(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATIONS
YEAR FOUR SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

COURSE CODE : CSC 473E

COURSE TITLE : PARALLEL AND CLUSTER COMPUTING

DATE: 15/02/2021 TIME: 11.00 A.M –01.00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO

QUESTION ONE [COMPULSORY] [30 MARKS]

a. Define the following terms:
   i. A cloud [2marks]
   ii. A cluster [2marks]
   iii. A grid [2marks]

b. Describe the Von Neumann architecture. [6marks]

c. An organization dealing with data analysis has hired you to advise them on the best computing solution they should implement in their organization. The organization has expanded and is now dealing with big data that requires complex computations and timely decisions to be made basing on the results. You have assessed the state of the organization's computing infrastructure and are of the opinion that parallel and cluster computing model can do for the organization unlike the sequential computing they are using at the moment.
   i. Explain to management the limitations of current computing model. [5 marks]
   ii. Why do you think the new model suggested is good for the organization? [5 marks]

d. Explain how the computing power of the sequential model above can be improved. [4marks]
e. Explain the importance of cost of communication in the design of inter task communication within parallel programs. [4marks]

QUESTION TWO [20 MARKS]

a. Distinguish between shared memory and distributed memory using well labelled diagrams. [6marks]
b. What are the advantages of using MPI? [6marks]
c. Give four reasons why MIPS is not a good measure of performance. [4marks]
d. Explain how load balancing is achieved in parallel architectures. [4marks]

QUESTION TIIREE [20 MARKS]

a) Explain any four Processor Characteristics for Multiprocessing. [8marks]
b) How would you measure the performance of a parallel algorithm? [8marks]
c) Cloud Computing can be divided into two distinct models. Explain. [4marks]

QUESTION FOUR [20 MARKS]

a. Basing on Flynn's taxonomy distinguish multi-processor computer architectures according to how they can be classified along the two independent dimensions of Instruction and Data. [4marks]

b. Briefly describe the following types of granularity.
   i. Fine grained [4marks]
   ii. Coarse grained [4marks]

c. Explain four factors that contribute to scalability in massively parallel computers. [4marks]

d. Fine how fine granularity contributes to overhead in data storage during processing. [4marks]

QUESTION FIVE [20 MARKS]

a. Explain the classifications of Clusters in cluster computing. [8marks]

b. Outline any three components of cluster interconnection. [4marks]
c. Describe the features of Clusters [8marks]