CERTIFIED PUBLIC ACCOUNTANT

FOUNDATION LEVEL 2 EXAMINATIONS

F2.3: INFORMATION SYSTEMS

DATE: TUESDAY, 26 JULY 2022

MARKING GUIDE AND MODEL ANSWERS

QUESTION ONE

Marking guide

Sub questions	Criteria	Marks
a)	1 mark for stating and 1 mark per point for ethics, maximum 6	6
b)	1 mark related to sign off and 1 mark for audit, maximum 2	2
c)	0.5 for outlined source of system quality problems including any valid source outside the provided model answer, maximum 2	2
d)	1 mark outline and 1 mark for control strategy, maximum 6	6
e)	1mark per system error cause including any correct error cause not provide in model answer, maximum 4	4
	Total Marks	**20**

Model answers

a) Ethical principles can be applied to aid in decision making are:

- **The Golden Rule:** It suggests doing unto others, as you would have them do unto you.

- **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.

b) **A general control principle to consider in the case study regarding computer systems is:**

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.

c) **The primary sources of system quality problems are** hardware and facility failures, software bugs and errors, and low data quality.

d) Three risk mitigation strategies that Anaconda Company could adopt are:

- **Risk acceptance** - continuing without controls and accept any loss that occurs.
- **Risk limitation** - implement some controls to reduce the risk.
- **Risk transference** - use other means to compensate for possible loss like purchasing insurance.

e) Patient App errors to systems are:

- Patient App errors can cause the system to crash,
- Slow down operation and can lead to large losses in productivity
- Losses of data.
- Software can contain hidden bugs in the program code which in addition to impacting performance can open system to hackers.

QUESTION TWO

Marking guide

Sub questions	Criteria	Marks
a)		
i	1 mark for outline and 1 mark per data manipulation, maximum 2	2
ii	1 mark for outline and 1 mark for database structure, maximum 2	2
b)	1 mark for stating and 1 mark for explaining the problems each, maximum 6	6
c)		
i	1 mark for clarification of quantity and 1 mark related to finance, maximum 2	2
ii	1 mark related to service and 1 mark for decision making, maximum 2	2
d)	1 mark for outline and 1 mark for system conversion, maximum 6	6
	Total Marks	**20**

Model answer

a) Terms used in designing Nyagatare Hospital database structure are:

i. **A key field** is a field in a record that uniquely identifies the record so that it can be retrieved, updated, or sorted.

ii. **The relational database model** organises data into two-dimensional tables. 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

b) The problems with the traditional file environment are:

- **Data redundancy** is the presence of duplicate data in multiple data files. In this situation, confusion results because the data can have different meanings in different files.
- **Program-data dependence** is the tight relationship between data stored in files and the specific programs required to update and maintain those files. This dependency is very inefficient, resulting in the need to make changes in many programs when a piece of data, has to be changed (e.g. changing the length of a data field).
- **Lack of flexibility** refers to the fact that it is very difficult to create new reports from data when needed. Ad-hoc reports are impossible to generate and a new report may require programmers to modify the application so it can search the file for the particular information and output the report required.
- **Poor security** results from the lack of control over the data because the data are so widespread.
- **Data sharing** is virtually impossible because it is distributed in so many different files around the organization and each file can only be accessed by its own application.

c) **The benefits that Nyagatare Hospital can gain from investing in information Systems are:**

i. **Tangible benefits** of information systems can be quantified and allocated a financial value.

ii. **Intangible benefits**; such as superior customer service or improved decision making, cannot be immediately quantified but may lead to quantifiable gains in the long run.

d) System changeover methods that can be applied in Nyagatare Hospital are:

- **Parallel changeover:** It involves running both the new and old system concurrently until you are confident that the new system is working effectively with low risk.

- **Direct changeover:** the old system is replaced one time with a new system. It is mostly used when the risk of losing data from the old system is significantly low or if the system has most the functions that are new.
- **Pilot changeover:** It means choosing a specific location or branch of the organization and implementing the system in that branch first. The branch (location) where the system is first test before it is implemented in the whole organization is called pilot site.
- **Phase changeover:** involves implementing a module of the system at a time until the whole system is implemented. It combines the parallel and direct change over strategies. The module

can be a functional part of the system or a specific subsystem. Each sub system is implemented until it succeeds that when the next one is implemented.

