Main Memory

EVALUATION SHEET

1. The table below presents two types of storage and their characteristics. Complete the table by writing the correct letters in the spaces provided.

Storage Types

Characteristic	Main Memory	Auxiliary
Access time	b	a
Storage capacity	c	d
Cost per bit	f	e

Access Time	Storage Capacity	Cost per Bit
a. Slower	c. Smaller	e. Smaller
b. Faster	d. Larger	f. Larger

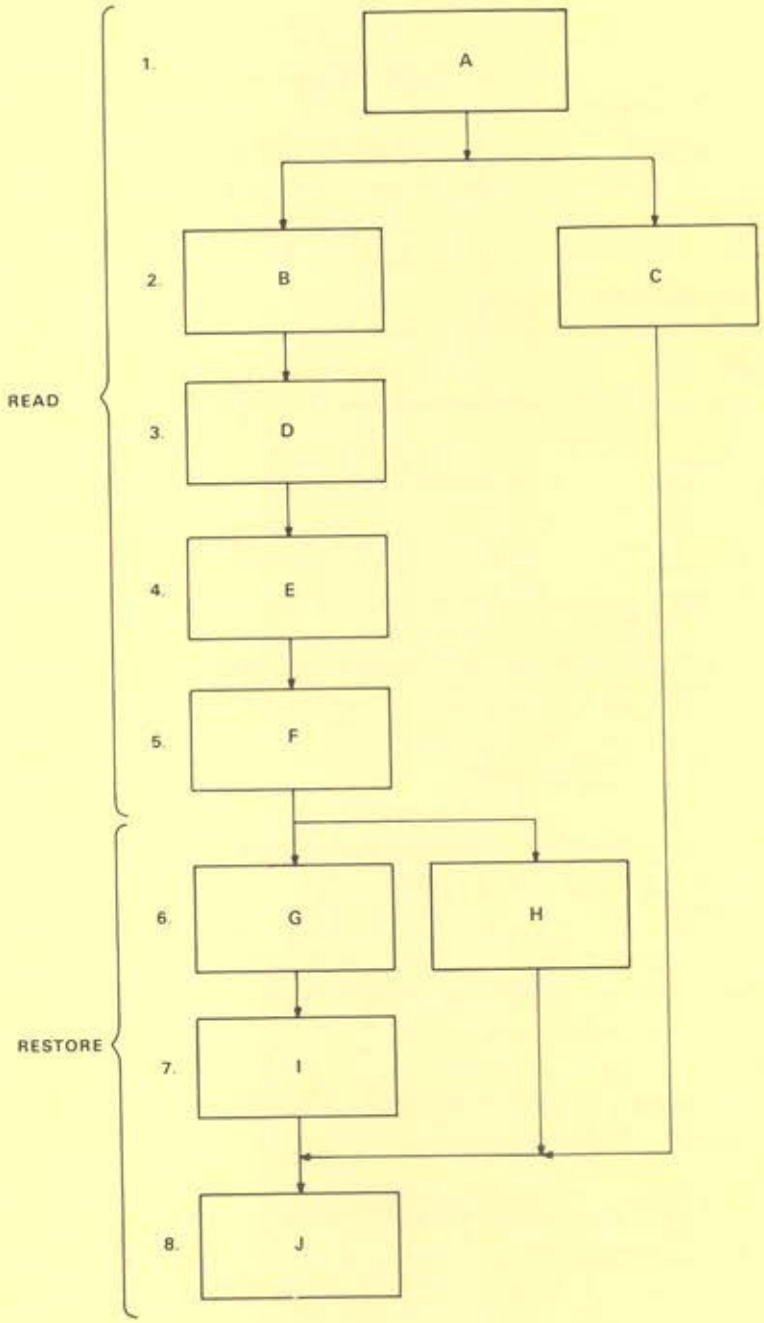
2. Indicate that the statements below refer to the read cycle (R) or the write cycle (W) by writing the correct letter in the space provided.

Statement	Cycle
Process by which main memory receives only an address from the processor.	R
Process by which main memory receives an address *and* a word of information from the central processor.	W
Stores the word of information in the proper location in the medium.	W
Locates and sends a word of information to the central processor.	R

3. *Part A*

Match each core memory cycle step with the corresponding position in the flowchart by writing the correct letter in the space provided.

Core Memory Cycle



Step	Position	Step	Position
X-Y current sets selected location to 0s.	D	Memory sends data to central processor.	H
Location select circuit determines X-Y coordinates.	B	Read/write circuit sends inhibit current for 0s.	G
Changed cores induce current on sense wire.	E	Control current sends "done" to the processor.	J
Memory receives address and control information.	A	X-Y current restores 1 bits in selected location.	I
Control circuit sends "busy" to the processor.	C	Read/write circuit sets memory buffer using sense wire.	F

Part B

Indicate the effect of the above steps on the contents of the memory location by writing N (for nothing), S (for set to 0s), or R (for previous contents restored) in the space provided.

Steps*	Effect on Memory Location
1	N
2	N
3	S
4	N
5	N
6	N
7	R
8	N

*Numbers 2 and 6 are double steps.

