



## **MASENO UNIVERSITY**

### **UNIVERSITY EXAMINATIONS 2016/2017**

**FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE  
DEGREE OF BACHELOR OF SCIENCE IN INFORMATION  
TECHNOLOGY**

### **MAIN CAMPUS**

### **CIT 104: COMPUTER ARCHITECTURE**

Date: 12<sup>th</sup> June, 2017

Time: 3.30 - 6.30 pm

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#### **INSTRUCTIONS:**

- Answer ALL questions in SECTION A and any other TWO from SECTION B
- Write your registration number on all sheets of the answer book used.
- Use a NEW PAGE FOR EVERY QUESTION attempted, and indicate number on the space provided on the page of the answer sheet.
- Mobile phones and PDAs are NOT allowed in the examination room.



**SECTION A: COMPULSORY QUESTION {30 MARKS}**

**QUESTION 1**

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- a) Explain the **FOUR** main structural components of a computer system. (8 Marks)
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- b) Differentiate between the following:
- i. Computer organization and computer architecture. (2 Marks)
  - ii. Computer structure and computer function. (2 Marks)
  - iii. *Seek time* and *Access time*, in relation to magnetic. (2 Marks)
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- iv. *Bandwidth* and *throughput*, in relation to computer bus architecture. (2 Marks)
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- c) Outline the **FOUR** functions of the computer system. (4 Marks)
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- d) Discuss the different types of ROM memory and their application areas in computer systems. (6 Marks)
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- e) Explain how the architecture of the processor can be modified to improve its performance and output. (4 Marks)
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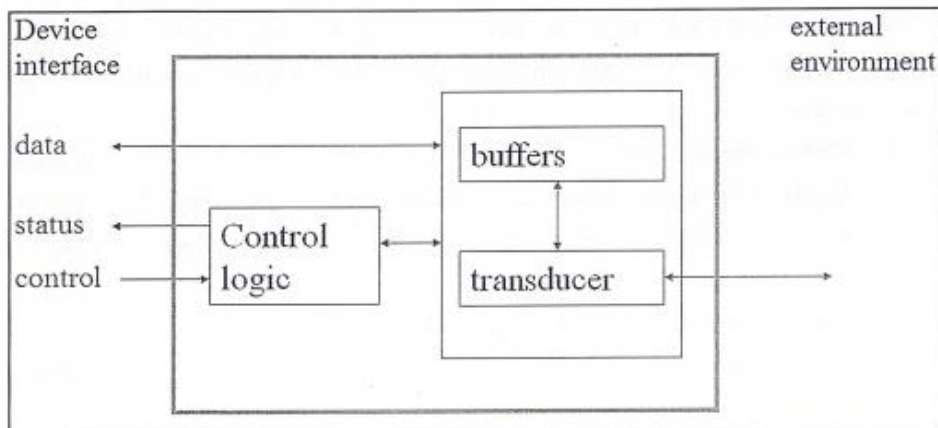
**SECTION B: ANSWER ANY TWO QUESTIONS (20 MARKS EACH).**

**QUESTION 2**

- a) Discuss the development of computers through the various generations, highlighting the significant changes that have occurred in the architecture. (8 Marks)
- b) Explain how memory hierarchy concept addresses the "*speed and capacity versus cost dilemma*". (4 Marks)
- c) Discuss any **FOUR** external factors that impact on the performance of the hard disk of a computer system (8 Marks)

**QUESTION 3**

- a) The image below shows the structure of an Input/Output module of a computing device. Explain how the modules functions by highlighting the function of each component. (8 Marks)



- b) The designer has **TWO** options of implementing a system bus in a computer system. The designer holds all other factors constant and tests the effect of *bus width* on performance of the computer system. The test is carried out on a **32 line bus** and a **36 line bus**. Assuming that it takes 20 nano seconds to transfer data from the processor registers to the main memory. Analyze the performance difference between the two proposed buses and recommend with justification, considering performance and cost. (8 Marks)

- c) Discuss the causes of hard disk failure and highlight how these manufacturers have attempted to solve these failures (4 Mark)

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**QUESTION 4**

- a) Explain the differences *Multiplexed* and *Dedicated* bus architecture implementations on cost and performance of a computer system. (6 Marks)
- b) Discuss Moore's law and its implication on design, performance and cost of computer systems and as well as on the economy the economy. (6 Marks)
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- c) Write short notes on each of the following cache replacement policies. (8 Marks)

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**QUESTION 5**

- a) Consider a magnetic disk drive with 8 surfaces, 512 tracks per surface, and 64 sectors per track. Sector size is 1 KB. The average seek time is 8 ms, the track-to-track access time is 1.5 ms, and the drive rotates at 3600 rpm. Successive tracks in a cylinder can be read without head movement.
- i. Compute the disk capacity (3 Marks)
  - ii. Compute the average access time, assuming that the file is stored in successive sectors and tracks of successive cylinders, starting at sector 0, track 0, of cylinder i. (3 Marks)
  - iii. Compute the time required to transfer a 5-MB file. (2 Marks)
  - iv. Compute the burst transfer rate. (2 Marks)
- b) Describe with the aid of a suitable diagram the Von Neumann machine, highlighting the radical changes proposed in this model and how these changes have impact the design of modern computers. (10 Marks)

END OF THE EXAM