to the Marsa head office within seconds.
The majority of bookings and customer queries are taken online where specialized staff focus and deal with any complex issues that arise such as customs, health regulations and other import dues or regulations.

Based on these specifications create a project plan for management which takes into consideration the various aspects of the task at hand and the diverse management, personnel and technical issues which you feel are critical to the success of the project. Create also a template for a tentative schedule and cost plan.

[You may use point form for the project tasks and keep it at high level detail. Answer is expected to be about three to four pages long and must address technical 15 marks, business 10 marks, organisational 5 marks, development team 5 marks and stakeholder 5 marks issues. Total: 40 marks]

2. Devsoft is a new software development company which develops web solutions and distributed application systems. The company which is staffed by professionally and academically qualified developers is growing rapidly and would like to adopt a recognized standard methodology which has inbuilt project management features.

i. Mention and briefly comment on the criteria they should consider in selecting the methodology
   [1 mark each for 10 criteria relevant to the program development culture of the company and 2 marks for integrating these criteria together]

ii. Discuss how social considerations in project development and management maturity affect the choice of a methodology.
   [4 marks for social issues and 4 marks for corporate maturity issues]

3. There are many commercial ICT project management tools available to support the whole software lifecycle of ICT project management.

i. Describe the main features of an ICT project management tool with which you are familiar.
   [2 marks for identifying good tools plus one mark for each for 8 main features identified.]

ii. Discuss how such tools can support the development effort and ensure good teamwork and empowerment, and ensure delivery of software on time, within budget and of the expected quality.
4.

i. Describe briefly some bottom up method for software estimation such as for example the function point or COCOMO method.
   [Answer must show how the method arrives at the estimate of time and effort required 8 marks]

ii. Give two examples of why estimating the development cost of software is not sufficient to understand the full lifecycle cost of software.
    [Student must include one example on the maintenance issue 4 marks and one example on the future risks issue 4 marks]

iii. What do we understand by the Expected monetary value of software projects and explain how it can be estimated by a scorecard or decision tree.
    [Student is expected to explain the Benson and Parker scorecard ROI method or show how a probability decision tree can provide an expected estimate 4 marks]

5.

i. Describe the main processes of development testing in a Rapid Application Development environment such as DSDM or SCRUM
   [10 marks]

ii. Consider you are the project manager of a medium sized RAD project and are concerned that errors are taking long to be actioned and resolved. Write a one page memo to your development team outlining a plan for improving defect prevention and detection and thus improving robustness and reliability
   [10 marks]

6.

i. “A project manager must be a multi-skilled leader who is skilled in technical management, business management and human management.”
   Discuss this statement with reference to the nine knowledge areas which a project manager must be competent in.
   [10 marks]
ii. A project manager for a medium sized financial application is concerned that his team is not fully understanding the business needs of the client. Write a short memo on user assurance to the development team outlining some measures to be taken in order to better relate with the client and his needs.

[10 marks]
This paper contains FIVE questions. You are to attempt any THREE questions. Use a separate script for questions 1&2; for question 3; and for questions 4&5.

1) This question is a case study of an organisation that offers home insurance adopting a well-known EIP solution that will be integrated with a back-end ERP.

Consider the following scenario and identify all the key aspects that need to be considered when answering the questions that follow:

The main objective of “SafeHome” insurance organisation is that it offers home insurance protection against loss or damage to your home buildings and contents. The aim is to cover various specified perils such as fire, explosion, storm risks, impact by vehicles as well as theft or attempt threat. Some insurers also provide coverage on accidental damage basis, generally referred to as ‘all-risks’, although the protection would still be subject to a number of exclusions. ‘All Risks’ cover may be arranged for the buildings, contents as well as for personal possessions whilst away from home. The Home Insurance generally also includes coverage for your legal liability to pay compensation as a result of third party property damage and/or bodily injury arising from your ownership of the home.

You have assigned the role of consultant. The EIP solution has a number of modules to cater for the various components needed. For this case study, focus on the module that is required to create a quote.

i. a) By referring to an ERP product of your choice identify the key modules needed to when setting up an ERP that caters for home insurance as described above. (8 marks)

b) By drawing a flow chart, illustrate the sales process required to create a quote. In each stage describe the key documents in the sale process in terms of their roles in the process. (4 marks for diagram 12 marks, 2 marks describing for each stage)

ii. Discuss in point form the following key aspects of a typical setup:
   a. What type of organisation does “SafeHome” be classified in. (2 marks)
   b. Explain at least 5 functions of the different systems in a typical application suite. How do they relate to each other? (5 marks)
   c. Explain the difference between a backorder and a stock out. (3 marks)

(Total: 34 marks)
2) **This question is about Return on Investment (ROI) when implementing an ERP:**

Today, nearly every management group needs to review and revise its supply chain management strategy often, in the pursuit of achieving and maintaining a competitive edge. Companies considering a new ERP system, as an enabler to more effective supply chain management, need to get to the heart of ROI early in the planning process. Management needs to ask some challenging, broad-ranging questions, and seek answers that demonstrate a tie-in to the company’s overall goals and objectives. Asking tough questions and making sure the answers are solid and as fact-based as possible should help to clarify many issues and priorities.

*Refer to the above discussion when answering the following questions.*

i) Identify at least 8 key issues and priorities that one must consider when implementing an ERP.  

   (8 marks)

ii) What are the reasons for increased global competition? What are the consequences of global competition to an organisation?  

   (8 marks)

iii) What are (at least 5 of) the key business processes in an organisation? Do all companies have the same key processes? Why or why not?  

   (5 marks, 5 marks)

iv) What are the typical functions of departments in an organisation? (Name at least 4) What type of work is done in each of these functions within an ERP solution of your choice?  

   (8 marks)

   (34 marks)
3) A sizable local foundation, which provides a range of hospital and other health-related services, currently places orders for its various inventory items at quarterly intervals.

Relevant data in respect of one particular stock item (coded AZ100) are as follows:

<table>
<thead>
<tr>
<th>Annual usage quantity</th>
<th>5,000 boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum order quantity</td>
<td>50 boxes</td>
</tr>
<tr>
<td>Cost per box</td>
<td>€2.00</td>
</tr>
</tbody>
</table>

This stock item is used on a regular basis and, on average, half of the amount purchased is held in inventory. The cost of storage is considered to be 25% of the inventory value. The average cost of placing an order is estimated at €12.50.

The management of the foundation has asked you to carry out a review of the present state of affairs, as well as to consider possible ways of effecting cost savings.

REQUIRED:

a) The foundation is trying to decide what size of order to place with the supplier of AZ100 for the coming year. Seven alternative order sizes are being considered: 125, 250, 500, 625, 1000, 1250 or 2500 boxes. Tabulate the total annual costs for each of these seven order sizes.

(14 marks)

b) Ascertain, from the tabulation, the number of orders which should be placed in a year in order to minimize the total annual cost.

(2 marks)

c) Propose a formula that could be used to calculate the order level which would minimize these costs. Your answer should clearly explain what each component of the formula represents/stands for.

(4 marks)

d) Use the formula to check the conclusion you reached in answering (b) above. Briefly discuss any reservations you might have.

(8 marks)

e) Calculate (as a percentage) the saving that the foundation could make on its current annual cost, if it adopts the EOQ system.

(2 marks)

f) At times, the use of purely quantitative models for the planning and control of stocks might be inappropriate. Highlight two other factors that could influence an organisation's final choice of order quantity.

(4 marks)

(Total: 34 marks)
4) Part A

i) You are a consultant within an independent consulting firm. Your client is a well-known local company, its main business being the sale of household appliances. Until quite recently the company represented a single major German brand and sold these products exclusively in its own shops. The company has, however, just acquired dealerships for a number of other European brands, and has changed its sales strategy to include online sales and retail through third party outlets. You know that they are not running an ERP system at the moment, and you see an opportunity here. Why?

(3 marks)

ii) Your colleague has been working with this particular client for a while and you have been asked to replace him for a short time while he is away on leave. As you are going to be looking into the purchasing process with the client, he emailed you a Business Process Diagram (below) so that you are not completely in the dark in his absence. Although at first you were annoyed that he sent you what seemed to be a scrap of paper as an afterthought before he left on holiday, you soon realised it might be more useful than it first seemed. Why?

(2 marks)

iii) Explain the process(es) captured in the diagram below.

(8 marks)

iv) In the couple of weeks that you worked with the client, you made a good impression – especially with the CEO, who you had lunch with last week. You discussed your observation about their business, and the fact that you saw that there might be quite a lot for them to gain if they had to adopt an ERP system in their organisation, and the CEO suggested you make a proposal to them. What would you put in the proposal, and why? Is there anything in particular that you should pay special attention to, and why?

(4 marks)

(Total: 17 marks)
Part B

The following is a typical conversation between an ERP Consultant and, in this case, the Dispatcher of a company providing Taxi services – where the Dispatcher’s job is to allocate a taxi to an incoming order by a travelling customer.

Draw a collaboration process model for the Taxi allocation process using Flow Objects (Events, Activities, Gateways). Connecting Objects and Swimlanes, in the following steps:

i. Assuming the participants are the Customer, the Taxi Driver, and the Dispatcher (who takes the order for a taxi and allocates it to a driver), create the base upon which a Business Process Diagram (BPD) can be created, in order that the participants’ activities can be partitioned and organised.

(1 mark)

ii. For each pool, go through the conversation below, identify the process flow, and annotate the BPD accordingly.

(Flow Objects-6; sequence flow logic-6 = 12 marks)

iii. Go through the conversation below once again and, on the same BPD, identify the message flows between the pools. For each of these, take care to begin the message flow at the correct point of origin of the message and to identify the activity/task that this communicates with or the event that this triggers in the destination flow.

(4 marks)

**Consultant:** So tell me, how do you allocate taxis to jobs as they come in?

**Client:** The allocation of the individual taxi is completely automated.

**Consultant:** I’m not sure I follow you. I need to understand what happens when an order for a taxi comes in.

**Client:** Right. Well, an order comes in, and I put it in the system and then the customer gets served.

**Consultant:** OK, to be honest, I’m no further than I was a moment ago. Let’s go step by step starting at the beginning. Could you tell me how an order comes in?

**Client:** Oh, that’s easy. Usually someone calls, so I get a phone call. But people can also order a cab on the web.

**Consultant:** How?

**Client:** What do you mean, how?

**Consultant:** I mean, what do they tell you or request?

**Client:** Oh, you mean you want details? Right. Basically someone asks for a taxi to come to pick him or her up from a particular place at a particular time. And that goes for the web orders too.
Consultant: Thanks. So what happens then?

Client: Well, I check if a taxi will be available at the time and place requested. That’s the difficult bit, since one has to figure out where all the cabs are going to be, and if one will be close enough, both in time and place, to make it to the destination on time. But that is the bit that I told you is completely automated. Doing that by hand is very hard – I did it for years – and pretty inefficient, since it is hard to predict where cars are going to be at specific points in time and which the best car would be to make the journey. So that is where, as I said before, I put the information in the system and it tells me which car, if any, can make it to the destination on time. Then I allocate that car to the job.

Consultant: Excellent. And if no car can make it to the place on time?

Client: Then I need to suggest an alternative time to the customer, since suggesting an alternative place would, of course, be nonsense – since they’d have to take a taxi to get there! Ha ha!

Consultant: Yes, that would be funny – though if I were a customer, I probably wouldn’t be very amused by that suggestion, especially if I were in a hurry!

Client: Anyway, so I suggest an alternative time, which the system gives me, and if the customer is ok with that, then I allocate the car and confirm the booking to the customer. By this I mean that I tell the customer the time and place that the car will be arriving. I also tell them what the cab will look like and give them a number to call in case it does not show up on time.

Consultant: Then what happens?

Client: Then I assign the cab operator, I do this through the system and this comes up on his screen in the car.

Consultant: What comes up on his screen?

Client: Well, on his screen there is always an ordered list of the journeys he has been allocated – namely time, place and customer name. So the newly allocated trip comes up in the right place on his list.

Consultant: And what happens when a trip has been completed?

Client: Ah, yes, when a trip is completed, then the customer has to pay – and when the driver takes payment, since he does this through the screen in his car, the journey is marked as complete, and I am notified about it. I then close it on the system so that it is taken off the list of outstanding journeys – since at any time we want to know how many open trips we have, in case of breakdowns, etc. Also the time taken to complete the journey, the route taken, and the time of day are all recorded so and fed in to our scheduling so that we can better estimate journey lengths for the future. This makes the system better at predicting how long journeys will take in future, which in turn helps us make better decisions when allocating vehicles to particular cars.

(Total: 17 marks)
(Total for Q4: 34 marks)
5) You are a consultant within an independent consulting firm and your client is a local agent for electronic equipment. Paul and James Borg, two brothers, have taken over UniTech, the family import business that has been in operation for over 30 years. Their father had originally started the business importing cheap products from Japan and selling them from his corner shop – however the business has since evolved. High value electronics and household goods now constitute the bulk of the company’s product range – coming mostly from Japan, but also more and more from Korea and China. These are sold not only in UniTech’s 6 retail outlets, but also through various shops belonging to third parties.

The Borg brothers would like to streamline UniTech’s operations and they have been advised that the first steps they need to take would involve implementing an ERP system to handle all their processes and data interaction in a centralised way.

The project, therefore, is to understand UniTech’s current systems, operations, and business requirements; to have these formally agreed with the company; and to eventually implement a system that addresses these requirements.

i) A colleague of yours made a proposal to the company which was accepted, and your respective legal offices are now working on putting a contract together. Your colleague, a member of the salesforce, has now handed the project over to you and you are tasked with searching for the ERP system that best fits your client’s needs. Explain the steps you would take to ensure that you select the most appropriate system for the company.

(list of steps-3; explanation of each step-3; explanation of overall process-4 = 10 marks)

ii) The system you proposed to your client was very well received and a contract has just been signed with your firm to deliver this. Indeed, you did your job so well that you have now been nominated Project Manager and must now develop the Project Initiation Document (PID) to kick off the project.

a) Why bother with this document? Might it not be better not to waste time, and hence money, and get started on the project without delay? Explain.

(2 marks)

b) List and describe each of the sections in the PID, and explain why it is important for this type of ‘content’ to be included in this first project document.

(5 marks)

c) One of the most important aspects of a project to get right is cost. Explain all of the cost elements to be taken into account on an ERP project if an off-the-shelf (OTS) product is to be acquired. What cost elements would change if a ‘cloud solution’ were to be selected, and how would the ‘end product’ differ? In what circumstances might the latter be a better solution than an OTS product?

(3 marks)

d) Develop a draft of the PID using, in the relevant sections, as much of the company details from the case description supplied above, and where appropriate explain why it was important that you included these.

(4 marks)
iii) The project plan is probably the most important document on the project – a poor plan is likely to result in project failure. List and discuss the main tasks/activities that need to be carried out on such a project and the dependencies that might exist between them, and in a diagram show how these might be arranged with respect to each other from the beginning of the project to the time the system goes live.

(list of tasks-3; explanation of each task-3; diagram with dependencies-4 = 10 marks)
(Total: 34 marks)
This paper contains THREE questions, you are to attempt any TWO questions. Use a separate script for questions 1 & 2 (Part A); and for questions 2 (Part B) & 3.

1) This question is a case study of an organisation that offers home insurance adopting a well-known EIP solution that will be integrated with a back-end ERP.

Consider the following scenario and identify all the key aspects that need to be addressed when answering the questions that follow:

The main objective of “SafeHome” insurance organization is that it offers home insurance protection against loss or damage to your home buildings and contents. The aim is to cover various specified perils such as fire, explosion, storm risks, impact by vehicles as well as theft or attempt threat. Some insurers also provide coverage on accidental damage basis, generally referred to as ‘all risks’, although the protection would still be subject to a number of exclusions. ‘All Risks’ cover may be arranged for the buildings, contents as well as for personal possessions whilst away from home. The Home Insurance generally also includes coverage for your legal liability to pay compensation as a result of third party property damage and/or bodily injury arising from your ownership of the home.

You have assigned the role of consultant. The EIP solution has a number of modules to cater for the various components needed. For this case study focus on the module that is required to create a quote.

i. a) By referring to an ERP product of your choice, identify the key modules needed when setting up an ERP that caters for home insurance as described above. (8 marks)

b) By drawing a flow chart illustrate the sales process required to create a quote. In each stage describe the key documents in the sale process in terms of their roles in the process. (4 marks for diagram
12 marks, 2 marks describing for each stage)

c) Identify some of the key problems associated with the manual, or paper-based, procurement process. How does an enterprise system eliminate or reduce the impact of these problems? (10 marks)
ii. Discuss in point form the following key aspects of a typical setup:
   a. What type of organisation is a "SafeHome" to be classified in. (2 marks)
   b. Explain at least 5 functions of the different systems in a typical application suite. How do they relate to each other? (10 marks)
   c. Explain the difference between a backorder and a stock out. (4 marks)

(Total: 50 marks)

2) Part A

This question is about Return on Investment (ROI) when implementing an ERP:

Today, nearly every management group needs to review and revise its supply chain management strategy often, in the pursuit of achieving and maintaining a competitive edge. Companies considering a new ERP system, as an enabler to more effective supply chain management, need to get to the heart of ROI early in the planning process. Management needs to ask some challenging, broad-ranging questions, and seek answers that demonstrate a tie-in to the company’s overall goals and objectives. Asking tough questions and making sure the answers are solid and as fact-based as possible should help to clarify many issues and priorities.

Refer to the above discussion when answering the following questions.

i) Identify at least 5 key issues and priorities that one must consider when implementing an ERP. (5 marks)

ii) What are the reasons for increased global competition? What are the consequences of global competitions to an organisation? (8 marks)

iii) What are the key business processes in an organisation? Do all companies have the same key processes? Why or why not? (Mention at least 5 of them) (5 marks, 3 marks)

iv) What are the typical functions of departments in an organisation? (Name at least 4) What type of work is done in each of these functions within an ERP solution of your choice? (4 marks) (25 marks)
2) Part B

i) You are a consultant within an independent consulting firm. Your client is a well-known local company, its main business being the sale of household appliances. Until quite recently the company represented a single major German brand and sold these products exclusively in its own shops. The company has, however, just acquired dealership for a number of other European brands, and has changed its sales strategy to include online sales and retail through third party outlets. You know that they are not running an ERP system at the moment, and you see an opportunity here. Why?

(4 marks)

ii) Your colleague has been working with this particular client for a while and you have been asked to replace him for a short time while he is away on leave. As you are going to be looking into the purchasing process with the client, he emailed you a Business Process Diagram (below) so that you are not completely in the dark in his absence. Although at first you were annoyed that he sent you what seemed to be a scrap of paper as an afterthought before he left on holiday, you soon realised it might be more useful than it first seemed. Why?

(3 marks)

iii) Explain the process(es) captured in the diagram below.

(12 marks)

iv) In the couple of weeks that you worked with the client, you made a good impression – especially with the CEO, who you had lunch with last week. You discussed your observation about their business, and the fact that you saw that there might be quite a lot for them to gain if they had to adopt an ERP system in their organisation, and the CEO suggested you make a proposal to them. What would you put in the proposal, and why? Is there anything in particular that you should pay special attention to, and why?

(6 marks)

(Total: 25 marks)
3) You are a consultant within an independent consulting firm and your client is a local agent for electronic equipment. Paul and James Borg, two brothers, have taken over UniTech, the family import business that has been in operation for over 30 years. Their father had originally started the business importing cheap products from Japan and selling them from his corner shop – however the business has since evolved. High value electronics and household goods now constitute the bulk of the company’s product range – coming mostly from Japan, but also more and more from Korea and China. These are sold not only in UniTech’s 5 retail outlets, but also through various shops belonging to third parties.

The Borg brothers would like to streamline UniTech’s operations and they have been advised that the first steps they need to take would involve implementing an ERP system to handle all their processes and data interaction in a centralised way.

The project, therefore, is to understand UniTech’s current systems, operations, and business requirements; to have these formally agreed with the company; and to eventually implement a system that addresses these requirements.

i) A colleague of yours made a proposal to the company which was accepted, and your respective legal offices are now working on putting a contract together. Your colleague, a member of the salesforce, has now handed the project over to you and you are tasked with searching for the ERP system that best fits your client’s needs. Explain the steps you would take to ensure that you select the most appropriate system for the company.

(list of steps-5; explanation of each step-5; explanation of overall process-5 = 15 marks)

ii) The system you proposed to your client was very well received and a contract has just been signed with your firm to deliver this. Indeed, you did your job so well that you have now been nominated Project Manager and must now develop the Project Initiation Document (PID) to kick off the project.

a) Why bother with this document? Might it not be better not to waste time, and hence money, and get started on the project without delay? Explain.

(2 marks)

b) List and describe each of the sections in the PID, and explain why it is important for this type of “content” to be included in this first project document.

(8 marks)

c) One of the most important aspects of a project to get right is cost. Explain all of the cost elements to be taken into account on an ERP project if an off-the-shelf (OTS) product is to be acquired. What cost elements would change if a ‘cloud solution’ were to be selected, and how would the ‘end product’ differ? In what circumstances might the latter be a better solution than an OTS product?

(4 marks)

d) Develop a draft of the PID using, in the relevant sections, as much of the company details from the case description supplied above, and where appropriate explain why it was important that you included these.

(6 marks)
iii) The project plan is probably the most important document on the project – a poor plan is likely to result in project failure. List and discuss the main tasks/activities that need to be carried out on such a project and the dependencies that might exist between them, and in a diagram show how these might be arranged with respect to each other from the beginning of the project to the time the system goes live.

(list of tasks-5; explanation of each task-5; diagram with dependencies-5 = 15 marks)

(Total: 50 marks)
Section A

Q1  Whilst you are at work (in the role of a systems administrator) you notice that there is a sensitive file stored on a UNIX like operating system (Linux, MAC OS X, etc). The file permissions are set to -rwx-rwx-rwx. This indicates that the file has read/write permission for:

- The owner of the file
- The people in the same logical user group as the owner
- Anyone else who has an account

It should also be noted that the file is in a location in the file system that is only accessible to people who are in the same logical group as the file owner. The file should only be accessible by the owner in this case.

a) This clearly constitutes a security violation. Define the CIA triad model of security and how they may/may not be violated in this scenario.

[Total 18 Marks]

b) What are the three categories of controls available? Explain which of these can be used to solve the issue above.

[9 Marks for definitions, 7 Marks for solutions – Total 16 marks]

Q2  a) Describe the hardest Crypto-attack possible.

[11 marks]

b) Define a cryptosystem. What is cryptography and cryptoanalysis? What is Symmetric Encryption?

[11 marks (2-Cryptosystem;2-Cryptography;3-Cryptoanalysis;4-Symmetric)]

c) Given the following Ciphertext, how would you approach breaking this encryption? (You do not need to give the decrypted result, only the process involved). Which possible situations can a cryptanalyst encounter?

UIJT JT B TUBOE BSE D BFTBS DJQI FSUFY U

[12 marks (10-Process;2-Situations)]
Section B

Q3 a) Discuss the similarities and differences between AIDS Popps Trojan and the CryptoLocker virus incidents.
[17 marks (4-Similarities;13-Differences)]

b) Define the terms cryptology, availability, reliability and integrity.
[8 marks (2-Each term)]

c) What does any form of attack involve? Distinguish between vulnerability and threat.
[9 marks (3-Attack;6-Distinguish)]

Q4 a) Computer security failures are a common occurrence nowadays. Give an example of a security failure which exemplifies a vulnerability issue.
What is an unknown perimeter?
[10 marks (6-Example;4-What is..)]

b) Define the terms DDOS, reduction of threat, object reuse, shadowing and trusted computing base.
[10 marks (2-Each term)]

c) List the main steps in developing computer security policies as found in RFC 2196 and its predecessor RFC 1244.
Define Security in terms of its four main aims.
Discuss briefly the ease of spying on the Internet. How could sensitive information be protected?
[14 marks (1-Per step;1-Per Aim;5-Discuss ease of spying/sensitive information)]

Section C

Q5 a) Define the term: 0-Day Exploit.
[2 marks]

b) What is EMET and why should it be installed on a Windows system?
[10 marks(3-What is..;7-Why should..)]

c) How can a virus surround a host program? A Virus may also integrate itself within an existing program. Briefly explain why such a procedure is unlikely to be very successful in terms of propagation.
[8 marks (6-How can a virus surround..;2-Briefly explain..)]

d) What may make a network vulnerable? Discuss briefly.
[12 marks (4-Characteristics for different network classes;8-Aspects)]
UNIVERSITY OF MALTA
Faculty of Information and Communication Technology
Department of Computer Information Systems

CIS2105 User Interface Design

Date: 15th January 2015
Time: 09.15-11.15 hrs
CIS2105 - User Interface Design

Instructions.

