



**CERTIFIED PUBLIC ACCOUNTANT
FOUNDATION LEVEL 2 EXAMINATIONS**

F2.3: INFORMATION SYSTEMS

TUESDAY: 01 DECEMBER 2020

INSTRUCTIONS:

1. **Time Allowed: 3 hours 15 minutes** (15 minutes reading and 3 hours writing).
2. This examination has **seven** questions and only **five** questions **should be** attempted.
3. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

To ensure effective distribution and usage of electricity in Rwanda, the Energy Utility Corporation Limited (EUCL) was created to provide energy utility services in the Country through operations and maintenance of existing generation plants, transmission and distribution network and retail of electricity to end-users. In an effort to improve its services, EUCL delivers electricity from suppliers to consumers using information systems to save energy, reduce costs, and increase reliability and transparency.

EUCL, now more than ever needs adequate information systems to optimize the energy generation and usage, enhance operational efficiency, improve customer service and ensure network growth and increased connections within the foot print of electrified areas thereby making an effective contribution to the Rwanda vision 2050.

EUCL through the Government of Rwanda has received a grant from the World Bank and part of it will be used to finance projects aimed at revolutionizing its information systems to meet the required international standards. The new modern information systems will have technologies such as: networks and switches for power management; sensor and monitoring devices to track energy usage and distribution trends; systems to provide energy suppliers and consumers with usage data; information systems to transmit data along the entire energy supply ecosystem. The new information systems will also support online payments through their e-commerce platform.

As an Electrical Engineer from Carnegie Mellon University Africa, you acquired similar expertise during your internship at Google and you are hired as a consultant to undertake a feasibility study for the project named: **“EUCL Information Systems Revolutionization”**. The terms of reference of the consultancy expects you to explain the following:

Required:

- a) **Explain briefly Big Data.** (2 Marks)
- b) **List and explain any Four key management challenges involved in building, operating and maintaining EUCL information systems.** (8 Marks)
- c) **Identify and explain any Three e-commerce benefits to organizations such as EUCL .** (6Marks)
- d) **Outline and describe any Two payment systems that customers can use to pay EUCL services through its e-commerce platform.** (4 Marks)

(Total Marks 20)

QUESTION TWO

Made in Rwanda policy is one of the tools to support an aspiration by the Government of Rwanda to becoming a hub for production of high-tech products on the continent. It is in this context, Maraphones Ltd has launched its manufacturing plant in the Special Economic Zone in Kigali becoming the continent’s first manufacturer of Smartphones. The factory is a manufacturing plant, not an assembly station. The distinction is that Maraphones Ltd produces its own chips and parts to make a complete phone. Assembly plants, on the other hand, put together complete parts. The

manufacturing model reduces the cost of the final smartphone and ensures that it's tailored to the needs of local users.

The policy aims also to create jobs for young Rwandans but with the prevailing conditions of Rwanda's education system, recruited local technical employees have to be re-skilled to prepare them to work for the Maraphones manufacturing plant which requires suitable skills in hardware and software technologies. This led to many education experts questioning the quality and level of information technology knowledge delivered by Integrated Polytechnic Regional Colleges (IPRCs) and Technical and Vocational Education and Training (TVET) centers which the Ministry of Education and Workforce Development Authority (WDA) are committed to address. A taskforce made of members from different stakeholders was created under supervision of the Ministry of Education and WDA and was tasked to review information and communication technology (ICT) curriculum, identify skills gap and upgrade it to ensure the knowledge students get from the IPRCs and TVET centers match the skills required by private and public employment. IPRCs and TVET Centers should mainly emphasize on computer hardware, software and networking practical competences that respond to the real needs of the job market and allow integration of young Rwandans into the IT professional workforce

Required:

As a member of the taskforce, explain the following computer hardware and software concepts:

- a) **Identify and describe any Five IT infrastructure elements.** (5 Marks)
- b) **Identify Five management challenges posed by IT infrastructure.** (5 Marks)
- c) **Describe Cloud Computing and list Two of its benefits.** (4 Marks)
- d) **Define the following terms:**
 - (i) **Virtualization;** (2 Marks)
 - (ii) **Extensible Business Reporting Language (XBRL);** (2 Marks)
 - (iii) **Outsourcing of information systems.** (2 Marks)

(Total Marks 20)

QUESTION THREE

In response to the coronavirus outbreak, the Government of Rwanda took the decision to close educational institutions to contain the spread of COVID-19. As a result, education institutions are having to rethink their approach, becoming more digitally led, and shifting to online learning platforms. The coronavirus pandemic has exposed the unpreparedness of many education institutions in Rwanda to migrate to e-learning. This could be an excellent time for education institutions in Rwanda to rethink what the future of education would look like and take practical steps towards adopting a blended learning approach in education to improve access and equity. Several schools, colleges and universities across Rwanda have moved some of their programmes to online platforms in partnership with telecom operators, information systems providers such as Microsoft and Google as well as sponsors such as UNESCO, UNICEF and World Bank to support

adoption of technological innovations such as learning management systems (LMS), content management systems (CMS) and decision support systems (DSSs).

Required:

With reference to the above scenario, answer the following questions:

- a) **Explain Two ways information systems can enhance business processes of an education institution.** (4 Marks)
- b) **Describe the following concepts:**
 - i. **DSS (Decision Support System).** (2 Marks)
 - ii. **e-learning.** (2 Marks)
 - iii. **IT Audit.** (2 Marks)
- c) **Describe any Three technology trends that raise ethical issues.** (6 Marks)
- d) **Explain any Two moral dimensions of the information age.** (4 Marks)

(Total Marks 20)

QUESTION FOUR

More than ever, the current unprecedented sanitary crisis has shown that the Information Technology is not only an enabler but a priority and basic need for businesses, organisations and the society as a whole. The Government of Rwanda trying to mitigate the impacts of the Covid-19 pandemic to its economy has urged businesses and organisations to continue their operations remotely using internet and available remote connectivity and collaboration technologies. Various measures were put in place to combat the spread of the COVID-19 such as online payment of all services (shopping, transport, bank transactions, etc...) which required information systems to rapidly adapt and support an abrupt increase of online transactions. As much as the online transactions have helped all sectors, a number of legal and privacy issues were raised that needed appropriate legal and regulatory policies to be urgently adopted to ensure data protection and safeguard for business and government online services. The Government of Rwanda has instructed the Rwanda Utilities Regulatory Authority (RURA) to develop legal and regulatory frameworks to ensure data privacy standards are upheld. RURA hired a consultant to draft a data security and privacy framework for Rwanda. To kick-off your consultancy work, the consultant needs to make a presentation and give an insight on impact of internet on individual privacy, business and government.

Required:

Referring to the above case study, answer the following:

- a) **Describe Three legal mechanisms that protect property rights.** (6 Marks)
- b) **Identify and explain Three approaches that can be implemented by RURA to protect the privacy of internet users.** (6 Marks)
- c) **Define the following terms:**
 - i. **Cookies.** (2 Marks)
 - ii. **Software Piracy.** (2 Marks)
- d) **Describe the impact of Internet of any of Two competitive forces** (4 Marks)

(Total Marks 20)

QUESTION FIVE

Rwanda's retail sector initially challenged by COVID-19, had to adapt very quickly to the outbreak and the most apparent shift was to consumers' dependency on online delivery systems. SIMBA Supermarket, one of the leading retailers in Rwanda has seen more shoppers turn to online shopping platform and a shift in customer shopping behavior. SIMBA Supermarket management team also dealing with restrictions due to COVID-19 had to continue working virtually and collaboratively to respond to the market demands. SIMBA Supermarket's chief operating officer (COO) called for the development of an executive information system with an executive dashboard that would display real-time data related to sells, orders, deliveries, shipping and inventory management. A huge central monitor screen showing a live display of the company's executive Dashboard will be placed in COO's office to review the performance of SIMBA Supermarket's 16 major branches in Kigali and take tactical business decisions. Other senior managers (finance, sales and marketing) also get business insights from the knowledge management system developed in-house. The information technology team under the supervision of the Chief Information Technology (CIO) also working remotely was tasked to design and implement the executive dashboard that will be used for critical business decisions during COVID-19 and beyond based on data retrieved from various operational systems and the e-commerce platforms.