QUESTION THREE

Marking guide

Sub questions	Criteria	Marks
a)	1mark for geographical scale,1 mark for network device, maximum 4	4
b)	1 mark for data processing (DP),1 mark for location of (DP), maximum 4	4
c)	0.5 mark for outline and 0.5 mark for signal or frequency, maximum 3	3
d)	0.5 mark related to information transmission and 0.5 marks for error, maximum 2	2
e)	1 mark for sub systems functional, maximum 1	1
f)	1 mark for outline and 1 mark for systems productivity, maximum 6	6
	Total Marks	**20**

Model answer

a)

•**A metropolitan area network** is a network that spans an urban area, usually a city and its major suburbs. But it doesn't go beyond the boundaries of the city. Routers, switches and hubs are used to create MAN

• **Wide Area Network** is a network spanning a large geographical distance. WANs may use a variety of media and a combination of switched and dedicated lines.

b)

Centralised processing is where data processing is carried out at one point. The data for processing can be gathered from several different locations. The output can then be distributed over a wide area.

Distributed processing on the other hand, allows the data processing to be distributed. There are several independent but interacting processors. These processors can be used to process the data near the source. Processors' workloads can be balanced so if one processor is overloaded and then the load can be redistributed to another processor.

c) Wireless Transmission Media to carry messages from one device to another are:

- **Microwave** systems transmit high-frequency radio signals through the atmosphere.
- **Cellular telephones** are assigned a specific range of frequencies by national regulatory agencies in line with international agreements.

- **Satellites**: is a space station that receives microwave signals from an earth-based station, amplifies (strengthens) the signals, and broadcasts the signals back over a wide area to any number of earth-based stations.

d) The basic function of any telecommunications networks is the transmission of information from the source device through the network(s) to its correct destination while ensuring that the received message is free of errors.

e) Computer systems integration services is the process of integrating all sub- systems into one functional system to look like one.

f) Computech should invest in information systems to accomplish the following six primary strategic business objectives:

- Operational excellence: Efficiency, productivity and improved changes in business practices and management behaviour.
- New products, services and business models: A business model describes how a company produces, delivers and sells a product or service to generate profit. Information systems and technologies create opportunities for products, services and new ways to engage in business.
- Customer and supplier intimacy: Improved communication and enhanced services to customers will help raise revenues. Closer relationships with suppliers will lead to lower costs of supplies.
- Improved decision making: Accurate and timely information is essential if business managers are to make the best possible decisions.
- Competitive advantage: Implementing effective and efficient information systems can allow a company to charge less than competitors for quality products, leading to higher sales and profits.
- Survival: Information systems can also be a necessity of doing business. A necessity may be driven by industry-level changes, such as the widespread adoption by many airlines of online booking of flights and check-in. A necessity may also be driven by governmental regulations, such as one requiring a business to retain data and report specific information for a period of time.
- Low-cost leadership: Use information systems to achieve the lowest operational costs and the lowest prices.

QUESTION FOUR

Marking guide

Sub questions	Criteria	Marks
a)		
i	1 mark for defining, maximum 1	1
ii	0.5 mark for outline ,0.5 mark for operations each, maximum 2	2
b)	1 mark for data storage occurrence each and 0.5 mark for each example including valid storage outside the provided model answer, maximum 4	4
c)		
i	1 mark for data source,1 mark for cost reduction, maximum 2	2
ii	0.5 mark for stating data risk and 0.5-mark storage per each, maximum 5	5
d)	0.5 mark for outline each ,0.5 mark for internet,0.5 mark for PSTN,0.5 marks for cable systems or cellular networks, 0.5 marks for email, 0.5 mark for corporate Web site, 0.5 mark for corporate intranets, 0.5 mark for production systems, 0.5 mark for customer support systems, 0.5 mark for local order entry, including any other valid system related to IT infrastructure not provided in model answer, maximum 6	6
	Total Marks	**20**