4. The four major parts of main memory and their functions are given below. Match each part with its function.

Major Part	Function
Location Select Circuit	c
Medium	d
Read/Write Circuit	b
Control Circuit	a

Functions

a. Oversees the operation of other parts.

b. Transfers information between a selected location and the memory buffer register, and between the memory buffer register and the CPU.

c. Receives the address from the central processor, stores and analyzes it and sends out X and Y coordinate signals.

d. Physically holds information.

5. For each statement below, write a T if the statement describes a major characteristic of core memory. Write an F is the statement does not describe a major characteristic of core memory.

Statement	T or F
It is non-volatile.	T
Each of its core planes includes several sense wires and inhibit wires.	F
It is composed of iron ferrite cores threaded with wire.	T
Any current flowing through an individual core will affect the magnetic field of the core.	F
Can perform a read or a write cycle in just one operation.	F
Its memory cycle requires both a read and a write operation.	T

6. For each statement below, write a T if the statement describes a major characteristic of semiconductor memory. Write an F if it does not describe a major characteristic of semiconductor memory.

Statement	T or F
Uses circuit boards.	T
Mass produced on a circuit chip.	T
Its volatility is a disadvantage.	T
Its memory chips are not capable of performing logic functions without help.	F
Faster than a core memory.	T
Memory chip capacity ranges from 1K to 20K bits.	F

7. The table below presents types of storage and their characteristics. Complete the table by writing the correct letters in the spaces provided.

Characteristic	Storage Types		
	Semiconductor		
	MOS	Bipolar	Core
Storage Element	a	c	b
Memory Cycle Time	f	e	d
Cost Per Bit	h	g	i
Power Consumption	l	j	k
Volatility	m	m	n

Storage Element

a. Cell
b. Ferrite
c. Flip-flop

Memory Cycle Time

d. 900 ns
e. <300 ns
f. 300–800 ns

Cost Per Bit

g. 1–2¢
h. 0.3–0.8¢
i. 0.3–0.5¢

Power Consumption

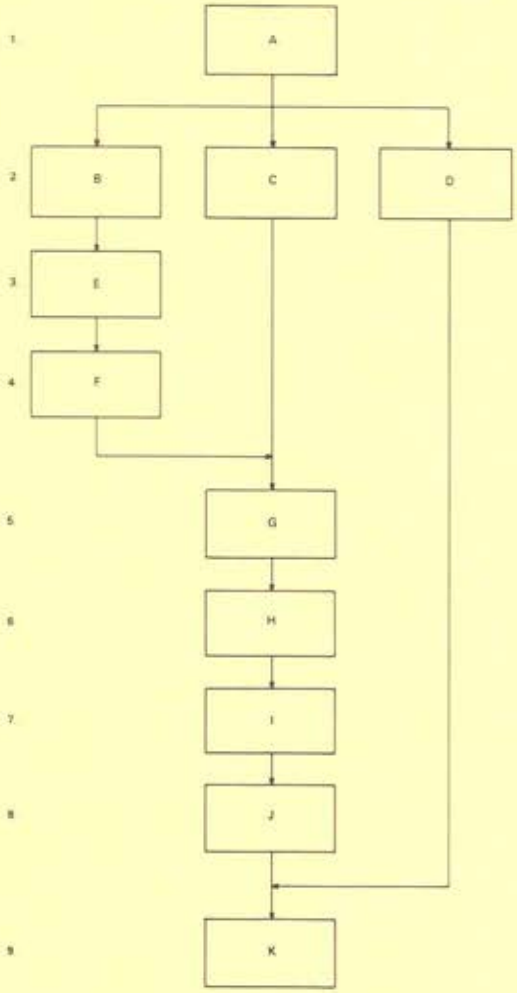
j. High
k. Low
l. Medium

Volatility

m. Yes
n. No

8. Match each semiconductor memory cycle step with its corresponding position in the flowchart by writing the correct letter in the space provided.

Semiconductor Memory Cycle



Step	Position
Location select circuit determines X-Y coordinates.	B
Location select circuit puts 1 on X-Y coordinates.	E
Memory receives address and control information.	A
Control circuit sends "busy" to the processor.	D
Control circuit puts 1 on read wire.	C
Location enable at selected location becomes 1.	F
Control circuit ends "done" to the processor.	K
Read/write circuit sets buffer register from read data wires.	I
Read enable at selected location becomes 1.	G
Read/write circuit sends data to the processor.	J
Values of flip-flops gated onto read data wires.	H

9. Four options for improving the performance of main memories, their definitions, and reasons for use are given below. Match each option with its definition and reason for use.

Option	Definition	Reason for Use
Cache Memory	c	h
Memory Interleaving	d	f
Read-Only Memory	b	e
Auxiliary Power Supply	a	g

Definitions

a. A device that provides electrical power to semiconductor memories when the external power fails.

b. A memory whose contents cannot be written.

c. A small semiconductor memory used in conjunction with core memory to hold the data from the most recent memory reference.

d. A technique for overlapping core memory references to sequential memory locations by having sequential locations in alternate memory units.

Reasons for Use

e. If power fails or the computer system malfunctions, the contents of the memory will not be destroyed.

f. Allows processor to make another memory reference without waiting for core memory to complete the last half of its cycle.

g. If power fails, contents of volatile semiconductor memory will not be lost.

h. Speeds up memory references without the high cost and volatility of a completely semiconductor memory system.