Q1

1- What are the four main functions and components of a general purpose computer?

2- Draw structural components of Van computer.

3- Explain Moore's law.

Q2 Find the word or phrase from the list below that best matches the description in the following questions. Use the numbers to the left of words in the answer. Each answer should be used only once.

1.1 Active part of the computer, following the instructions of the programs to the letter. It adds numbers, tests numbers, controls other components, and so on.
1.2 Approach to the design of hardware or software. The system consists of hierarchical layers, with each lower layer hiding details from the level above.
1.3 Binary digit.
1.4 Collection of implementations of the same instruction set architecture. They are usually made by the same company and vary in price and performance.
1.5 Component of the computer where all running programs and associated data reside.
1.6 Component of the processor that performs arithmetic operations.
1.7 Component of the processor that tells the datapath, memory, and I/O devices what to do according to the instructions of the program.
1.8 Computer designed for use by an individual, usually incorporating a graphics display, keyboard, and mouse.
1.9 Computer inside another device used for running one predetermined application or collection of software.
1.10 Computer used for running larger programs for multiple users often simultaneously and typically accessed only by a network.
1.11 Computer network that connects a group of computers by a common transmission cable or wireless link within a small geographic area (for example, within the same floor of a building).
1.12 Computer networks that connect computers spanning great distances, the backbone of the Internet.
1.13 High-performance machine, costing more than $1 million.
1.14 Integrated circuit commonly used to construct main memory.
1.15 Microscopic flaw in a wafer.
1.16 Nickname for a die or integrated circuit.
1.17 On/off switch controlled by electricity.
1.18 Optical storage medium with a storage capacity of more than 4.7 GB. It was initially marketed for entertainment and later for computer users.
1.19 Percentage of good dies from the total number of dies on the wafer.
1.20 Program that converts a symbolic version of an instruction into the binary version.
1.21 Program that manages the resources of a computer for the benefit of the programs that run on that machine.
1.22 Program that translates from a higher-level notation to assembly language.
1.23 Technology in which single chip that contains hundreds of thousands to millions of transistors.
1.24 Single software command to a processor.
1.25 Small, fast memory that acts as a buffer for the main memory.
1.26 Specific interface that the hardware provides the low-level software.
1.27 Substance that does not conduct electricity well but is the foundation of integrated circuits.
1.28 Thin disk sliced from a silicon crystal ingot, which will be later divided into dies.

1 abstraction
2 assembler
3 bit
4 cache
5 central processor unit (CPU)
6 chip
7 compiler
8 computer family
9 control
10 datapath
11 desktop or personal computer
12 Digital Video Disk (DVD)
13 defect
14 DRAM (dynamic random access memory)
15 embedded system
16 instruction
17 instruction set architecture
18 local area network (LAN)
19 memory
20 operating system
21 semiconductor
22 server
23 supercomputer
24 transistor
25VLSI (very large scale integrated circuit)
26 wafer
27 wide area network (WAN)
28 yield

Q3 1-

A benchmark program is run on a 40 MHz processor. The executed program consists of 100,000 instruction executions, with the following instruction mix and clock cycle count:

Instruction Type	Instruction Count	Cycles per Instruction
Integer arithmetic	45000	1
Data transfer	32000	2
Floating point	15000	2
Control transfer	8000	2

Determine the effective CPI, MIPS rate, and execution time for this program.

2-

Consider two different machines, with two different instruction sets, both of which have a clock rate of 200 MHz. The following measurements are recorded on the two machines running a given set of benchmark programs:

Instruction Type	Instruction Count (millions)	Cycles per Instruction
Machine A		
Arithmetic and logic	8	1
Load and store	4	3
Branch	2	4
Others	4	3
Machine A		
Arithmetic and logic	10	1
Load and store	8	2
Branch	2	4
Others	4	3

3- Shows the execution times in sec for the five different benchmark programs on the machines:

a) Compute the speed metric for each speed metric for each processor for each benchmark, normalized to machine R.

Benchmark	Processor		
	R	M	Z
E	417	244	134
F	83	70	70
H	66	153	135
I	39,449	35,527	66,000
K	772	368	369

In addition to: Exercises 4.8:
4.1; 4.2; 4.3; 4.7; 4.8; 4.9, 4.12, 4.13, 4.14, 4.17, 4.18, 4.45,