Model answer:

a)

i. The microprocessor is the heart of any computing device no matter how small or large.

ii. Two main components of a microprocessor are:

- **The Arithmetic/Logic Unit (ALU**) performs both arithmetic and logical operations.
- **A Control Unit** extracts instructions from memory and decodes and executes them, calling on the ALU when necessary.

b)

- Memory: stores data and program instructions during processing for e.g., RAM and ROM.
- Storage: store data and programs when they are not being used in processing for e.g., magnetic and optical disks, flash disks.

c)

i. Cloud computing: provides necessary infrastructure from centralised sources and 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.

ii. The disadvantages associated with cloud computing are:

- Responsibility for data storage and control is transferred away from the organization to a third party.
- Security risks and chances of data compromises are increased.
- Risk diminishing system reliability.
- Increased dependency on a third party.
- Huge investments in proprietary systems supporting unique business processes may be at risk.

d) Three major levels of IT infrastructure are:

- **Public**: All firms are dependent on public IT infrastructure, which includes the Internet, the Public Switched Telephone Network (PSTN) and other IT support facilities such as cable systems and cellular networks.
- **Enterprise-wide infrastructure**: This includes services such as e-mail, a corporate Web site, corporate intranets and a range of enterprise software applications.
- **Business unit**: This IT infrastructure is tailored to the particular line of business such as specialised production systems, customer support systems, local order entry and other transaction systems.

QUESTION FIVE

Marking guide

Sub questions	Criteria	Marks
a)	1 mark of spread information,1 mark for service per each, maximum 6	6
b)	0.5 mark for buying ,0.5 mark for selling and 1 mark for transaction, maximum 2	2
c)	1 mark for location,1 mark for information exchange each, maximum 4	2
d)	1 mark for device display, 1 mark for web design each, maximum 4	4
e)	1 mark for listing ,1 mark for type of transaction each, maximum 6	6
	Total Marks	**20**

Model answer

a) Briefly discuss how the Internet is changing the way companies do business

- The Internet radically reduces the cost of creating, sending, and storing information while making that information more widely available.
- The Internet reduces search costs, allowing customers to locate products, suppliers, prices, and delivery terms.
- The Internet enables companies to collect and analyze more detailed and accurate information about their customers, allowing these companies to more effectively target their products and services to a suitable market.
- The Internet has transformed the richness and reach of information. It can help companies create and capture profits in new ways by adding extra value to existing products and services. It also provides the foundation for new products and services.
- The Internet permits personalization (targeting personal messages to consumers) and customization (changing a product or service based on consumer preference or history).

b) Explain E- business.

E-business is a broader concept as in addition to buying and selling of goods and services it also includes servicing customers, collaborating with business partners and performing electronic transactions both within and outside an organisation.

c) Distinguish intranet from extranet

- Intranets can significantly improve communications and collaboration within an enterprise. Regardless of location, intranets allow organisational members to exchange ideas, share information, and work together on common projects and assignments.
- Extranets are network links that use Internet technologies to interconnect the Intranet of a business with the Intranets of its customers, suppliers, or other business partners. An extranet is a type of inter-organisational information system, Extranets enable people who are located outside a company to work together with the company's internally located employees.

d) Describe two Mobile-Commerce Challenges.

- M-commerce represents a tiny fraction of all online purchases because wireless mobile devices can't display merchandise very well.
- More Web sites need to be designed specifically for small wireless devices.

e) Mwisoko App requires the following 3 special digital payment systems:

- Micropayment systems are where the mobile operator or internet service provider handles the small payments by adding them up and presenting them on a single bill such as the mobile telephone bill.

- Mobile wallets speed up purchases by storing online shoppers' personal information and credit card numbers that can be used in online transactions.
- Mobile money is the term used to describe tools to perform banking and financial transaction services using mobile phones or devices

QUESTION SIX

Marking guide

Sub questions	Criteria	Marks
a)	1 mark for security,1 mark for theft control each, maximum 6	6
b)	1 mark for unauthorised access,1 mark for prevention each, maximum 8	8
c)	1 mark for system's backup,1 mark for maintenance, maximum 2	2
d)	1mark for redesign, 0.5mark for quality 0.5marks for productivity, maximum 2	2
e)	1 mark for encryption,1 mark for coding information, maximum 2	2
	Total Marks	**20**

Model answer

a) Describe business value of security and control regarding physical theft of an unencrypted device.

