

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**FIRST YEAR SEMESTER TWO EXAMINATION FOR BACHELOR OF SCIENCE IN
COMPUTER SCIENCE**

COSC 110: COMPUTER ARCHITECTURE

STREAMS: YEAR1 SEMESTER 1

TIME: 2 HOURS

DAY/DATE: MONDAY 14/12/2020

2.30PM – 4.30 PM

INSTRUCTIONS

Answer Question One and any other two questions

Question One (30 marks)

- (a) Explain the two cycles in the instruction cycle. (2 marks)
- (b) Discuss the concept of locality of references in computer memory operations. (4 marks)
- (c) Discuss the difference between direct mapping and set-associative mapping mechanisms in cache memory. (4 marks)
- (d) Discuss the stored program concept as outlined in the John von Neumann computer architecture. (4 marks)
- (e) State four differences between main memory and the hard disk in a computer system. (4 marks)
- (f) Discuss the concept of pipelining in processor operations. (4 marks)
- (g) Given an expression $x = y + z * q$
 - (i) Represent the instructions using stack architecture. (4 marks)
 - (ii) Represent the instructions using two address general purpose register. Use two registers R1 and R2. (4 marks)

Question Two (20 marks)

- (a) Interrupts are said to provide efficiency in tasks processing. In light of instruction execution, justify this statement. (4 marks)

- (b) Discuss the two mechanisms of handling multiple interrupts in a computer system. (4 marks)
- (c) When interrupts are enabled, discuss how the flow of program execution is affected. (4 marks)
- (d) Describe the following cache write policies.
 - (i) write-through (4 marks)
 - (ii) write-back (4 marks)

Question Three (20 marks)

- (a) Given the two instructions ADD R1, R2, R3 and SUB R4, R1, R5, with appropriate illustrations, discuss the stalling problem in pipelining. Show the five stages of instruction execution. (6 marks)
- (b) Discuss how the processor accesses the cache or what is known as cache operation in computer system memory operations. (6 marks)
- (c) Briefly discuss the Flynn's classification of computer systems. (8 marks)

Question Four (20 marks)

- (a) List five registers used in the instruction cycle along with their purpose. (5 marks)
- (b) Discuss three differences between Dynamic RAM and Static RAM. (6 marks)
- (c) Discuss the following memory access modes. (9 marks)
 - (i) Sequential Access
 - (ii) Direct Access
 - (iii) Random Access

Question Five (20 marks)

- (a) Explain the differences between programmed I/O and Interrupt Driven I/O techniques. (4 marks)
 - (b) Consider the infix expression $x = B * C + D * E - A$
 - i). write the postfix format of the instruction (2 marks)
 - ii). Write the stack ISA instructions for the postfix expression (7 marks)
 - iii). Write the two-address ISA instructions of the infix expression (7 marks)
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