



BOWEN UNIVERSITY, IWO, NIGERIA
COLLEGE OF COMPUTING AND COMMUNICATION STUDIES
INFORMATION TECHNOLOGY PROGRAMME
B.SC. (HON) INFORMATION TECHNOLOGY
FIRST SEMESTER 2023/2024 EXAMINATION

COURSE CODE:	IFT 307	UNIT: 3UNITS	LEVEL: 300
COURSE TITLE:	COMPUTER ARCHITECTURE AND ORGANIZATION		
INSTRUCTION(S):	ANSWER QUESTION ONE AND ANY OTHER THREE		
TIME ALLOWED:	3HOURS		

Question One

- (a) The collection of different instructions that the processor can execute is referred to as the processor machine instruction. State four (4) elements of a machine instruction. **[4 marks]**
- (b) State and briefly explain four important instruction set design issues **[4 marks]**
- (c) Enumerate four (4) most important general categories of operands data. **[4 marks]**
- (d) Describe an Instruction set. **[2 marks]**
- (e) An instruction format defines the layout of the bit of an instructions, in terms of its constituent's fields. State and explain the instruction format for basic computer. **[1.5 marks]**
- (f) Describe in general terms the distinction between computer organization and computer architecture? **[2 marks]**
- (g) Describe in general terms the distinction between computer structure and computer function? **[2 marks]**
- (h) Central Processing Unit is tag as the most complex of computer structure. State and describe its major components. **[2 marks]**
- (i) For a given program, the execution time on machine A is 1s and on B is 10s. Find the performance or speed up of the machines. **[2 marks]**
- (j) Briefly characterize Little's law. **[1.5 marks]**

Question Two

- (a) With the aid of well labeled diagram, describe the von Neumann Architecture. **[5 marks]**
- (b) List and briefly define the main structural components of a computer. **[4 marks]**
- (c) The fetched instruction is loaded into a register in the processor which interprets the instruction and performs the required action. State and discuss the four (4) categories of the Instruction register. **[6 marks]**

Question Three

- (a) The control unit and the ALU contain storage locations called registers. State and discuss five (5) register for executing instructions from the memory. [5 marks]
- (b) Discuss the term “bus” and describe the major buses and their features [5 marks]
- (c) List and explain the key characteristics of a computer family. [5 marks]

Question Four

- (a) A certain program with 10, 000,000 instructions has an average CPI of 2.5 cycles/instruction and clock rate of 200MHz. When a new optimization compiler is deployed, the instruction count was reduced to 9, 500,000 with new CPI=3.0 cycles/instruction at modified clock rate of 300MHz. Find the speedup. [5 marks]
- (b) As designers wrestle with the challenge of balancing processor performance with that of main memory and other computer components, the need to increase processor speed remains. List and briefly define some of the techniques used in contemporary processors to increase speed. [6 marks]
- (c) Explain the differences among multicore systems, MICs, and GPGPUs. [4 marks]

Question Five

- (a) With the aid of well labeled diagram, explain Flynn's Taxonomy. [5 marks]
- (b) For a certain program with 10, 000, 000 instructions, find the execution time given the average CPI is 2.5 cycles/instruction and clock rate as 200MHz [6 marks]
- (c) Briefly explain the following representations: sign magnitude, and twos complement. [4 marks]

Question Six

- (a) Why is virtual memory important to a programmer? [4 marks]
- (b) With the aid of a diagram, discuss the hierarchy design of memory in a computer system [6 marks]
- (c) Why is memory hierarchy relevant in the organization of a computer system? [5 marks]