BINDURA UNIVERSITY OF SCIENCEEDUCATION

FACULTY OF SCIENCEAND ENGINEERING

DEPARTMENT OF EDUCATIONAL TECHNOLOGY

CS113 Computer Organization and Architecture

Time 3 hours

Instruction to candidates

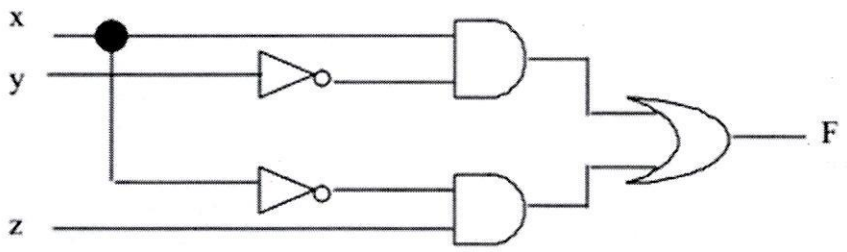
Answer all questions, each question carries 20 marks

Question 1

a. Draw the following logic gates and produce their truth table:

i. NAND gate. **[3]**
ii. NOR gate. **[3]**

b. Write the logic statement which corresponds with the following logic circuit: **[4]**



c. Explain the characteristics of a microprocessor. **[10]**

Question 2

a. Name and describe any four registers found in Von Neumann architecture. **[10]**

b. List four of micro-operations giving an example in each. **[10]**

Question 3

a. List **five** differences between interrupt and polling. **[10]**

b. What is virtual memory? **[2]**

c. Give two advantages and two disadvantages of virtual memory. **[8]**

Question 4

a. What is Cache? **[2]**

b. Discuss direct mapping in cache. **[8]**

c. Arrange and explain the order of memory devices based on the access time, cost and capacity. **[10]**

Question 5

a. What is a computer instruction? **[2]**

b. Explain the classifications of microprocessors based on the instruction. **[8]**

c. Consider the following reference string: **4, 2, 0, 1, 2, 6, 1, 4, 0, 1, 0, 2, 3, 5, 7**. Using the least recently used (LRU) page replacement algorithm with 4-page frames.

i. Determine the pages that are resident in cache after each page reference. **[6]**

ii. Find the number of page faults. **[2]**

iii. Find the number of hits. **[2]**