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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2024/2025 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

KCS 2103 INTRODUCTION TO COMPUTER ORGANIZATION

Date: 9TH AUGUST, 2024
Time:8:30 AM – 10:30

AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE: COMPULSORY (30 MARKS)

a) A local museum is setting up an exhibit to showcase the evolution of computer architecture from the early days of computing to modern systems. As a recent graduate in computer organization, you have been asked to design this exhibit. Highlight significant advancements and the impact of the evolution of computer have on computing capabilities. **(6Marks)**

b) A software development company is transitioning a critical application from a high-level language to assembly language to optimize performance on a specific hardware platform. Explain the process of translating high-level language constructs to assembly language. **(6Marks)**

c) You are part of a team designing a new embedded system for an automated manufacturing line. The system needs a custom combinational logic circuit to control a series of operations.

   i) Design a combinational logic circuit that satisfies the following requirements of two input signals (A, B) and one output signal (Y). **(6Marks)**

   ii) Provide the truth table, and derive the Boolean expression. **(6Marks)**

d) Your team is developing new processor architecture. You are responsible for defining the instruction set architecture (ISA) for this processor. Explain how ISA impacts the design and performance of the processor. **(6Marks)**

QUESTION TWO (20 MARKS)

a) You are tasked with explaining the internal workings of a CPU to a group of new interns at your company. They need to understand how instructions are processed.

   i) Describe the Instruction Fetch, Decode, Execute cycle in detail. **(6Marks)**

   ii) Explain the roles of the control unit and the data path in this process. **(6Marks)**

b) A gaming company is experiencing performance issues with their latest game due to inefficient memory usage. You are hired as a consultant to improve their system's memory performance. Describe how caching techniques and the principle of locality can be applied to optimize the performance of the gaming system. **(8Marks)**

QUESTION THREE (20 MARKS)

A university is setting up a new computer lab with a variety of input/output devices. They need an efficient I/O system to manage these devices.

a) Explain the different types of input/output operations and techniques. **(6Marks)**

b) Discuss interrupt-driven I/O and Direct Memory Access (DMA) and their advantages. **(6Marks)**

c) Describe how communication protocols and networking are integrated into I/O systems to enhance performance and reliability. **(8Marks)**

QUESTION FOUR (20 MARKS)

a) A tech company is looking to enhance the performance of their server farms by implementing parallel and pipelined processing techniques.

   i) Describe how these techniques can improve instruction execution efficiency. **(6Marks)**

   ii) Provide examples of real-life applications where parallel and pipelined processing has significantly enhanced performance. **(6Marks)**

b) You are an IT consultant hired to evaluate the performance of a company's computer systems and suggest improvements. Identify common bottlenecks in computer systems and propose strategies for performance improvement. **(8Marks)**

QUESTION FIVE (20 MARKS)

You are giving a keynote speech at a technology conference about the future of computer organization.

a) Discuss recent trends in computer organization that you will include in your keynote speech, such as multi-core and parallel architectures. **(8Marks)**

b) Your keynote speech, identify the challenges in designing energy-efficient systems and the importance of security considerations. **(6Marks)**

c) Reflect on the ethical and societal implications of advancements in computer organization design. **(6Marks)**