CERTIFIED PUBLIC ACCOUNTANT

FOUNDATION LEVEL 2 EXAMINATIONS

F2.3: INFORMATION SYSTEMS

DATE: TUESDAY 22, AUGUST 2023

MARKING GUIDE AND MODEL ANSWERS

QUESTION ONE

Marking guide

Sub question	Marks
(a) (i) Award 2 marks of advise (Maximum 2 marks)	2
(a) (ii) Award 2 marks for each point supporting the answer from (i) (Maximum 6 marks)	6
(b) Award 2 marks for each advantage that e-commerce platform will offer to TIG Ltd (Maximum 8 marks)	8
(c) Award 2 marks of each distinctive features that TIG Ltd can use to serve its clients (Maximum 4 marks)	4
Total for this question	**20**

Model answers

a. (i) Actually, E-commerce refers to buying and selling goods and services online while M-commerce as subcategory of E-commerce refers to purchasing using the Mobile devises. So looking to the situation during the Covid 19 both E-commerce and M-commerce could help TIG Ltd to overcome all challenges caused by Covid 19 to help their customers to buy the insurance online through Mobile devices like telephone and computer as well.

(ii) Points to sustain the opinion above include:
- 24/7 service
- Each set of customers will have appropriate option
- Target easily new client
- Reduce operation costs
- Support fight against Covid as no physical interaction between TIG Ltd and its customers.

b) The advantages that E-commerce platform will offer to TIG Ltd are as follows:

✓ **Benefits to organisations includes:**
- Global reach: e-commerce expands the company's marketplace to national and
- International markets.
- Cheaper supplies: Enables companies to buy materials and services from other
- companies rapidly and at less cost.
- Reduced Costs: Decreases the cost of creating, processing, distributing, storing, and retrieving
- Information by digitising the process.
- Speeds up the flow of goods: Allows businesses to carry lower levels of inventories by
- Facilitating just in time strategies.
- Improved customer service: It enables companies to provide product support and
- Creates the possibility of a 24-hour service. It also allows companies to provide
- Enhanced services to customers.
- Others: It helps small businesses compete against large companies and it provides
- Advertising opportunities.

✓ **Benefits to consumers includes:**

- Providing less expensive products and services by allowing customers to do quick online comparisons
- Enabling customers to shop or make other transactions 24 hours a day from almost any location
- Giving customers more choices in terms of products and suppliers
- Delivering relevant and detailed information quickly
- Enabling consumers to get customised products such as PCs

c) Distinctive features of retailing using the Internet:

The Internet enables companies to create closer, cost-effective relationships with its customers. The company can use the Internet to provide information, services, support, and in many instances deliver the product over the Web. The Internet facilitates direct sales over the Web, interactive marketing and personalisation, blogs and customer self-service.

The Internet digitally enables the firm. The firm can link to customers and suppliers so that electronic commerce, business-to-business transactions such as invoices, purchase orders, and payments can be carried out.

- **Direct Sales**

The customer can purchase a product or service directly from a company's Web site. A Web site also allows potential customers to obtain information about the products and services and also about who distributes them. A frequently asked questions (FAQ) section on the Web site can be used to provide cost effective support for the product and customer.

Interactivity

The Internet provides a number of ways for companies to interact and communicate with customers and build relationships with them.

- **Personalisation and Customisation**

Marketers can use the interactive features of Web pages to keep consumers engaged and to capture information about their tastes and interests as they move around the Web site. This information may be obtained by asking visitors to "register" online and provide information about themselves. Companies can then analyse this information to develop more precise profiles of their customers and modify the web pages presented to each customer. This web feature is called personalisation and involves directly tailoring the Web content to the specific user interests to achieve the benefits of personal treatment but at much lower cost than having an individual salesperson deal with each customer. Personalisation can help firms build long lasting relationship with the customer.

