HARDWARE PAPER 2

Section A

1) Compare and contrast SRAM and DRAM in terms of their construction and use.
2) What are the key differences between RAM and ROM in terms of functionality?
3) Describe how data is transferred between the CPU and memory.
4) What is the role of cache memory in improving processing speed?
5) Explain how a hard disk drive stores and retrieves data.
6) How does wear leveling in flash memory devices extend their lifespan?
7) Discuss the limitations of PROM in modern computing systems.
8) Describe how a 3D printer can be used in the design and testing of hardware components.
9) What are the challenges associated with using optical storage in modern systems?
10) Explain the significance of secondary storage in data management.
11) How does data fragmentation affect the performance of a hard drive?
12) Describe the process of formatting a hard drive.
13) What are the advantages of solid-state drives (SSDs) over hard disk drives (HDDs) in terms of speed and reliability?
14) Explain the concept of dual-layer DVDs and how they store more data than single-layer DVDs.
15) How does a mechanical mouse work, and what are its limitations?
16) Describe the differences between a wired and wireless mouse in terms of connectivity and performance.
17) Explain the operation of a digital-to-analog converter (DAC) in controlling a motor.
18) How does the capacitive touch screen technology work?
19) Compare flash memory with EEPROM in terms of usability and data retention.
20) What is a programmable ROM (PROM), and how does it differ from standard ROM?
21) Discuss the benefits and drawbacks of using cloud storage for data backup.
22) Explain the operation of a heat sink and its importance in cooling systems.
23) What is the purpose of using registers in memory management?
24) Describe how memory paging works in an operating system.
25) What are the benefits of using embedded systems in industrial automation?
26) How does a virtual reality (VR) headset work to simulate real-world experiences?
27) What are the challenges of using OLED technology in large displays?

28)How does the structure of a NAND flash memory differ from a NOR flash memory?
29)Discuss the role of sensors in a microprocessor-controlled environment.
30)How does a resistive touch screen detect user input?
31)Describe the process of reading data from an EEPROM.
32)What are the advantages of using DRAM in mobile devices?
33)How does a microprocessor use ADC and DAC converters to control devices?
34)What is the difference between EEPROM and Flash memory?
35)How does an inkjet printer create color prints?
36)Explain the significance of latency in hard disk performance.
37)How does the organization of data into blocks improve hard drive efficiency?
38)Describe the difference between synchronous and asynchronous DRAM.
39)What is the role of a printer buffer in document printing?
40)How does a microprocessor process data from a sensor?
41)Explain the function of an interrupt in a microprocessor system.
42)How does a USB flash drive store and retrieve data?
43)Discuss the difference between a solid-state drive (SSD) and a hard disk drive (HDD) in terms of power consumption.
44)Describe the importance of write protection in storage devices.
45)How do multi-level cell (MLC) and single-level cell (SLC) technologies differ in flash storage?
46)How does a 3D printer differ from traditional manufacturing techniques?
47)Explain the purpose of a digital signal processor (DSP) in embedded systems.
48)Describe the structure of a multi-layer DVD and its impact on storage capacity.
49)How does a microprocessor interpret inputs from a keyboard?
50)What are the advantages of using solid-state drives in high-performance computing systems??

Section B

1) Compare and contrast SISD and SIMD architectures.
2) Explain how pipelining works in a RISC processor with an example.
3) How does a processor use registers to enhance performance?
4) What are the advantages of using parallel processing in scientific computations?
5) Describe the limitations of pipelining in a CPU.
6) What is meant by "instruction-level parallelism"?
7) How does a memory hierarchy improve CPU efficiency?
8) Explain the role of pipelining in instruction execution.
9) Compare multicore processors with massively parallel computers.
10) Describe how a CISC processor handles complex instructions.
11) How do RISC processors optimize the execution of instructions?
12) What are the challenges in implementing SIMD architecture?
13) How does parallel processing overcome the Von Neumann bottleneck?
14) Explain the concept of an interrupt handler.
15) How does a multicore processor manage multiple threads?
16) What is a "control unit," and how does it manage CPU operations?
17) How does a CPU handle memory read and write operations?
18) What are the main differences between DRAM and SRAM?
19) Explain how parallelism is achieved in a SIMD architecture.
20) What is the importance of using general-purpose registers in a CPU?
21) Describe the differences between MISD and MIMD architectures.
22) How does a CPU manage concurrent processes in a multicore system?
23) What are the challenges associated with pipelining in modern CPUs?
24) Explain how a processor uses the stack to handle function calls.
25) What is the role of the ALU in executing arithmetic instructions?
26) How do processors handle interrupts and exceptions?
27) Explain how instruction pipelining can lead to data hazards.
28) What is the significance of instruction pre-fetching in modern CPUs?
29) Describe how parallelism improves performance in a MIMD system.
30) What are the key differences between CISC and EPIC architectures?

31) Explain the concept of "branch prediction" in a CPU.
32) How does a cache controller manage data in a CPU?
33) What is the role of the memory management unit (MMU) in a CPU?
34) How does the instruction pipeline in a superscalar processor work?
35) What are the challenges in designing an efficient instruction set?
36) Describe the architecture of a multicore processor.
37) How does a CPU execute a conditional branch instruction?
38) What is the role of the clock in synchronizing CPU operations?
39) How do interrupts affect pipelined instruction execution?
40) What is the role of SIMD in modern GPUs?
41) How do CPUs handle simultaneous execution of multiple instructions?
42) Explain the concept of data parallelism in SIMD systems.
43) What is a control hazard in pipelining, and how is it managed?
44) How does a processor handle data dependency in pipelined instructions?
45) What are the benefits of using RISC architecture in mobile devices?
46) Describe how a CPU handles speculative execution.
47) What are the challenges in scaling multicore processors?
48) How does a multicore processor execute parallel threads?
49) Explain the significance of instruction set design in CPU performance.
50) How does parallel processing affect energy consumption in modern CPUs?