1. Q1 (Multiple Choice) is mandatory.
2. Choose any 2 of the remaining 4 questions (Q2 - Q5).
3. Read all questions carefully before choosing.
4. Put answers in spaces provided. Plenty of space has been provided for answering each question. Note that the amount of space provided does not imply that you must use it all. Answer each question to the best of your ability.
5. No calculators or other electronic devices are allowed.

<table>
<thead>
<tr>
<th>Section</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory</td>
<td>34</td>
</tr>
<tr>
<td>Multiple Choice</td>
<td>33</td>
</tr>
</tbody>
</table>

Choose 2 of the Following 4

<table>
<thead>
<tr>
<th>Section</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability, Guidelines, Principles and Theories / Managing Design Process</td>
<td>33</td>
</tr>
<tr>
<td>Managing Design Process / Evaluating Interface Design</td>
<td>33</td>
</tr>
<tr>
<td>Interaction Styles</td>
<td>33</td>
</tr>
<tr>
<td>Home Automation Design</td>
<td>33</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
</tr>
</tbody>
</table>
Question 1: Multiple Choice  [34 marks]
Select the best answer for each question from list the provided.

[2] (a) From the user's perspective the interface often ____________.
   A. is the problem.
   B. is the system.
   C. contains functionality.
   D. is the direct manipulation.

[2] (b) The ____________ of a design ensures smooth conversion across different display sizes. delivery by way of desktop web browsers or cell phones. translation into multiple languages and compatibility with accessibility-support devices for the disabled.
   A. obviousness
   B. user-friendliness
   C. colour scheme
   D. plasticity

[2] (c) ____________ is the ease of use and learnability of a human-made object.
   A. Software's user-friendliness
   B. Usability
   C. Habitability
   D. The value of software usability scores

[2] (d) Usability tradeoffs may sometimes have to occur when designing software. For example, if the error rate is to be kept low ____________ may have to be sacrificed.
   A. direct manipulation
   B. menu structure
   C. audio interface capabilities
   D. speed of performance

[2] (e) ____________ in software architecture is a must for competitiveness. This may include storing text in external files so they can be swapped of different languages or facilitating customisation of local versions of user interfaces.
   A. localisation
   B. usability
   C. habitation
   D. cultural sensitivity algorithms

[2] (f) As part of the on-going effort to evaluate an interface to an already released product. data logging can be used to ____________.
   A. Log errors
   B. Spy on users
   C. Backup data
   D. Save screenshots

[2] (g) Expert users using an application like a word processor will tend to use the ____________ less than novice users.
   A. monitor
   B. keyboard
   C. mouse
   D. direct manipulation options
[2] (h) Designers need to understand task frequencies as this tends to __________.
A. make teleoperation easier
B. help decide what tasks to support
C. help decide how to include all possible actions
D. avoid the need for an ethnographic study

[2] (i) If you were on a website and looking to download a demo version of some software, a link called “Download Demo” could be said to have a good __________.
A. relevance profile
B. linkage
C. information scent
D. information profile

[2] (j) When competitive products provide similar functionality the deciding factor can be __________.
A. aesthetics
B. advanced functionality
C. temporal relevance
D. usability

[2] (k) Embedded menus and hotlinks are a type of __________.
A. Explicit menu
B. Pull down menu
C. Non-contextual reference
D. Method for viewing items/information in context

[2] (l) In Tohidi et al.’s experiment performed regarding showing users single designs vs multiple designs (three), it was found that __________.
A. More negative comments were expressed when single designs were shown
B. Similar types of comments were expressed between both groups
C. More positive comments were expressed when single designs were shown
D. More positive comments were expressed when the group of three designs were shown

[2] (m) Sorting menu options by frequency of use can be an acceptable strategy on __________.
A. Mobile devices
B. Teleoperated devices
C. Most pull-down menus
D. 3D-virtual menus

[2] (n) In the Comparative Usability Evaluation (CUE-4) study discussed in class it was found ______.
A. Usability experts generally found the same problems
B. Usability experts generally aren’t worth using
C. Usability experts are very expensive
D. Usability experts tended to find different problems between them
[2] (o) Which one of the following would be an example of a good application for an augmented reality interface?
   A. Surgeon looks at a patient whilst they see an overlay of the X-Ray
   B. Being immersed in a 3D realistic environment for an architecture prototype
   C. Dragging a folder to a trash bin on the desktop
   D. Realistic 747 cockpit flight simulator

[2] (p) Microsoft introduced adaptive menus in Office 2000. As users worked with the application ________.
   A. Menu items not used would change colour
   B. Menu items used frequently would be listed in bold
   C. Menu items that have not been selected for some time disappear from the menu
   D. Menus start off short and grow in size as the comfort level of the user increases

[2] (q) Pop-up menus ________.
   A. Appear on your screen un-prompted demanding input
   B. Are optional menus that you can customise buttons/commands for and keep as a pallet on screen in a different window
   C. Are always circle menus
   D. Appear on displays as the result of a click or tap with a pointing-device
Question 2: Usability, Guidelines, Principles and Theories/Managing Design Processes [33 marks]

(a) You have just started work at a new company that specialises in software for the engineering discipline. During your orientation sessions you are going through the development processes, team structure and other information regarding how software development at the company is carried out. You notice there are no formal procedures in the software development processes for the development of user interfaces or their design. Some number of months later you end up on a large project for a new software product. You realise that the software is fairly complex and that some time/effort should be devoted to the design of the interface but due to the company culture you realise this may be a bit of a hard sell. Your team leader asks for any input you may have on the new product. How would you try and convince him that resources (or even outside expertise) are required to be allocated to the design for the interface of this new product? [3 Marks for each point raised].
(b) For the same software project mentioned above, it is agreed that an *ethnographic observation* should take place in order to observe how the potential users go about their business and currently carry out their tasks in their day to day operation. You have been tasked with arranging and looking after this exercise. Create a checklist/tasklist of the activities you should do to prepare for such a visit, what to do when on site and what should be done afterwards.

[2 Marks for each relevant activity/observation. 1 bonus mark for getting 7]
Question 3: Managing Design Process / Evaluating Interface Design  [33 marks]

(a) Many authors/researchers have urged participatory design strategies. Define what is meant by participatory design and outline the benefits/risks inherent with such an approach.
[5 Marks for definition. 2 Marks for each benefit/risk]

(b) Describe what it meant by getting the right design and getting the design right. How should this influence your design process?
(c) It is possible to evaluate software design/interfaces during active use (after it has been released). Suggest two strategies for doing this along with the benefits of doing so. [5 Marks for each strategy and description]
Question 4: Interaction Styles  [33 marks]

(a) How can we make interfaces more forgiving?

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------


(b) Forms are crucial for transaction-based applications, however badly designed forms may harm your product.

1. With examples, list at least three attributes of a badly designed form [3 marks]
2. How can tools such as Keystroke Level Model Form Analyser (KLM-FA) help? [2 marks]

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

------------

Page 9 of 16
(c) This question is about user involvement in projects

1. What risks exist if we do not involve users at any point in time during the requirements, design and development process? [2 marks]
2. What risks exist if we constantly involve users during the requirements, design and development process? [2 marks]
3. Mention one user-centred technique to mitigate the above risks. [2 marks]

(d) Examine the picture below of the registration page for a well-known eCommerce site in Malta. What changes would you suggest to this form fill-in? Note the modal dialog box with the error with the sample data put in after "sign-up" was clicked. Also note the dialog box popped up in the middle of the page initially (it was moved when the snapshot was taken). What improvements can you suggest for the form fill-in in general (looking at the data supplied)? What suggestions could you make to improve data validation and error handling? [4½ marks per suggestion]
Question 5: Home Automation Design  [33 marks]

Home automation is becoming a more common feature in modern home construction. Being able to centrally (or even remotely!) control your home's climate control features is one such example. Your task is to design the interface for such a system (home climate control). Assume the physical interface for this is in the home, is roughly the size of a tablet and is a touch screen. Clearly list any assumptions you make regarding the design. The functionality that it should include is as follows:

1. The current home temperature and pre-programmed setting shall be displayed.
2. The current time and date shall be displayed.
3. The ability to set date/time shall be provided.
4. The ability to program a number of pre-programmed settings shall be provided (spring, summer, fall, winter [weekdays and weekends for each], vacation and special occasions).
5. The ability to select a pre-programmed setting
6. The ability to override the current active programme-setting with an arbitrary temperature setting shall be provided.

Complete the following:

[12] (a) Provide sketch(es) of your proposed design (please use blank pages at end of exam). Please annotate where necessary.

[21] (b) For each of the interface requirements above, provide an explanation as to how this is achieved and what usability or device issues you needed to take into account. Refer to your sketches where necessary.
Calculators are allowed
SMART devices are NOT allowed

UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems

B.Sc. (Hons.) – Year II
January/February 2015 Assessment Session

CIS2106 Software Engineering

19th January, 2014
09:15-11:15

This paper contains SIX questions, you are to attempt ANY FOUR questions.

Q1

a) Compare the main differences between i) Agile methods and ii) RUDP (Rational Unified Development Process). Where would you suggest to use these methods.

[10 marks (5 marks for differences, 5 marks for suggested use)]

b) List and briefly explain any five main workflows in RUDP.

[5 marks (1-mark each)]

c) Briefly compare an architecture centric approach with a component based approach.

[5 marks (2.5 marks architecture c., 2.5-component based.)]

d) Give a very brief explanation of the UML object interaction, collaboration and communication in object-oriented systems. Discuss any two similarities and any two differences between sequence diagrams and communication diagrams.

[5 marks (3 mark for explanation; 2 marks for differences and similarities)]

Q2

a) Assume that you are a project manager in charge of three projects. Your task is to decide whether an agile or lightweight method like XP (extreme programming) is suitable in full or in part, or is not suitable at all, for the following projects (your reasoning needs to be adequately justified):

i) The first project considers the development of a typical web-based business information system for travel purposes that requires a web server and web service integration. This system has to offer a variety of functions to different user groups. The initial investigation indicates that some requirements are more important and are to be delivered first rather than others. This transpires from requirements analysis.
ii) The second project involves the development of a typical information system for a local government department. The system must provide a variety of simple to complex functions to different user-groups. The usability for this user group revolves around appropriate and suitable user interfaces that the system should provide. All requirements are to be fully specified before the design and programming stages take place. The system can also be accessed by different users from the public in general.

iii) The third project involves the development of the software for a car Electronic Control Unit (ECU). This system monitors the engine parameters and sends corrective signals to the engine actuators to control its performance. (e.g. thermostat, amount of air intake, idling speed etc.)

[15 marks (5 marks each - 2 marks for valid answer, 3 marks for reasoning)]

b) A small computer networking company wishes to develop a stock control system for its employees working at client installation sites. The system must allow the employees to interrogate or check the system online for general and specific parts and find information if they are available or not and also the specific categories of parts and their specification. General information like availability, delivery dates and quantity are important. Using an appropriate UML diagrammatic notation and clearly stating assumptions, preconditions and post conditions, identify and draw four main use-cases.

[10 marks (2.5 marks each for each)]

Q3

a) What is meant by the term ‘Component Based Development’? What are some advantages of this approach?

[5 marks (2 marks for CBD, 3 marks for advantages)]

b) Briefly compare the life cycle of an i) agile method with that of the ii) traditional waterfall life cycle. Give some advantages and disadvantages in both cases.

[5 marks (3 marks for compare, 2 marks for advantages)]

c) Draw a Class Diagram for the following scenario: Any assumptions must be clearly stated and explained.

A conceptual model for a very simplistic and hypothetical flight management system composed of flights and pilots is required. An airline company operates flights. Each airline has an ID and each flight has an ID, departure airport and arrival airport. The arrival and departure airports have unique ids. Each flight has a Captain and 1st Officer. The aircraft used has a unique identifier. A flight recorded on a flight plan
has at minimum a departure time, arrival time, plane details and states, pilot details etc. An airline owns a set of aircrafts of different types. An aircraft can be in a working state or in a repair state. An aircraft can be either airborne or on the ground. A type of airplane can require a particular number of pilots with different roles. E.g. captain, 1st officer, etc.

[10 marks (5 marks for cd, 5 marks for labelling & explain)]

d) You are a developer of mobile applications. You are working on introducing some new applications in your workplace. Suggest which UML diagrams would be useful for the following:

i) Detailed business logic of the applications
ii) Components of the applications

Clearly explain and justify your reasoning. [5 marks (2.5 marks each)]

Q4

a) A regional authority is facing a number of serious environmental problems such as polluted rivers, air with poor quality giving rise to an increasing number of health problems among the citizens of that area. The problems are caused by a number of reasons including: increasing and uncontrolled industrialization, higher use of cars and increased building in environmentally sensitive areas.

Although the causes and effects are known, the solutions are difficult to find and implement. Controlling industrialisation may affect the region’s income. Reducing the number of cars may affect people’s ability to move around and their ability to go about work and leisure activities. There exist laws that govern environmental issues, but these are outdated and although the region has a police force which can be used to control infringements, they are severely under-resourced and are fully occupied with more immediate issues such as thefts and car incidents. Moreover there are severe lack of financial and human resources as well as a general lack of awareness of environmental issues among the citizens.

The authority has tasked a multi-disciplinary team to investigate this problem and come up with a clear description of the problem, identifying the main issues, stakeholders, activities and systems involved and the related concerns.

a) Draw a Rich Picture to represent this problem environment identifying the main stakeholders, entities, systems, issues, constraints and concerns. [11 marks: 3 for entities, 2 for systems, 2 for issues, 2 for concerns, 2 for constraints]

b) The authority is also investigating the setting up of a system for this purpose. The functions of this system would include the following:

- Registration of reports of infringements such as illegal dumping or construction.
- Follow-up investigation of the report by appointed inspectors.
- The inspectors’ report will either lead to legal action or dropping of the case.
- Legal action could take the form of a fine or a forced halting of activity.
• If a fine is given, the payment is collected and recorded in a system and the case is closed.
• If the activity is to be halted – a notice is issued to the police for enforcement.
• In both types of action a follow up check is carried out and the case is closed.

Draw a conceptual model to represent the various activities in the proposed system and the flow of information between them. [10 marks: 1 mark per activity/connection]

c) Why do you think such holistic techniques be considered more suitable at early stages of analysis and design? [4 marks]

Q5

A well-established non-governmental organization (NGO) involved in the area of social welfare is involved in a wide range of services and activities aimed at helping the underprivileged and people at risk in the region. Due its rapid growth over the recent years, this NGO is facing a number of problems managing the funds and coordinating its activities.

The organization’s management has decided to develop an IT system to help it manage its time and money in a more efficient and controlled manner. However its requirements are not entirely clear at the moment and are evolving as time is passing. They would like to have some systems or parts of the system in place as early as possible in order to learn more about the new way of doing things so as to guide the development of the remaining parts of the system.

Furthermore they would like to have something to show to the main sponsors to keep them satisfied that their funds are being used well.

a) Why would an evolutionary approach in the development of the new system be appropriate than a waterfall approach? [2 marks]

b) Suggest a suitable development methodology that is based on such an approach and that would ensure that the system is the right system. Explain your choice. [4 marks: 2 marks for method, 2 marks for explanation of choice]

c) How would such a methodology ensure that the client is involved in the development process? Give an example. [4 marks: 2 for explanation, 2 for example]

d) What does the methodology offer to keep the NGO’s management and sponsors satisfied that work is taking place on the project? [5 marks]

e) Briefly describe three of its main phases of the methodology you selected [6 marks: 2 marks per phase]

f) Explain why each phase depends on the outcome of the previous phase? Give an example [4 marks: 2 marks – for reason, 2 marks for example]
A hairdresser’s salon has experienced a significant increase in business from a simple operation managed and run by the owner to a thriving business with three outlets in popular areas and about twenty employees.

The management was advised to computerise their booking system and integrate it with their sales and other reporting needs. A further requirement was to have the booking system available online to customers via internet. A software analyst was contracted to carry out an analysis of the current system and propose the main elements of a new system. As part of the findings the analyst determined the following requirements.

Bookings are recorded in a diary by the receptionist who allocates the booking to a time slot. For each booking the name of the customer is recorded and the main type of service expected.

The working day is of 9 hours and is split into 18 half hour slots. No more than three bookings are taken per slot to allow for adequate attention to each client by the salon staff. Further customer data consisting of their name, surname, address, contact phone number, style preferences, date of last visit are kept in a separate register for reference.

When the customer arrives a ticket is raised and all the services by the different staff members and all products used are listed on the ticket. The ticket is then used for billing at the end of the session. However, the ticket is sometimes lost and all the details have to be rewritten, with the risk of forgetting some item which is then not charged.

A cash sale is then issued against the ticket and the customer pays at the receptionist’s desk on the way out. The process of calculating the bill does not take too long, but is seen as slowing down the operations as sometimes clients will have to wait in a queue just to have the bill settled.

At the end of the month, management request an analysis of operations which is carried by going through the tickets and drawing up a report of services rendered by type of service during that month across all the branches and analysed by employee. A similar report, but on products used, is produced in order to counter-check stock levels. This report is also based on the tickets. These reports take a long time to produce and are often outdated by the time they are available.

a) List the main users and briefly describe their roles in respect of the information system, i.e. what information would they contribute to the new system and what information they expect to receive. [8 marks: 4 - identify users, 4 - user roles]

b) Identify two non-functional requirements of a new system. Briefly explain the relevance of these non-functional requirements to the system [4 marks: 2 per requirement]
c) The analyst decided to produce a set of prototype inputs and outputs for the main entry and output screens. What would be two important benefits of these prototypes [4 marks: 2 per benefit]

d) What would be the main data items to put in prototypes for the following functions

i) an input screen for a reservations entry program [3 marks]

ii) a report of services rendered by staff across all the branches, by type of service, employee, branch. [3 marks]

e) Who would be involved in the design of the two prototypes mentioned in d)? [3 marks]
Examination Instructions

This is an open book examination. You may use any hardcopy written reference material, including hard copy course notes, textbooks and dictionaries with any annotations. Digital equipment is not permitted.

This paper contains 4 questions. Answer Question 1 and any other 2 questions.
**QUESTION 1.** This is a compulsory question related to OOP design. You are required to provide a descriptive answer.

You are required to design a program using object oriented techniques that is going to be used by a Dentist to keep records of the appointments for a whole year that is made up of 52 (6-day) weeks. The Dentist works between 9.00 am and 7.00 pm from Monday to Friday and between 9.00 am and 2.00 pm on Saturdays. Between 9.00 am and 10.30 am the Dentist usually performs dental implantations while from 10.30 am onwards the Dentist sees patients that have an appointment. Usually dental implantations take approximately 45 minutes while a normal visit takes about 30 minutes.

For every appointment the information about the Patient are required. The program should include functionalities that allow the Dentist to:

- View the appointments for a whole day
- View the appointments for a whole week
- View the total amount in Euros earned during a complete week
- Add an appointment
- Delete an appointment
- View the next appointment for that particular day

Your answer should include a description of all the classes that are required for the implementation of this program (including the list of attributes and functions) and also information about how such classes will relate to each other. There is no need to write any code. You can take assumptions for any missed information. However it is suggested to write such assumptions.

[10 marks for selection of classes]
[15 marks for the functions and attributes of the classes]
[3 marks for program flow]
[7 marks for overall correctness]

[Total of 40 marks]
QUESTION 2. This is a selectable question that contains short programming questions. You are only required to write code snippets and not complete programs.

Answer the following questions by writing code snippets using the C++ programming language:

a) Using only one `std::cout` statement, write the required code to produce the following output:

```
Faculty of ICT
University of Malta
Msida MSD 2180
Malta (Europe)
```

b) Write code that asks the user to enter his/her name and age in variables `name` of type `string` and `age` of type `int` respectively.

c) Using a `for` loop, output the times table of the number 3. When executed, the `for` loop should output the following:

```
1 x 3 = 3
2 x 3 = 6
... 
10 x 3 = 30
```

d) Write the required code to ask the user to enter a menu option between 1 and 5. If the menu option entered by the user is not within the range of 1 to 5 then the user should be asked to re-enter the option. This should be repeated until a valid menu option is entered.

e) Write the required code to output on separate lines the odd numbers between 1 and `n`, where `n` is a variable of type `int`.

[6 marks each]
[Total of 30 marks]

QUESTION 3. This is a selectable question related to OOP. You are required to provide a descriptive answer using C++ code snippets.

Using suitable C++ examples, explain the following Object Oriented Programming terms:

- Class
- Object
- Class Attributes
- Functions
- Access Modifiers
- Encapsulation
- Constructor
- Destructor
- Inheritance

[2 marks for the explanation of each point]
[9 marks for the overall validity of the examples]
[3 marks for the overall understanding of OOP]
[Total of 30 marks]
QUESTION 4. This is a selectable question related to OOP. You are required to provide an answer using complete C++ code.

Write a C++ class named Rectangle that consists of two attributes, length and breadth respectively. Implement functions that:

- Allow the user to enter the values of the length and the breadth
- Calculate and returns the perimeter of the Rectangle
- Calculate and returns the area of the Rectangle
- Display all the information related to the rectangle including the dimensions, perimeter and area.

[5 marks for each function]
[10 marks for overall correctness]
[Total of 30 marks]
Examination Instructions

This is an open book examination. You may use any hardcopy written reference material, including hard copy course notes, textbooks and dictionaries with any annotations. Digital equipment is not permitted.

This paper contains 6 questions.
Answer Question 1 and any other 3 questions.
QUESTION 1. This is a compulsory question related to web application design. You are required to provide a descriptive answer.

Answer all questions:

a) Write short notes on the following web programming technologies, techniques and methods:
   i. The post and the get methods
   ii. jQuery
   iii. JSF (Java Server Faces)
   [4 marks each]
   [12 marks]

b) You have been hired to design a web application for a library system. This web application will have two types of users, the librarians and the borrowers. The librarians should be able to do all the housekeeping of the library, i.e. add, edit and remove book details, handle books that are being borrowed/returned and any other function that you think is necessary. The borrowers should be able to browse the library, check if a book is available or on loan, reserve books and register their details in order to become new library members.

You are required to DESIGN this system from scratch. No implementation is required however the classes, web pages and database tables that are required should be listed and explained. Make sure to include all the required data validation and session keeping.

The marking scheme for the question gives you a clear idea of what your answer should include. You can use UML diagrams, DFD diagrams, ERM diagrams, or any other notation that you think is necessary to explain your design.

[7 marks for database design]
[7 marks for classes]
[7 marks for web pages]
[7 marks for overall correctness (including data session validation)]
[28 marks]

[Total of 40 marks]

QUESTION 2. This is a selectable question related to Java Servlets and JSP. You are required to provide complete source code.

Answer the following questions:

a) Write the HTML code required for a web Login page that allows the user to type in a username and a password. Your Login button should redirect the flow of the web application to a Java servlet named LoginServlet.

[4 marks]

b) Implement the LoginServlet listed in part a) of this question. Use the following static method to check whether the user credentials are valid or not:

   boolean Helpers.isUserValid(String username, String password)

   [4 marks]
If the login is successful the web application should be redirected to a JSP page called menu.jsp. Otherwise the web application should be redirected to the login page (named login.html). Make sure to include in your code the required session keeping code.

[9 marks]

c) Write a code snippet for the menu.jsp page to show the mechanism required to be sure that the user is successfully logged in before s/he can use this web page.

[7 marks]

[Total of 20 marks]

**QUESTION 3. This is a selectable question related to JPA and JDBC.**

Answer the following questions:

a) Compare and contrast JPA and JDBC technologies.

[2 marks JPA]

[2 marks JDBC]

[4 marks]

b) Write a Java class called DatabaseHelpers that can be used to programatically access a database using JDBC technology. The class should accept the JDBC driver class name, the database URL and the database username and password as parameters via the constructor. Then implement the following methods:

i. public void closeConnections() — To close the database connection
ii. public ResultSet executeQuery(String sqlQuery) — To execute an SQL query
iii. public void executeUpdate(String updateStatement) — To execute an update statement.

[4 marks for each constructor method]

[12 marks]

c) Using the above DatabaseHelpers, write the required code the check if the student *Joseph Borg* is enrolled in a music course. All students that are enrolled in this course have their details stored in the following table:

STUDENTS(studId, name, surname, email, mob)

The URL of the database is jdbc:mysql://localhost/musicSchool
The username and password for the database are musicAdmin and x3wqaz respectively.

The JDBC driver class is com.mysql.jdbc.Driver

[4 marks]

[Total of 20 marks]

**QUESTION 4. This is a selectable question related to JSF.**

Using Java Server Faces technology, write all the code required to implement a form submission. The form should be implemented in a web page named PatientDetails.xhtml and it should include four fields, namely: Id Card Number, Name, Surname and Date of Birth.
When the user submits the form information, the web application should be redirected to another web page named Display.xhtml. The Display.xhtml should display on the screen the data fields previously entered by the user.

(Hint: 2 JSF pages and a Java class are required)

QUESTION 5. This is a selectable question related to HTML and Jquery.

