



*(Knowledge for Development)*

**KIBABII UNIVERSITY**

**(KIBU)**

**UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR**

**SPECIAL/ SUPPLEMENTARY EXAMINATION  
YEAR THREE SEMESTER TWO EXAMINATIONS  
FOR THE DEGREE IN  
(COMPUTER SCIENCE)**

**COURSE CODE : CSC355E**

**COURSE TITLE : PARALLEL COMPUTER  
ARCHITECTURE**

**DATE: 10/01/2022**

**TIME: 02.00 P.M – 04.00 P.M**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

### QUESTION ONE (COMPULSORY) [30 MARKS]

- a) List the four classes of parallel computers to Flynn's Taxonomy (4 marks)
- b) Define parallel computing (3 marks)
- c) Explain why parallel computing is important (8 marks)
- d) What is Cache Coherence? (2 marks)
- e) State any three application area of parallel computing (3 marks)
- f) In shared memory model, there are several mechanisms that are used to control access to shared memory. State any two of these mechanisms (2 marks)
- g) Discuss various pipeline hazards. Give hazard detection and resolution techniques. (8 marks)

### QUESTION TWO [20 MARKS]

- a) Discuss using a diagram how different parallel computers are classified according to Flynn's taxonomy. (12 MARKS)
- b) Explain any three desired characteristics of parallel system. (6 marks)
- c) Discuss the Uniform memory access (UMA) (2 marks)

### QUESTION THREE [20 MARKS]

- a) Define Partitioning as applied in parallel programs and state and explain two types of Partitioning (8 Marks)
- b) State and explain four important factors to consider when designing program's inter-task communication. (8 marks)
- c) List the four classes of parallel computers to Flynn's Taxonomy (4 marks)

### QUESTION FOUR [20 MARKS]

- a) What is the significance of 'Scalability'? Derive the Amdahl's law for speedup performance. (10 marks)
- b) I/O operations are generally regarded as inhibitors to parallelism, explain (10 marks)

### QUESTION FIVE [20 MARKS]

- a) Explain two ways in which load balancing can be achieved in parallel computing (4 marks)
- b) Briefly describe the following parallel modes
  - i. Shared address space (2 marks)
  - ii. message passing (2 marks)
  - iii. Data parallel programming (2 marks)
- c) Discuss various types of synchronization (10 marks)