



MAASAI MARA UNIVERSITY
UNIVERSITY EXAMINATIONS 2019/2020 ACADEMIC YEAR
SCHOOL OF SCIENCE AND INFORMATION SCIENCES
(REGULAR)

**FOURTH YEAR SEMESTER I EXAMINATIONS FOR THE BACHELOR OF
SCIENCE IN COMPUTER SCIENCE**

COURSE CODE: COM 4109
COURSE TITLE: COMPUTER SYSTEMS DESIGN

DATE:11/12/2019

TIME: 0830-1030

INSTRUCTIONS TO CANDIDATES

- ANSWER Question **ONE** and any other **TWO**

QUESTION ONE

- a) System structure and system behavior are two key properties of a system. Using diagrams, distinguish the difference between the two terms in relations to computer systems design. **[8 marks]**
- b) Elaborately give the meaning of computer “design” as opposed to computer “organization”. **[4 marks]**
- c) Using diagrams show the difference in design between the Harvard design and Princeton design. **[8 marks]**
- d) Discuss four challenges in the relations to the Von Neumann design **[4 marks]**
- e) Illustrate the processes involved in the design of computer systems, bearing in mind the costs in relations to performances. **[6 marks]**

QUESTION TWO

- a) Discuss SIX different steps that are followed during design at register level. **[6 marks]**
- b) Following the steps you indicated in the question above, show how a multifunction register can perform a control function such that: $Cond: E = E + F, G = G + H$. Comment on how it improves performance or otherwise and also whether it is cost effective. **[14 marks]**

QUESTION THREE

- a) Describe the main difference between combinational circuit designs versus sequential circuit designs. Give examples of each. **[4 marks]**
- b) Outline the design procedure of the combinational circuits. **[6 marks]**
- c) You are a system designer at *iUtel* Inc. Use the procedure you gave in (b) above to design a combinational logic circuit with three input variables. It is expected that it will yield *logic 1* output whenever more than one input variables are *logic 1*. Explain your design. **[10marks]**

QUESTION FOUR

- a) The classifications defined by Flynn are based upon the number of concurrent instructions (or control) and data streams available in the architecture. Discuss. **[14 marks]**

- b) Discuss each of the following taxonomies of parallel architecture designs in detail:
 - i. NUMA
 - ii. UMA
 - iii. ccNUMA

[6 marks]

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