An oil refinery company named Oil Us is currently doing a rebranding exercise. A new logo has been designed. This logo consists of a background image with the name of the company printed on it. The rebranding exercise includes a revamp to the company’s website. The artistic designer of this rebranding exercise has decided to include some animation in the revamped website by making the logo of the company appearing moving from the left hand side of the webpage to the right, enlarging the company name as shown below:

```
| B E F O R E |
```

```
| A F T E R |
```

Assuming that the logo background image is called logo.jpg and is stored under the imgs/logos directory, write the required code to make the above animation possible each time the web page is loaded.

[10 marks for the correct implementation of the animation and selection of technology]
[5 marks for the correct implementation of the HTML code]
[5 marks for the overall correctness of the solution]
[Total of 20 marks]

QUESTION 6. This is a selectable question related to Java Object Oriented Design and Reflection Techniques.

Answer the following questions:

a) Explain the meaning and the importance of reflection in a software development context.

[10 marks]

b) In a Java package named bank there are a number of classes that are all inheriting from super class Account. The class diagram below illustrates this scenario:
Write a main method that will ask the user to type in a subclass name and then instantiate it using reflection. Then invoke the method `displayBalance()`. If the subclass is invalid, the program should output an error message.

[10 marks]

[Total of 20 marks]
Answer question 1 and two other questions.

**Question 1 - Compulsory**

- a) Define entrepreneurship. (5 marks)
- b) What are the characteristics of Entrepreneurs? (5 marks)
- c) List the five steps for building an effective startup company. (5 marks)
- d) What is a business model? (5 marks)
- e) What is a feasibility study? (5 marks)
- f) How does a business plan differ from a feasibility study? (5 marks)

(30 marks)

**Question 2**

Why is a feasibility analysis essential when starting up a company? Describe in some detail the four basic components of a feasibility analysis. Include a description of the cash flow analysis in your answer.

(35 marks)

**Question 3**

- a) What are the two primary reasons for writing a business plan? (5 marks)
- b) Who needs the business plan and what are they looking for? (5 marks)
- c) Distinguish between a summary business plan, a full business plan and an operational business plan. (5 marks)
- d) Which is the most important section of the business plan and why? (5 marks)
- e) Why is the “management and company structure” section of particular importance in a business plan? (5 marks)
- f) Describe in some detail one other section of a business plan that you consider important for a technology start-up. (10 marks)

(35 marks)
Question 4

To take an idea to successful commercialization requires a number of funding rounds. List the important stages in the lifecycle of a successful software start-up and hence identify the sources of funding appropriate for each stage.

(35 marks)

Question 5

It can be argued that entrepreneurs need to read risk rather with the aim of mitigating it. What techniques and measures are available to entrepreneurs to reduce risk when starting up a business?

(35 marks)
General instructions:

Candidate must attempt all questions in section A. Furthermore the students shall answer two other questions from section B. The total marks in this paper are 100. The weight of each question section is there to guide you.

State any assumptions made. Your writing, drawing and coding should be clear and concise.

Section A – Student to attempt all

1 Some files have been deleted from the file system (assume a MS Windows FS). Plan and explain the actions required to identify, gather, and present this incident. [5 marks]

2 We have a 250 GB Hard Disk to make a copy of. Describe how one can by using a well-known tool, e.g. NETCAT, copy the Hard Disk data to another storage. [5 marks]

3 Give five characteristics of digital evidence. [5 marks]

4 a) What does non-repudiation investigation in digital forensic entail? [2 marks]

b) Management is worried on the increasing incidence of employees claiming their accounts have been hacked. Could you suggest two techniques to monitor and possibly identify an illegitimate log-on? [3 marks]

5 a) Explain the possible use of MS Windows registry in digital forensics investigations. [3 marks]

b) Explain the key and its value in forensic investigation shown in figure 1. [2 marks]
Figure 1: Registry screen dump

6 a) List the order of volatility of digital evidence in live forensics. [3 marks]

b) List six Malware Code Types which you are aware of. [2 marks]

7 It is known that data on a hard disk drive (HDD) is encrypted using the Blowfish block-cipher with a 50-bit key. It is your job to decipher this data for a complete forensic study of the HDD. Estimate how many computers are required to decipher this data in one week. You may assume that a single block of data can be decrypted in 0.3 μs. State any further assumptions. [5 marks]

8 Would the data on a hard disk drive be encrypted using a symmetric or a public-key cipher or both? Justify your answer. [5 marks]
Section B – student to choose any two

9 a)  i) In Cryptography, explain what is meant by Kerchoff’s Principle and why this is important. [5 marks]

   ii) Briefly describe the four modes of attacks on a cryptosystem. [4 marks]

b)  i) Explain what is meant by perfect secrecy. [5 marks]

   ii) Can perfect secrecy be achieved in practice? If so, explain one technique that can achieve this. In any case, justify your answer. [5 marks]

c) A Linear Feedback Shift Register (LFSR) may be used together with a stream cipher to encrypt data.

   i) Explain how this system works with the help of a block system diagram. [5 marks]

   ii) What is the main weakness of this system? [3 marks]

   iii) How can this weakness be addressed? Are there other problems with your proposed solution? [3 marks]

10 a) Define the terms: live forensics and network forensics, [4 marks (2-Per term)]

   b) How would you go about preserving live evidence? List the detailed steps involved, giving attention to live data and which tools would be needed. [26 marks (20-Steps; 6-Tools)]

11 a) Give a detailed logical design (in ERM notation) of the data requirements for a custody information system. Limit and specialise the database for recording details of wood artefacts and wood samples found in criminal cases.

   i) ERM entities including attributes. [10 marks]

   ii) ERM relationships (including cardinalities and participation constraints) [12 marks]

   b) Describe two processes over the above database related with a digital forensic investigation. [8 marks]

12 File carving is a process to extract purged files from a filing system without access to their meta data.

   a) Describe a file carving attempt that although file is not entirely reconstructed, it’s still useful. [3 marks]

   b) Give an example of a deep carving. [3 marks]
c) View figure 2. What's the cause of this banding in the figure? [4 marks]

d) What challenges does a file fragmentation bring to file carving? [8 marks]

e) Describe a file reassembly procedure that is based on a graph path traversal technique. [12 marks]

Figure 2: A recovered file
This paper contains FIVE questions. You are to attempt Question 1 and any other TWO questions.

1. Throughout this question refer to the design decisions you have made when designing the event tablet application.

You have been assigned a job as a developer to design a mobile app. The app will be used by a group of users who will need to access information related to various activities that are taking place during a large outdoor event. The app should cater for a number of characteristics. These characteristics are defined by the needs of the crowd attending the event that ask about the various activities. Some of these are general info about each activity, type of activity venue and location, images and short videos. A tablet device is used to provide better access to this information and demonstrates the information as required. A number of challenges can be identified that need to be addressed when designing for the scenario described above.

a) Design a use-case diagram or list key aspects you would considered when designing the mobile app. Describe in detail each aspect.

[10 marks key aspects]
[10 marks description of each one]

b) List 5 user interface design challenges that you would addressed to engage with mobile user the required information. Refer to the Human Interaction Guidelines (HIG) of the respective platform you are designing for.

[5 marks]

c) By considering the choice of platform/s you would design your application for, justify your approach for the following:

i) The Offline/Online and respective functionality required during transfer of data.

ii) The technologies you would have used to achieve your final prototype.

iii) Key features that users using your app are alerted with when updates are taking place during the event.

List any assumptions you will consider in your solution.

[15marks, 5 marks each]
[TOTAL 40 Marks]

Note for Question 1: You do not need to implement the application.
2) This question is about mobile testing.

Software testing "is a process or a series of processes, designed to make sure computer code does what it was designed to do and conversely, that it does not do anything unintended." – Glenford J. Meyers, Corey Sandler, Tom Badgett

a) How does test automation help developers design apps for mobile devices during development? (10 marks)

b) List at least two tools and frameworks that are used for testing mobile apps. Briefly describe the key features. (8 marks)

c) Explain the underlining concepts behind Jenkins Continuous Integration Server and Karma, Unit-Testing Runners. (6 marks)

d) Referring to the task assigned to develop the Events mobile application as described in question 1, propose a mobile testing strategy you would adopt to ensure quality of service, QOS when the app is deployed in real life. (List at least 6 key points) (6 marks)

[TOTAL 30 Marks]

3) i) This question is about mobile web applications.

Mobile web apps running in modern browsers can listen and react to events related to network connectivity.

a) Give a technical explanation of how this can be achieved, referencing the respective API property and associated events. (5 marks)

b) Provide one use-case whereby it would be absolutely necessary to adopt this technique. (2 marks)

c) Provide an algorithmic outline of how you would develop the above use-case (in pseudo-code)? (8 marks)

ii) This Question is about mobile databases.

Explain the following storage options referring to a mobile platform of your choice. Give examples of when to adopt each particular mobile storage strategy:

a) Shared preferences
b) Internal Storage on device memory
c) SQLite Database
d) Network Connection (8 marks)

iii) Briefly describe how Hadoop works? (7 marks)

[TOTAL 30 Marks]

Page 2 of 4
4) This question is related to Single Sign On APIs.

Popular Single Sign On APIs are not dependent on a particular technology or device. No matter the device, you can authenticate your identity through one application, which then authenticates your identity for all cloud applications. Single sign On APIs, provided by reliable sources, help to assert identities to mobile, web and network resources from that same, original login to increase productivity and improve user experience.

a) i) By referring to a case study of your choice clearly explain when best to adopt single sign on solutions. List three protocols that are used for sharing information.

[6 marks]

ii) Explain step by step the various components needed to create a single sign on solution within a native mobile app. Clearly state the platform you are referring to in your discussion.

[9 marks]

b) This question is related to Wireless Solutions.

i) When deploying quality of service (QoS) a number of steps are required. List the five steps and described in detail the each one.

[12 marks]

ii) By referring to case studies what are the challenges in QoS when adopting wireless infrastructure?

[3 marks]

[TOTAL 30 Marks]
5) a) This question is related to payment SDKs that can be enabled within mobile apps.

i) List the main features developers are expected to find when adopting a payment gateway API as part of an m commerce solutions. Give an example of such solutions. [10 marks]

ii) Describe the step-by-step procedure when integrating a payment process within a mobile app. [5 marks]

b) This question is related to cloud solutions.

Mobile services are also referred to as Backend-as-a-Service. Instead of you having to design, build test, deploy, manage and upgrade your whole backend, Cloud solutions provide features that manage your requirements.

i) By referring to a Cloud solution of your choice describe any 4 mobile services that are available for use. Give an example of each by referring to a case study of your choice. [10 marks]

ii) List a step-by-step procedure when integrating push notifications to your Mobile Services app. [5 marks]

[TOTAL 30 Marks]
Universities of Malta
Faculty of Information and Communication Technology
Department of Computer Information Systems
January/February 2015 Assessment Session

CIS3087 Business Intelligence
13.00-16.00
Calculators are allowed

This paper contains SIX questions, you are to attempt any FOUR questions.

Question 1 (Selectable)

a) Data Mining

Consider the following table of labelled OAV data from the concept Cool Car:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Doors</th>
<th>Shape</th>
<th>Cool Car</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>2</td>
<td>Saloon</td>
<td>Yes</td>
</tr>
<tr>
<td>Green</td>
<td>2</td>
<td>Coupe</td>
<td>No</td>
</tr>
<tr>
<td>Red</td>
<td>4</td>
<td>Coupe</td>
<td>Yes</td>
</tr>
<tr>
<td>Blue</td>
<td>3</td>
<td>Hatchback</td>
<td>No</td>
</tr>
<tr>
<td>Red</td>
<td>5</td>
<td>Hatchback</td>
<td>Yes</td>
</tr>
</tbody>
</table>

i. Define decision tree and give a decision tree that is consistent with the labelled OAV data in the table. How would you describe the concept Cool Car in a single sentence in English?

ii. Explain how the ID3 algorithm uses entropy and information gain to construct a decision tree from labelled OAV data.

iii. Is decision tree learning using ID3 classified as supervised or unsupervised learning?

iv. Does the ID3 algorithm return the highest possible or the shortest possible decision tree consistent with the OAV data? Explain your answer.

(6 + 7 + 2 + 3 = 18 Marks)

b) Describe a business application of decision tree learning using the ID3 algorithm.

(7 Marks)

(Total: 25 Marks)
Question 2 (Selectable)

a) Cryptography

i. What do you understand by symmetric and asymmetric key encryption? Explain how each works. In the case of asymmetric or Public Key encryption do we need to encrypt the message twice? Why?

ii. Suppose you want to send a love letter to your friend in Japan without going to the trouble and risk of sharing passwords. How would you do this?

iii. You are the CIO of a major multi-national and you want to transfer, on a daily basis, operational data from each country to the corporate data warehouse in Dublin. Which encryption methods would you use and how?

iv. What is weak and strong encryption?

v. What is the Key Distribution Problem?

vi. What is a digital signature? How does it work?

(7 + 5 + 3 + 4 + 3 + 3 = 25 Marks)

(Total: 25 Marks)

Question 3 (Selectable)

a) Artificial Neural Networks

i. In the context of neural network learning what is;
   a. a labelled training set?
   b. an epoch?
   c. the learning rate?
   d. the error threshold?

ii. Give an explanation of how Error Back Propagation is used to train an artificial neural network?

iii. What convergence criteria is used to decide when to stop training an artificial neural network?

iv. How is a neural network tested after training stops?

(8 + 10 + 4 + 3 = 25 Marks)

(Total: 25 Marks)
Question 4 (Selectable)

a) **Data Modelling**

i. Define, compare and contrast ROLAP, MOLAP, and HOLAP. Explain in which circumstance you would use each of these.

ii. In the context of data warehousing what do you understand by fine granularity and coarse granularity (i.e. aggregation & summarizing)? Explain the advantages and disadvantages of each and explain why important consideration must be given to granularity in large data warehouses.

iii. What is a multi-dimensional data cube and how is it used in data warehousing? Give an example (diagram) of a data cube in a business domain of your choice. Are data cubes used in ROLAP, MOLAP, or HOLAP? In which circumstances or applications are data cubes desirable or even necessary?

iv. Explain vertical and horizontal partitioning in data warehousing databases. Explain how each is used and any advantages.

(6 + 7 + 6 + 6 = 25 Marks)

(Total: 25 Marks)

Question 5 (Selectable)

a) **Data Warehousing**

i. Explain what you understand by OLTP and OLAP. Explain how OLTP and OLAP are used in a business.

ii. Explain why and how databases for OLTP and OLAP are tuned and optimized for different tasks.

iii. Do you think it is a good idea to run analytics, reporting and data mining engines on operational data? Explain your answer.

iv. Define data mart. Explain why and how data marts are used. What does it mean for a warehouse to be data-mart centric?

v. In the context of data warehousing, what are metadata and the time horizon?

vi. Give two tips for a successful data warehouse.

(5 + 4 + 4 + 4 + 4 = 25 Marks)

(Total: 25 Marks)
Question 6 (Selectable)

a) Data Warehousing

   i. Define ETL and explain the process.
   ii. In the context of data transformation define:
       a. Data integrity problems
       b. Enrichment
       c. Data Cleansing
       d. Scoring
       e. Data Anonymizing
   iii. What is a staging database and what is it used for?
   iv. Why is it often desirable for OLAP databases to be de-normalized?
   v. Explain why it is common for OLAP databases to be more indexed than OLTP databases.
   vi. Describe three pitfalls of Data Warehousing.

\[(4 + 5 + 4 + 4 + 4 = 25 \text{ Marks})\]

(Total: 25 Marks)
There are total fifteen questions. Attempt any ten questions.

1. a. Suggest any two limitations of current silicon-based computers? Which of these can be (or cannot be) overcome by a DNA computer. Justify your answer.
   b. Suggest any two useful computer-intensive problems which cannot be solved by the latest computing systems and require more computing power than what is available. Why is it important to solve each of these problems?

   Mark Scheme
   1x2=2
   1x2=2

2. a. Suggest any one potential advantage and one potential limitation/problem of 3D transistors over traditional transistors in processor design.
   b. Suggest any two limitations of DNA computing?
   c. Suggest any two problems which may be better solved using a silicon-based computer or other computing systems than a DNA computing system.
   d. Name any two novel computing architectures other than DNA computing, Quantum computing and silicon-based computer systems.

   Mark Scheme
   1x2=2
   1x2=2
   2x2=4

3. a. The Polymerase Chain Reaction (PCR) is used to amplify the DNA strands of a desired sequence. If we start with a single strand, calculate how many DNA strands will there be at the end of 15 cycles of PCR, considering that the PCR provides theoretical amplification.
   b. What is the theoretical information density of a DNA system made up of a DNA strand of size 10 (or with 10 bases)?
   c. Suggest how 3D scanners might help in better robotic surgery.
   d. Suggest any one application of emotion recognition by speech signals.

   Mark Scheme
   3
   3
   2
   1x2=2
4. a. Name any four approaches of handling missing data in survey questionnaires.  
   b. Suggest any four problems/issues with content based recommendation systems.  
   c. Suggest any four advantages of collaborative filtering based recommendation systems over content based recommendation systems.

5. a. With an example for each suggest how the recommendation systems for the following 6 services are being used (you should provide an example of the information provided through the recommendation systems by each of the following):
   1. LinkedIn  
   2. YouTube  
   3. Amazon  
   4. MS-Word  
   5. Google Search  
   6. Smartphone Keyboard  
   b. Write any two examples suggesting how recommendation systems can be used to develop adaptive interfaces.

6. a. Suggest one application of digital taste simulator and one application of digital smell simulator.  
   b. Provide any two reasons why search engine optimization (SEO) is important for a business.  
   c. Do you think that 3D printing technology can potentially reduce traffic on the roads? Justify your answer. Also, suggest any two limitations/problems of 3D printing technology.  
   d. Suggest any two applications of eye-tracking.

7. a. Suggest any two limitations of the current technology in autonomous cars.  
   b. How is a Nymi different from a smartwatch? Suggest two applications of Nymi and also suggest two applications of a smartwatch?  
   c. Suggest any two examples of business applications of Social Network Analysis.
8. a. Suggest how virtual reality is different from augmented reality (any two differences) and what similarities are between these two technologies (any two similarities). Write one application of augmented reality and one application of virtual reality.

b. Suggest how a digital wallet (e-wallet) is different from a cryptocoin (provide any two differences between these two). Also provide any one limitation of e-wallet technology and one limitation of cryptocoin technology.

9. a. Suggest how predictive analysis can be applied to (partially) solve traffic and parking problems in Malta.

b. Is it possible to use google glass as a cyborg? If yes, then suggest any two applications of google glass as a cyborg. Else, suggest why it cannot be used as a cyborg.

c. Give examples of any two digital foot prints being collected by businesses and suggest how businesses are using each of these digital foot prints.

10. a. Suggest any one application of sign language recognition using Microsoft’s Kinect. Also, suggest any one limitation of it.

b. Do you think that the activity trackers and fitness trackers are the same? Justify your answer with an example.

c. Suggest any two examples of how smart home technology can help disabled people improve their quality of life.

d. Suggest any two limitations of current intelligent transport systems.

e. Do we have the necessary supporting network infrastructure available to implement intelligent transport systems in Malta? Justify your answer.

11. a. Suggest any two limitations/problems of current sound recognition systems? Suggest how natural language processing technology can help improve speech recognition in voice command devices?

b. Suggest any two advantages of Erlang over other programming languages for web applications development.

c. Suggest an application of 4G which is not feasible with 3G or earlier
d. Suggest any two applications / examples of Haptic technology.

12 a. In terms of modern Big Data Management, justify the need for real-time data processing over data storage in the context of today's digital world and the prognosis for the future 5

b. Mention a recent cloud attack you are aware of. 1x3=3

c. List the three Cloud service models as defined by NIST, and a fourth model as defined by others. 0.5x4=2

13 What is a breakout attack? List the three requirements for a hypervisor. How is a Side Channel attack performed? Give an example and list counter-measures which can be taken to prevent this. 2+3+2+1+2 =10

14 a. Software Intensive Systems (SIS) have become commonplace in modern technologies. These signify trends indicating that software must be: i) safe, ii) secure, and iii) reliable. Explain what is meant by these facts and discuss. Explain the basic concepts behind Pervasive computing 3+3=6 (3 for explanation and 3 for discussion)

15 a. Briefly discuss the concepts behind interoperability and networking as "mash-ups" are becoming more commonplace. 5

b. List and explain any five soft trends that affect modern software technologies 5
Answer question 1 and any other three questions

1. In this MBA credit you had to submit a written assignment and a presentation on a particular aspect of ICT.

   (i) Comment on why you decided to choose this particular topic from the three options which were offered. [give at least four reasons - 8 marks]

   (ii) How does the assignment you chose relate to policy and operational issues in your place of work or in your interests in ICT? [give at least two examples - 8 marks]

   (iii) What changes to the current ICT setup would you propose to senior management in the area of the topic you selected in order to make the business more effective, transformational and ethically aware? Discuss how your proposed changes would align ICT with business objectives. [5 marks + 4 marks]

2. The chairman of the ICT steering committee at your workplace has asked you to recommend measures to improve and strengthen the business strategy and operational policies. Write a one page executive summary report of the issues you would like to be addressed. [Your report should consider both strategic (13 marks) and operational (12 marks) measures - Total 25 marks]

3. Comment and give real world examples on the following business opportunities and models for running organizations based on the use of the Web and advanced computer information systems:

   (i) Creating Globalised virtual organisations [give two examples - 8 marks]

   (ii) Streamlining production cycle in a manufacturing company through Business Process Modelling [give two examples - 8 marks]

   (iii) Creating inter-organisational linkages with other businesses through use of the Web. [give 3 types of such linkages - 9 marks]
4. (i) What do you understand by integrated corporate wide computing and how are modern advanced information systems supporting this objective? 

[definition (2 marks), stating 5 ways of change (5 marks) - Total 7 marks]

(ii) How is the Web changing the procurement, customer relations and marketing functions within organisations to the benefit of both suppliers, customers and stakeholders? 

[3 marks each for procurement, customer relations and stakeholders - Total 9 marks]

(iii) How is ICT transforming the modern business office from the technical, business and social point of view? 

[3 marks each for technical, support and social changes - Total 9 marks]

5. “The knowledge based view of a firm premises that the success of an organisation depends on its ability to gather, organize, maintain and disseminate knowledge which is used to produce better goods and services.” 


[5 marks each for each type of system - Total 25 marks]

6. Discuss, giving examples how the following social and human issues are changing the way our society functions in the Information age:

(i) Teleworking [6 marks]
(ii) Social networking [7 marks]
(iii) Privacy and data protection [3 marks each - Total 6 marks]
(iv) Online marketing and sales. [3 marks each - Total 6 marks]

7. Data management and database management are at the core of managing a modern organization.

(i) Distinguish between the functions and skills of a data manager and those of a database manager 

[give 4 responsibilities of data managers and 4 of database managers - Total 8 marks]

(ii) Describe some modern trends in data storage and data management and discuss some of the benefits which have been achieved. 

[give examples of three trends 3 marks each - Total 9 marks]

(iii) What is the role of data warehouses and storage networks in a modern data management architecture. 

[explain the role of warehouses and storage networks in a ICT system (4 marks each) - Total 8 marks]
UNIVERSITY OF MALTA
Faculty of Information and Communication Technology
Department of Computer Information Systems

CIS1001 Electronic Commerce 1

Date: 16th January 2016

Time: 8.30-10.05 hrs
UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems

Saturday January 16 08:30-10:05       Final Examination       90 Minutes

Instructions.

1. Answer all questions.
2. Read all questions carefully.
3. Put answers in spaces provided.
4. No calculators or other electronic devices.
5. There are a few extra pages at the back of the exam paper that can be used if required. If you use them please CLEARLY state which question(s) are being answered.

<table>
<thead>
<tr>
<th>Section</th>
<th>Points</th>
<th>Your Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Choice</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Short Answer</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Fill In the Blank</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Section 1: Multiple Choice [40 marks]

CIRCLE the letter of the BEST answer.

[2] (a) Consumer shopping on the Web is often called ___________.
   A. B2B   
   B. B2C   
   C. B2G   
   D. eProcurement

[2] (b) Some researchers define a fourth category of eCommerce called ___________, which includes individuals who buy and sell items amongst themselves.
   A. C2C   
   B. B2B   
   C. C2B   
   D. B2C

[2] (c) Which of the following statements is correct?
   A. In the second wave of eCommerce, Internet technologies are being integrated into B2B transactions and internal business processes by using bar codes and scanners to track parts, assemblies, inventories, and production status.
   B. In the first wave of eCommerce, radio-frequency devices and smart cards were combined with biometric technologies.
   C. The first wave of eCommerce was predominantly a USA phenomenon.
   D. In the second wave, eMail was used as a tool for relatively unstructured communication.

