JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN INFORMATION TECHNOLOGY SECURITY AND AUDIT

1ST YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

KISUMU CAMPUS

COURSE CODE: **IIT 5111**

COURSE TITLE: **COMPUTER OPERATING SYSTEMS AND VIRTUALIZATIONS**

EXAM VENUE: **STREAM: MSC**

DATE: 13TH AUGUST 2019   **EXAM SESSION: 2.00 – 5.00PM**

TIME: 3.00 HOURS

INSTRUCTIONS:

1. **Answer ANY three questions**
2. **Candidates are advised not to write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE [20 MARKS]

(a) "An important kernel design decision is the choice of the abstraction levels where security mechanisms and policies are implemented". Explain how this statement is applied in the following kernels: [12 Marks]

   (i)   Monolithic   (iii)   Exokernels

   (ii)   Microkernels   (iv)   Nanokernels

(b) "An alternative method of operating system design, called the *client-server model*, tries to minimize the chance of a bug in one part of operating system from corrupting another one". Using a well-labelled diagram where applicable, discuss. [8 Marks]

QUESTION TWO [20 MARKS]

(a) A debate ensued in 1992 between Linus Torvalds and Prof. Andrew Tanenbaum on the Usenet discussion group entitled "*Linux is obsolete*". Tanenbaum was quoted saying "*I think it is a   gross error to design an OS for any specific architecture, since that is not going to be around all that long.*" whereas Torvalds retorted "*Portability is for people who cannot write new programs*". Explain your agreement or disagreement with the two statements. [6 Marks]

(b) *"Active Directory (AD)* is the Windows implementation of *Lightweight Directory Access Protocol (LDAP)* services where the topological information about the domain are stored". Describe the secure implementation of AD and/or LDAP under the following environment; [8Marks]

   (i)   FreeBSD   (ii)   Windows XP

(c) Compare and contrast the terms *Open Source* and *Free Software* in relation to computer operating system. [6 Marks]

QUESTION THREE [20 MARKS]

(a) Describe how virtualization and cloud computing are often used together in building a public and private cloud infrastructure in an enterprise network. [10 Marks]

(b) Briefly explain any five reasons for and five advantages of adopting virtualization by an academic institution. [10 Marks]

QUESTION FOUR [20 MARKS]

    (a) Describe OSI Security Architecture according to RFC 2828. [5 Marks]

    (b) Compare and contrast the security features in the implementation of TLS 1.0, TLS 1.1 and TLS 1.2. [12 Marks]

    (c) Explore the security issues with SSL/TLS tunneling while implementing a firewall in a corporate network. [3 Marks]

QUESTION FIVE [20 MARKS]

Consider yourself being consulted to assist an organization in implementation of their corporate network. The organize has 1,000 workstations running on multi-platforms, operating systems, and 25 servers spread in their seven offices in many locations in the country. The operations are on a distributed model where each station has a LAN for its operations but the same activities are mirrored from a central station located at the main office. The organization also plan to mounts its transactional activities online for ease of access by their clientele. You are required to advise the organization on the implementation of the DNS services, Corporate mail service running on Sendmail mail servers, an Active Directory to handle their topological information, and VOIP service that supplement communication services to the internal and clientele communication. Prepare a detailed technical document that the organization can use based on the information provided. You are free to state your assumptions and any other necessary information that can be helpful to this organization, for example, security considerations that may be needed.

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