

**CERTIFIED PUBLIC ACCOUNTANT**  
**LEVEL 2 EXAMINATIONS**  
**F2.3: INFORMATION SYSTEMS**  
**THURSDAY: 30 NOVEMBER 2017**

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**INSTRUCTIONS:**

1. **Time Allowed: 3 hours 15 minutes** (15 minutes reading and 3 hours writing).
2. This examination has **seven (7)** questions and only **five (5)** questions are to be attempted.
3. Marks allocated to each question are shown at the end of the question.
4. Show all your workings.
5. All iCPAR Examination rules and regulations apply.

*Attempt any five questions*

**QUESTION ONE**

Rwanda Communications Authority (RCA) was established in 1959 with the mandate of regulating all the telecommunications networks and telecommunications services like telephony, television and radio broadcasting in Rwanda. For RCA to carry out its regulatory duties effectively, it put an information technology (IT) infrastructure in place. The IT infrastructure provides the foundation for serving customers of the telecommunications sector in Rwanda, working with vendors, and managing business processes. The IT infrastructure has evolved through a number of stages from the time of its inception. The changes in IT infrastructure has resulted from developments in computer processing, memory chips, storage devices, telecommunications and networking hardware and software; and software design that have exponentially increased computing power while exponentially reducing costs. IT infrastructure that was adopted by RCA has seven main components; the computer hardware platforms, the operating system platforms, the enterprise software applications, the data management and storage, the networking/ telecommunications platforms, the internet platforms and the consulting system integration services.

**REQUIRED:**

- (a) Explain the term ‘information technology (IT) infrastructure’ as used by RCA and in information systems. **(2 Marks)**
- (b) Describe the five IT infrastructure stages that RCA has gone through since 1959. **(12 Marks)**
- (c) Explain any four technology driving factors that have influenced RCA to move from one IT infrastructure stage to another. **(6 Marks)**

**(Total 20 Marks)**

**QUESTION TWO**

Initially, almost all traffic systems in cities had to be controlled exclusively by people. Currently in Rwanda, there are digitalized traffic lights on roundabouts to direct traffic from different roads for predestined time lag. Traffic officers are now using an information technology (IT) system including a hand-held terminal (HHT) which is an acquired device that replaces the usual paper traffic fine receipt, motor vehicle mechanical inspection queues and the process of acquiring a driver’s license. However, this IT system does not automatically view the flow of vehicles on the

different roads. Given the rate at which people are buying vehicles it is expected there will be traffic congestion on most roads in Kigali city in the near future. This calls for an IT system that will automatically monitor traffic and control its flow. Flying machines which are called unmanned aerial vehicles (UAVs) and commonly known as Drones can do this surveillance well though they have to be programmed. As a consultant on intelligent systems, you have been identified to sensitize the traffic officers in Rwanda about UAVs and how they can best be utilised to monitor traffic and control its flow on Rwandan roads in the near future.

**REQUIRED:**

- (a) Explain four benefits resulting from use of unmanned aerial vehicles (UAVs) to monitor traffic and control its flow in Rwanda. **(8 Marks)**
- (b) The management of Rwanda Traffic officers has requested you to enlighten them on the workings of UAVs in monitoring and controlling traffic. Explain to them the **four** major parts the customized UAV will use to monitor the flow of traffic. **(4 Marks)**
- (c) Discuss any **four** factors that may hinder the acquisition of knowledge required for the setup and maintenance of the UAVs to monitor traffic and control its flow in Rwanda. **(8 Marks)**

**(Total 20 Marks)**

**QUESTION THREE**

The system development life cycle is referred to as the application development lifecycle and is a term used in systems engineering, information systems and software engineering to describe the process for planning, creating, testing, and deploying an information system. There are many development life cycle models that have been developed in order to achieve different required objectives. The models specify the various stages of the process and the order in which they are carried out. The selection of model has very high impact on the testing that is carried out. It will define the what, where and when of planned testing, influence regression testing and largely determines which test techniques to use. Choosing the right model for developing of the software product or application is very important. Based on the model, the development and testing processes are carried out. Different companies basing on the software application or product, they select the type of development model which suits their application.

Rabashake and Sons Engineering Limited (RSEL) provides professional civil and water engineering works including water well drilling. This company would like to have software programs developed for most of its services like design for infrastructure projects, supervision

during realization of works, project control to check fulfillment of essential project requirements, construction of buildings, maintenance of completed projects and scientific research in the area of civil engineering. You are the software engineer in RSEL and the board of directors has requested you to make a presentation to them about system development life cycle models and management considerations for outsourcing software development.

**REQUIRED:**

- (a) Explain to the board of directors the meaning of the term "software development model" as applied to system development life cycle. **(2 Marks)**
- (b) Using illustrations, describe any **three** software development models that can be employed to come up with customized programs for their services. **(12 Marks)**
- (c) Explain the **three** essential considerations in outsourcing software development for most of their services to be carried out more effectively and timely. **(6 Marks)**

**(Total 20 Marks)**

**QUESTION FOUR**

A study carried out by Business Sweden Limited based in Nairobi showed that there are many business opportunities in Rwanda. One of the areas sighted out by the report was information communication technology (ICT). The study indicated that skill development in the ICT sector is a priority for the government of Rwanda. Additionally, with fourth generation of data technology for cellular networks Long-term Evolution (4GLTE) availability, demand for advanced IT services is expected. Mr. Habarushimana read the report and decided to venture into mobile commerce (m-commerce) by opening an online book store called Mugeni Book Store (MBS). Customers would access the bookstore, order and pay for selected books using the wireless handheld devices like Smartphones, Personal digital assistant, laptops and tablets. In order to understand how the business will run, he has carried research on M-commerce and he found out that there exists many M-commerce applications. Therefore he decided to hire an expert to develop a M-commerce application suitable for his business so that the customers are able to access the book store using their wireless handheld devices.

