Q.1

    a. Explain the role of timing and control used in the design of computer organization.

Answer: Page Number 390-391 of Text Book I

    b. Compare isolated I/O and memory-mapped I/O.

Answer: Page Number 388-389 of Text Book I

    c. Explain delayed load and delayed branch in RISC pipeline operations.
Answer: Page Number 315-319 of Text Book I

    d. Explain memory interleaving. Give its respective advantages.

Answer: Page Number 324-325 of Text Book I

    e. Give any two examples for each of the following:
      (i) Arithmetic microoperations
      (ii) Logic microoperations

Answer: Page Number 102-103, 108-110 of Text Book I

    f. Explain priority interrupt. Mention the role of polling in priority interrupt.
Answer: Page Number 407-408 of Text Book I

    g. Explain fixed-point data representation and floating-point data representation used digital systems. Give an example with illustration.
Answer: Page Number 77-79, 83-85 of Text Book I

Q.2
    a. Explain the metrics used in the performance of a computer.
Answer:

a. The most important measure of the performance of a computer is how quickly it can execute programs. The speed with which a computer executes programs is affected by the design of its hardware and its machine language instructions. Because programs are usually written in a high-level language, performance is also affected by the compiler that translates programs into machine language. For best performance, it is necessary to design the compiler, the machine instruction set, and the hardware in a coordinated way. Clock - Processor circuits are controlled by a timing signal called a clock. The clock defines regular time intervals, called clock cycles. To execute a machine instruction, the processor divides the action to be performed into a sequence of basic steps, such that each step can be completed in one clock cycle. 187-191

b. Draw the flow chart of first pass assembler and second pass assemble. Explain its working mechanism.
Answer: Page Number 187-191 of Text Book I

c. Explain how stacks are used in subroutines. Give an example with illustration.
Answer: Page Number 247-251 of Text Book I

Q.3
a. What is the significance of the addressing modes? Explain the following addressing modes with an example:
(i) Implied mode
(ii) Register Indirect Mode
(iii) Indirect Address Mode
Answer: Page Number 261-262, 263 of Text Book I

b. Explain the organization of register stack and memory stack.
Answer: Page Number 249-252 of Text Book I

c. Explain register transfer logic. Give an example to illustrate bus and memory transfer operations.
Answer: Page Number 95-100 of Text Book I
Q.4
a. Explain the working of microprogram sequencer. Draw the respective block diagram.
Answer: Page Number 232-235 of Text Book I

b. Explain horizontal microinstruction and vertical microinstruction.
Answer:

b. In horizontal microinstruction, there is one bit for each internal processor control line and one bit for each system bus control line. There is a condition field indicating the condition under which there should be a branch, and there is a field with the address of the microinstruction to be executed next when a branch is taken. in a horizontal microinstruction every bit in the control field attaches to a control line

In a vertical microinstruction, a code is used for each action to be performed, and the decoder translates this code into individual control signals. The advantage of vertical microinstructions is that they are more compact (fewer bits) than horizontal microinstructions, at the expense of a small additional amount of logic and time delay.

c. Show how a 9-bit microoperation field in a microinstruction can be divided into subfields to specify 46 microoperations. How many microoperations can be specified in one microinstruction?
Answer:

c. 5-bits $2^5 - 1 = 31$ microoperations
4-bits $2^4 - 1 = 15$ microoperations

Total 46 microoperations

Q.5

   a. Describe various types of auxiliary memory used in digital systems.
Answer: Page Number 453-456 of Text Book I

   b. Explain segmented-page mapping.
Answer: Page Number 477-479 of Text Book I

   c. Write short notes for each for the following:
      (i) Associative mapping
      (ii) Direct mapping
      (iii) Set-associative mapping

 Answer: Page Number 466-471 of Text Book I

   Q.6

   a. Explain DMA based data transfer. Give the respective block diagram.
Answer: Page Number 415-419 of Text Book I

   b. Give at least six status conditions for the setting of individual bits in the status register
      of an asynchronous communication interface.
Answer:

  b. Six Conditions

     (i)   Output flag to indicate when transmitter register is empty
     (ii)   Input flag to indicate when the receiver register is full
     (iii)   Enable interrupt if any flag is set
     (iv)   Parity error
     (v)   Framing error
     (vi)   Overrun error

   c. A virtual memory has a page size of 1K words. There are eight pages and four blocks.
      The associative memory page table contains the following entries:

Page	Block
0	3
1	1
4	2
6	0

Answer:

Page	Address	Addresses that will cause page fault
2	2K	2048-3071
3	3K	3072-4095
5	5K	5120-6143
7	7K	7168-8191

Q.7

    a. Explain the characteristics of CISC and RISC architectures.
Answer: Page Number 283-285 of Text Book I

    b. Explain the following:

    (i)   Pipeline processing

    (ii) Vector processing

    (iii) Array processors

Answer: Page Number 302-303, 319-320, 326-327 of Text Book I

Text Books

1. Morris Mano-Computer System Architecture-PHI, Eastern Economy Edition-2001

2. John D. Carpinelli-Computer Systems Organization and Architecture-Pearson Education Asia 1st Edition