



THE UNIVERSITY OF ZAMBIA

School of Natural Sciences

Department of Computer Science

CSC 2101 COMPUTER SYSTEMS

FINAL EXAMINATION

Date: 24th June, 2022
Time: 09:00 – 12:00 Hours
Duration: 3 Hours
Venue: NSLT

INSTRUCTIONS

1. This exam paper has **Seven (7)** questions.
 2. Answer **ANY FIVE (5)** questions.
 3. Clearly identify the problem being solved.
 4. Use the marks as a guide to the detail required in your answers while keeping your answers concise and relevant.
-

*QUESTION ONE

- i. Define what *non-compliant* and *legacy systems* are and explain why they are especially vulnerable to software exploitations. [4 marks]
- ii. Match the following types of attacks to the descriptions below: *Pretexting, Ransomware, Adware, Worm, Scareware, Phishing, Spyware, Virus, Trojan Horse, Rootkit, Baiting*. Some attacks may be repeated for the descriptions. [6 marks]
 - a. Malicious software that executes a specific, unwanted, and often harmful function on a computer.
 - b. Malware that executes arbitrary code and installs copies of itself in the memory of the infected computer.
 - c. Non-self-replicating type of malware. Often contains malicious code that is designed to look like something else.
 - d. Malware used to gather information about a user, and, without the user's consent, send the information to another entity.
 - e. Malware that typically displays annoying pop-ups to generate revenue for its author.
 - f. Malware that attempts to convince people to divulge sensitive information.
 - g. Malware that includes scam software that uses social engineering to shock, cause anxiety, or cause the perception of a threat.
 - h. Malware that is installed on a compromised system and provides privileged access to the hacker.
 - i. Malware that denies access to the infected computer system and demands a person be paid in order for the restriction to be removed.
 - j. An attacker pretends to need personal or financial data in order to confirm the identity of the recipient.
 - k. An attacker sends fraudulent email disguised as being from a legitimate, trusted source to trick the recipient into installing malware on their device.
 - l. An attacker leaves a malware infested flash drive in a public location.
- iii. Briefly explain the difference between the symmetric and asymmetric encryption process for messages. [4 marks]
- iv. Consider the following terms regarding wireless authentication methods. State what each acronym stands for, and explain its function. [6 marks]
 - a. WEP
 - b. WPA
 - c. TKIP

* QUESTION TWO

- i. Classify each of the following statements as either relating to Android or iOS mobile OS. [5 marks]
 - a. Open-source operating system.
 - b. Unix based operating system.
 - c. Uses a walled garden model for their apps.

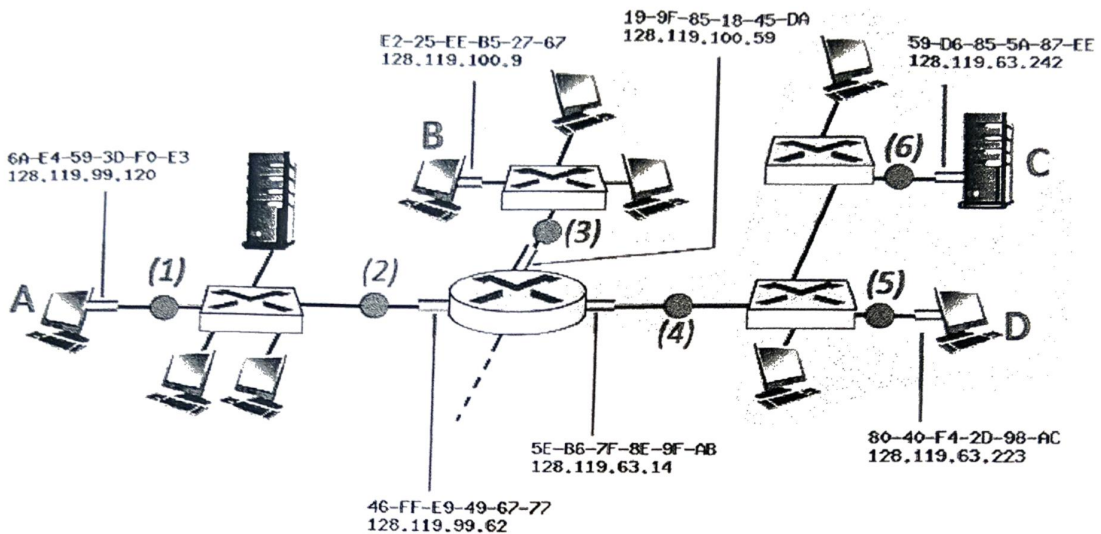
- d. Released in 2008.
 - e. Released in 2007.
 - f. Apps run in a sandbox and have only the privileges enabled by the user.
 - g. Linux based operating system.
 - h. Closed source operating system.
 - i. Developed by Open Handset Alliance.
 - j. Third-party or custom programs are installed directly using an .apk file.
- ii. Rooting and Jailbreaking are two methods for removing restrictions and protections added to mobile operating systems.
- a. What is Rooting? [2 marks]
 - b. What is Jailbreaking? [2 marks]
 - c. What are three (3) advantages that can result from rooting and jailbreaking. [3 marks]
 - d. What is the major disadvantage of rooting and jailbreaking? [1 mark]
- iii. Classify each of the following statements as either relating to Linux or MacOS. [4 marks]
- a. OS can be customised by the user installing and removing software packages.
 - b. Apps and desktop are organised through Mission Control.
 - c. Uses the popular boot manager Grub.
 - d. Uses ext3 and ext4 file systems.
 - e. Closed source operating system.
 - f. Uses the extended hierarchical file system.
 - g. The security credentials manager is called Gnome-Keyring.
 - h. The security credentials manager is called Keychain
- iv. State the function of each of the following file and administrative commands. [3 marks]
- a. iwconfig
 - b. chmod
 - c. chown