[2] (d) Porter uses the term _____________ to describe the large stream of activities into which a particular business unit’s value chain is embedded.
   A. Business Strategy
   B. Value System
   C. Business Integration
   D. Collaboration

[2] (e) ____________ began as a legal research tool, and it has been available as an online product for years.
   A. ProQuest
   B. lexis.com
   C. LexisNexis
   D. EBSCO

[2] (f) Online stock brokerage firms use a(n) _____________ revenue model, which allows them to charge their customers a commission for each trade executed.
   A. Fee-for-Service
   B. Fee-for-Transaction
   C. Information Sales
   D. Catalog
(g) Personal contact and mass media approaches are often called ____________.
   A. Communication Modes
   B. Market Strategies
   C. Market Segments
   D. Media Destination Modes

(h) __________ used product categories as a very strong organising theme in the design of their Web sites.
   A. Staples
   B. AltaVista
   C. MasterCard
   D. WeddingChannel.com

(i) __________ is the first condition that must be met to create a product or service brand.
   A. Product Differentiation
   B. Relevance
   C. Perceived Value
   D. Permission Marketing

(j) One group of active Internet users, __________, are intensive users of chat rooms, instant messaging services, electronic greeting card sites, and Web-based eMail.
   A. Routiners
   B. Surfers
   C. Sportsters
   D. Connectors

(k) The information that a Web site can gather about its visitors is called a(n) ____________.
   A. Clickstream
   B. Marketing Mix
   C. Ad View
   D. Occasion Segmentation

(l) Companies have traditionally used ____________ appeals in their advertising and promotion efforts to establish and maintain brands.
   A. Permitted
   B. Rational
   C. Perceived
   D. Emotional

(m) In cause marketing, when visitors click a link on the affiliate’s Web page, a donation is made by a(n) ____________ company.
   A. Advertising
   B. Not-for-Profit
   C. Marketing
   D. Sponsoring
[2] (n) A(n) ____________ is a Website that allows individuals to create and publish a profile, create a list of other users with whom they share a connection (or connections), control that list, and monitor similar lists made by other users.
   A. Social Commerce
   B. Electronic Commerce
   C. Social Networking
   D. Social Medium

[2] (o) The trend toward having readers help write the online newspaper is called ____________ journalism.
   A. Participatory
   B. Peer
   C. Social
   D. Collective

[2] (p) The New York Stock Exchange conducts ____________ auctions of stocks and bonds in which the auctioneer, called a specialist, manages the market for a particular stock or bond issue.
   A. First-price Sealed-bid
   B. Sealed-bid Double
   C. Open-outcry Double
   D. Second-price Sealed-bid

   A. Double
   B. Shill Bid
   C. Sealed-bid
   D. Seller-bid

[2] (r) In Malta, the Maltese courts have ____________ over issues governed by Maltese law.
   A. Subject-matter Jurisdiction
   B. Personal Jurisdiction
   C. Legitimacy
   D. Notice

[2] (s) ____________ occurs when owner information maintained by a public domain registrar is changed in the registrar’s database to reflect a new owner’s name and business address.
   A. Trademark Infringement
   B. Product Disparagement
   C. Domain Name Ownership Change
   D. Signatory Change

[2] (t) A(n) ____________ is assessed on the amount of value added at each stage of production.
   A. VAT
   B. import tariff
   C. Property Tax
   D. Transaction Tax
Section 2: Short Answer  [42 marks]

[8]  (a) Chris Anderson, the editor of Wired magazine (2001-2012), famously proposed that the economics of producing and selling digital products is different from the economics of producing and selling physical products. Discuss this concept and how it could potentially be used to an eCommerce venture’s advantage selling digital products online. Give one real-world example [6 marks discussion, 2 marks for example].

[6]  (b) Many online businesses try to maintain dialogue with their customers by using automated eMail communications. Discuss the merits of permission marketing and how it differs from other eMail marketing techniques. Discuss whether or not this marketing strategy should be more/less successful than a marketing strategy that sends general promotional messages via the mass media. [4 marks how it differs, 2 marks discussion on whether it is more/less successful].
(c) Social media websites can use various revenue models to generate income. Consider the Facebook social media website. How does Facebook generate most of its revenue and why is it so successful at doing so? [3 marks how, 3 marks why]

(d) Describe the process of a Reverse Auction. What types of items are likely to be attractive to purchase in this manner? [3 marks process, 3 marks type of item]
(e) Legal scholars define the relationship between geographic boundaries and legal boundaries in terms of four elements: **power**, **effects**, **legitimacy** and **notice**. Define each of these terms and make an observation as to how it affects eCommerce. [3 marks per definition, 1 mark for each effect on eCommerce].
Section 3: Fill in the blank  [18 marks]
For the following questions, fill in the blanks by selecting the best word or words from the list provided at the bottom of the page. Not all the words provided are used, but no word is used more than once.

[2] (a) B2B electronic commerce is sometimes called ________.

[2] (b) For more than 40 years, banks have been using ________ which are electronic transmissions of account exchange information over private communications' networks.

[2] (c) In the first wave of electronic commerce, Web pages were primarily in ________.

[2] (d) The ________, used by Lands' End, is an intelligent agent program that learns the customers' preference and makes suggestions.

[2] (e) The concept of nexus is similar in many ways to the concept of ________ jurisdiction.

[2] (f) ________-wave advertising fees are based less on up-front site sponsorship payments and more on the generation of revenues from continuing relationships with people who use social networking sites.

[2] (g) The total of all financial costs that the customer pays (including the transaction costs) to obtain the product, subtracted from the benefits that a customer derives from the product, yields the customer ________.

[2] (h) The highly customized approach to offering products and services that match the needs of a particular customer is called ________ marketing.

[2] (i) When based on things that happen at a specific time, behavioural segmentation is sometimes called ________ segmentation.

<table>
<thead>
<tr>
<th>auction</th>
<th>authority to bind</th>
<th>bargainers</th>
<th>behavioural</th>
<th>bidders</th>
<th>cannibalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>centric</td>
<td>cookie</td>
<td>commitment</td>
<td>consideration</td>
<td>copyright</td>
<td>descending-price</td>
</tr>
<tr>
<td>diminishing</td>
<td>Dutch</td>
<td>e-business</td>
<td>e-procurement</td>
<td>English</td>
<td>EFT</td>
</tr>
<tr>
<td>first</td>
<td>intellectual property</td>
<td>Italian</td>
<td>infrastructure</td>
<td>Maltese</td>
<td>marketing</td>
</tr>
<tr>
<td>mass-media</td>
<td>meetup</td>
<td>microblogs</td>
<td>occasion</td>
<td>one-to-one</td>
<td>patent</td>
</tr>
<tr>
<td>personal shopper</td>
<td>personal</td>
<td>presence</td>
<td>procurement</td>
<td>property</td>
<td>reintermediation</td>
</tr>
<tr>
<td>routines</td>
<td>second</td>
<td>service mark</td>
<td>Six Degrees</td>
<td>snipe</td>
<td>social shopping</td>
</tr>
<tr>
<td>stakeholders</td>
<td>statutory law</td>
<td>strategic alliance</td>
<td>stickiness</td>
<td>trademark</td>
<td>terms of service</td>
</tr>
<tr>
<td>usability</td>
<td>value</td>
<td>vertical</td>
<td>Web Directory</td>
<td>Web 2.0</td>
<td>wire transfers</td>
</tr>
</tbody>
</table>
EXTRA SPACE - If you use this PLEASE MAKE IT CLEAR WHICH QUESTION/PART the answer refers to. Use this only if you feel you do not have enough space to write your answer OR if you make a mistake and need to rewrite your answer to a particular question.
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed. SMART devices are NOT allowed.

3) This paper has six questions. Answer any four.

1. a) A small store requires an information system for transaction processing. Explain any two types of transaction processing that could be used for this and explain why. 
   [5 marks (2-marks for transaction processing, 3-marks for explanation)]

   b) List any four qualities of good information and briefly explain why these are relevant for information systems.
   [5 marks (1-marks for each quality total 4 marks, 1 mark for explain)]

   c) Discuss the term functional information system and its relevance to modern organisations. Is a functional structure still relevant in a virtual organization? Briefly discuss with reasons.
   [5 marks (2-marks for functional inf. sys, 1 mark for relevance, 2 marks for discuss)]

   d) With the help of a diagram briefly outline the process with which data can be transformed into information.
   [5 marks (3 marks for diagram, 2 marks for explanation)]

   e) Explain the relevance of modern MIS (management information systems) in business organizations.
   [5 marks (1 mark for each valid point)]
2. a) Describe and explain the ‘Work Systems Framework’ (WSF).
   [10 marks (5-marks definition, 5- marks for use)]

   b) How can analysing a work system or a system of work be of great benefit to an
       organization.
   [5 marks (1 –mark for each valid point)]

   c) Is planning important before implementing a new information system for a large
       organization? Discuss and give valid reasons.
   [10 marks (5-marks for planning, 5- marks for valid reasons 1 mark per reason)]

3. a) Explain Simon’s mode for decision taking. Explain any two limitations of this
     model.
     [5 marks (3-marks for simon’s model, 2-marks for limitations)]

   b) Discuss when it is more appropriate to use a DSS (decision support system), rather
       than an expert system.
   [5 marks (1 mark for each valid point)]

   c) Explain any three types of expert systems. Give an example of their use.
   [5 marks (3 marks for three types of ES, 2 marks for use)]

   d) Describe the relevance of an EIS (Executive Information System) to an
       organization.
   [5 marks (1 mark for each valid point)]

   e) Briefly explain how a TQM ( total quality management) approach can improve an
       information system.
   [5 marks (1 mark for each valid point)]

4. a) Briefly explain any five of the following:

   i) Information overload
   ii) The use of ICT in society
   iii) Distributed Computing
   iv) Intranets vs the Internet
   v) Ergonomics and HCI (human computer interaction) issues
   vi) Business Process Reengineering (BPR) in relation to information systems
   vii) Teleworking

   [25 marks (5-marks each)]
5. a) OAS (office automation systems) are supposed to help with facilitating back office and front office work in an organization. Briefly explain this statement.
   [5 marks (1 mark for each point)]

   b) Explain what is meant by the term ‘Automation’. Briefly outline any four advantages and any four disadvantages of automation.
   [5 marks (1 mark for automation, 4 marks for adv. and disad.)]

   c) Discuss the concept of value added in the context of Information Systems.
   [5 marks (1-mark for each valid point)]

   d) Why is disaster recovery planning necessary for information systems?
   [5 marks (1-mark for each valid point)]

   e) How does a PSS (professional support system) application differ from other tradition applications?
   [5 marks (1-mark for example & def. of PSS, 1-marks for each valid point)]

   [5 marks (2 marks for value chain, 3 marks for explain)]

   b) In the context of the ‘value chain’, clearly distinguish between i) primary and ii) secondary activities. Explain if IT support is a primary or secondary activity?
   [8 marks (4 marks for primary and sec. activities. 4 marks for IT support & reasoning)]

   c) Briefly explain what is meant by the term ‘Workflow’?
   [2 marks]

   d) What are the different needs of an operations manager from an executive manager in terms of information systems.
   [5 marks (1 mark per valid point)]

   e) What are CSF’s (Critical Success Factors)? How can these affect the successful implementation of a new IT system?
   [5 marks (2 marks for CSFs, 3 marks for expl.)]
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed. SMART devices are NOT allowed.

3) This paper contains seven (7) questions, you are to attempt ANY four (4).

1. a) Discuss how an Information System can add value, when processing data that is transformed into information.
   [5 marks (2-marks for add value concept, 3-marks for explanation)]

   b) Define and explain the term Management Information System (MIS).
   [5 marks (2-marks for define, 3-marks for explain)]

   c) Explain how with the help of IT it is possible to construct a virtual organization.
   [5 marks (2-marks for virtual org., 3-marks for explain)]

   d) Describe any five qualities of good information. Briefly outline the significance of each.
   [5 marks (1-mark for each valid quality)]

   e) Compare the Information System needs of an operations manager and those of an executive manager and explain any differences.
   [5 marks (2-marks for compare, 3-marks for differences)]

2. a) Draw and explain Simon’s model for decision taking. Describe and explain any two limitations of this model.
   [5 marks (3-marks for simon’s model, 2-marks for limitations (1-mark each))]
b) An insurance company requires an information system that will automate the
insurance valuation for certain products without requiring new personnel. Explain
whether a DSS (decision support system) or a rule based Expert System is more relevant
for this problem.
[10 marks (5-marks for understanding of problem, 5- mark for correct system type
and explanation)]

c) What is an integrated Decision Support System (DSS). Explain how this differs from a
normal DSS.
[5 marks (2.5-marks for DSS, 2.5 - marks for explanation)]

d) When is it preferable to use an Optimisation Based Decision Support System (DSS)
rather than a data driven DSS?
[5 marks (2.5 -marks for OPDSS vs Data driven DSS, 2.5 - marks for explanation)]

3. a) If a business organisation lacks expertise in a certain important area would it make
sense to outsource the requirements for an information system? Discuss.
[5 marks (0.5 mark for each valid point and 0.5 mark for each explanation.)]

b) How can an Office Automation System (OAS) be used to obtain added value in basic
work processes in the office? Explain.
[5 marks (0.5 mark for each valid point and 0.5 mark for each explanation)]

c) Explain the term ‘workflow’ and its relevance to information system automation.
[5 marks (2.5-marks for workflow, 2.5-marks for relevance)]

d) Explain any two modern technologies that can help to automate the workflow in an
office.
[5 marks (2-marks for modern technologies, 3-marks for explanation)]

e) List and discuss the importance of any two applications that are normally used in basic
office automation systems.
[5 marks (2-marks for applications, 3-marks for discuss and explanation)]
4. a) How can the implementation of a Supply Chain Management (SCM) system contribute to build strong business relationships between a company and its suppliers?

[6 marks (3 marks per point)]

b) Give two types of information that may be shared between different participants in an SCM system?

[4 marks (2 marks per type of information)]

c) Give three ways in which a consumer benefits if he/she is purchasing from a company which has an SCM system in place with its suppliers?

[9 marks (3 marks per point)]

d) Mention three ways in which Internet supports an SCM.

[6 marks (2 marks per point)]

5. a) What is the central focus of a Customer Relationship Management (CRM) system?

[2 marks]

b) Mention two systems that could be found in CRM.

[4 marks (2 marks for each system)]

c) Give an example of how integration between the two systems mentioned in b) above can give additional advantages to the company?

[3 marks]

d) What is the possible impact on a client who is dealing with a company that uses a CRM system?

[6 marks (2 marks per point)]

e) Give an example of how the implementation of a CRM system can help a company vis-à-vis any two of the following essential client related activities, i.e. acquisition, retention and enhancement.

[6 marks (3 marks for each activity)]

f) Give two possible causes for failure in CRM implementation projects.

[4 marks (2 marks for each cause)]
6. a) What is the overall purpose of an Accounting Information System?

[3 marks]

b) Describe one item of data and one type of report usually found in each of these ledger modules.

i) General Ledger

ii) Accounts Receivable (or Debtors) Ledger Module

[12 marks (6 marks for data items and 6 marks for reports)]

c) Give two advantages of dividing such an information system in modules?

[4 marks (2 marks per advantage)]

d) Among the various items of data, the General Ledger module maintains a summary of Accounts Receivable activity in the form of monthly totals in order to have a general picture of the value of money owed to the company by its clients.

i) How can this type of information in the General Ledger module be kept up to date in an automated and accurate manner?

[3 marks]

ii) How can traceability be maintained in such a context?

[3 marks]

7. a) Outline the main components of the Work System Framework (WSF). How does the framework assist organisations with understanding their business processes?

[10 marks - (5 marks for main components of WSF (1 mark each) and 5 marks for how WSF assists organisations (1 mark per valid point))]

b) An organisation is about to embark on a project to transfer its office automation software onto the cloud. The adopted approach is that of a staggered migration with great emphasis being placed on confidentiality, integrity and availability of the migrated data. Draw, listing any assumptions taken, a high level WSF for this project’s main processes.

[10 marks (5 marks for drawing, 5 marks for interpretation)]

c) Discuss which changes to the project may/may not effect the product positioning.

[5 marks (1 mark for each valid point)]
CIS1024  Information Systems

Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed. SMART devices are NOT allowed.

3) This paper contains nine (9) questions, you are to attempt ANY five (5).

1. a) Explain what is meant by the term MIS (management information systems) in reference to a business organization. How do these systems support management functions?

   [5 marks (1-mark for MIS, 4-marks for function support)]

b) List and describe the main components of a typical information system.

   [5 marks (1-mark for each valid component)]

c) Explain in which parts of the decision process is a DSS (decision support system) useful.

   [5 marks (2-marks for part identification, 3-marks for explanation)]

d) Clearly explain the differences between data, information and knowledge in IS.

   [5 marks (2- marks for understanding, 3-marks for differences)]

2. a) An insurance company requires an information system that will automate the insurance valuation for certain products without requiring new personnel. Explain whether a DSS (decision support system) or a rule based Expert System is more relevant for this problem.

   [10 marks (5-marks for understanding of problem, 5- mark for correct system type and explanation)]
b) Which type of Information System supports the decision making policies and strategies of executive managers? Clearly explain.

[5 marks (2-marks for correct IS system, 3-marks for explain)]

c) Discuss how semi structured and unstructured decision making problems can be improved through the use of information systems. Which types of MIS do you suggest for this purpose?

[5 marks (2-marks for semi/unstructured, 3-marks for MIS types and explain)]

3. a) Explain the key differences between Business Process Reengineering (BPR) and TQM Total Quality Management (TQM).

[5 marks (1-mark for each valid point)]

b) Explain the term ‘Transaction Processing’ and describe any three types of transaction processing.

[5 marks (2-marks for transaction processing, 3-marks for examples (1-mark each))]  

c) When is it preferable to use an Optimisation Based Decision Support System (OBDSS) rather than a data driven DSS?

[5 marks (2.5-marks for OBDSS vs Data driven DSS, 2.5-marks for explain)]

d) Explain any two modern technologies that can help to automate the workflow in an office.

[5 marks (2-marks for modern technologies, 3-marks for explain)]

4. a) If a business organisation has a high level of expertise and experience in a certain important area and system development does it make sense to outsource the requirements of a new information system to another company? Discuss.

[5 marks (1-mark for each valid point)]

b) Why is it important to have security and backup procedures for information systems?

[5 marks (1-mark for each valid point)]

c) Explain any five disadvantages of automating an office.

[5 marks (1-mark for each valid point)]

d) Explain what is meant by a PSS (professional support system). Give some examples.

[5 marks (2-marks for pss, 3-marks for examples)]
5. a) What important step is necessary before purchasing an Enterprise Resource Planning (ERP) package and proceeding with its implementation? [2 marks]

b) Why is it important that this step is carried out thoroughly? [2 marks]

c) What would be the impact on the project if little or no effort is made on this step. [4 marks]

d) Although ERP suites offer a lot of in-built functionality, it is to be expected that other functionality needs to be added in order to meet the client’s needs. One way is to build the functionality through customization and another is to extend the ERP by buying additional packages from third parties.

i) Discuss one advantage and one disadvantage of customising an ERP package? [6 marks (3 marks for advantage and 3 marks for disadvantage)]

ii) Discuss one advantage and one disadvantage of extending an ERP package through third party packages? [6 marks (3 marks for advantage and 3 marks for disadvantage)]

6. a) How can the implementation of a Supply Chain Management (SCM) system contribute to build strong business relationship between a company and its suppliers? [4 marks]

b) Give two types of information that may be shared between different participants in an SCM system? [4 marks (2 marks for each type of inf.)]

c) Give three ways in which a consumer benefits if he/she is purchasing from a company which has an SCM system in place with its suppliers. [6 marks (2 marks per point)]

d) Mention three ways in which Internet supports an SCM. [6 marks (2 marks per point)]
7. a) What is the central focus of a Customer Relationship Management (CRM)?
[2 marks]

b) Mention two systems that could be found in CRM.
[4 marks]

c) Give an example of how integration between the two systems mentioned in b) above can give additional advantages to the company?
[2 marks]

d) What is the possible impact on a client who is dealing with a company that uses a CRM system?
[4 marks]

e) Give an example of how the implementation of a CRM system can help a company vis-à-vis any two of the following essential client related activities, i.e. acquisition, retention and enhancement.
[4 marks (2 marks each)]

f) Give two possible causes for failure in CRM implementation projects.
[4 marks (2 marks each)]

8. a) What is the overall purpose of an Accounting Information System?
[4 marks (1 mark for each valid point)]

b) Briefly describe two items of data and two types of reports usually found in each of these ledger modules:

i) General Ledger

ii) Accounts Receivable (or Debtors) Ledger Module

[8 marks (4 marks for data items, 4 marks for reports)]

c) Give two advantages of dividing such an information system in modules?
[2 marks (1 mark for each advantage)]
d) Among the various items of data, the General Ledger module maintains a summary of Accounts Receivable activity in the form of monthly totals in order to have a general picture of the value of money owed to the company by its clients.

i) How can this type of information in the General Ledger module be kept up to date in an automated and accurate manner? [3 marks]

ii) How can traceability be maintained in such a context? [3 marks]

9. a) Outline the main components of the Work System Framework (WSF). How does the framework assist organisations with understanding their business processes?

[10 marks – (5 marks for main components of WSF {1 mark each} and 5 marks for how WSF assists organisations {1 mark per valid point})]

b) An organisation is about to embark on a project to transfer its office automation software onto the cloud. The adopted approach is that of a staggered migration with great emphasis being placed on confidentiality, integrity and availability of the migrated data. Draw, listing any assumptions taken, a high level WSF for this project’s main processes.

[10 marks (5 marks for drawing, 5 marks for interpretation)]
CIS1102  Computer Platforms & Applied Operating Systems

20th January 2016

1300-1505

Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators and smart devices are not allowed.

3) This paper has six questions. Answer any four.

---

1

a) Android can be defined as being a metaplatform. Define the term metaplatform.  

[5 marks]

b) What is a Software Platform? List two different software platforms which you are aware of.  

[5 marks (1-What is; 2-Per Software Platform)]

c) i) What do . and .. refer to under Linux?  
ii) In the Linux shell, which commands can be used to create a directory and subsequently enter it.  
ii) What is the umask command used for and how is a umask value calculated?  

[7 marks (2-i; 2-ii; 3-Umask)]

d) What is the Linux shell? What was GNU created for? Mention two GNU commands or programs you are aware of.  

[8 marks (2-What is the Linux..;2-What was GNU..;4-Mention two GNU..)]
2

a) i) What are the Windows filesystems *FAT16, FAT32* and *NTFS* respectively referred to under Linux?

ii) What is the advantage of the Linux filesystem with regards to mounting multiple devices such as hard disks, usb sticks etc?

iii) What are the five steps involved in compiling a program from source (under Linux)?

iv) List three licenses released by GNU. Which one of these three would be an ideal choice for someone writing a software library package?

[15 marks (1-Per filesystem; 2-What is the advantage..1-Per step; 1-Per license; 2-Which one...)]

b) List six features of the ext4 filesystem.

[6 marks (1-Per feature)]

c) How can a file in Linux be changed to read-only for all users? Give the command which would perform this operation.

[2 marks]

d) What is the Bourne shell (sh)?

[2 marks]

3

a) i) How can the ownership of a file be changed in Linux? Give the command which is used for this.

ii) How can a recursive option be specified to the Linux commands to change owner or group?

[4 marks (2-How can the ownership..; 2-How can a recursive..)]

b) Which are the two classes of applications which come with a Linux distribution? What could be the purpose of each?

[6 marks (1-Per class; 2-Per purpose)]

c) i) List the three file access classes supported by Linux and Unix-like OSes.

ii) Explain briefly the result for a normal user granted access a) *r-x*, b) *rwx*, and c) *r--*.

[6 marks (3-i; 1-a; 1-b; 1-c)]

d) How are command-line parameters accessed under Linux? Give an example using C or Java notation.

[9 marks (5-Explanation; 4-Example)]
4

a) Explain what a scripting language is. Explain any two categories of scripting languages, give examples of their use in a particular OS platform and discuss their importance.

[10 marks: (2.5 marks for scripting language explanation, 2.5 marks for two categories, 5 marks for examples and discuss (3,2))]

b) Explain any five differences between scripting languages and normal 4GL programming.

[5 marks – 1 mark each]

c) Discuss if it is possible for scripting languages to contain complex constructs. Give any two examples.

[5 marks: (3 marks for discussion, 2 marks for examples]

d) Briefly explain the significance of the term ‘platform independence’ in relation to computer programming.

[1 mark]

e) Describe any two main components of an operating system platform?

2 marks: (1 mark each)]

f) Explain the difference between i) symmetric and ii) asymmetric multiprocessing in terms of load balancing.

[2 marks: (1 mark each)]

5

a) An operating system has a PCB (process control block). Clearly explain what type of information should normally be found in the PCB.

[5 marks: (2 marks for PCB, 3 marks for information]

b) What are concurrent processes? Give some examples.