Another Web personalisation technique used in online marketing compares information collected about specific user behaviour at a web site such as what links they clicked on and pages they visited to information stored about other customers with similar interests. This information can be used to predict what the user may want to see next. Amazon use similar technology to suggest suitable books or other products to a shopper – "Customers Who Bought This Item Also Bought…" Or when a regular shopper logs in Amazon will present a set of recommendations which are based on what that particular customer purchased in the past.

- **Blogs**

Blogs (short for Weblog) are usually maintained by an individual with regular entries of commentary, descriptions of events, etc. Businesses are increasingly using blogs to communicate with customers and suppliers to announce new products or services and to get feedback about company services.

- **Social Networks**

Businesses are realising the value of providing easy ways for interaction with customers to enable a sharing of ideas and collaborate with each other. Starbucks is an example of a company that has started to leverage this emerging social computing trend. My Starbucks Idea (http://mystarbucksidea.force.com/) gives customers an opportunity to share ideas on how the company can make improvements. Social computing has the potential to transform business as dramatically as the Internet has already done.

- **Using the Internet to support Customer Service**

Customer service starts with the ease that customers have in researching products themselves, and then the ease of purchasing them. After the product has been delivered (whether physical or digital product), the customer can obtain help and support on using the product over the Internet. This support could include information on how to assemble or use the products or services. Answers to questions can be e-mailed from the Web site without making customers wait for telephone support.

- **Business to Business e-Commerce**

Much of B2B e-commerce is still based on electronic data interchange (EDI). Electronic data interchange (EDI) enables automated computer-to-computer exchange between two organisations of standard transactions such as invoices, shipment schedules, or purchase orders. Companies use EDI to automate transactions for B2B e-commerce and supply chain management transactions.

Suppliers can automatically send data about shipments to purchasing firms. The purchasing firms can use EDI to send details of inventory requirements and payment data to suppliers.

Today companies are progressively moving to the Internet for this purpose because it provides a much more flexible and low-cost platform for linking to other firms. Business-to business transactions can occur via a company's Web site, net marketplace, or private exchange and utilise intranets and extranets.

- **Private Industrial Networks (Private Exchanges)**

These typically consist of a large firm using an extranet to link to its suppliers and other business partners. The Volkswagen Group opted for a private industry network (private exchange) instead of an industry sponsored net marketplace because it wanted to have control over supplier relationships and because of its business processes for supply chain management.

Net Marketplaces

A net marketplace is a single digital marketplace based on Internet technology linking many buyers to many sellers. The net marketplace is a business model for B2B e-commerce and some net marketplaces serve vertical markets for specific industries (such as the chemical and steel industries), while other net marketplaces serve horizontal markets, selling goods that are available

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in many different industries. Also, net marketplaces can sell either direct goods or indirect goods.

QUESTION TWO

Marking guide

Sub question	Marks
(a) Award 2 marks for the meaning of legacy systems (Maximum 2 marks)	2
(b) Award 2 marks for each recommendation provided and any valid point (Maximum 4 marks)	4
(c) Award 2 marks for each factor that contribute to system implementation failure (Maximum 8 marks)	8
(d) Award 2 marks for each type of system and data conversion or changeover approaches recommended for system implementation (Maximum 6 marks)	6
Total for this question	**20**

Model answers

a. A short note on legacy system
Definition of legacy system

These services become more critical as many companies merge their old **legacy systems** with newer technologies such as wireless computing. Some legacy systems can't be thrown away but must work seamlessly with today's technologies. Companies choose not to totally replace legacy systems because it's too expensive, involves too much training, and carries too much organisational change and sometimes risk. It's easier to use **middleware** and other technologies to merge old and new systems

b. Recommendation to KBU to use in-house IT developers from each bank member or outsource the development to an external company

- ✓ If KBU opts to use In-house IT, this might take longer time to develop hence delay some implementation of services/ system objectives and more costly as well.
- ✓ Also, if KBU opts to Outsource, this makes KBU to be sure of the detailed specifications to be outsourced and the experience of the outsourced company, this may also lead to lack of independent on system.

