AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF ENGINEERING AND APPLIED SCIENCES

NCIS306: COMPUTER ARCHITECTURE AND ORGANISATION

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2024

LECTURER: DR. TENDAI ZENGENI

TIME: 3 HOURS

INSTRUCTIONS

You are required to answer questions as instructed.

Start **each** question on a new page in your answer booklet

Answer ***3 (THREE)*** *questions* **ONLY**

Credit will be awarded for logical, systematic and neat presentations

Total = 75 marks

1. An operating system is first loaded into the computer by a boot program. It then manages all the other application programs. The applications on your computer use the operating system to make requests for things to happen. Give a detailed account of the architectural differences between Windows and MacOS in terms of both hardware and software. **[25]**
2. Draw and label a CPU, complete with input and output detailing how a process of writing a CV, editing it, correcting the format, deleting some text, adding some text, adding a picture, performing calculations, the instructions/ instruction set used until it is saved and printed. **[25]**

3. a) Differentiate between computer architecture and computer organization. **[5]**

b) Explain the concept of virtual memory in computer systems highlighting its benefits. **[5]**

c) Differentiate a multi-processor system and a multi-computer system. **[5]**

d) Explain the purpose of Cache memory, how it operates, and its impact on system performance. Identify the different types of Cache. **[5]**

e) What is RAM & ROM. Give different types of RAM and ROM. **[5]**

4. a) Explain the concept of computer organization and architecture in the context of computing systems. **[4]**

b) With the aid of examples define an algorithm **[3]**

c) Discuss what these international organisations govern with regards to computing:

i. IEEE **[4]**

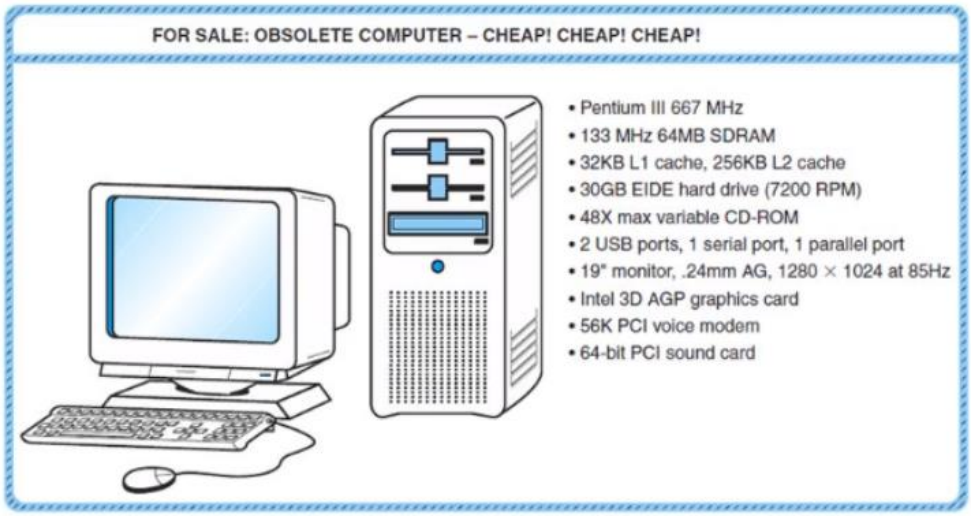
ii. ITU **[4]**

iii. ISO **[4]**

d) Discuss the function of Registers within a computer system. **[4]**

e) Draw a Register and label it. **[2]**

5. Look at this advertisement below and answer the questions



Look at the components of the computer in the advertisement and discuss the changes compared to today's computers. Discuss the evolution of the computer components in context with computers of today. **[25]**