Required:

- a) **Identify and explain any Two main steps of a knowledge management system.** (4 Marks)
- b) **Describe any Two differences between neural networks and expert systems.** (4 Marks)
- c) **Explain the following concepts:**
 - i. **Artificial Intelligence;** (2 Marks)
 - ii. **Business Intelligence;** (2 Marks)
 - iii. **Executive support system (ESS).** (2 Marks)
- d) **Explain Three components of a Group Decision Support System (GDSS).** (6 Marks)

(Total Marks 20)

QUESTION SIX

RISA (Rwanda Information Society Authority) is mandated to improve Rwanda's cybersecurity readiness, protection and incident response capabilities by organising CyberDrills at national level. A CyberDrills event is planned during which cyber-attacks or information technology incidents or other types of disruptions are simulated in order to test RISA's capabilities, from being able to detect a security incident to being able to respond appropriately and minimize any related impact. Through a CyberDrills, RISA is able to validate policies, plans, procedures, processes, and capabilities that enable preparation, prevention, response, recovery and continuity of operations. The increase in usage of ICTs poses significant challenges to cybersecurity and cyber threats have increased. RISA organises CyberDrills in collaboration with public and private stakeholders to enhance capacity and capabilities through national collaborations and cooperation, amongst other

things. Participants in the CyberDrills need to have proficiency in information security and control aspects

Required:

As a participant to the CyberDrills,

- a) **Describe Four tools and techniques to help commercial Banks in Rwanda protect against or monitor intrusions (cyber-attacks).** (8 Marks)
- b) **Outline any Three categories of assets that need to be assessed by cybersecurity experts** (3 Marks)
- c) **Explain the following terms:**
 - i. **Computer Forensics;** (2 Marks)
 - ii. **Authorisation policy;** (2 Marks)
 - iii. **Business Continuity planning.** (2 Marks)
- d) **List Three dimensions of Information Systems** (3 Marks)

(Total Marks 20)

QUESTION SEVEN

Credit reference bureau (CRB) Rwanda, a credit bureau solutions provider launched its operations in Rwanda in 2010, promising to provide adequate information about the borrowers' credit history, debt profiles and repayment history. CRB should ensure that the information collected from a variety of sources, including creditors, lenders, debt collection agencies, and the courts is managed in the most secured manner and the standards adhered to in accordance to the law. These data are received through telecommunication networks and aggregated and stored in massive databases maintained by CRB. Several loan applicants are complaining about inaccurate information that provides wrong overdue loan information and many people have been victimized by inaccurate or outdated data in CRB's database information systems. CRB understands the importance of providing accurate information to both lenders and consumers. But they also recognize that their own systems are responsible for many credit reports errors. Some mistakes occur because of the procedures for matching loans to individual credit reports or wrong information due to identity theft or errors transmitted by creditors. The huge volume of information being transmitted from creditors to CRB also increases the likelihood of mistakes. On the hand, researchers believe that the high growth of digital traffic on the Internet is likely to result in multiple information transmission issues.

REQUIRED

With reference to the above scenario,

- a) **Identify and explain the Three types of communication networks** (6 Marks)
- b) Explain the following concepts:
 - i. **Unified communications (UC);** (2 Marks)

- ii. **Virtual Private Network (VPN);** (2 Marks)
 - iii. **Benchmarking.** (2 Marks)
 - c) **Describe outsourcing and list any two of its benefits** (4 Marks)
 - d) **Describe Data Warehousing and identify any two of benefits of Data Warehouse users** (4 Marks)
- (Total Marks 20)**

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