Conclusion: each option has its own advantages and disadvantages, the management of KBU has to balance each advantage and disadvantages of each option vis a vis to the timeline and available resources to support this initiative.

c. Major factors that contribute to system implementation failure.
Before the new system is implemented,
- End users are normally trained to use the new system.

- Documentation must be prepared on the operation and use of the new system and this will be used during training and in normal operations.
- Inadequate training and poor or non-existent documentation can be major factors in contributing to system failure
- Poor specification
- Lack of ownership
- Information requirements is a difficult task of the systems analyst and faulty requirements capture and analysis can lead to system failure and high systems development costs as major changes may be needed to the systems after implementation.
- Poor implementation

d. Types of system and data conversion or changeover approaches you would advise KBU to use during system implementation and why.

Implementation

As part of the system implementation phase new hardware may need to be acquired and if not already developed in house software will also need to be acquired. A critical part of the implementation phase is the data conversion or changeover.

System conversion or changeover is the process involved in changing from the old system to the new system. There are four main approaches to conversion: parallel running, direct cutover, the pilot study and phased approach.

Direct Cutover: The direct cutover or Big Bang approach involves fully replacing the old system with a new system in one move. This is generally the fastest and cheapest method of conversion, and in many situations, it may be the only practical approach. However, it is also the riskiest method as there is no fallback if a serious problem is discovered with the new system after it has gone live.

Parallel Running: The parallel approach involves running the old system and the new system together for a period until there is reassurance that the new system is operating correctly. This is the safest approach because if serious errors are discovered in the new system, users can revert back to the old system until the problems are resolved. However, this approach is very expensive in terms of effort and resources required to update two systems at the same time with every transaction.

Pilot Study: The pilot study involves the new system going live in one location only or within just one part of the organisation initially. When the system is working correctly in the pilot area, it is then rolled out to the remainder of the organisation. In many cases this is not a practical approach as the new system must go live across the whole organisation simultaneously.

Phased Approach: The phased approach introduces the new system in stages which could be one module at a time or part of the functionality in stages. This approach reduces the risk inherent in a direct changeover of the full system in one go.

QUESTION THREE

Marking guide

Sub question	Marks
(a) Award 1 mark for each database recommended and 1 mark for elaboration (Maximum 4 marks)	4
(b) (i) Award 1 mark for the provided meaning of the entity relationship diagram and 2 marks for each use (Maximum 7 marks)	7
(b)(ii) Award 0.5 marks for each entity provided and 0.5 marks for its attributes (Maximum 3 marks)	3
(c) (i)Award 3 marks for well description of Not-Only-SQL database concept (Maximum 3 marks)	3
(c)(ii) Award 3 marks for a well recommendation given to implement NoSQL (Maximum 3 marks)	3
Total for this question	**20**

Model answers

a. Type of database that may help DIM Ltd and TSacco to implement their aim includes:

Distributing Databases

A distributed database is one that is stored in more than one physical location. A distributed database can be **partitioned** or **replicated (duplicated)**. A partitioned database is divided into partitions so that there is local access to the data that it needs to serve its local area. These databases can be updated locally and later synchronised with the central database.

With replication, the database is duplicated at various remote locations. The central database can be partitioned so that each remote processor has the necessary data to serve its local area. Changes in local files are synchronised with the central. The central database can be replicated at all remote locations. Any change made to the database at one location is automatically replicated at all the other locations.

