THE CATHOLIC UNIVERSITY OF EASTERN AFRICA
A. M. E. C. E. A

P.O. Box 62157
00200 Nairobi – Kenya
Telephone: 891601-6
Fax: 254-20-891084
e-mail:academics@cuea.edu

GABA CAMPUS - ELDORET

MAIN EXAMINATION

SEPTEMBER – DECEMBER 2021 TRIMESTER

FACULTY OF SCIENCE

BACHELOR OF SCIENCE

DEPARTMENT OF COMPUTER AND INFORMATION SCIENCE

CMT 412: DISTRIBUTED OPERATING SYSTEM

Date: December 2021	**Duration:** 2 Hours
Instructions: Answer Question **ONE** and any other **TWO** Questions	

QUESTION ONE

a) Differentiate between the following

i) Distributed System vs Distributed Operating System **(2 marks)**

ii) Cloud computing vs Cluster computing **(2 marks)**

iii) TCP vs UDP **(2 marks)**

b) Why would you design a system as a distributed system? List some FIVE advantages of distributed systems **(6 marks)**

c) What is the role of middleware? Use an illustration to show its position in a network system architecture. **(5 marks)**

d) What is a Single-point-of-failure and how can distribution help here? **(3 marks)**

e) Use a single block diagram to explain the relationship among Grid computing, cloud computing, cluster computing and distributed computing **(10 marks)**

QUESTION TWO

a) What is the transparency dogma in distributed systems middleware and what is wrong with it? **(5 marks)**

b) Distributed system is heterogeneous. Name four different software and hardware architectures that heterogeneous components should be able to interoperate across. **(4 marks)**

c) Define Grid Computing? **(2 marks)**

d) Outline steps for implementing Remote Message Invocation application **(9 marks)**

QUESTION THREE

a) Define the following terms/phrases citing example where necessary

i) Thread **(2 marks)**

ii) RMI **(2 marks)**

iii) Dispatcher **(2 marks)**

iv) Shared memory **(2 marks)**

v) Process **(2 marks)**

b) What is the advantage if your server side processing uses threads instead of a single process? **(2 marks)**

c) Draw a diagram that explains the life cycle of a thread **(8 marks)**

QUESTION FOUR

a) Clarify the following concepts which supports synchronization

i) Race Condition **(4 marks)**

ii) Semaphore **(4 marks)**

b) What is a distributed deadlock and why are they hard to detect? **(2 marks)**

c) Differentiate between Synchronization vs asynchronization **(2 marks)**

d) Identify FOUR security threats against distributed system, suggest ways in which such threats can be mitigated. **(8 marks)**

QUESTION FIVE

a) Demonstrate the process of implementing a server socket using java syntax **(10 marks)**

b) How would you implement a client socket to communicate with the server socket. **(10 marks)**

END