6. a) Fill in the table with the names of the logic gates. **[7]**

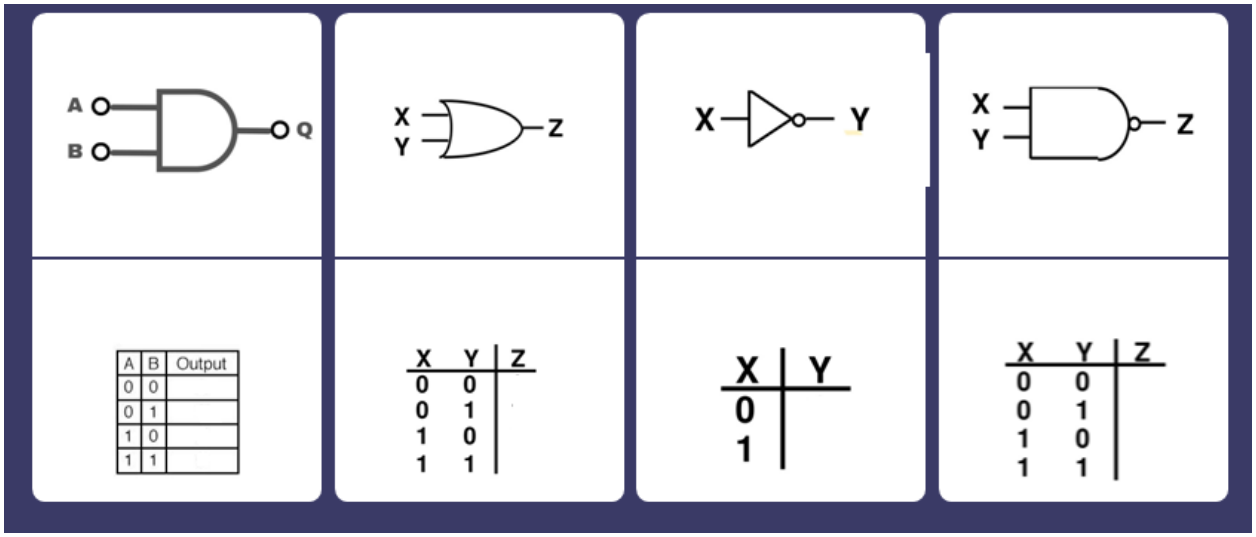
Logic Gate (AND, OR, XOR NOT, NAND, NOR & XNOR)

Logic Gate	Symbol
	
	
	
	
	
	
	

b) What is a logic gate? **[3]**

c) A typical digital computer system has four basic functional elements: (1) input-output equipment, (2) main memory, (3) control unit, and (4) arithmetic-logic unit. Elaborate and give examples. **[15]**

7. Fill in the blanks for the output in the Boolean logic gates.

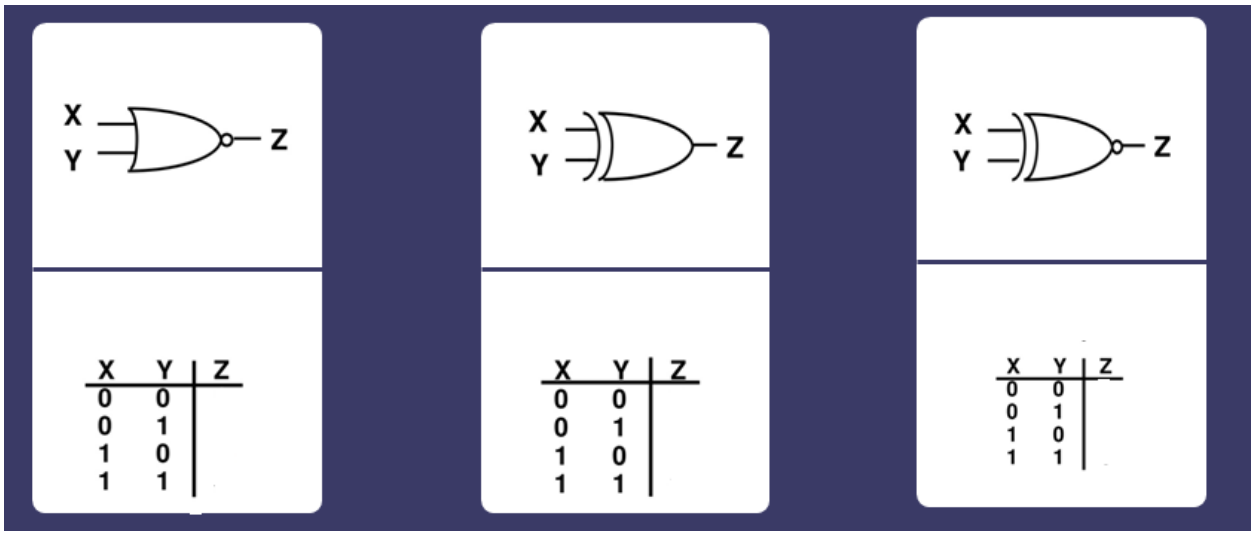


A	B	Output
0	0	
0	1	
1	0	
1	1	

X	Y	Z
0	0	
0	1	
1	0	
1	1	

X	Y
0	
1	

X	Y	Z
0	0	
0	1	
1	0	
1	1	



X	Y	Z
0	0	
0	1	
1	0	
1	1	

X	Y	Z
0	0	
0	1	
1	0	
1	1	

X	Y	Z
0	0	
0	1	
1	0	
1	1	

[25]

END OF EXAMINATION