Relational Database

The relational database model organises data into two-dimensional tables (see Figure 6.6). The relational model can relate any piece of information in one table to any piece of information in another table as long as the two tables share a common data 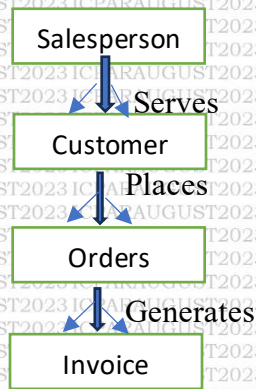element (such as a Supplier Number). Because relational DBMS can easily combine information from different sources, they are more flexible than the other DBMS structures. They can easily respond to ad-hoc inquiries. The main problem with relational DBMS is poor processing efficiency. Response time can be very slow if large numbers of accesses to data are required to select, join, and extract data from tables. Developments in relational technology, such as indexing, can overcome this problem.

b. **(i)**

Entity relationship diagrams

- ✓ An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how "entities" such as people, objects or concepts relate to each other within a system.
- ✓ The diagram may also show the relationship between the entities Salesperson, Customer, Orders, and Invoices. See the example below:

```
    Salesperson
        │
        ▼  Serves
    Customer
        │
        ▼  Places
    Orders
        │
        ▼  Generates
    Invoice
```

- ✓ From the figure above represent entities. The lines connecting the boxes represent relationships. A line connecting two entities that ends with a crow's foot topped by a short mark indicates a one-to-many relationship. A line connecting two entities that end with no crow's foot designates a one-to-one relationship. The figure shows also that one Salesperson can serve many Customers. Each Customer can place many orders but each order can only be placed by one customer. Each order generates only on Invoice.

(ii) Give any three (3) entities and their attributes that can be used in (i).

- Teacher (id, name, sex, age, location
- Item or product (id, name, price, category)
- Shop or supermarket (id, name, location)

c. (i) Not only SQL Database

A Not-only SQL (NoSQL) database is a non-relational database that is highly scalable, fault-tolerant and specifically designed to house semi-structured and unstructured data. A NoSQL database often provides an API-based query interface that can be called from within an application. NoSQL databases also support query languages other than Structured Query Language (SQL)

because SQL was designed to query structured data stored within a relational database. As an example, a NoSQL database that is optimized to store XML files will often use XQuery as the query language. That being said, there are some NoSQL databases that also provide an SQL-like query interface

(ii) Would you recommend to DIM Ltd and TSacco to implement (NoSQL) no-sql database in this case scenario?

Not required as NSQL is used in large and non-related data.

QUESTION FOUR

Marking guide

Sub questions		Marks
(a)	Award 2 marks for each well explained moral dimensions of information system -1 mark for list and 1 mark for explanation (Maximum 8 marks)	8
(b)	Award 1 mark for listing and 1 mark for explaining at least 3 technology trends that raise ethical issues (Maximum 6 marks)	6
(c)	Award 2 marks for each outlined ethical principle (Maximum 6 marks)	6
Total		**20**

Model answers

a. Discuss any four (4) moral dimensions of information systems that WEOP will encounter during the process of computerizing & automating its process.

Five Moral Dimensions of the Information Age

Laudon and Laudon (2010) describe five moral dimensions of information systems as follows:

• Information Rights: What information rights do individuals and organisations have with respect to information about themselves? There are also moral obligations for those dealing with this information.

• Property Rights: How will intellectual property rights be protected in a digital society, where traditional measures that protect property are no longer applicable?

• Accountability and Control: Who can be held responsible for damage caused to individual information and property?

• System Quality: Data quality and system errors - No software program is perfect, errors will be made, even if the errors have a low probability of occurring

• Quality of Life: What values should be retained in an information society? Which cultural values and practices are supported by the new information technology? These dimensions pose useful ethical questions that a company should consider when introducing a new technology.

b. List and explain any three (3) Technology Trends That Raise Ethical Issues.

There are a number of technological trends that generate ethical concerns including:
• Computing power has doubled every 18 months: This is enables growing numbers of organisations to use information systems in their primary business practices. This is increasing reliance on systems and increases vulnerability to system errors and reduced data quality.

• Rapidly falling data storage costs and developments in data storage techniques: This has led to big increases in the amount of data kept on individuals by private and public organisations - allowing for violation of an individual's privacy.

• Networking advances and the Internet: This enables personal data to be remotely accessed. It is incredibly easy to copy data from one location to another. This raises the issue of who actually owns the data? Furthermore, how can this ownership be protected?