- Companies that rely on computer systems to support their main business functions can be seriously impacted if a problem occurs with their information systems.
- If data stored on information systems such as employee records, trade secrets, customer data were to become accessible to people outside the organisation it would undermine the business, damage its reputation and open the firm to legal liability.
- Businesses must protect not only their own information assets but also those of customers, employees, and business partners. Failure to do so can lead to costly litigation for data exposure or theft.

b) Discuss six principal general 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.

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

c) Clarify disaster recovery planning.

Disaster recovery plans focus primarily on the technical issues involved in getting the systems up and running, such as which files to back up and the maintenance of backup computer systems and having backup telecommunications links in place.

d) Explain Business Process Reengineering.

Business Process Reengineering involves the redesign of core business processes with a goal of improvements in productivity and quality or reducing cost.

e) Tools and techniques that can help Kigoma University protect against or monitor intrusions are:

Encryption is the coding and scrambling of messages to prevent their access by unauthorised individuals. Encryption offers protection by keeping messages or packets hidden from the view of unauthorised readers.

QUESTION SEVEN

Marking guide

Sub questions	Criteria	Marks
a)	2 marks for formal information policy, 2 marks for data administration function and 2 marks for data-planning, including valid requirements not provided in the model answer, maximum 6	6
b)	1mark for defining 1 mark for advantage and 1 mark for disadvantage including valid advantages and disadvantages not provided in the model answer, maximum 3	3
c)	1 mark for definition ,1 mark for type of decision making,1 mark for use of Decision support systems and 1 mark for type of management level, maximum 4	4
d)	1 mark for outline, 1 mark for database structure for each maximum 4	4
e)	1mark for transaction ,1 mark for information and 1 mark for decision making, maximum 3	3
	Total marks	**20**

Model answer

a) Discuss the requirements for developing a database environment

- Database requires a formal information policy governing the maintenance, distribution, and use of information in the organisation.

- The organisation must also develop a data administration function and a data-planning. Resistance to the sharing of data must also be addressed.

- Data-planning is needed to make sure that the organisation's data provides the information efficiently for its business processes and organisational decision making and contributes to enhanced performance.

- Data residing in any database that is not accurate, timely, or does not contain relevant information will limit the effectiveness of an organisation. Organisations need to identify and correct faulty data and establish routines to edit and update data once a database becomes operational.

- A data quality audit, involves a structured survey of the accuracy and level of completeness of the data in an information system. Data cleansing consists of activities for detecting and correcting data in a database that are incorrect or redundant. Data cleansing not only corrects data but also enforces consistency among different sets of data that originated in separate information systems.

- Database design should include efforts to maximise data quality and eliminate error. Some data Quality problems result from redundant and inconsistent data, but most stem from errors in data input. Organisations need to identify and correct faulty data and establish better controls for input and editing.

b) Describe Object object-oriented database, give one advantage and one disadvantage.

- The object-oriented database stores data and the procedures acting on the data as objects that can be automatically retrieved and shared.

- Object-oriented databases can store complex types of information.

- Object-oriented databases are slower at processing larger numbers of transactions when compared to relational DBMS. -oriented Database.

c) Explain Decision support systems.

- Decision support systems (DSS) or business intelligence systems, assist managers with non-routine decisions that are unique, rapidly changing and not easily specified in advance (semi-structured decision-making).

- DSS are more analytical than MIS, as they use a variety of models to analyse internal and external data or compress large quantities of data for analysis. Decision-support systems are generally used at the middle management level.

d) Clarify two design stages used in database creation.

- The logical design of a database is a model of the database from a business perspective.
- The physical design shows how the database is arranged in the storage devices.

e) Businesses use their databases to:

- Keep track of basic transactions
- Provide information that will help the company run the business more efficiently
- Help managers and employees make better decisions

END OF MARKING GUIDE AND MODEL ANSWERS