The book store was launched last week; however, Mr. Habarushimana is experiencing many challenges with the e-commerce business and one of them is that he does not know the different payment methods that his customer can use to pay for the books. You are an expert in e-

commerce and Mr. Habarushimana has invited you to advise him on the challenges his business is facing.

**REQUIRED:**

- (a) Explain any **four** different payment methods customers can use to pay for the books. **(4 Marks)**
- (b) Discuss any **four** challenges Mugeni Book Store is likely to face while conducting e-commerce and how the government of Rwanda can intervene to curb the challenges. **(8 Marks)**
- (c) Explain the importance of any **four** mobile commerce applications for hand held devices that Mr. Habarushimana and his customers can use. **(8 Marks)**
- (Total 20 Marks)**

**QUESTION FIVE**

Uwamwesi Traders Limited (UTL) is a firm that imports and exports merchandise in the eastern province of Rwanda. Ten years ago, this company was using a file-based approach to manage its data. The files ranged from human resource files, customers' files, payroll files, suppliers' files, merchandise files, and inventory system. This data file environment posed many challenges to the company. In quest for the solutions to the prevailing problems then, UTL discovered that Database Management Systems (DBMS) could help them overcome the challenges at hand.

DBMS are software that UTL used for creating and maintaining their contemporary databases. The DBMS now permits UTL to rationally manage data for the entire firm, gives an interface between application programs and physical data files, separates logical and design views of data and solves many problems of the traditional data file approach. A DBMS has different components which include a data definition language which specifies content and structure of database and defines each data element, a data manipulation language which is used to process data in a database and a data dictionary which stores definitions of data elements and data characteristics. There are many DBMS on the market today with varying characteristics, types and sizes. Organizations' can choose a DBMS depending of the functionalities of the database they want.

**REQUIRED:**

- (a) Explain **four** challenges UTL experienced while they were using the traditional file system to manage their data. **(8 Marks)**

- (b) State the **four** database technologies UTL could have used to build and maintain their contemporary databases. **(4 Marks)**
- (c) Explain **four** factors that UTL should put into consideration when choosing a Database Management system to purchase. **(8 Marks)**
- (Total 20 Marks)**

### **QUESTION SIX**

Mr. Shema Prince is the CEO of Keeza Aviation Authority (KAA) located in western province. He would like to acquire the information system (IS) which is to be used in different departments of KAA. He is aware that an information system has different functions which when utilized can help in the alignment of the information system to the KAA business strategies. He is also confident that the information system will help KAA acquire a competitive advantage against other aviation authorities present in the country. Whereas Mr. Shema believes that information systems are very important components to have in KAA, he is skeptical about them due to the challenges that can arise as a result of alignment of IS with business and he would like to be aware of them so that he plans how to curb them. You are an information system expert and Mr. Shema has requested you to help him get a deeper understanding of how to utilize the information systems in order to make his company more competitive.

#### **REQUIRED:**

- (a) Identify any three features of information systems and explain how those features will help KAA benefit from the functions of information systems. **(6 Marks)**
- (b) Explain how any three departments of KAA will use the information systems. **(3 Marks)**
- (c) Explain to Mr. Shema any four ways in which alignment of information systems to business strategy can help KAA to gain a competitive advantage. **(8 Marks)**
- (d) Identify and explain any three challenges KAA is likely to face while aligning information systems with business. **(3 Marks)**
- (Total 20 Marks)**

### **QUESTION SEVEN**

Royal Bank of Rwanda (RBR) is a commercial bank in Rwanda which is fully registered and licensed by the National Bank of Rwanda with its headquarters in Kigali. RBR has branches in Musanze, Huye, Rwamagana and Rubavu. Mr. Rwishimi, the business development manager recently came up with a new product. The management of RBR plans to promote the

development of new products and would like to be able to project what products they will be making in the next five years and what type of employees they will need in future. Mr. Rwishimi has contacted knowledge workers asking how RBR can achieve the above and they have recommended that RBR uses management decision support tools like decision support systems (DSS) and executive support systems (ESS). The new product was an application that would enable RBR's customers obtain information about the properties they intend to buy before they take up the mortgages. A recent trend showed that most customers are cheated and lack avenues of comparing different properties before they purchase.

RBR is interested in setting up a system which gives customers from the different branches details about the owners of property, size of property, assessment analysis and market value. Mr. Rwishimi has been advised by the knowledge workers that the Bank needs to use different types of decision support systems to achieve this dream. The knowledge workers have convinced Mr. Rwishimi that the use of decision support tools and executive support tools will come up with many benefits and it is worth investing. You are an expert of information systems and have been appointed as a consultant to help the company decide on which decision support tools would be suitable for RBR.

**REQUIRED:**

Prepare a presentation:

- (a) Explaining the meaning of the following concepts:
    - (i) Decision support systems (DSS) **(1 Mark)**
    - (ii) Executive support systems (ESS) **(1 Mark)**
  
  - (b) Discussing to the employees of RBR the importance of any **three** types of decision support systems. **(6 Marks)**
  
  - (c) Explaining any **three** advantages Executive Support Systems. **(6 Marks)**
  
  - (d) Describing any **three** benefits the knowledge workers will bring to the bank. **(6 Marks)**
- (Total 20 Marks)**

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**End of question paper**