• Advances in data analysis techniques: This has enabled companies and government agencies to use profiling to establish detailed information about an individual's behaviour and tastes and to create a record of this personal information.

• Non-obvious Relationship Awareness (NORA) is a new data analysis technology that can locate obscure hidden connections between people or other entities by analysing information from a range of sources to identify relationships. This technology is used by governments and the private sector to provide powerful profiling. NORA can gather information about people from many sources such as job applications, telephone records, customer records, court record, tax records etc. This correlates relationships so that hidden connections can be uncovered that might help identify criminals or terrorists. NORA poses ethical questions in relation to privacy implications for individuals. In other words the information that each of us generates about ourselves every day can be correlated, manipulated, mined and sold, as it is very valuable. This is an intrusion into an individual's privacy and is a major ethical issue for our society

c. Outline any three (3) ethical principales you would advise WPOP Ltd to consider during this process.

Ethical Principles
Once the 5-step analysis above has been carried out, the following six ethical principles can be applied to aid in decision making:
The Golden Rule: It suggests doing unto others, as you would have them do unto you. This ethical guideline is found in all major religions and traditions.
Immanuel Kant's Categorical Imperative: Act on rules that you wish to apply to yourself and universally. This suggests that if an action is not right for everyone to take, then it is not right for anyone.
Descartes' Rule of Change: This rule also known as the slippery slope rule, suggests that if an action cannot be taken repeatedly, then it is not right to be taken at any time.
Utilitarian Principle: The Utilitarian Principle suggests taking the action that overall achieves the higher or greater value. An action is good if it promotes 'happiness' over 'pain' between those affected by it.

Risk Aversion Principle: The Risk Aversion Principle suggests taking the action that produces the least harm or the least potential cost

The Ethical "no free lunch rule": This rule says that practically all tangible and intangible objects are owned by someone unless there is a specific declaration to state otherwise. If someone has created something of value to you, that person probably wants some form of payment for your use.

QUESTION FIVE

Marking guide

Sub questions		Marks
(a)(i)	Award 2 marks for each well explained cloud computing (Maximum 2 marks)	2
(a)(ii)	Award 2 marks for each well explained virtualization (Maximum 2 marks)	2
(b)(i)	Award 4 marks for a well explained green computing (Maximum 4 marks)	4
(b)(ii)	Award 2 marks for each well explained advantage of green computing (Maximum 6 marks)	6
(c)	Award 2 marks for well explained Grid computing, Edge computing and Autonomic Computing (Maximum 6 marks)	6
Total		**20**

Model answers

a. Explain the following terms:

(i) Cloud Computing.

Cloud computing (also called on-demand computing): On-demand computing, which is another term for cloud computing, provides necessary infrastructure from centralised sources. Cloud computing enables firms to off-load the demand for computing power to remote, large-scale data processing centres. By doing this firms can reduce their investment in IT infrastructures, and pay for only as much computing power as they require. It's cheaper and helps companies reduce the total cost of ownership of IT technology.

They can also take advantage of newer technologies than what they are able to buy and maintain On their own. Utility computing is another term for cloud computing.

(ii) Virtualization.

Virtualization and Multi-core Processors
As companies deploy more and more servers, many have discovered that they are spending more on electricity to power and cool their systems than they did on acquiring the hardware. Power consumption can be lowered through virtualization and multi-core processors. Virtualization is the process of presenting a set of computing resources (such as computing power or data storage) so that they can all be accessed in ways that are not restricted by physical configuration or geographic location. Server virtualization enables companies to run more than one operating system at the same time on a single machine. Most servers run at just 10 to 15

percent of capacity, and virtualization can boost server utilization rates to 70 percent or higher.
A multi-core processor is an integrated circuit that contains two or more processors.
This technology enables two or more processing engines with reduced power requirements and heat dissipation to perform tasks faster than a single-core processor.
Intel and Advanced Micro Devices (AMD) now make multi-core processors. SUN Microsystems sells servers using its eight-core processor.

b. (i) Write a short note on Green Computing

Green Computing

This is an approach to reduce the impact on the environment and reduce resources consumption by using more efficient hardware and better software.

c. (ii) Elaborate on any three (3) advantages of Green Computing.