QUESTION THREE

- i. What is a traditional server deployment approach? [2 marks] Hence, explain three (3) problems with this approach. [6 marks]
- ii. A hypervisor, also called the Virtual Machine Manager (VMM), is the brain of virtualization.
- a. Explain the term virtualisation. [2 marks]
 - b. Explain the difference between a Type 1 (native) hypervisor and Type 2 (hosted) hypervisor. [4 marks]
- iii. Explain how each of the following cloud services operates. [6 marks]
- a. Software as a Service (SaaS)
 - b. Platform as a Service (PaaS)
 - c. Infrastructure as a Service (IaaS)

QUESTION FOUR

Consider the figure below. The IP and MAC addresses are shown for nodes A, B, C and D, as well as for the router's interfaces.



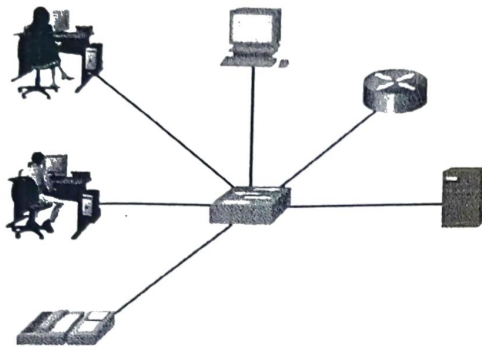
- Distinguish between MAC and IP addressing. [3 marks]
- Using the MAC address of host B, show how a MAC address is organised in different parts. Show your answer in binary [3 marks]
- Consider an IP datagram being sent from node A to node C. [9 marks]
 - What is the source mac address at point 1?
 - What is the destination mac address at point 1?
 - What is the source IP address at point 1?
 - What is the destination IP address at point 1?
 - Do the source and destination mac addresses change at point 2? Answer with yes or no.
 - Do the source and destination mac addresses change at point 4? Answer with yes or no.
 - What is the source mac address at point 4?
 - What is the destination mac address at point 4?
 - Do the source and destination mac addresses change at point 6? Answer with yes or no.
- For each of the following IP addresses, determine the following: (a) Subnet mask, (b) Network address and (c) First host address. [5 marks each]
 - 179.97.51.51/10
 - 169.50.97.254/27

QUESTION FIVE

- i. For each of the following intermediary devices, draw its icon and state its function. [6 marks].
 - a. Switch
 - b. Router
 - c. Access Point



- ii. Consider the following network diagram. State the topology name and outline its characteristics. [4 marks]



- iii. Consider Dial Up, ISDN and DSL. Describe the main features of each connection technology in order of historical development. [6 marks]
- iv. Explain what each letter in the term 'AAA' server stands for. [4 marks]

QUESTION SIX

- i. Name the layers of the TCP/IP model. [2 marks]
- ii. Outline the three basic operations of reliability with respect to TCP. [3 marks]
- iii. Port numbers are an important part of the TCP/IP model.
 - a. What are port numbers? [2 marks]
 - b. What is the difference between source and destination port numbers? [4 marks]
 - c. Write down the Port number, Transport protocol and Application Protocol for any five well-known application port numbers. [5 marks]
- iv. Explain the order of colour labels on the eight (8) wires of the T568A twisted pair cable. [4 marks]

QUESTION SEVEN

- i. A good IT professional should understand the importance of preventive maintenance and troubleshooting.
 - a. How must a fan be held when you clean it with compressed air? Why? [2 marks]
 - b. What is the definition of an optimal operating environment for a computer? [3 marks]

- c. Identify the steps in the troubleshooting process of computer problems. [3 marks]
- ii. Distinguish between POST and CMOS. [2 marks]
 - iii. Distinguish between RISC and CISC. [2 marks]
 - iv. Distinguish between Overclocking and throttling. [2 marks]
 - v. Distinguish between Stripping and Mirroring in RAID storage technology. [2 marks]
 - vi. Distinguish between Pin Grid Array (PGA) and Land Grid Array (LGA) CPU architectures. [2 marks]
 - vii. Distinguish between active and passive cooling solutions in computers. [2 marks]

The End