



TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION
TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN INFORMATION COMMUNICATION
TECHNOLOGY

EIT 4410: PARALLEL COMPUTING

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Sep 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (30 MARKS)

A. Difference between the following terminologies

- i. Parallel Computing and Grid Computing [3 marks]
- ii. Synchronize and Asynchronize [3 marks]

B. Using relevant examples discuss the following operations of a microprocessor

- i. Fetch Cycle [4 marks]
- ii. Execution Cycle [4 marks]

C. There are different ways to classify computers. One of the more widely used classifications, in use since 1966, is called Flynn's Taxonomy. Using relevant examples and with aid of diagram discuss the following classification of computers

- i. SISD Computer Architecture [4 marks]
- ii. SIMD Computer Architecture [4 marks]
- iii. MISD Computer Architecture [4 marks]
- iv. MIMD Computer Architecture [4 marks]

QUESTION TWO (20 MARKS)

As a hardware designer consultant for HP, you are required to design a direct mapping cache scheme of set size 4 blocks with the following memory cache parameters:

- a. Memory Size = 528KB
- b. Cache Size = 256 KB
- c. Block Size 8B

Calculate the number the following address bit partitioning

- i. Offset bit [3 marks]
- ii. Index bit [7 marks]
- iii. Tag bit [3 marks]
- iv. Draw the design diagram for the Address Bit Partitioning [7 marks]

QUESTION THREE (20 MARKS)

Parallel programming model is an abstraction of parallel computer architecture, with which it is convenient to express algorithms and their composition in programs. The value of a programming model can be judged on its generality: how well a range of different problems can be expressed for a variety of different architectures, and its performance: how efficiently the compiled programs can execute. Discuss the following parallel programming models using relevant examples

- i. Message Passing Model [10 marks]
- ii. Data Parallel Model [10 marks]

QUESTION FOUR (20 MARKS)

- A. Describe the importance of the OpenMP programming standard in parallel computing [5 marks]
- B. Write an MPI program using several MPI environment that will send and receive routines in C Programming for parallel computing [15 marks]

QUESTION FIVE (20 MARKS)

Shared memory parallel computers vary widely, but generally have in common the ability for all processors to access all memory as global address space. Multiple processors can operate independently but share the same memory resources. Discuss the memory architecture and classes with respect to the following

- i. Shared Memory [10 marks]
- ii. Distributed Memory [10 marks]