A few trends in green computing include:
• purchasing desktops that are built to reduce power needs;
• more efficient server computers;
• increase the use of virtualization to reduce the number of servers needed;
• reducing power costs;
• turning off equipment that isn't being used;
• recycling computer equipment;
• Using environmentally friendly materials in computer manufacture.

From a business perspective it makes sense to reduce costs, both in the short term and long term.

d. Differentiate Grid Computing, Edge computing and Autonomic computing.

Grid Computing

Grid computing involves connecting geographically remote computers into a single network to create a computational grid that combines the computing power of all the computers on the network to create a large computing platform. It allows companies to save money on hardware and software, and increase computing and processing speeds to make the company more agile.

Edge computing

Edge computing is a multi-tier, load-balancing scheme for Web-based applications in which parts of the Web site content and processing are performed by smaller, less expensive servers located near the computer. In edge computing platform client requests are initially processed by the edge servers, which may deliver static presentation content and reusable code, while database and business logic components are delivered by the enterprise servers.

Autonomic computing

As companies rely more and more on IT to meet the demands of employees, customers, suppliers, and business partners, they can't afford to have any system downtime at all. Autonomic

computing is a step towards creating an IT infrastructure that is able to diagnose and fix problems with very little human intervention. Autonomic computing features systems that can:
• Configure themselves
• Optimise and tune themselves
• Repair themselves when broken
• Protect themselves from intruders and self-destruction

Although this type of computing is still relatively new, it promises to relieve the burden many companies experience in trying to maintain large, complex IT infrastructures.

QUESTION SIX

Marking guide

Sub questions		Marks
(a)	Award 2 marks for each well functionality or features provided by business intelligence well explained (Maximum 6 marks)	6
(b)(i)	Award 4 marks for a valid advice on how AE Group-Rwanda can take an advantage of group decision support (Maximum 4 marks)	4
(b)(i)	Award 2 marks for each well explained component of group decision support system (Maximum 4 marks)	4
(c)	Award 2 marks for a well explained between unstructured, structured and semi structured type of decision (Maximum 6 marks)	6
Total		**20**

Model answers

a. Discuss any three (3) functionalities or features provided by Business Intelligence.

Functionality Provided by Business Intelligence
The aim of business intelligence systems it to provide managers and decision makers with accurate, real-time information so as to enable them to make better decisions. According to Laudon and Laudon (2012) Business intelligences systems will typically provide some or all of the following functionality:
• Predefined reports
• Customizable reports
• Graphical presentation of data – e.g. Dashboards
• Ad-hoc query and report
• Drill down – to detailed information

b. (i) Advise AE Group-Rwanda on how it can take advantage of Group Decision Support System.

A GDSS is an interactive computer-based system that facilitates the solution of unstructured problems by a set of people working together as a group. GDSS have been developed in response to the growing concern over the quality and effectiveness of meetings. In general, DSS focus on individual decision making, whereas GDSS support decision making by groups.
The underlying problems related to group decision making that have led to the development of GDSS are the growth in the number and frequency of decision-maker meetings, the growing length of these meetings, and the increased number of people attending these meetings.

Benefits of GDSS

GDSS enable more people to attend and participate in a meeting, and at the same time can increase meeting productivity. This increase in productivity is realised since the attendees can contribute simultaneously. A GDSS can guarantee anonymity, follow structured methods for organising and evaluating ideas, preserve the results of meetings, and can increase the number of ideas generated and the quality of decisions made, while producing the desired results in fewer meetings. A GDSS can support idea generation, complex problem analysis and large groups.

