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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
KIT 2107 – COMPUTER ORGANIZATION AND MAINTAINANCE

Date: 06TH December 2024

Time: 2:30PM – 4:30PM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) A software developer is tasked with optimizing the performance of a new application for a client. The developer decides to investigate how the system's hardware components, such as the CPU, memory, and input/output devices, interact during program execution. Explain why knowledge of computer organization is crucial for the developer to optimize the application's performance. **(6 Marks)**
- b) The IT department is tasked with upgrading the motherboards of several Personal Computers. Explain the key components they should consider during the upgrade. **(6 Marks)**
- c) An application developer needs to convert decimal numbers into binary format. Provide an example of how this would be done for the number 45. **(6 Marks)**
- d) A company is upgrading its CPUs to support pipelining. Explain how pipelining enhances data path design in modern processors. **(6 Marks)**
- e) A computer is experiencing performance issues. Would upgrading the RAM, cache, or ROM have the most significant impact? Justify your answer. **(6 Marks)**

QUESTION TWO (20 MARKS)

- a) A company is considering upgrading its operating systems. What factors should be considered when the company is evaluating the purpose and organization of different operating systems? **(8 Marks)**
- b) During a system boot-up process, a PC is failing to load. Explain how ROM BIOS issues can affect the boot-up process. **(6 Marks)**
- c) An ICT department is upgrading its computer systems. How would you advise on selecting appropriate monitors based on resolution and size requirements? **(6 Marks)**

QUESTION THREE (20 MARKS)

- a) A server frequently runs out of memory when hosting large applications. How would virtual storage help alleviate this problem? **(6 Marks)**
- b) A financial institution needs to store a large amount of sensitive numerical data efficiently. Should they use binary, octal, or hexadecimal representation for this purpose? Explain your reasoning. **(6 Marks)**
- c) A medical equipment manufacturer is designing a new heart-rate monitoring system. The design team must ensure that the internal computing system processes signals accurately and without delay, as any failure could compromise patient safety. Explain how different types of basic logic gates (AND, OR, NOT) contribute to the processing of signals in such a critical medical system. **(8 Marks)**

QUESTION FOUR (20 MARKS)

- a) A company is comparing different processor types for use in high-performance computing tasks. Should they choose Reduced Instruction Set Computer (RISC) or Complex Instruction Set Computer (CISC) architecture? Defend your recommendation. **(6 Marks)**
- b) As an IT expert, you are tasked with improving the efficiency of a control unit in a computer system. Explain how microprogramming would be utilized to foster the computer's control unit efficiency. **(6 Marks)**
- c) A hardware engineer is designing a CPU with limited registers. How could this limitation impact the performance of a system, and what strategies could be used to manage register overflow efficiently during complex computations? **(8 Marks)**

QUESTION FIVE (20 MARKS)

- a) An IT department is facing delays in data retrieval from main memory. How could implement an effective memory hierarchy with cache principles improve data access speeds, and what are the trade-offs between cache size and memory organization? **(6 Marks)**
- b) A logistics company wants to upgrade its computer system for faster communication with peripheral devices. Compare different input/output methods and recommend the best option for minimizing CPU idle time. **(6 Marks)**
- c) A research group is exploring the development of energy-efficient multi-core processors for AI applications. What recent trends in computer organization, such as parallel processing and energy-efficient design, should they consider? **(8 Marks)**