[3 marks: (1 mark for concurrent process explanation, 2 marks for examples)]

c) List and explain any five major properties of a typical operating system.

[5 marks: (1 mark per property)]

d) Explain the concepts behind ‘virtual’ memory management in an operating system.

[2 marks for VM explanation]

e) Describe and explain the structure and layers expected to be found in a modern operating system.

[5 marks: (2 marks for diagram, 3 marks for explanation)]]
f) Describe the main components of an OS process. What are the main components of a process?
   [2 marks: (1 mark for OS process, 1 mark for main component)]

g) Explain what can be used for two processes to communicate at the command or shell level of a typical operating system.
   [3 marks: (1 mark for understanding, 2 mark for explanation)]

6

a) Explain what Microsoft Power shell is.
   [5 marks: (1 mark per valid point)]

b) Briefly explain the following windows commands: i) IPCONFIG, ii) NET, iii) FC, iv) PING v) TRACERT.
   [10 marks: (2 marks each)]

c) Explain precisely the result of the following command at a windows command prompt
   DIR *.* | SORT > list.txt
   [5 marks: (3 marks for correct symbol identification, 2 marks for correct ans.)]

d) Why does memory fragmentation occur in a typical operating system? How can this problem be resolved.
   [4 marks: (1 mark for understanding fragmentation, 3 marks for how to resolve it. 1 mark per valid point)]

e) What is the difference between a physical address and a logical address for a program residing in main memory.
   [1 mark]
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators and smart devices are not allowed.

3) This paper has five questions. Answer any three.

4) The total number of marks obtainable in this assessment is 99. This will be scaled up to 100%.

1) Why should people’s personal data be protected? Explain the main ideas behind Data Protection (DP).
   [6 marks]

   List and briefly explain the 7 legal principles that the law on Data Protection embodies, giving examples where possible.
   [7 x 3 = 21 marks]

   Explain the concept of Freedom of Information (FOI), and how DP and FOI are simply two sides of the same coin.
   [6 marks]
   [Total: 33 marks]

2) List and briefly explain four guiding principles that can be used when making decisions which involve an ethical dimension.
   [4 x 2 = 8 marks]

   Discuss two ethical philosophies, how these might relate to the above guiding principles, and what their inherent weaknesses might be.
   [2 x 3 = 6 marks]
c. A not uncommon view among people in our society is that “The end justifies the means”. What is your view on this, both in general and in specific situations, and how does it tie in with one of the above ethical philosophies?  
[your view 3 marks; link with ethical philosophy 3 marks = 6 marks]

d. What is the downside to subscribing to one – and only one – ethical philosophy? In certain situations, might it be useful to make use of an ethical philosophy that you do not generally agree with? If so, why?  
8 marks

e. Why should one always be conscious of which ethical viewpoint one is taking in a given situation? Discuss.  
5 marks  
[Total: 33 marks]

3)

a. In the United States, companies go to some lengths (and expense) to establish an ‘ethical environment’ in the workplace. Why?  
1 mark

b. Provide a checklist of various structures and processes that need to be put in place in such an environment and explain the logic behind them.  
[checklist 9 marks; logic 6 marks = 15 marks]

c. Is the US approach to establishing an ‘ethical environment’ in the workplace a step in the right direction which should be adopted in Europe? Briefly discuss.  
1 mark

d. In the context of working to solve problems in a corporate environment, what steps could be implemented to ensure that a proposed solution is analysed from an ethical perspective? What are the benefits of such analysis?  
[steps 6 x 2 marks; overall process 3 marks; benefits 1 mark = 16 marks]  
[Total: 33 marks]

4)

a. What is Trustworthy Computing (TwC)?  
3 marks

b. What 3 actions must one take in order to implement TwC? How do these actions translate into documents, processes and activities?  
[3 + 3 marks]

c. Risk is an important factor to take into account in the provision of IT related products and services. What might be the consequences of inadequate consideration of risk?  
2 marks

d. What is the purpose of Risk Assessment? With the aid of a diagram, describe this process.  
10 marks
e. A common saying is that prevention is better than cure – but there is usually a cost to mitigating risk. How would you decide whether or not to invest in the required means of risk prevention? What are some common methods employed to prevent threats?

[5 marks]

f. In the case of a security breach, what can one be expected to do to recover from such a failure?

[7 marks]

[Total: 33 marks]

5)

a. What is the difference between ethics and law? Using examples if possible, explain how something unethical can still be legal. Why is the law insufficient to regulate behaviour in a professional or organisational context? What is the function of a written Code of Ethics / Code of Conduct in a professional (or organisational) context?

[difference 1 mark; legal vs ethical 2 marks; behaviour in context 2 marks; CoE 3 marks = 8 marks]

b. As a new ICT graduate, you are likely to work in the ICT services industry. Name six (6) major factors that are driving change in the professional services industry.

[3 marks]

c. What is a professional organisation, and what is its purpose? What are the key characteristics that distinguish a professional from other kinds of workers? In Malta, is an IT worker considered a professional? Why?

[organisation 3 marks; characteristics 4 marks; IT professional 1 mark = 8 marks]

d. With whom must a person working in the ICT sector develop relationships? What is the key ingredient required to develop and maintain such relationships, and what are the things that a professional person is expected to do to establish this?

[relationships 2 marks; behaviour 6 marks = 8 marks]

e. Give 6 examples of unprofessional behaviour and explain how these can undermine professional relationships.

[6 marks]

[Total: 33 marks]
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) This is an open book examination. You may use any hardcopy written reference material, including hard copy course notes, textbooks and dictionaries with any annotations.

3) Digital equipment is not permitted.

4) This paper contains 2 Sections. Answer all questions from Section A and any two questions from Section B.
SECTION A – ANSWER ALL QUESTIONS

QUESTION 1. This is a compulsory question related to C programming constructs. You are only required to write code snippets as shown in the example below:

Sample Question: Write code that outputs on the screen fifteen asterisks on the same line.

Sample Answer:
```c
for(i = 0; i < 15; i++)
{
    printf("*");
}
```

Answer the following questions:

a) Using only one `printf` statement, write the required code to produce the following output:

"Whatever you are, be a good one."
- Abraham Lincoln

b) A variable of type `double` named `g` holds the value 9.80665. Write a statement to output on the screen the contents of `g` in three decimal places.

c) Write the required code to output on separate lines the odd numbers of the numbers between 1 and n, where n is a variable of type `int`.

d) Write the required code in order to ask the user to enter the characters Y or N as an answer for a Yes/No question. The input should not be case sensitive (i.e. y or n are also valid) however any other character should not be allowed. If the user enters an invalid character then the user should be asked to re-enter the character. This should be repeated until a valid character is entered.

e) A variable `sNum` of type `char[5]` contains a whole number. Write the required code to convert the contents of this variable to an actual integer. The integer should be stored in a variable `num` of type `int`.

[3 marks each]
[Total of 15 Marks]

QUESTION 2. This is a compulsory question. You are required to provide a descriptive answer for each question.

Answer the following questions:

a) The aim of the program below is to display the contents of array `months`.

```c
int main(void)
{
    int i;
    for(i = 1; i <= 12; i++)
    {
        puts(months[i]);
    }
}
```
When the above program is executed, something goes wrong. Answer the following questions:

i. What is wrong with the above code? [Hint: there are 2 issues in the above code snippet]
ii. What is actually outputted on the screen?
iii. Write a code snippet to show how the above code can be altered in order to give the correct output.

[2 marks each]

[6 Marks]

b) When the following program is executed:

```c
#include <stdio.h>

int main(void)
{
    char quote[39] = "What's normal anyways?" - Forrest Gump;
pus(quote);
}
```

The following output is given:

![Image of the output](image_url)

Answer the following questions:

i. What is wrong with the above program?
ii. Write a code snippet to show how the above code can be fixed.

[3 marks + 2 marks]

[5 Marks]

c) When executed, what will this program output?

```c
int main(void)
{
    float avg = (4 + 3 + 3) / 3;
    printf("%f\n", avg);
}
```

[4 Marks]

[Total of 15 Marks]

**QUESTION 3. This is a compulsory question. You are required to write a complete C program.**

The probability of getting a HEAD or a TAIL when tossing a coin is 50% for HEAD and 50% for TAIL. A secondary school teacher wants to demonstrate this probability theorem by simulating the process of tossing a coin for a very large number of times (say 10,000 times) using a program so that her students would be able to better understand this concept.

You are required to write a program using C that will ask the user the amount of times a coin is going to be tossed, following which the program should simulate the tosses and output the final results. It is important that the result is displayed in an ordered and understandable way as shown in the screen shot below:
QUESTION 4. This is a compulsory question related to pointers. You are required to provide a descriptive answer for parts a and b and a code snippet for part c.

Answer the following questions:

a) Explain the meaning of the following three lines of code:

```c
int *pNum;
int num = 55;
pNum = &num;
```

[1 Mark for each line of code]

b) Consider the following four functions:

```c
void cube1(int *num)
{
    *num = *num * *num * *num;
}

void cube2(int num)
{
    num = num * num * num;
}

void cube3(int num)
{
    return(num * num * num);
}

int main(void)
{
    int num = 3;
    printf("%d\n", num);
    cube1(&num);
    printf("%d\n", num);
    cube2(num);
    printf("%d\n", num);
    cube3(num);
    printf("%d\n", num);
}
```

When the main function is executed, what will the program output?

[1 mark for each variable output]

[4 Marks]
c) An array `nums` of type `int` has a length of 10. Using pointer techniques (do not use array indexing with `[]`) and a `for` loop, write the required code in order to display the contents of this array on the same line, separated by a comma (,). You are not required to write the whole program but only the missing part (shown as an empty rectangle) shown in the code snippet below:

```c
#include <stdio.h>

int main(void)
{
    int i;
    int nums[10] = {00 , 11 , 22 , 33 , 44 , 55 , 66 , 77 , 88 , 99};
    int *ptrNums;

    // [missing code here]

    printf("\n");
}
```

[8 Marks]
[Total of 15 Marks]
SECTION B – ANSWER ANY 2 QUESTIONS FROM THIS SECTION

QUESTION 5. This is an optional question. You are required to write a complete C program by answering the given questions.

The program that you are required to implement is related to single linked lists and structs. Consider the following struct that is used to store the details of an employee in a restaurant:

```c
typedef employee
{
    int employeeId;
    char name[20];
    char surname[20];
} Employee;
```

You are required to implement a linked list that can be used to store a list of employees. When executed, the program should display the following menu:

1. Add Employee
2. Search Employee
3. Display All Employees
4. Exit

Option 1 should allow the user to add a new employee to the linked list. Option 2 should allow the user to search for an employee using the name and surname, while option 3 should be used to display all the details of the employees on the screen. Option 4 should halt the program.

Implement this program by answering the following questions:

a) Define the struct that is required to represent the nodes for the required linked list and declare also all the global variables that might be required for this program. [2 Marks]

b) Write a function to add a new employee to the list. Make sure to include the required code to allow the user to type in the employeeId, name and surname. [3 Marks]

c) Write a function to display on the screen the details of a particular employee struct passed as a parameter. [3 Marks]

d) Write a function to search for an employee in the list using the name and surname. It is important to make your program case insensitive. The results (employees) found should be displayed on the screen. [3 Marks]

e) Write a function to display the whole list of employees. [3 Marks]

f) Write the main function of the program and other functions (if any) that you think are necessary to finalise the implementation of this program. [6 Marks]

[Total of 20 Marks]
QUESTION 6. This is an optional question related to looping structures. To answer this question you are required to write three separate code snippets.

In C and in other imperative and object oriented languages there are three basic types of loops. Although there are three types of loops, in theory it is possible to do anything with only one type of loop. This is obviously not recommended. In this question you are required to show that this is possible by providing three different answers each time using a different type of loop.

**QUESTION:**
Write a program which will find the average of a set of positive numbers entered by the user. There is no limit to how many numbers the user can input, in fact an end-of-data marker such as "-1" should be used to stop the program from asking the user to enter more numbers.

[3 marks for correct identification of loops]
[4 marks for each correct loop implementation]
[5 marks for overall correctness of the solutions]

[Total of 20 Marks]

---

QUESTION 7. This is an optional question. You are required to write three C functions.

Consider the following three sketches of three triangles made up of a sequence of asterisks:

```
* 
*** 
***** 
******** 
********** 
*********** 
************ 
************* 
************** 
***************
```

```
* 
*** 
***** 
******** 
********** 
*********** 
************ 
*************
```

```
* 
*** 
***** 
******** 
********** 
*********** 
************ 
************* 
**************
```
You are required to implement three functions – a function to generate each triangle. Each function should accept an integer parameter that represents the number of lines that the triangle should be made up of. For example each of the above triangles is made up of 6 lines.

Hint: If you want to genericise this triangle:

```
  
  
  
  
  
  
`...

...it is suggested to fill the empty spaces with an actual space character. In the sketch below a space is represented using the character $\textbackslash s$:

```
  
  
  
