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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY <u>KIT 2108 – INFORMATION ASSURANCE</u>

Date: 04TH December 2024 Time: 11:30AM – 1:30PM

<u>INSTRUCTIONS TO CANDIDATES</u> <u>ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS</u> <u>QUESTION ONE (30 MARKS)</u>

InfoShield Technologies is a cybersecurity firm known for delivering advanced security solutions to businesses across various sectors. The company specializes in safeguarding client data through comprehensive information assurance practices, focusing on analyzing risks and deploying cryptographic measures to prevent data breaches. In recent times, InfoShield Technologies has helped several companies mitigate cyber threats by implementing proactive security strategies, ensuring that sensitive information remains secure. The company prides itself on staying ahead of emerging threats by incorporating cutting-edge technologies into its security framework. InfoShield Technologies is tasked with providing reliable information security to its clients through the adoption of advanced cryptographic tools and robust risk management practices. As threats grow more sophisticated, the firm must focus on maintaining data integrity, availability, and confidentiality.

- a) Information Assurance is central to InfoShield Technologies' mission. Define information assurance and explain its importance within the context of the company's operations. How does it enable InfoShield to protect client information? (4 Marks)
- b) InfoShield Technologies must implement several critical components to maintain secure systems. Identify and discuss three essential components of information assurance that InfoShield should focus on to ensure the protection of client data. (6 Marks)
- c) Provide a real-world example where information assurance played a crucial role in preventing a data breach. Explain the specific measures taken by the organization to avert the attack and how this aligns with InfoShield's security strategies. (4 Marks)
- d) To stay effective, InfoShield Technologies incorporates technological advancements into its security framework. Discuss three key technological components used for security implementation in information assurance, explaining their importance. (6 Marks)
- e) InfoShield Technologies regularly employs DNS monitoring to safeguard its clients' systems and networks. Explain two reason why DNS monitoring is vital in ensuring the security of any computer system and network, and how it helps mitigate cyber threats. (5 Marks)
- f) InfoShield Technologies must implement robust measures to ensure the protection of customer data. Discuss four key security measures that the company should integrate as part of its information assurance framework to protect sensitive client information. (5 Marks)

QUESTION TWO (20 MARKS)

In cybersecurity, information assurance models are essential for analysing and mitigating threats to data systems.

a) Discuss the **primary purpose** of an information assurance analysis model in the context of cybersecurity. (4 Marks)

- b) Explain **four key steps** involved in implementing an information assurance analysis model, detailing how each step contributes to ensuring robust data protection and system security.(8 Marks)
- c) Describe the **process of evaluating and mitigating threats** using the information assurance analysis model. How does the model assist in identifying vulnerabilities and implementing countermeasures to prevent cyberattacks? (8 Marks)

QUESTION THREE (20 MARKS)

Cryptography is a foundational security element within organizations.

- a) Define **cryptography** and explain its significance in the protection of information within information assurance frameworks. (4 Marks)
- b) Discuss the **differences between symmetric and asymmetric cryptography**, providing clear examples of each. How do these cryptographic methods contribute to securing information?

(8 Marks)

c) Identify and explain **four common cryptographic methods** (e.g., RSA, AES, DES) used in cybersecurity. Assess their effectiveness in protecting data and maintaining information security. (8 Marks)

QUESTION FOUR (20 MARKS)

- a) Identify and explain **three key security services** provided by information assurance. How do these services contribute to a comprehensive security strategy for organizations? (6 Marks)
- b) Examine the **role of authentication** within information assurance security services. Provide and explain **two examples of authentication methods** commonly used to verify user identities and ensure data protection. (6 Marks)
- c) Describe **three real-world scenarios** where information assurance utilized encryption and access control measures to protect sensitive client data. Discuss how these techniques ensured the security of the information. (8 Marks)

QUESTION FIVE (20 MARKS)

- a) Define **redundancy** in the context of information systems. Why is it critical for organizations to implement advanced redundancy measures, including Intrusion Detection Systems (IDS)?(4 Marks)
- b) Discuss four types of redundancy that can be implemented to improve system reliability, including both hardware redundancy (e.g., failover systems) and data redundancy (e.g., backups, replication). Provide examples for each. (8 Marks)
- c) Analyze a **hypothetical scenario** where an organization experiences a significant hardware failure. Explain how the implementation of redundancy could mitigate the impact of the failure and ensure business continuity. (8 Marks)