(ii) Outline any two (2) components of Group Decision Support System.
Components of a GDSS
GDSS consists of three basic elements, hardware, software tools, and people. Hardware includes the electronic conference facility itself (virtual room) that is laid out to support group collaboration.
It also includes electronic hardware such as electronic display boards as well as audio-visual, computer and networking equipment. Software tools include electronic questionnaires, electronic brainstorming tools, tools for voting or setting priorities, stakeholder identification and analysis tools, and group dictionaries. People include the participants, a trained facilitator, and the staff to support the hardware and software.

Overview of a GDSS Meeting
• In a GDSS electronic meeting, each attendee has a networked workstation,
• All data sent from the workstations to the group are saved on the file server,
• The facilitator controls the use of tools during the meeting.

c. Elaborate on the main differences between Unstructured, Structured and Semi-Structured type of decision used in Management Decision Support Systems.

Types of Decisions – Unstructured, Structured and Semi-Structured
Decisions can be classified according to type: Unstructured, structured and semi-structured
Unstructured decisions are non-routine decisions where the decision-maker must provide judgement and evaluations for which there is no standard procedure for the solution. These decisions are non-routine requiring unique solutions. Examples are an airline deciding on whether to start a new route, or a book retailer deciding whether to close the book shop and move to selling on-line.
Structured decisions are repetitive and routine where the decision maker can follow standard procedures for solutions. These tend to occur at the operational level of the organisation and are generally low risk. An example of a structured decision would be a supermarket manager deciding how many staff to have on duty on a Saturday.

Semi-structured decisions are those where only part of the problem has a clear answer which is provided by a standard procedure (structured part) and other components of the problem are the unstructured part. There is a level of human judgement required in the decision-making process.

These different types of decisions tend to be required at different levels in the organisation which can be summarised as follows:

- Senior management have to make many unstructured decisions.
- Middle management faces more structured decisions but these decisions may include an unstructured part and are generally referred to as semi-structured decisions.
- Operational management and operational staff tend to make more structured decisions.

QUESTION SEVEN

Marking guide

Sub questions		Marks
(a)	Award 2 marks for a well definition provided for social engineering attack (Maximum 2 marks)	2
(b)	Award 2 marks for each way of preventing social engineering attack (Maximum 4 marks)	4
(c)	Award 2 marks for each consequence (Maximum 6 marks)	6
(d)(i)	Awards 4 marks for well differentiation between general control and application control as type of information system control (Maximum 4 marks)	4
(d)(ii)	Award 2 marks for each example provided (Maximum 4 marks)	4
Total		**20**

Model answers

a. Define "Social Engineering attack".

Social engineering is the term used for **a broad range of malicious activities accomplished through human interactions**. It uses psychological manipulation to trick users into making security mistakes or giving away sensitive information. Social engineering attacks happen in one or more steps.

b. List and explain any two (2) ways you can prevent Social Engineering attack.

Some Quick Tips to Remember:

- Think before you click. Attackers employ a sense of urgency to make you act first and think later in phishing attacks. When you get a highly urgent, high-pressure message, be sure to take a moment to check if the source is credible first. The best way is to utilize another method of communication different from where the message is from - like texting the person to see if they emailed you an urgent message or that was from an attacker. Better be safe than sorry!

- Research the sources. Always be careful of any unsolicited messages. Check the domain links to see if they are real, and the person sending you the email if they are actual members of the organization. Usually, a typo/spelling error is a dead giveaway. Utilize a search engine, go to the company's website, check their phone directory. These are all simple, easy way to avoid getting spoofed. Hovering your cursor on a link before you actually click on it will reveal the link at the bottom, and is another way to make sure you are being redirected to the correct company's website.

- Email spoofing is ubiquitous. Hackers, spammers, and social engineers are out to get your information, and they are taking over control of people's accounts. Once they gain access, they will prey on your contacts. Even when the sender appears to be someone you are familiar with, it is still best practice to check with them if you aren't expecting any email links or files from them.