  `...

```

[4 marks for the first triangle]
[3 marks for the second triangle]
[8 marks for the third triangle]
[Total of 20 Marks]
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed.

3) This paper contains FIVE questions. You are to attempt any THREE questions, including at least one question from Section A and at least one question from Section C.

4) Use a separate script for questions 1&2; for question 3; and for questions 4&5.

5) This examination adds up to a total of 102 marks. This will be scaled to 100%.

SECTION A.

1) This question is a case-study adopting a well-known EIP solution that will be integrated with a back-end ERP.

Consider the following scenario, and list all the key aspects that need to be considered:

About the organisation

*CleaningMalta* is a local company dedicated to a quality finish. In recent years *CleaningMalta* has expanded its operations to provide cleaning services to large companies around Malta. It offers different packages that cater for different needs and types of organisations. The mission of *CleaningMalta* is to provide the best cleaning services to the costumer. Above all it uses the right equipment, and employs the right personnel – who are highly trained and certified – all to make sure that the work is completed in time and to high standards, no matter the season or time of the day. The quality of service of *CleaningMalta* is therefore monitored regularly by supervisors who do random checks. The organisation invests in regular training to ensure quality. The organisation has one main head office and a store from where all employees can collect their uniforms and cleaning material. The management has decided to change the current IT solution and is considering purchasing and customising an ERP system. Although *CleaningMalta* has a computer solution most of the business process is still being done by pen and paper using an outdated reservation platform. The management of *CleaningMalta* feels
that its needs to make use of computer solution to manage the organisation and supervise its employees.

**About the IT solution**

The organisation has selected an IT company to propose a solution. The company decided to use an existing solution. Cleaning Monitor System (CMS) is an IT solution that contains different features that can be enabled to provide updated information related to HR, Finance warehouse management and operation management. CMS provides a user-friendly web-scheduling engine, support for project management that is accessible also through mobile devices and integrating all information about different contractors that CleaningMalta has with its clients. All this information will need to be integrated to a back-end ERP system that will help to better manage the services provided.

**CMS** has a number of modules that cater for the various requirements. For this case-study focus on the following modules:

- An Intranet that integrates with the back end ERP system (offsite at the head office of CleaningMalta) that allows supervisors access roasters of employees and instructions related to day-to-day jobs.
- A management system that efficiently allows management to create the necessary day-to-day reports.
- A customer relationship management module that manages customer feedback that is integrated to the back end ERP system.

*Note that CMS has been designed specifically for cleaning organisations and thus follows best practices with most standard features readily available in the standard package. The CMS is not an ERP system but can easily be integrated to a back-end ERP system.*

i. a) By referring to an ERP product of your choice identify the key modules needed to provide functionalities required by CleaningMalta.

(6 marks)

b) An ERP provides a template to increase the speed of implementation in order to avoid complexity and high cost. Draw a diagram showing the employee scheduling process assigned for any particular cleaning project needed for the following case study.

(10 marks)

ii. Discuss in point form the following key aspects of a typical setup:

a. What type of organisation does CleanMalta solution be classified in?

(2 marks)

b. How would you ensure that all modules are integrated within an ERP solution when using IT solutions such as **CMS**?

(6 marks)
c. Key reports that are provided by ERP solutions, particularly focusing on feedback of customers collected from the CRM module. (4 marks)

d. List four key features you would recommend to ensure the new system must have to integrate information such as employee roster of on-going projects and deadlines. (6 marks)

(Total: 34 marks)

2) This question is about manufacturing process using ERP solutions.

Popular ERP software suites are designed to tackle mission-critical business functions with the aim to link all information through integrated modules such as finance, HR, procurement etc. These solutions aim to gain total visibility – in real-time – to all information so one can run more efficiently and grow more profitable. Manufacturing Companies strive to organise and track all manufacturing process, planning and execution, inventory management, quality assurance, compliance, financials, sales, among other to improve the Batch Production Process.

a) Identify the two common ways of how Electronic Data Interchange- EDI is adopted in ERP. Clearly described what are the main advantages of integrating EDI within ERP solutions. Give examples by referring to case study you are familiar with. (6 marks)

b) Manufacturing process is divided in two main stages. List and briefly describe them by referring to the product preparation. (2 marks)

c) Security is a challenge that needs to be addressed. Allowing third parties access the back-end ERP solution helps better automate the purchasing process and help organisations acquire the best prices in the market without needing to manually search for them. Discuss the various aspects to consider when designing the backend solution. (4 marks)

d) List 6 reasons clearly stating why an organisation should implement an ERP. (12 marks)

e) With the increase of interactions between departments, it was no longer easy to deliver sales orders to customers cost-effectively and in a timely fashion.

What is value chain? In your answer refer to a case study and ERP vendor of your choice explain how organisation adopt the value chain. (4, 6 Total 10 marks)

(Total: 34 marks)
### SECTION B.

3) The following trial balance was extracted from the books of M. Borg, a sole trader, on 31/12/2015.

<table>
<thead>
<tr>
<th>Description</th>
<th>€</th>
<th>€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixtures and fittings</td>
<td>74,230</td>
<td></td>
</tr>
<tr>
<td>Accumulated depreciation on fixtures and fittings</td>
<td>34,120</td>
<td></td>
</tr>
<tr>
<td>Motor vehicles</td>
<td>65,400</td>
<td></td>
</tr>
<tr>
<td>Accumulated depreciation on motor vehicles</td>
<td>32,160</td>
<td></td>
</tr>
<tr>
<td>Inventory as at 01/01/2015</td>
<td>31,730</td>
<td></td>
</tr>
<tr>
<td>Receivables and payables</td>
<td>101,110</td>
<td>99,020</td>
</tr>
<tr>
<td>Bank</td>
<td>5,500</td>
<td></td>
</tr>
<tr>
<td>VAT liability</td>
<td>4,210</td>
<td></td>
</tr>
<tr>
<td>Purchases and sales</td>
<td>397,300</td>
<td>614,070</td>
</tr>
<tr>
<td>Returns</td>
<td>11,700</td>
<td>8,600</td>
</tr>
<tr>
<td>Discounts</td>
<td>9,780</td>
<td>4,760</td>
</tr>
<tr>
<td>Carriage</td>
<td>10,090</td>
<td></td>
</tr>
<tr>
<td>Rent</td>
<td>9,140</td>
<td></td>
</tr>
<tr>
<td>Licences and permits</td>
<td>7,890</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>22,700</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>14,950</td>
<td></td>
</tr>
<tr>
<td>Wages and salaries</td>
<td>74,200</td>
<td></td>
</tr>
<tr>
<td>Allowance for receivables (doubtful debts) at 01/01/2015</td>
<td>6,990</td>
<td></td>
</tr>
<tr>
<td>Irrecoverable (bad) debts</td>
<td>2,350</td>
<td></td>
</tr>
<tr>
<td>Drawings</td>
<td>20,600</td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td>43,740</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>853,170</td>
<td>853,170</td>
</tr>
</tbody>
</table>

The following information, which has **not** been accounted for above, is also available:

1. The value of the closing inventory as on 31 December 2015 was €34,790.

2. 60% of the carriage relates to carriage inwards. The remainder relates to carriage outwards.

3. €12,000 of the insurance shown above relates to the year from 1 July 2015 to 30 June 2016.

4. Meter readings reveal that €2,750 was owing for utilities at 31/12/2015.

5. During 2015, one of the above motor vehicles was very badly damaged in a collision. This motor vehicle had been purchased during 2012 for €30,000. On 24 December 2015, the firm sold the vehicle for €700 scrap and also received a cheque for €8,500 by way of compensation from the insurance company. The firm’s accounting assistant was unaware of this transaction.

6. Depreciation is to be provided for as follows: Fixtures and fittings 10% reducing balance. Motor vehicles 20% straight line.
It is to be noted that it has always been (and, to date, still is) the firm’s policy to charge a full year of depreciation in the year of acquisition and none whatsoever in the year of disposal.

7. A review of receivables as at 31 December 2015 showed that a further €3,500 needed to be written off as irrecoverable (bad) debts. It was also decided that the closing allowance for receivables (‘doubtful debts’) was to be 10% of the outstanding receivables as at 31/12/2015.

You are required to prepare the income statement for the year ended 31 December 2015, and the statement of financial position as at that date.

(Total: 34 marks)

SECTION C

4)  
   a) You are a consultant in an independent consulting firm. List and explain the factors that you would look for in order to persuade an established organisation to consider an ERP system implementation. How would an ERP solution address such issues?  
      (8 marks)

   b) You have a long-standing client in the insurance sector, and you see that this client could rationalise many processes by eliminating a number of disparate ‘vertical’ systems that are running on technologies that, while not quite obsolete, are severely limiting the company’s ability to keep up with its competitors. You suggest to your client that they would benefit immensely from an ERP implementation but, although clearly interested, your client is worried that introducing some ‘generic’ ERP system could be detrimental to the firm, as it would not cater to the specifics of the insurance business – and that would cause them more harm than good. What steps would you take to select an appropriate ERP system for your client, also taking into account ‘best practices’ as presented by the ERP vendors? What might the disadvantage be of using ‘best practices’?  
      (11 marks)

   c) After you go through the process of selection and come up with a short list of possible systems that offer ‘best practices’ in the insurance business, you pick the one you think is most appropriate to your client’s business and decide to walk him through the insurance sales process, so as to ensure that there is a good fit between the process that the system offers and the wishes of your client. Below (see Figure 1 overleaf) is a BPD for this process as provided by the ERP vendors. Describe the process model to your client.  
      (15 marks)

(Total: 34 marks)
5) 

a) You are a consultant with an independent consulting firm. You have been working with a client of yours for some time and have come to the point that he sees value in investing in an ERP system for his business and is willing to go with your recommendation of a particular vendor. He tells you to submit a proposal to him for consideration. What ‘content’ do you put in the proposal, and to what level of detail do you go in each part of the proposal? 

(6 marks) 

b) Your proposal was very well received, and a contract has since been negotiated with your firm to deliver a new ERP system. Because of your good working relationship, your client has requested that you be appointed Project Manager on this project. What document do you produce now, at the outset of the project, and how does it help ensure that the good relationship with the client is maintained? List and describe each of the sections in this document, and why it is important for this ‘content’ to be documented at such an early stage of the project. 

(11 marks) 

c) Implementing an ERP system is complex. Explain why the project plan is one of the most important documents on the project. List and describe the main tasks/activities that need to be undertaken on a typical ERP project, and draw a diagram – from the beginning of the project to the time the system goes live – reflecting the order in which these should be conducted and any dependencies that the constituent tasks may have on one another. 

(11 marks) 

d) In developing the project plan, you will have to do a very detailed cost breakdown. One of the decisions that are still to be made is whether to buy an ERP system ‘off the shelf’ (OTS) and customise it to reflect the way your customer works, or to simply adopt a cloud based solution and change many of your clients processes to comply with those embodied in the ERP system selected. Compare and contrast the costs of each of these possible solutions, and explain what might determine which model your customer adopts in the end. 

(6 marks) 

(Total: 34 marks)
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed.

3) This paper contains FOUR questions. You are to attempt any TWO questions – one from Section A and one from Section B.

4) Use a separate script for Section A (questions 1 & 2); and for Section B (questions 3 & 4).

SECTION A.

1) This question is a case-study adopting a well-known EIP solution that will be integrated with a back-end ERP.

Consider the following scenario, and list all the key aspects that need to be considered:

About the organisation

CleaningMalta is a local cleaning company dedicated to a quality finish. In recent years CleaningMalta has expanded its operations to provide cleaning services to large companies around Malta. It offers different packages that cater for different needs and types of organisations. The mission of CleaningMalta is to provide the best cleaning services to the costumer. Above all it uses the right equipment, and employs the right personnel – who are highly trained and certified – all to make sure that the work is completed in time and to high standards, no matter the season or time of the day. The quality of service of CleaningMalta is therefore monitored regularly by supervisors who do random checks. The organisation invests in regular training to ensure quality. The organisation has 1 main head office and a store from where all employees can collect their uniforms and cleaning material. The management has decided to change the current IT solution and is considering purchasing and customising an ERP system. Although CleaningMalta has a computer solution most of the business process is still being done by pen and paper using an outdated reservation platform. The management of CleaningMalta feels that its needs to make use of computer solution to manage the organisation and supervise its employees.
About the IT solution

The organisation has selected an IT company to propose a solution. The company decided to use an existing solution. Cleaning Monitor System (CMS) is an IT solution that contains different features that can be enabled to provide updated information related to HR, Finance warehouse management and operation management. CMS provides a user-friendly web-scheduling engine, support for project management that is accessible also through mobile devices and integrating all information about different contractors that CleaningMalta has with its clients. All this information will need to be integrated to a back-end ERP system that will help to better manage the services provided.

CMS has a number of modules that cater for the various requirements. For this case study focus on the following modules:

- An Intranet that integrates with the back end ERP system (offsite at the head office of CleaningMalta) that allows supervisors access rosters of employees and instructions related to day-to-day jobs.
- A management system that efficiently allows management to create the necessary day-to-day reports.
- A customer relationship management module that manages customer feedback that is integrated to the back end ERP system.

Note that CMS has been designed specifically for cleaning companies and thus follows best practices with most standard features readily available in the standard package. The CMS is not an ERP system but can easily be integrated to a back-end ERP system.

i. a) By referring to an ERP product of your choice identify the key modules needed to provide functionalities required by CleaningMalta.

(8 marks)

b) An ERP provides a template to increase the speed of implementation in order to avoid complexity and high cost. Draw a diagram showing the employee scheduling process assigned for any particular project needed for the following case study.

(12 marks)

ii. Discuss in point form the following key aspects of a typical setup:

a. What type of organisation does CleaningMalta solution be classified in?

(6 marks)

b. How would you ensure that all modules are integrated within an ERP solution when using IT solutions such as CMS?

(8 marks)

c. Key reports that are provided by ERP solutions, particularly focusing on feedback of customers collected from the CRM module.

(8 marks)
d. List four key features you would recommend to ensure the new system must have to integrate information such as employee rosters of on-going projects and deadlines.

(8 marks)

(Total: 50 marks)

2) **This question is about manufacturing process using EIP solutions.**

Popular ERP software suites are designed to tackle mission-critical business functions with the aim to link all information through integrated modules such as finance, HR, procurement etc. These solutions aim to gain total visibility – in real-time – to all information so one can run more efficiently and grow more profitable. Manufacturing Companies strive to organise and track all manufacturing process, planning and execution, inventory management, quality assurance, compliance, financials, sales, among other to improve the Batch Production Process.

a) Identify the two common ways of how Electronic Data Interchange- EDI is adopted in ERP. Clearly described what are the main advantages of integrating EDI within ERP solutions. Give examples by referring to case study you are familiar with.

(6, 8 total 15 marks)

b) Manufacturing process is divided in two main stages. List and briefly describe them by referring to the product preparation.

(4 marks)

c) Security is a challenge that needs to be addressed. Allowing third parties access the back-end ERP solution helps better automate the purchasing process and help organisations acquire the best prices in the market without needing to manually search for them. Discuss the various aspects to consider when designing the backend solution.

(4 marks)

d) List 6 reasons clearly stating why an organisation should implement an ERP.

(12 marks)

e) With the increase of interactions between departments, it was no longer easy to deliver sales orders to customers cost-effectively and in a timely fashion.

What is value chain? In your answer refer to a case study and ERP vendor of your choice explain how organisations can adopt the value chain.

(6, 8 total 15 marks)

(Total: 50 marks)
SECTION B

3)  

a) You are a consultant in an independent consulting firm. List and explain the factors that you would look for in order to persuade an established organisation to consider an ERP system implementation. How would an ERP solution address such issues?  

   (12 marks)

b) You have a long-standing client in the insurance sector, and you see that this client could rationalise many processes by eliminating a number of disparate ‘vertical’ systems that are running on technologies that, while not quite obsolete, are severely limiting the company’s ability to keep up with its competitors. You suggest to your client that they would benefit immensely from an ERP implementation but, although clearly interested, your client is worried that introducing some ‘generic’ ERP system could be detrimental to the firm, as it would not cater to the specifics of the insurance business – and that would cause them more harm than good. What steps would you take to select an appropriate ERP system for your client, also taking into account ‘best practices’ as presented by the ERP vendors? What might the disadvantage be of using ‘best practices’?  

   (16 marks)

c) After you go through the process of selection and come up with a short list of possible systems that offer ‘best practices’ in the insurance business, you pick the one you think is most appropriate to your client’s business and decide to walk him through the insurance sales process, so as to ensure that there is a good fit between the process that the system offers and the wishes of your client. Below (see Figure 1 overleaf) is a BPD for this process as provided by the ERP vendors. Describe the process model to your client.  

   (22 marks)

(TOTAL: 50 marks)
4)

a) You are a consultant with an independent consulting firm. You have been working with a client of yours for some time and have come to the point that he sees value in investing in an ERP system for his business and is willing to go with your recommendation of a particular vendor. He tells you to submit a proposal to him for consideration. What ‘content’ do you put in the proposal, and to what level of detail do you go in each part of the proposal?

(9 marks)

b) Your proposal was very well received, and a contract has since been negotiated with your firm to deliver a new ERP system. Because of your good working relationship, your client has requested that you be appointed Project Manager on this project. What document do you produce now, at the outset of the project, and how does it help ensure that the good relationship with the client is maintained? List and describe each of the sections in this document, and why it is important for this ‘content’ to be documented at such an early stage of the project.

(16 marks)

c) Implementing an ERP system is complex. Explain why the project plan is one of the most important documents on the project. List and describe the main tasks/activities that need to be undertaken on a typical ERP project, and draw a diagram – from the beginning of the project to the time the system goes live – reflecting the order in which these should be conducted and any dependencies that the constituent tasks may have on one another.

(16 marks)

d) In developing the project plan, you will have to do a very detailed cost breakdown. One of the decisions that are still to be made is whether to buy an ERP system ‘off the shelf’ (OTS) and customise it to reflect the way your customer works, or to simply adopt a cloud based solution and change many of your clients processes to comply with those embodied in the ERP system selected. Compare and contrast the costs of each of these possible solutions, and explain what might determine which model your customer adopts in the end.

(9 marks)

(TOTAL: 50 marks)
UNIVERSITY OF MALTA  
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
Department of Computer Information Systems  

January 2016 Assessment Session  

CIS2102 Security and Information Assurance  
25th January 2016  

1000-1205  

Instructions:  

1) The first 5 (five) minutes of the exam is reading time.  
2) Students are allowed to use scientific calculators. No other electronic / smart devices are permitted except for translators.  
3) General instructions: This exam paper contains FIVE questions, you are to attempt ONE question from Section A, ONE question from section B, and ALL of Section C.  

Section A  

Q1 In August 2015, US authorities broke up an alleged insider-trading ring that involved Ukrainian computer hackers stealing corporate press announcements and then profiting by trading on this sensitive information before it became public (the documents stolen were press releases containing corporate data on earnings that could be used to anticipate stock market movements and make advantageous trades). Assume this data was typically stored on a company’s system in the form of Word/Excel documents that are only accessible by the Press Officer.  

a) What are the four types of potential data/access/control vulnerabilities in this scenario?  
   [16 marks]  

b) Which vulnerability(ies) were exploited?  
   [6 marks]  

c) Assume the sensitive data becomes available (internally) in the form of a press release 3 weeks before it is to be released. Assume that the organisation in question decided to encrypt these press-releases whilst they are stored pre-release date. Would this be sufficient?  
   [6 marks]  

d) Given the nature of the data at risk, which principle of computer security comes to mind? Describe this principle.  
   [6 marks]  
   [Total 34 Marks]
Q2 a) Securing information systems becomes of paramount importance when considering equipment such as medical pumps, diagnostic systems and anaesthesia machines which directly interact with patients. Tampering with dosages could result in serious consequences including death. In 2007 Dick Cheney had the wireless capabilities of his pacemaker disabled for fear of potential attacks against his life. The late hacker Barnaby Jack worked on the security of medical devices. Discuss whether medical device security is still in the “wild west”? Which classes of medical devices exist and what are the different security aspects for each?

[24 marks (15-Discuss; 9-Security aspects of classes of medical devices)]

b) Describe briefly the steps involved in RFC 2196 with regards to security.

[10 marks (2-Per Step)]
[Total 34 Marks]

Section B

Q3 a) Which encryption did Julius Caesar use? Give an example of such a cryptosystem.

[16 marks (4-Encryption type; 12-Example)]

b) Define the terms keylogger, rootkit, cryptography, DDOS and back door.

[8 marks (2-Each term)]

c) What are the properties of a strong cryptosystem?

[10 marks (2-Per Property)]
[Total 34 Marks]

Q4 a) Define the term trojan horse. Give an example of a trojan horse which you are familiar with.

[10 marks (Definition-6; Example-4 marks)]

b) Define the terms logic bomb, (virus) payload, (encryption) recipients, boot sector and boot chaining.

[10 marks (2-Each term)]

c) i) Describe “adaptive chosen plaintext”.
ii) Define Information Security in terms of its four main aims.
iii) Discuss briefly the ease of spying on the Internet. How could sensitive information be protected?

[14 marks (1-Describe “adaptive chosen plaintext”; 1-Per Aim in ii);5-Discuss ease of spying/sensitive information)]
[Total 34 Marks]
Section C

Q5  a) Briefly explain how you would choose a reliable and efficient anti-virus for your organisation.  
    [4 marks]

b) What is the “Orange Book”?  
    [8 marks]

c) In a Military environment, would you choose to use Discretionary Access Control or Mandatory Access Control, or both? Explain your reasoning.  
    [8 marks (2-Choice; 6-Reasoning)]

d) What is a Reference Monitor? What is enforced by a functional Reference Monitor?  
    [5 marks (3-What is a reference; 2-What is enforced..)]

e) What is a Script Kiddie? Define cyberterrorism.  
    [7 marks (4-What is a Script..; 3-Define Cyberterrorism)]
    [Total 32 Marks]
UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems

Friday January 22 10:00-12:05          Final Examination          Two Hours

CIS2105 - User Interface Design

Instructions:

1. Q1 (Multiple Choice) is mandatory.

2. Choose any 2 of the remaining 4 questions (Q2 - Q5).

3. Read all questions carefully before choosing.

4. Put answers in spaces provided. Plenty of space has been provided for answering each question. Note that the amount of space provided does not imply that you must use it all. Answer each question to the best of your ability.

5. No calculators or other electronic devices are allowed.

6. There are a few extra pages at the back of the exam paper that can be used if required. If you use them please CLEARLY state which question(s) are being answered.

<table>
<thead>
<tr>
<th>Section</th>
<th>Points</th>
<th>Your Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple Choice</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Choose 2 of the Following 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usability, Guidelines, Principles and Theories / Managing Design Process</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Managing Design Process / Evaluating Interface Design</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Interaction Styles</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>eCommerce Shopping Basket/Checkout</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Question 1: Multiple Choice  [34 marks]
Select the best answer for each question from the list provided.

[2] (a) A life critical system (such as air traffic control) should consider usability motivations such as

A. user satisfaction
B. error-free performance
C. rapid performance
D. intuitiveness

[2] (b) Design guidelines generally prescribe

A. the software’s user friendliness.
B. techniques for direct manipulation.
C. good practices and caution against dangers.
D. user-centric heuristics.

[2] (c) Knowledgeable intermittent users generally

A. use a variety of systems. have stable task concepts and broad knowledge of interface
   concepts.
B. know little of task or interface concepts.
C. just care enough to get the task done.
D. are thoroughly familiar with the task and interface concepts and seek to get work done
   quickly.

[2] (d) _________ in software architecture is a must for competitiveness. This may include storing
   text in external files so they can be swapped for a different language or facilitating customisation
   of local versions of user interfaces.

A. localisation
B. usability
C. habituation
D. cultural sensitivity algorithms

[2] (e) A multi-layer approach to learning an interface can sometimes be taken. Novices are most likely to
   make correct choices when they have only a few options and are protected from making mistakes.
   that is, when they are given a _________ interface.

A. training-wheels
B. user-centric
C. direct manipulation
D. desktop metaphor

[2] (f) One way to reduce the loss in productivity due to errors is to _________.

A. improve the user interface.
B. use multiple colours.
C. prevent errors.
D. analyse user data logs.

[2] (g) What is not an advantage of WYSIWYG word processors

A. Rapid response and display.
B. Document is seen as it will appear when printed.
C. Users see a full page of text.
D. Menus can be customised or modified.
2) (h) The goal of ____________ is to obtain the necessary data to influence interface redesign.
   A. user surveys
   B. eye-tracking technology
   C. usability labs
   D. ethnographic observation

2) (i) An example of Norman’s stages-of-action model was given in class and the notes (that of reading in a chair and realising that more light is required). The stage of perceiving the system state would relate to ____________.
   A. getting more light.
   B. getting up to turn on the light.
   C. noting that the light switch is flipped and it is brighter.
   D. comprehending the goal has been met.

2) (j) If you seek out the direct involvement of people in the collaborative design of the things and technologies they use, you can be said to be using a ____________ design strategy.
   A. volunteer
   B. subordinate
   C. user-centric
   D. participatory

2) (k) In Tohidi et al’s experiment regarding the showing users single designs vs multiple designs (three), it was found that ____________.
   A. More negative comments were expressed when single designs were shown
   B. Similar types of comments were expressed between both groups
   C. More positive comments were expressed when single designs were shown
   D. More positive comments were expressed when the group of three designs were shown

2) (l) When the ____________ expert review method is used, the reviewers critique an interface to determine conformance with a short list of rules of thumb.
   A. heuristic evaluation
   B. guidelines review
   C. formal usability inspection
   D. cognitive walkthrough

2) (m) A user routing sound from a CD player located in the living room to the bedroom and kitchen by dragging the CD icon into these rooms is using a ____________ interface.
   A. direct manipulation
   B. console
   C. drag and drop
   D. anthropomorphic

2) (n) A heads up display shown on the windscreen of a F-16 fighter jet is an example of a(n) ____________ interface.
   A. virtual reality
   B. augmented reality
   C. direct manipulation
   D. tangible
(o) When designing menus for a small display, _________ may prove beneficial.
   A. sequencing items in alphabetical order
   B. sequencing items by category
   C. sequencing items by frequency of use
   D. sequencing items by order of the most recently used

(p) Digital whiteboards, such as the SMART board, provides functionality identical to that of _________.
   A. A projector with attached laptop.
   B. A traditional desktop machine, using users’ fingers as pointing devices.
   C. A unique virtual reality experience.
   D. An equivalent tangible interface.

(q) *Simple truncation* is one of several _________ strategies for naming commands.
   A. heuristic
   B. tangible
   C. command name requirement
   D. abbreviation
Question 2: Usability, Guidelines, Principles and Theories/Managing Design Process  [33 marks]

[18] (a) You have just been hired as a user interface designer at an engineering software company. You are aware that guidelines documents are fairly common and useful. They give a shared language for UI descriptions, promote consistency among multiple designers and generally record the best practices derived from practical experience or even empirical studies. A new product is to be designed in the coming months that monitors the settings and readings at an oil refinery. Your team needs some guidelines regarding getting the users’ attention.

List 6 methods of getting the users’ attention along with any rules of thumb they might employ. [2 Marks for each point raised, 1 Mark for each rule of thumb].

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
When designing software for general consumption often the skill level of the user must be taken into consideration. List three different skill levels of users along with a description of each level's typical abilities. Also, for each skill level, list two things that you may have to watch out for or things you can do when bearing them in mind for the development of the interface.

[1 Mark for each skill level, 2 Marks for each skill level description/definition, 2 Marks for each observation/technique that can be applied for each group.]
Question 3: Managing Design Process / Evaluating Interface Design  [33 marks]

(a) Imagine you are working for a software company that is producing access to bus timetables/local information for a bus company in Malta. The product manager overseeing the project asks you if a social impact statement would be relevant for this type of a software project and, if so, what type of issues it would address. Articulate your response below including a description of what a social impact statement is (general features are ok to describe).

[2 Marks for decision (yes/no). 2 Marks for definition, 6 Marks for issues/features (1 per)]
(b) For large implementation projects, the customer or manager will usually set objective and measurable goals for hardware and software performance. These notions of acceptance testing can be also applied to the interface. List and define four measurable criteria for an interface that could potentially be established for such a test. [2 Marks each]

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________


(c) Many expert review techniques are available to the interface professional for usability testing. One popular method is known as Cognitive Walkthrough. Define what the Cognitive Walkthrough expert review technique is and two tests/features of a cognitive walkthrough that you would typically use whilst performing one. [3 Marks definition, 2 Marks for each test/feature of Cognitive Walkthrough identified]

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________
(d) In class, considerable time was spent discussing the research work of Tohidi et al. regarding their experiment on user feedback with respect to usability testing with a single interface versus three equivalent (but stylistically distinct) interfaces. Discuss the findings of this research with respect to the type of feedback given by each group concluding with a recommendation from these observations. [6 Marks for findings, 2 Marks for recommendation].
Question 4: Interaction Styles [33 marks]

[2] (a) Discuss the idea of interaction design that absorbs workload from users.

[3] (b) Discuss the idea of forgiveness when designing forms.
(c) How can tools such as a Keystroke Level Model Form Analyzer (KLM-FA) help to design better forms?

(d) It is not always possible to have user representative(s) present during all design meetings. Discuss a User Centred Design technique that can be adopted to compensate for this possible threat to system success.
(e) Command line interfaces have the distinction of enabling the user to have a high degree of control. The downside to this is that error rates tend to be higher and learning such an interface requires more effort. The commands themselves tend to be abbreviated in practice for increased speed of input. Consider the commands below. Abbreviate these commands using the primary abbreviation strategy of your choice. If there are any conflicts then employ a secondary abbreviation strategy to avoid conflicts. Clearly state what the strategy(ies) are. [5 Marks strategy(ies), 1 mark per command]

Command List: copy delete move apply send connect compare undo

(f) When designing a menu structure the issue of breadth vs depth can occur when the number of items is large. What are the arguments for/against breadth versus depth and what general strategy should be employed? [3 marks argument, 2 marks strategy]
Question 5: eCommerce Shopping Basket/Checkout  [33 marks]

ECommerce is a popular way for consumers to do online shopping and is especially popular in Malta. Thousands of eCommerce sites exist selling all manner of goods. One thing most eCommerce websites have in common, however, is the ability for shoppers to add goods to a virtual shopping basket and utilise this shopping basket in some sort of interactive checkout process.

Your task is to design the interface for such a system. You can assume that the shopping basket has already been populated by the user at this point (you don’t have to design an eCommerce system!). Assume the physical interface is a typical PC with the user utilising a web browser. Your design should deal with:

1. The editing (you decide what features are needed) of a shopping basket. Item details include:
   (a) Item Name
   (b) Item Price (in Euros)
   (c) Item Quantity
   (d) Total value of goods in shopping basket.

2. The checkout process. The checkout process should include:
   (a) Listing of shopping basket contents
   (b) Ability/Link to editing features of shopping basket
   (c) Ability to enter delivery details (Customer Name, Address, Phone, Email)
   (d) Ability to enter payment details (Credit Card #, Card Expiry Date, Card Verification Value (CVV))
   (e) Review and confirmation of transaction.

CLEARLY state any assumptions you make.

Complete the following:

[12]  (a) Provide sketch(es) of your proposed design (please use blank pages towards the end of this exam paper). Please annotate where necessary.

[21]  (b) For each of the interface requirements above, provide an explanation as to how this is achieved and what usability or device issues you needed to take into account. Refer to your sketches where necessary.
EXTRA SPACE - If you use this PLEASE MAKE IT CLEAR WHICH QUESTION/PART the answer refers to. Use this only if you feel you do not have enough space to put an answer OR if you make a mistake and need to rewrite your answer to a question.
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed. Smart devices are not permitted.

3) This paper contains 6 questions. Answer any 4 questions.

Q1

a) The RUDP (Rational Unified Development Process) is a software development method that makes use of certain key principles. List and explain any three of these key principles and discuss their relevance to modern Agile system development in a medium-sized organisation.

   [5-marks (3 marks for principles, 2 marks for relevance)]

b) Briefly list and explain any five major workflows in the RUDP.

   [10-marks (1 mark per correct workflow, 1 mark for explain)]

c) The UML (Unified Modelling Language) has a large set of diagrammatic notations for system modeling. These diagrams can be divided into static representation and dynamic or behavioural representation. Identify any i) two static representation diagrams and ii) two behavioural representation diagrams. Explain their intended use and give an example of their use.

   [5-marks (2.5 marks for static & behavioural, 2.5 marks for explain)]

d) Explain some advantages for component-based development. Is component-based development relevant to modern applications like for example web-site construction?

   [5-marks (2.5 marks for explain, 2.5 marks for relevance)]

   [Total 25 marks]
Q2

a) Assume that you are a project manager in charge of three projects. Your task is to decide whether RUDP or Agile is suitable for each of these projects:

i) The first project is the development of a controller application and hardware for temperature via a sensor monitoring system.

ii) The second project involves the construction of a Business Intelligence application that might need to evolve as the functions of the business are being properly understood and change over time. The company that shall use this system is a small company and has some experts in the field.

iii) The third project involves the construction of a large web portal for a corporate organisation. This web portal has to be properly studied and requires detailed analysis and preparation. Project managers have to be selected and take over the ownership of the project.

[15-marks (5 marks each, 2.5 for understanding, 2.5 for proper reasoning)]

b) A computerised point-of-sale terminal (POST) system is used to record sales and handle payments. It is typically used in a retail store. It includes hardware components, i.e., a computer, a bar code scanner, and software to run the system. The following important operations are provided by this system: Cashier: Login and Logout, Customer: Buy items and Return items.

Your task is to identify the main Use-Cases of the system and draw them using the appropriate diagrammatic notations. The Use-Cases need to be clearly explained and any assumptions must be stated.

[10-marks (5 marks for proper use cases, 5 marks for correct drawing and explanation)]

[Total 25 marks]

Q3

a) A small company has a number of managers and teams. A manager is responsible for a particular team and the teams are composed of employees. Employees work for the company. The managers are also employees. It is possible to have contracted employees who have a contract for a specified period of time. After the contract expires the contracted employee is no longer a member of staff. Every employee has a unique ID, name, surname and monthly salary. A manager is linked to a team name he is managing. Processes to create a new manager, a new employee and a new team member are important.

Your task is to draw a conceptual UML 2 class diagram for this scenario. Some attributes and methods need to be shown. All assumptions must be clearly stated.

[10-marks (5 marks for UML diagram, 5 marks for labelling and explanation)]

b) Compare the advantages of a process based software development method like RUDP, (Rational Unified Development Process) with the traditional ‘waterfall’ method.

[5-marks (1-mark for each valid point)]
c) You are developing web applications for a small company. The web applications include the shopping cart, checkout and registering, etc. Suggest which UML diagrams are suitable for the following. Valid reasons for your selection should be provided.

i)    Workflow modelling
ii)   Identifying the top level activities and the users involved.

[5-marks (2.5 marks each)]

d) Which UML diagram or diagrams are suited for modelling or representing computer network topologies? Clearly explain.

[5-marks (2 marks for diagram, 3 marks for explanation)]

[Total 25 marks]

Q4

QUESTION ON DSDM

A fairly young mobile telephony company is seeking to expand its services in the telecommunications field. From their early experiences in this sector the management of this company is aware of the many rapid changes that are affecting both its technological and commercial aspects.

They also know what a key role their information systems play in running their day-to-day operations, maintaining overall control and exploiting new avenues through increased efficiency and product innovation.

They have already had an experience having an IT based system developed for their requirements. However the software provider of their first project used a water-fall approach and took too long to deliver the required system. The system still necessitated several modifications to get it to function properly. This severely affected their ability to operate and benefit from the automation. This generated a lot of tension and distrust between the company and the software vendor, making them wary of starting a second IT development project.

Eventually the company’s management decided to embark on an extensive IT project to upgrade the IT system they started off with and introduce new functionality. They also know that as the project evolves so will their requirements.

It was decided early in the project setup to use the Dynamic Systems Development Methodology (DSDM) as the approach to the design and development of the new software system.

a) Briefly discuss five specific elements in the principles driving DSDM that are aimed at reducing the problems stated above.

[3 marks per element x 5 elements]
b) Discuss two of the method’s phases/steps in terms of the main objectives of each stage, how they are achieved and how they help minimize the problems/challenges described above.

[2 phases x 5 marks per phase]

Q5

QUESTION – ERM, CONTEXT DIAGRAM

The following is a description of requirements for an Emergency Response System:

The regional civil defence authority wishes to computerise its emergency response registration system. The authority would like to procure a system which will enable the call centre to register emergency aid requests as they come in. The system will enable the response centre to keep track of such reports and record any interventions undertaken in regard of each report.

The system would be used to generate reports as follows:

- Statistical reports on number of calls attended to per week;
- Analysis by type of call;
- Analysis by type of resources utilised;
- Weekly average response times (between time of call and time of first intervention);
- Report on requests involving casualties;
- Monthly Statistical report by district (13 districts in all).

Currently a call-form is filled in for each request with the following initial details:

Call Reference – a unique number assigned in numerical sequence

Date and Time, Requestor name, Type of request, Details of Request

Address, Contact number, Officer receiving call, Number of Casualties.

As the response gets under way the reception officer adds the details of each of the responses undertaken for that call, which include:

Time of response, Officers attending, Type of Service, Duration of response

Any resources used (cars, lifts, jacks, metal bending equipment).

Sometimes services are also provided by other departments e.g. ambulance, fire brigade, police. In such cases the Call Form is updated with the following details regarding such services:

Date and Time, Type of External Service, Organisation providing the service, Duration of intervention.
Vital records of staff members are kept on a special register at the reception desk. These are the details kept about each staff member:

Staff id number, Surname, Name, Address, Mobile no, Next of kin name, Next of kin contact details,

The wish was expressed to have these details also in the system for quick reference.

Furthermore, important details of such providers of emergency services were also to be kept handy in the system such as:

Organisation code, Type of organisation, Contact person, Contact Number, Address.

a) Develop an Entity Attribute Relationship (EAR) Diagram for the Emergency Response System described above. Identify the main entities involved, attributes, relationship types and indicate the keys, types of participation and cardinality.

(Entities 5 marks , attributes 5 marks, relationship types 5 marks, cardinality 2 marks, keys 2, participation 1) [Total 20 marks]

b) Draw a context diagram for a possible system based on this requirement.

(5 marks)

[Total 25 marks]

Q6

QUESTION ON RICH PICTURES, CONCEPTUAL MODEL

A regional council has decided to embark on a series of studies in order to set up an environmental watch and control agency.

The recent growth spurt of industry in the region has had a positive effect on the general income of the citizens of the region but has had a negative impact on the health of the air, rivers and urban areas.

The tourist sector is slowly feeling the impact of this increased industrialisation of the region and is beginning to suffer from lowered visits and thus, hotels, restaurants and tour operators are having lowered income each year.

Applications for new industrial developments are handled by the regional authority

A multi-disciplinary task group was set up and various issues were explored.

a) Draw a Rich Text Diagram to represent the problem environment. In it you are to identify the main stakeholders, their concerns, the main activities, the main issues, any systems in place. Use your own symbols but prepare a suitable legend.

[stakeholders 5 marks, activities 3 marks , systems 2 marks, concerns 3 marks, choice of symbols 3 marks, overall 2 marks] [Total 18 marks]
b) The regional authority runs the system for processing applications for development was identified to be a key component in this study. The system covers a number of activities related to the processing of development applications.

Phase 1 A citizen or a company fills in an application and submits it to the authority. The authority issues an acknowledgement and starts the vetting process. In the process a specialist report may be requested to provide professional advice on the impact of the development proposed in the application.

Phase 2 A decision is take whether to accept or to reject the application. This is noted in the file and the applicant is duly notified.

Phase 3 If the application is accepted, a development fee is paid by the applicant. Work is monitored for any infringement (breaking of law). If there is an infringement, this is noted and the applicant is duly fined. On completion of the development the file on the application is closed.

Draw a simple Conceptual Model to represent this system.

(Activity 5 marks, links 2 marks) [Total 7 marks]

[Total 25 marks]
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) This is an open book examination. You may use any hardcopy written reference material, including hard copy course notes, textbooks and dictionaries with any annotations.

3) Digital equipment is not permitted.

4) This paper contains 4 questions. Answer Question 1 and any other TWO questions.
**QUESTION 1.** This is a compulsory question related to OOP design. You are required to provide a descriptive answer.

You are required to design a program using Object Oriented Techniques that is going to be used by a Veterinary Clinic to keep records of the appointments for a whole year. Note that a year is made up of 52 (5-day) weeks. The veterinary works between 9.00am and 6.00pm from Monday to Friday. Between 9.00am and 10.30am the Vet usually performs minor operations. From 10.30 onwards the Vet sees clients' pets that have an appointment. Usually an operation takes approximately 30 minutes while a normal (consultancy) visit takes about 10 minutes.

For every appointment the information about the Pet and its owner's contact details are required. The program should include functionalities that allow the Vet to:

- View the appointments for a whole day
- View the appointments for a whole week
- View the Details of the pet (including any medical history) that he is currently diagnosing
- View the contact details of the owner of the pet
- Add/Edit/Delete appointments
- View the next appointment for that particular day
- Print all the appointments of a particular day

Your answer should include a description of all the classes that are required for the implementation of this program (including the list of attributes and functions) and also information about how such classes will relate to each other. There is no need to write any code. You can take assumptions for any missed information. However it is suggested to write such assumptions.

- [10 marks for selection of classes]
- [15 marks for the functions and attributes of the classes]
- [5 marks for program flow]
- [7 marks for overall correctness]
- [Total of 40 marks]
QUESTION 2. This is a selectable question that contains short programming questions. You are only required to write code snippets and not complete programs.

Answer the following questions by writing code snippets using the C++ programming language:

a) Using only one std::cout statement, write the required code to produce the following output:

```
The overall length of an A320 aircraft is 123' 3"
The wing span is 117' 5"
```

b) Write code that asks the user to enter his/her age and nationality, in variables age of type int and nationality of type string respectively.

c) Using for loops, output the following triangle made up of asterisks:

```
*
***
*****
*******
********
```

d) Write the required code to ask the user to enter a menu option between ‘A’ and ‘E’. If the menu option entered by the user is not within the range of ‘A’ and ‘E’ then the user should be asked to re-enter the option. This should be repeated until a valid menu option is entered.

e) Write the required code to output on separate lines the even numbers between 1 and n, where n is a variable of type int.

[6 marks each]
[Total of 30 marks]

QUESTION 3. This is a selectable question related to OOP. You are required to provide a descriptive answer using C++ code snippets.

Using suitable C++ examples, explain the following Object Oriented Programming terms:

- Class
- Object
- Class Attributes
- Functions
- Access Modifiers
- Encapsulation
- Constructor
- Destructor
- Inheritance

[2 marks for the explanation of each point]
[10 marks for the overall validity of the examples]
[2 marks for the overall understanding of OOP]
[Total of 30 marks]
**QUESTION 4.** This is a selectable question related to OOP. You are required to provide an answer using complete C++ code.

Write a C++ class named `Triangle` that consists of two attributes, `base` and `height` respectively.

Implement the following constructors:
- An empty and parameter less constructor
- A constructor that accepts as parameters the base and height

Implement functions that:
- Allow the user to enter the values of the base and the height
- Calculate and returns the area of the Triangle
- Display all the information related to the Triangle including the dimensions and area.

<table>
<thead>
<tr>
<th>Marks allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 marks for first constructor</td>
</tr>
<tr>
<td>5 marks for second constructor</td>
</tr>
<tr>
<td>5 marks for each function</td>
</tr>
<tr>
<td>7 marks for overall correctness</td>
</tr>
<tr>
<td><strong>Total of 30 marks</strong></td>
</tr>
</tbody>
</table>

END OF PAPER
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) This is an open book examination. You may use any hardcopy written reference material, including hard copy course notes, textbooks and dictionaries with any annotations.

3) Digital equipment is not permitted.

4) This paper contains 6 questions. Answer Question 1 and any other 3 questions.
**QUESTION 1.** This is a compulsory question related to JDBC, and web application technologies.

A book shop owner has decided to enhance his business by selling books online. This book shop owner already uses a database to keep track of his stock. The database is named borg_bookshop and resides on a MySQL database server with the following IP address: 192.168.40.50. The username and password to connect to this database are borgdb and borgpass respectively.

As this book shop owner is still sceptic on whether this is a good idea, he wants to migrate to the online shopping business in stages. Therefore he has decided that the first step would be that of only allowing internet users to search through his catalogue.

You have been hired to develop a simple web application for this book shop owner so that his clients would be able to search through his online catalogue. To be able to implement this system, you have to use the books table from the borg_bookshop database. An extract of this table is displayed below:

<table>
<thead>
<tr>
<th>ISBN</th>
<th>Title</th>
<th>Author</th>
<th>Publisher</th>
<th>Num Stock</th>
<th>Shelf Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-56347-221-X</td>
<td>An Introduction to Aircraft Performance</td>
<td>Mario Anselin</td>
<td>AIAA</td>
<td>3</td>
<td>E45</td>
</tr>
<tr>
<td>0-340-63200-3</td>
<td>Flight Principles Dynamics</td>
<td>M V Cook</td>
<td>Arnold</td>
<td>20</td>
<td>H23</td>
</tr>
</tbody>
</table>

**Answer the following questions:**

a. Using JDBC technology, write a Java class named DatabaseHelpers that can be used to query and update a particular database. Your class should have the following:
   i. A constructor that accepts four parameters: database URL, username, password, and the driver class path (in case of a MySQL database this is com.mysql.jdbc.Driver).
   ii. A method called searchBook that will accept the book title and author and it will return whether there is a copy of that book in stock.
   iii. A method called queryDatabase that will accept as a parameter a string with an SQL query and will return back the ResultSet of that query.
   iv. A method called closeConnection that will close the database connection when invoked.

   [i, ii, iii: 4 marks each; iv: 1 mark]

   [13 marks]

b. The following is the code snippet of a simple HTML form that allows the user to type in the title and author of a book respectively so that the user can search for that book.

   ```html
   <form action="searchBook.jsp">
   Book Title <input type="text" name="title"/> <br/>
   Author <input type="text" name="title"/> <br/>
   <input type="submit" value="Search"/>
   </form>
   ```

   Implement the JSP page that the above form is being redirected to. Note that this JSP page should also perform data validation, i.e. if there is any missing information it should output an error. Make use of the DatabaseHelpers class created in part (a) of this question.

   [HTML tags: 2 marks; JSP tags: 3 marks; Correct Logic: 4 marks; Use of helpers/methods: 4 marks]

   [13 marks]
c. You have been asked to prepare a login page for this system. A `users` table is created using the following SQL code:

```sql
create table users(
    username varchar(20) not null primary key,
    password varchar(20) not null
);
```

An HTML form is also created. The two text fields that are used for the entry of the username and password are `user` and `pass` respectively and the form is redirecting to a servlet called `LoginServlet`. Implement the `LoginServlet`. This servlet should output on the screen whether the user credentials are valid or not. Make use of the `DatabaseHelpers` class created in part (a) of this question. (Hint: Remember to choose the appropriate `Servlet` method)

{Servlet method: 4 marks; Correct implementation: 5 marks; Error handling: 5 marks}  
{14 marks}  
[Total of 40 marks]

---

**QUESTION 2.** This is a selectable question related to JPA. Note that this question makes reference to the previous question (i.e. Question 1).

The books table that is shown in Question 1 is mapped to an `Entity` class so that JPA technology can be used.

**Answer the following questions:**

a. A `persistence.xml` file with the following statements is created. Explain the meaning of lines 3, 5, 7, 8, 10 and 11:

```xml
<provider>org.eclipse.persistence.jpa.PersistenceProvider</provider>
<class>entities.Books</class>
<properties>
    <property name="javax.persistence.jdbc.url" value="jdbc:mysql://192.168.40.50:3306/borg_bookshop"/>
    <property name="javax.persistence.jdbc.password" value="borgpass"/>
    <property name="javax.persistence.jdbc.driver" value="com.mysql.jdbc.Driver"/>
    <property name="javax.persistence.jdbc.user" value="borgdb"/>
    <property name="cql:generate-ddl" value="true"/>
</properties>
</persistence-unit>
```

[1 mark each]  
[6 marks]

b. Assuming that a constructor with parameters indicating all the book fields is available, write the code necessary to add the following book to the database using JPA:

<table>
<thead>
<tr>
<th>Book details</th>
<th>ISBN</th>
<th>TITLE</th>
<th>AUTHOR</th>
<th>PUBLISHER</th>
<th>NUM_STOCK</th>
<th>SHELF_REFERENCE</th>
</tr>
</thead>
</table>

[6 marks]  
Page 3 of 6
c. Write a named query for this entity class that will return all the books written by a particular author. Then show a simple code snippet to illustrate how this named query can be used.

[Named query: 4 marks; Use of query: 4 marks]
[8 marks]
[Total of 20 marks]

QUESTION 3. This is a selectable question related to Java Graphics and Event handling.

*Space Invaders* is a basic game where rows of “invaders” fall from the top of the screen and the player has to try to kill these “invaders” by firing at them. You are part of a team of three programmers with the task of implementing this game. Your colleague has implemented a Java class called *Invader* that paints one invader on the screen. This class accepts the top left coordinate as parameters via the constructor.

You are required to implement a class that instantiates a number of “Invaders” ordered in three rows that move down from the top of the window to the bottom. The *Invader* class contains all the required setters and getters. The image below can help you to better understand what you are required to do:

![Image of invader class instantiation]

[HINT: Make use of the Swing Timer Class. There is no need to use threads in this question.]
[6 marks for the correct placing of the invaders]
[10 marks for the correct implementation of the movement of the invaders]
[4 marks for the overall correctness]
[Total of 20 marks]

QUESTION 4. This is a selectable question related to Java Swing and Event programming.

Write the required Java code to implement the following JFrame form that is used by a University Canteen order counter. When the *Place Order* button is clicked, the following method that is used to place the order should be invoked:

```java
private void placeOrder(String mealType, String drink, String tableNum)
```
QUESTION 5. This is a selectable question related to Java Object Oriented Design and Reflection Techniques.

Answer the following questions:

a) Explain the meaning and the importance of reflection in a software development context.

[10 marks]

b) In a Java package named bank there are a number of classes that are all inheriting from super class Account. The class diagram below illustrates this scenario:

![Class diagram](image)

Write a main method that will ask the user to type in a subclass name and then instantiate it using reflection and invokes the method displayBalance(). If the subclass is invalid, the program should output an error message.

[2 marks for correct use of OOP techniques]
[6 marks for correct use of reflection techniques]
[2 marks for overall correctness]

[10 marks]

[Total of 20 marks]
**QUESTION 6. This is a selectable miscellaneous question.**

Answer the following questions:

a) What is the difference between an HTML page, a Java Servlet and a JSP page?
   - [2 marks for HTML]
   - [2 marks JPA]
   - [2 marks JDBC]
   - [6 marks]

b) How is a session kept within a Servlet/JSP web application? Use an example (in code) to explain your answer.
   - [1 marks for the explanation]
   - [5 marks for the code example]
   - [6 Marks]

c) What is the difference between the *get* and the *post* methods in server side programming?
   - [2 marks get]
   - [2 marks post]
   - [4 marks]

d) Compare and contrast JPA and JDBC technologies.
   - [2 marks JPA]
   - [2 marks JDBC]
   - [4 marks]
   - [Total of 20 marks]

---

END OF PAPER
Examination Instructions
1) The first 5 (five) minutes of the exam is reading time.
2) Non-programmable calculators are allowed.
3) Answer all of question 1, and 2 other questions.

Question 1 – Compulsory

i) How would you define entrepreneurship? (5 marks)
ii) Identify five top traits of an entrepreneur. (5 marks)
iii) What is the difference between a salary replacement company, a lifestyle company and a high growth company? (5 marks)
iv) Consider the 3-year cash flow of a startup company shown in figure 1. After how many quarters does the company break-even? What is the overdraft required by the company? (5 marks)
v) Two friends start a company by investing €5,000 each. They decide that each share will cost €1. After 12 months, the company is doing well and the friends need more money to expand the company. They approach an investor and ask for an investment of €60,000 for a 30% stake in the company. Stating any the assumptions made,
   a. What is the valuation of the company? (3 marks)
   b. How much money are the friends’ shares now worth? (3 marks)
   c. How many shares will each of the shareholders own after the sale? (4 marks)
Question 2
With the use of a block diagram, explain how you would go about starting up a company to commercialise a technically sound concept. Include a discussion of idea generation, feasibility analysis and business planning in your explanation. (35 marks)

Question 3
Write brief notes on each of the following sources of funds:

i) Own funds and Friends, Fools and Family; (7 marks)
ii) Grants; (7 marks)
iii) Bank Loans; (7 marks)
iv) Business Angels; (7 marks)
v) Venture Capital. (7 marks)

Question 4
Defining an appropriate business model is crucial to determine how to go about commercialising a technically-sound idea. Consider the Lean Canvas in figure 2. Describe how you would use it to model the business of a start-up company. (35 marks)

Question 5
Entrepreneurs read risks and mitigate against them.

i) Discuss the causes of risk in a start-up business. (10 marks)
ii) Describe a process, including a risk register, that can help an entrepreneur manage risk. (25 marks)
<table>
<thead>
<tr>
<th>Year</th>
<th>Q4</th>
<th>Q3</th>
<th>Q2</th>
<th>Q1</th>
<th>Q4</th>
<th>Q3</th>
<th>Q2</th>
<th>Q1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Share Capital</strong></td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td><strong>Bank Loan</strong></td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
</tr>
<tr>
<td><strong>Investment Income</strong></td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
</tr>
<tr>
<td><strong>Statutory Reserve</strong></td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
</tr>
<tr>
<td><strong>Total Cash Flow In</strong></td>
<td>115,000</td>
<td>115,000</td>
<td>115,000</td>
<td>115,000</td>
<td>115,000</td>
<td>115,000</td>
<td>115,000</td>
<td>115,000</td>
</tr>
<tr>
<td><strong>Statutory Requirements (10%)</strong></td>
<td>11,500</td>
<td>11,500</td>
<td>11,500</td>
<td>11,500</td>
<td>11,500</td>
<td>11,500</td>
<td>11,500</td>
<td>11,500</td>
</tr>
<tr>
<td><strong>Rent</strong></td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
<td>4,200</td>
</tr>
<tr>
<td><strong>Rates</strong></td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
<td>540</td>
<td>540</td>
<td>540</td>
<td>540</td>
<td>540</td>
<td>540</td>
<td>540</td>
<td>540</td>
</tr>
<tr>
<td><strong>Business Travel</strong></td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td><strong>Stationary, printing etc.</strong></td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>19,470</td>
<td>19,470</td>
<td>19,470</td>
<td>19,470</td>
<td>19,470</td>
<td>19,470</td>
<td>19,470</td>
<td>19,470</td>
</tr>
<tr>
<td><strong>Raw Materials</strong></td>
<td>33,970</td>
<td>33,970</td>
<td>33,970</td>
<td>33,970</td>
<td>33,970</td>
<td>33,970</td>
<td>33,970</td>
<td>33,970</td>
</tr>
<tr>
<td><strong>Vehicle Operating Costs</strong></td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>Office Equipment</strong></td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
</tr>
<tr>
<td><strong>Total Capital Expenditure</strong></td>
<td>38,375</td>
<td>38,375</td>
<td>38,375</td>
<td>38,375</td>
<td>38,375</td>
<td>38,375</td>
<td>38,375</td>
<td>38,375</td>
</tr>
<tr>
<td><strong>Total Cash Flow Out</strong></td>
<td>72,345</td>
<td>72,345</td>
<td>72,345</td>
<td>72,345</td>
<td>72,345</td>
<td>72,345</td>
<td>72,345</td>
<td>72,345</td>
</tr>
<tr>
<td><strong>Quarterly Bank Balance</strong></td>
<td>22,845</td>
<td>22,845</td>
<td>22,845</td>
<td>22,845</td>
<td>22,845</td>
<td>22,845</td>
<td>22,845</td>
<td>22,845</td>
</tr>
</tbody>
</table>

**Figure 1 - 3-year cash flow**
CIS3086 Mobile Device Programming

14th January 2016

10.00-12.05

Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Digital equipment is not permitted.

4) This paper contains SIX questions. You are to attempt FOUR questions.

1. Throughout this question refer to the design decisions you have made when implementing the DiscoveringMalta tablet application

You have been assigned a job as a developer to design a mobile app for a tour operator. DiscoveringMalta is a local tour operator that in recent years has expanded its operations to a number of popular tourist sites around Malta. Different modules are needed and can be accessed through mobile devices. The modules allow clients to book tours and also allow admin staff to manage various activities through the backend using a mobile device.

Tablet devices are used to better help access the activities information and other required information as needed. A number of challenges can be identified that need to be addressed when designing apps for the scenarios described above.

a) Design a use case diagram of a module of your choice that is accessible through a tablet application for DiscoveringMalta.

[10 marks]

This part refers to the mobile strategy you have chosen when implementing your tablet application. Where necessary use pseudo code to explain your design.

b) By considering the choice of platform/s you designed your application for, justify your approach for the following:

i) The Offline/Online and respective functionality required.

ii) The technologies you have used to achieve your final prototype.
iii) The key features that users using your app are alerted with when updates are taking place during the event.

List any assumptions you may consider in your solution. [15 marks, 5 marks each] [TOTAL 25 Marks]

Note for Question 1: You do not need to implement the application.

2. This question is about HCI principles when designing apps for mobile devices and a Cloud solution offering mobile services.

a) List and briefly describe 6 concepts when designing a user interface for your mobile app. In your description give an example of each concept referring to the guidelines of the platform of your choice. [12 marks, 2 marks each]

b) Cloud solutions offer mobile services that can be used when designing mobile applications. List 5 of them explaining 2 of them in detail, by describing how they are implemented when designing an app of your choice. Give an example for each mobile service listed. [5, 8 Total 13 marks] [TOTAL 25 Marks]

3. This question is about mobile testing.

“Selendroid is a test automation framework which drives off the UI of Android native and hybrid applications (apps) and the mobile web. Selendroid can be used on emulators and real devices and can be integrated as a node into the Selenium Grid for scaling and parallel testing.”

a) List the main features available in Selendroid and describe the main Test Automation Framework that it provides. (10, 5 Total 15 marks)

b) How does automation help when developing mobile apps? Produce a case Scenario describing context coverage when attempting to test mobile apps in the real world. (5, 5 Total 10 marks) [TOTAL 25 Marks]
4. This question is about mobile web apps.

You are to provide a first-cut design for a mobile web-app that helps users access and maintain a catalogue of wild rabbits – on the go. This app should consist of a few pages, including a search page, as well as the usual CRUD (Create, Read, Update and Delete) operations on individual entries. This app should be robust enough to allow for most of its functionality to work even in the remotest of places, where an internet connection may not exist. This will allow your users to consult the app whenever and wherever they spot a wild rabbit. In case a new species is discovered (from the user’s perspective), the app should allow its user to create a new entry, which includes: details about the rabbit, a photo as well as location information. At some point this entry should be made available on a central server for other app users to download (pull or push) and see.

a) Give a technical outline of the app’s architecture, referencing the respective standards, technologies, libraries and APIs you may adopt for this app to work across devices (including mobiles, tablets and desktop machines) and irrespective of whether an internet connection exists. Your answer should also outline the various use-case scenarios, and how your app will operate under different network conditions

[15 marks]

This Question is about notifications

Mobile notifications are updates and information sent to your mobile device alerting you to things happening on your favorite app. You can opt to receive a variety of notification types. Some of these, for example is a social media app, are: mentions of your account including photos you are tagged in, new followers, direct messages, posts from people you have enabled for mobile notifications and crisis and emergency alerts.

b) Explain the step-by-step process of implementing notifications for a mobile app (native approach) of your choice using pseudo code. In your answer indicate the mobile platform you have chosen.

[10 marks]

[TOTAL 25 Marks]
5. This question is related to Indoor and Outdoor location based Services.

“Nowadays, location-based services based on GPS and map data are commonly available. Since GPS does not work in buildings and map data provide geographic information only, such services are limited to outdoor scenarios. Large research effort has been carried out to explore indoor positioning and navigation systems but up to now mostly proprietary and isolated solutions have been proposed.”

(Springer, 2011)

a) Define location-based Service. Which technologies are required to set up an outdoor location-based service and an indoor location-based service?  
[2, 10 Total 12 marks]

b) List the five components that are required for Location based services.  
[5 marks]

c) Describe briefly two approaches commonly used when measuring the distance in indoor location-based services.  
[8 marks]  
[TOTAL 25 Marks]

6. This question is related to the concept of persuasive technology.

“Persuasive technology is the study of computer systems designed with the intent to change people’s behaviors and attitudes.”

(Fogg, 2009)

a) How can participatory methods be used to design effective and ethical persuasive technology?  
[10 marks]

b) What do we mean by participatory design and what is its role in changing behaviour?  
[5 marks]
This question is related to “Bring Your Own Device” on security Issues at workplace

“Mobile computing has supplanted Internet computing because of the proliferation of cloud based applications and mobile devices (such as smartphones, palmtops, and tablets). As a result of this, workers bring their mobile devices to the workplace and use them for enterprise work. The policy of allowing the employees to work with their own personal mobile devices is called Bring Your Own Devices (BYOD).”

(Olalere, 2015)

c) Discuss BYOD’s background, benefits, challenges, and possible security attacks.

[2 marks on each concept discussed, Total 10 marks]

[TOTAL 25 Marks]
Instructions:

1) The first 5 (five) minutes of the exam is reading time.

2) The use of calculators is allowed during this exam.

3) This is NOT an open book exam. You are not allowed to keep notes/books during the exam.

4) This paper has six (6) pages, including the front page.

5) This is divided into two sections. Section A contains two questions. You are required to answer one question from this section. Section B contains four questions. You are required to answer three questions from this section.

For clarity, you are required to:

- Answer one question from Section A
- Answer three questions from Section B

6) Each question carries 25% of the total marks. The distribution of marks is given at the end of each question.
Section A: You are to select and answer one question from this section.

Question 1 (selectable)

a) General

You are involved in a project within an organisation where the senior management wants to improve the sale and distribution of the company's products. Your manager wants to recommend a Business Intelligence solution, and asks you to present a business case to the senior management.

i. Define Business Intelligence and give at two (2) reasons how a BI solution can be beneficial to the organisation.

ii. Describe two (2) potential data-related problems that the company can face during the implementation of the project. What measures should the company take to mitigate these issues?

(5 + 8 = 13 marks)

b) Data Collection

A part of the process involves collecting data from the different systems that the organisation has. Part of your task will be to discuss the requirements with potential users and to identify the data and documents that they use in their line of work.

i) Distinguish between qualitative and quantitative variables. Give two (2) examples of each. (3 marks)

ii) Distinguish between raw data and processed data. Give examples to support your answer. (3 marks)

iii) Describe the process you would use when you are extracting data for a particular dataset and intend to share it with a colleague. (6 marks)

(3 + 3 + 6 = 12 marks)

(Total: 25 marks)
Question 2 (selectable)

a) General

You are the manager of an IT department and you are tasked with a new BI project for the company. You are seeking to recruit a number of developers to work on this project.

i) Discuss two (2) important processes that are required to implement a new BI project.

ii) Identify two (2) technology skills that you would expect the new recruits to possess. In which part of the project will these techniques be used?

iii) Identify two (2) business and customer skills that you think are important for the new recruits to have. Where would you apply these skills in the BI project?

(4 + 3 + 3 = 10 marks)

b) Applying BI principles

The IT department in your organisation has a good understanding of the different platforms used to run the different systems it uses. The developers also have an in-depth knowledge of the architecture of the different systems since they have worked on them for a long time, and also of the reports that are generated by the tools that are currently available to the users.

i) Discuss three (3) things that can go wrong when implementing a BI strategy, giving appropriate examples.

ii) What is data quality and why is it important for a BI project?

iii) Identify three (3) data quality related issues that could potentially impact your BI project. Give appropriate examples to describe these issues.

(6 + 3 + 6 = 15 marks)

(Total: 25 marks)
Section B: You are to select and answer three questions from this section.

Question 3 (selectable)

a) Data Warehousing

A large multi-national company has a large data warehouse that it uses for its decision-making process. The data warehouse stores the company’s historical data and is used for reporting by the parent company and its subsidiaries worldwide.

i) Describe what a data warehouse is. Your definition should focus on its organisation, its relationship to other systems in an organisation and the time aspect of the data warehouse.

ii) Define what ETL and ELT are and highlight the difference between the two.

iii) What is a staging database and what is its role in data warehousing?

iv) Explain the difference between OLTP and OLAP and compare three features of each.

v) The company decided to start a new product line and want to know which features of the existing products are of interest to the customers. They want to report on the trends over the last 10 years, as well as the flexibility to report by year, quarter and month. Design a Star Schema that will enable the generation of these reports. List any assumptions you may make.

(4 + 4 + 2 + 6 + 9 = 25 marks)
(Total: 25 marks)

Question 4 (selectable)

a) Artificial Neural Networks

An insurance company has been in business for around five years. Up till now it has been able to monitor insurance claims and manually check for fraudulent activities. Over the last few months the insurance company has embarked on a successful advertising campaign that has drawn numerous customers which makes it impossible to continue checking claims manually. The IT manager has decided to build an ANN for this task and has prepared a large labelled dataset.

i) Describe what is meant by a labelled dataset.

ii) Explain what is meant by classification and prediction.

iii) Is an ANN considered to be a supervised or unsupervised learning method? Describe what these terms mean.

iv) Describe the architecture of a Neural Network and explain how it works during training.

v) Do you agree with the IT manager that an ANN is suitable in this case? Justify your answer.

(3 + 3 + 6 + 8 + 5 marks)
(Total: 25 marks)
Question 5 (selectable)

a) **Decision Trees**

A bank wants to streamline the decision process for approving bank loans across its different branches. It has engaged a consultant who has recommended that the bank should use Decision Trees to achieve their goal. The bank implemented a Decision Tree following the recommendation of the consultant, and tested the Decision Tree with 1000 loan application cases. The results are summarised in the following confusion matrix.

<table>
<thead>
<tr>
<th></th>
<th>Predicted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Approved</td>
<td>Rejected</td>
</tr>
<tr>
<td>Actual</td>
<td>630</td>
<td>370</td>
</tr>
<tr>
<td>Approved</td>
<td>750</td>
<td>595</td>
</tr>
<tr>
<td>Rejected</td>
<td>250</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>215</td>
</tr>
</tbody>
</table>

**Figure 1**

i) Define decision trees. Do you agree with the consultant’s recommendation to the bank? Justify your answer.

ii) Describe what a confusion matrix is and explain how it is constructed and how it is interpreted.

iii) Provide an interpretation of the results in the confusion matrix above (Figure 1 above).

iv) Explain the terms **Entropy** and **Information Gain**.

v) Given the following two attributes (Figure 2 below), work out the information gain for each and identify which attribute represents the best decision for a node.

![Figure 2](image)

(4+6+4+4+7 = 25 marks)

(Total: 25 marks)
Question 6 (selectable)

a) Visualisation and KPIs

A local council wants to publish some Key Performance Indicators of its performance on its website. After a meeting of the council, it was decided that the council will publish the number of complaints received and the number of complaints that it has successfully resolved within a particular month, starting from the date when it was set up until the previous month.

i) What visualisation technique would be suitable in this case? Justify your answer.
 ii) Mention four (4) elements of good visual representation and provide examples to show how they can be used.
 iii) What is pre-attentive processing and why is it important in visualisation?
 iv) What are Key Performance Indicators and why are they important to an organisation?
 v) Mention two other KPIs that might be interesting for the local council, outlining any assumptions that you make and justifying your answer.

(4+4+6+4+7 marks = 25 marks)
(Total: 25 marks)
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators are allowed. SMART devices are NOT allowed.

3) Candidate must attempt all questions in section A. Furthermore the students shall answer two other questions from section B. The total marks in this paper are 100. The weight of each question section is there to guide you.

4) State any assumptions made. Your writing, drawing and coding should be clear and concise.

Section A – Attempt ALL questions

1 Name and write a sentence on the four commonly cited high level processes in digital forensics. [5 marks]

2 Give ten examples of digital forensics data sources. [5 marks]

3 Compare and contrast bit-stream and sparse data copying. For each method mention a tool that is capable of that mode of copying. [5 marks]

4 Some filing systems and cloud storage services offer file level versioning. Mention two investigative approaches that are possible with this set-up. (Indication – a short essay between 75 and 150 words is expected). [5 marks]

5 Using the slack space available in a file physical allocation for hiding data has had much attention. Discuss how hiding data in slack space is this technically effective. (Indication – a short essay between 75 and 150 words is expected). [5 marks]
6. Explain why in a perfect secrecy system, the number of possible keys must equal the number of possible messages. [5 marks]

7. In the simple transposition cipher of order $n$, the plaintext is divided into groups of successive $n$ letters and each group is re-ordered in a manner defined by the key. Explain why this cipher cannot be attacked using a frequency analysis method. How can this be easily broken in practice? [5 marks]

8. a) Define the terms: Mobile Forensics and Network Forensics.
   b) Mention a tool that can be used to dump a RAM image.
   c) List the order of volatility of digital evidence in live forensics. [1, 1, 3 marks]

Section B – Attempt any TWO (2) questions

9. a) List four Malware Code Types which you are aware of. [4 marks]
   b) Discuss how fully RAM resident malware which does not leave traces on a hard disk can be detected. Give attention to which tools can be used to preserve the evidence in question. [26 marks (20-Discussion;6-Tools)]

10. Prior to Windows 7, Windows operating systems hashed user’s passwords using the LAN Manager (LM) algorithm, as follows:
    - The password is first converted into upper case letters.
    - The converted password is padded with null characters to make it length 14.
    - The new password is split into two 7-character halves.
    - These are used as two DES encryption keys, one from each half, with 8 parity bits added to each to create two 64 bit keys.
    - These two DES keys are used to encrypt a known pre-set ASCII string, resulting in two 64-bit cipher text values.
    - Combining these two 64-bit cipher text values give the completed 128-bit LM hash that is stored in a special file.
   a) Describe briefly how DES works. [10 marks]
   b) Why is DES considered weak by today’s standards? [5 marks]
   c) Explain how this is solved using Triple DES. [5 marks]
   d) Briefly describe how you would go about extracting the plain text password associated with a Windows LM hash. Hence, stating any assumptions, estimate the amount of time required to determine the password, given that it takes 0.1μs to perform one DES encryption. [10 marks]
11 Some filing systems suffer from external fragmentation of data files.
   a) Explain how external file fragmentation comes about. [4 marks]
   b) Some filing systems have utilities that help understand external fragmentation; e.g. filefrag and contig (for Windows). Explain how this tool works vis-à-vis file fragmentation. [4 marks]
   c) How can external fragmentation affect file recovery of deleted files? [4 marks]
   d) When is file carving invoked? And to which problem does file curving reduces to (i.e. known computational problem). [6 marks]
   e) Describe a generic file carving architecture and explain each of its functional units and its various data inputs and outputs. [12 marks]

12 a) Give a detailed logical design (in ERM notation) of the data requirements for a custody information system. Limit and specialise the database for recording details of blood samples found in criminal cases. Marks are allocated as follows:
   i) ERM entities including attributes. [10, 12 marks]
   ii) ERM relationships (including cardinalities and participation constraints).
   b) Describe two processes over the above database related with a digital forensic investigation. [8 marks]
UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems
January 2016 Examination / Assessment Session
CIS3106: Emerging Technologies 20th January 2016

1000-1205

Instructions:
1) The first 5 (five) minutes of the exam is reading time.
2) There are seventeen (17) questions, you are to answer ANY ten (10) questions.
3) All parts of a question should be written together. Each new question is to be answered on a separate page. Question numbers are to be clearly indicated.
4) Calculators are allowed.

Question 1
(a) Write one application of each of the following:
   i. 3D design
   ii. 3D printing
   iii. Taste Simulator

   (2x3=6 marks)

(b) How can simulation help in solving traffic problem in Malta? Provide a suitable example.

(2+2=4 marks)

Question 2
(a) Write any five applications/advantages of recommendation systems with suitable examples for each.

(2x5=10 marks)

Question 3
(a) What is a 3D transistor? What is its advantage over traditional transistors?

(1+2=3 marks)

(b) Do we really require faster computers then those available today? Give examples of any two problems that cannot be solved using existing computers and require faster computers to solve. Why is it important to solve these problems?

(1+3x2=7 marks)
Question 4
(a) What do you understand by the complexity of a computing problem? Explain with a suitable example.

(2 marks)

(b) Can DNA computers ever replace traditional silicon based computers? Justify your answer. Write two advantages and two limitations of DNA computers.

(2+2+2=6 marks)

Question 5
(a) Write two advantages and two limitations of quantum computers.

(2+2=4 marks)

(b) Can driverless cars solve the traffic congestion problem in Malta? Can they also help in solving the parking problem? Justify your answer with suitable examples.

(3+3=6 marks)

Question 6
(a) Describe any two applications of big data analytics.

(2x2=4 marks)

(b) Can neuro-centric technologies or brain computer interface (BCI) help in reducing road accidents? Justify your answer with a suitable example.

(3 marks)

(c) Can we use augmented reality to improve tourist experiences? Justify your answer with suitable examples.

(3 marks)

Question 7
(a) Are utility computing and cloud computing the same or different? Write two advantages of utility computing.

(1+2=3 marks)

(b) Compare ‘cryptocurrency’ with ‘NFC based contactless payment’. Write two advantages and two limitations of each.

(3+2+2=7 marks)
Question 8
(a) How can we use drones for disaster recovery (during a natural disaster)? Write any two limitations/challenges of drones. Justify your answer with suitable examples.

\[2+2=4 \text{ marks}\]

(b) Health wearables collect different health data. Please give any two examples of how this data can be used to improve the health of a person and of the community as a whole if this health data is made available as big data. What are the data security and privacy issues related to health wearables? Justify your answer with suitable examples.

\[2\times2+2=6 \text{ marks}\]

Question 9
(a) How are 360° interactive videos different from high definition videos? Write any two applications of 360° interactive videos.

\[2+2\times2=6 \text{ marks}\]

(b) Can we use behavioural targeting to improve national defense and healthcare services? Justify your answer.

\[2\times2=4 \text{ marks}\]

Question 10
(a) Describe any two applications of screenless displays. Justify its advantage over screen-based displays.

\[3\times2=6 \text{ marks}\]

(b) Write two applications/scenarios where LiFi (Light Fidelity) would be a better choice over WiFi. Justify your answer with suitable examples.

\[2\times2=4 \text{ marks}\]

Question 11
(a) Mention two types of Data Mining / Machine Learning techniques and briefly describe their function.

\[2\times2=4 \text{ marks}\]

(b) Applying Machine Learning techniques is part of a broader process called the Knowledge Discovery Process. Mention four of the main steps that make up this broader process.

\[1\times4=4 \text{ marks}\]
(c) Parts of the Knowledge Discovery process require repetition or cycles of repetition. Why do you think this is so?

(2 marks)

Question 12
A large bank is interested in assisting their branch managers in the process of deciding whether to approve a request for a loan or not. The bank has a long history of dealings with customers in this regard and has a large client database and another database with details of current and past applications for loans.

(a) Suggest a type of Machine Learning technique which can assist the bank’s managers in this regard.

(1 mark)

(b) Describe how this technique could be of assistance to the bank’s managers.

(2 marks)

(c) Give four possible items of data (attributes/fields) from the existing databases that could be used as input attributes to the technique.

(4 marks)

(d) What would the output from the application of this technique be?

(1 mark)

(e) How can one measure the performance of the technique you are recommending?

(2 marks)

Question 13
(a) Why would one see remote hosting as a form of cloud computing?

(2 marks)

(b) What is a VMM? List the three requirements for a VMM.

(2 marks)

(c) What is a breakout attack? What is a hosted hypervisor? Mention one hosted hypervisor which you are aware of. How can data leakage be prevented?

(2+2+2=6 marks)

Question 14
(a) Software systems depend heavily on modern technologies. List any two types of modern technologies and briefly explain how the IT infrastructure is affected by each of these types of modern technologies.

(2x2+4=8 marks)
(b) What is meant by the term ‘Service oriented computing’?

(2 marks)

Question 15
(a) Briefly outline how ‘mash-ups’ can be combined with cloud technologies.

(5x1=5 marks)

(b) Discuss any five soft trends that affect modern software technologies.

(5x1=5 marks)

Question 16
(a) List the main functional components of a DBMS.

(3 marks)

(b) Solid state drives (SSD) are widely available and becoming cost-effective for many computational tasks.
   i. Select a DBMS functional component that strongly favours SSD utilisation and technically explain these benefits.
   ii. Select a DBMS functional component that does not favour SSD utilisation and technically explain these benefits.

(4+3= 7 marks)

Question 17
(a) What is Bioinformatics and what does it try to achieve?

(2 marks)

(b) What is a protein and why is understanding its function important?

(5 marks)

(c) Describe the challenges that exist in determining the functions performed by proteins.

(3 marks)
CIS5100  Advanced Databases – Data Models & Database Languages

0830-1135

Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators or SMART devices are NOT allowed.

3) This paper contains six (6) questions, you are to attempt any four (4).

4) State any assumptions made. Your writing, drawing and coding should be clear and concise.

5) If a question’s subsection is broken into sections (i.e. numbered with Roman numerals) then total marks are divided equally. Unless otherwise indicated.

6) Note on SQL dialects. Although most class examples worked for PostgreSQL (plus extensions e.g. PostGIS) candidates are allowed to use any other SQL dialect they prefer provided that this is stated in each question response.
a  i  Give two examples of basic and self-contained spatial objects; and two spatially related object collections.
ii Explain the following spatial relationships, in terms of boundary and interior predicates: disjoint and overlap for two spatial objects.  

[8 marks]

b  i  Explain the following construct (syntax Postgresql + Postgis):

```
drop table xypolygon;
create table xypolygon
  ( yg_serno  int8 not null primary key,
    yg_text   varchar(20),
    yg_weight int8)
without oids;

select
  addgeometrycolumn('public','xypolygon','yg_polygon',
                   4326, 'POLYGON', 2);

insert into xypolygon
  (yg_serno, yg_text, yg_weight, yg_polygon ) values
  (1,'polygon 1',1,GeomFromText('POLYGON((0 0, 0 1, 1 1, 1
0, 0 0))',4326));
```
ii Explain the following query (syntax Postgresql + Postgis):

```
select p1.pt_serno, astext(p1.pt_point),
   p2.pt_serno, astext(p2.pt_point),
   distance(p1.pt_point, p2.pt_point) as "dist_apart"
from xypoint p1, xypoint p2
where p1.pt_serno > p2.pt_serno
  and distance(p1.pt_point, p2.pt_point) <= all ( 
    select distance(p1.pt_point, p2.pt_point)
      from xypoint p1, xypoint p2
    where p1.pt_serno > p2.pt_serno );
```

[8 marks]

c  Write two queries to implement the following. Clearly explain the construct and the table(s) on which the query work on.

i  A spatial join;

ii  Nearest neighbour.

[9 marks]
2 A drug is a medical substance used in the treatment of a disease, having a name, chemical formula, and medical action. A drug may come in many forms, including pills, capsules, gels, ointments, tinctures, suspensions, and powders, for example. A compound is a particular form and strength of a drug or combination of drugs produced by a particular manufacturer. Compounds may be purchased through distributors. There may be various compounds of a drug. A compound may have secondary ingredients besides the drugs, which are the primary ingredients. Every drug has a controlled substance classification relevant to its additive properties and a functional classification, which is a broad categorisation of the purpose of the drug, such as antibiotics, anti-fungal, and sedatives. Finally, there are possibly harmful drug interactions and allergies to consider. Drug interactions usually involve a pair of drugs, but might involve three or more. Allergies are summarised with allergy identifiers, which specify allergic reaction mechanisms.

The system should assist with the following tasks:

- Detect allergies and drug interactions;
- Manage information about drugs and compounds;
- Determine distributors and manufacturer of a compound.

a Give a first cut design of the data requirements. You can use EERM notation.

*Marks allocation: The appropriate Entities and their properties carry 9 marks and appropriate Relationships and their properties and constraints 9 marks. Note the Relationships might include EERM constructs e.g. specialisation.*

[ 18 marks ]

b Write a short plan that indicates the data model of choice and query language that is adequate to design this system. Justify your choices. Candidate is totally free to choose any data model; e.g. relational, nested relational, OODM, NoSQL variant.

Write-up should be between 175 and 250 words.

[7 marks ]

3 a i What is the nested relational data model?

ii Describe an algebra that operates over the nested relational model?

[ 4 + 16 marks ]

b In general, unnesting followed by nesting does not preserve the information content of a nested relation. Give an example of this. How can we ensure that the unnesting operator preserves a relation’s information content when used with a nesting operator?

[ 5 marks ]
4 a i Explain and give code examples through ODMG’s ODL for the implementation of a binary ‘many to many’ relationship between two classes.
   ii How can one implement a ternary relationship between three classes through ODL? [5+4 marks]

b Explain and give four (i.e. 4) examples of the basic querying structure and features of ODMG’s OQL select statement proposal. [16 marks]

5 a i What is valid time in temporal modelling?
   ii What is transaction time in temporal modelling? [7 marks]

b Explain and give three (i.e. 3) examples of an SQL dialect that addresses querying time modelling. Ensure you include examples of temporal select, restructuring, partitioning of temporal data, and ‘valid’ time. [18 marks]

6 a i Use SQL constructs to show how bill of material queries are specified. (Candidate is expected to use the WITH RECURSIVE construct).
   ii State what’s the view update problem and how SQL addresses some of the issues of this occurrence. [12 marks]

b Explain using four (i.e. 4) examples of the querying structure and features of SQL’s OVER clause (and possible use of the WINDOW clause). Your examples must be based on querying for OLAP; for example write the DDL and DML (SELECT statement) constructs for computing the moving average of daily sales figures. [13 marks]
Examination Instructions

1) The first 5 (five) minutes of the exam is reading time.

2) Calculators, or any other digital equipment, is NOT permitted.

3) This paper contains six (6) questions. Answer any four (4) questions.

1. a. The "Manifesto for Agile Software Development" stated that its aim was "to uncover better ways of developing software by doing it and helping others do it".
   (i) Explain what you understand by this statement and state some of its implications.
   (3 marks for its meaning and 4 marks for at least four implications)

   (ii) State at least ten of the twelve Agile principles.
   (10 marks - one for each principle)

   b. Briefly compare and contrast agile development methods with plan driven methods and with formal methods

   Hint: Ideally draw a table showing 4 differences of Agile Programming from plan driven development and four differences from formal methods.
   (4 + 4 marks)

2. When comparing the merits of various methodologies to be adopted by a software house, its software managers consider various desirable criteria.

   (i) List at least twenty of such criteria
   (10 marks - 0.5 for each criterion)

   (ii) For one of the Agile methodologies you studied namely DSDM, SCRUM or XP discuss how it satisfies what you consider to be eight of the above most desirable criteria.
   (8 marks)
(iii) In the context of a manufacturing company with which you are familiar, write a short report to the CEO recommending a particular Agile methodology to be adopted given the particular resources and skills within the company.

(7 marks)

3

a. State five reasons why Business Continuity (BC) and Disaster Recovery Planning (DRP) are important factors for the smooth and risk-free operation of information systems.

(5 marks)

b. Describe five mitigating measures which can be implemented to ensure more reliable Business Continuity and avoidance of disasters.

(5 marks)

c. Fair odds is a company operating in the on-line betting industry. A recent audit by their risk manager identified various weaknesses in their operations which give rise for concern. Write a short report to the Board of directors explaining how a proper Business Continuity and Disaster Recovery plan can be drawn and put in place to improve the situation.

(15 marks)

4

a. The role of a project manager demands a range of skills to handle a wide range of functions. Identify at least ten of these functions and discuss how a new ICT graduate intern can acquire these skills.

(10 marks for functions and 5 for learning such skills)

b. Stakeholders have different interests and expectations from an ICT project:
   (i) Distinguish between the needs and expectations of internal users of the system and the needs of external stakeholders showing five needs and expectations for each group.

(5 marks + 5 marks)

5

a. Quantitative methods and techniques allow for the objective monitoring and control of a project. Describe briefly the following quantitative methods in the cost and schedule management of a project:
   (i) Estimation of the cost and effort required during the tendering and analysis stage.

(5 marks)

(ii) The Critical Path Method for estimating the duration of a project.

(5 marks)

(iv) Statistical measures to monitor and control actual costs and elapsed time against the planned schedule and cost budget.

(5 marks)
b. Find the duration of the following project given the Work Breakdown Structures (WBS), their duration and their inter-relationships. Find also the critical WBS activities in this project.

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Activity Name</th>
<th>Preceding Activities</th>
<th>Duration (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>WBS1</td>
<td>none</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>WBS2</td>
<td>none</td>
<td>6</td>
</tr>
<tr>
<td>C</td>
<td>WBS3</td>
<td>A</td>
<td>5</td>
</tr>
<tr>
<td>D</td>
<td>WBS4</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>WBS5</td>
<td>C, D</td>
<td>3</td>
</tr>
<tr>
<td>F</td>
<td>WBS6</td>
<td>C, D</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>WBS7</td>
<td>B</td>
<td>7</td>
</tr>
<tr>
<td>H</td>
<td>WBS8</td>
<td>E</td>
<td>6</td>
</tr>
<tr>
<td>I</td>
<td>WBS9</td>
<td>F</td>
<td>4</td>
</tr>
<tr>
<td>J</td>
<td>WBS10</td>
<td>G</td>
<td>1</td>
</tr>
<tr>
<td>K</td>
<td>WBS11</td>
<td>H, I</td>
<td>3</td>
</tr>
<tr>
<td>L</td>
<td>WBS12</td>
<td>J, H</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>WBS13</td>
<td>F</td>
<td>2</td>
</tr>
</tbody>
</table>

(10 marks)

6. At the end of an ICT project, the project manager should file a final project report of the completed system.

(i) Outline the structure and main chapters of such a report.  

(12 marks)

(ii) Specify the project and product documentation which should be attached to such a report.

(8 marks for project documentation and 5 marks for product documentation)