- Don't download files you don't know. If you (a) don't know the sender, (b) don't expect anything from the sender and (c) don't know if you should view the file they just send you with "URGENT" on the email headline, it's safe not to open the message at all. You eliminate your risk to be an insider threat by doing so.

Offers and prizes are fake. I can't believe I'm still saying this in the big year of 2018, but if you receive an email from a Nigerian prince promising a large sum of money, chances are it's a scam.

Five Ways to Protect Yourself:

1. Delete any request for personal information or passwords. Nobody should be contacting you for your personal information via email unsolicitedly. If you get asked for it, it's a scam.

2. Reject requests for help or offers of help. Social engineers can and will either request your help with information or offer to help you (i.e posing as tech support). If you did not request any assistance from the sender, consider any requests or offers a scam. Do your own research about the sender before committing to sending them anything.

3. Set your spam filters to high. Your email software has spam filters. Check your settings, and set them to high to avoid risky messages flooding into your inbox. Just remember to check them periodically as it is possible legitimate messages could be trapped there from time to time.

4. Secure your devices. Install, maintain and update regularly your anti-virus software, firewalls, and email filters. Set your automatic updates on if you can, and only access secured websites. Consider VPN.

5. Always be mindful of risks. Double check, triple check any request you get for the correct information. Look out for cybersecurity news to take swift actions if you are affected by a recent breach. I recommend subscribing to a couple of morning newsletter to keep you up to date with the latest in InfoSec like Cyware or BetterCloud Monitor. If you are a podcast person, decrypted by Bloomberg, DIY Cyber Guy and Reply All offer easy to digest information and news that's very user-friendly.

c. Highlight on any three (3) consequenses that might happen if hackers were to be successful. **(6 Marks)**

Security

The term **Security** is used to refer to the policies, rules, procedures and technical solutions that can be used to prevent the following:

- Unauthorised access to systems,
- Alteration of data or software,
- Theft of data, software or equipment,
- Physical damage to information systems hardware.

d. (i)Differentiate general control and application control type of information system control.

(ii) Give any two (2) examples for each type of control mentioned above (i).

Information System Controls

Computer systems are controlled by a combination of **general controls** and **application controls**.

General Controls

There are six principal general controls, which include software controls, hardware controls, computer operations controls, data security controls, system implementation controls and administrative controls.

Computer software security can be promoted by program security controls to prevent unauthorised changes to programs in production systems. Software security is also promoted by system software controls that prevent unauthorised access to system software and log all system activities.

Computer hardware security can be promoted by locating hardware in restricted rooms where only authorised individuals can access it. Special safeguards against fire, high temperature, and electric power disruptions can be implemented.

Computer operations controls oversee the work of the computer department, ensuring that procedures for storage and processing of data are followed. Computer operations controls include the setup of computer processing jobs, computer operations and computer backup and restore procedures.

Data security controls prevent unauthorised changes, deletion or access to data while the data is in use or in storage. Data security software can be configured to restrict access to individual files, data fields or groups of records. Data security software often features logs that record users who access or update files. Data storage media can be physically secured to prevent access by unauthorised personnel.

System implementation controls ensure that the systems development process is properly controlled and managed. A system development audit checks that formal reviews and signoff were done by users and management at the various stages of the development process. The audit should look for the use of controls and quality assurance techniques for program development, conversion and testing and for complete system documentation.

Administrative controls are formalised standards, rules, procedures and control disciplines to ensure the organisations general and application controls are properly executed and enforced.

Application Controls

These are specific controls that are associated with each application system such as payroll systems. Their purpose is to ensure that only authorised data enters the system. They can include both automated and manual controls.

There are three principal application controls, which are called input controls, processing controls and output controls.

Input controls are procedures to check data for accuracy and completeness when they enter the system.

Processing controls are the routines for establishing that data are complete and accurate during updating. Common controls include control totals, computer matching and run control totals.

Output controls are measures to ensure that the outputs after processing are accurate, complete and distributed to the correct recipients.

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