Q1)-a) -i) 9145

a)-ii) 9b45

a)-iii) Bit sequence of 45 = 0100 0101
Bit sequence of b6 = 1011 0110

Bit sequence of 9b45 = 1001 1011 0100 0101

Each hexadecimal method can represent four bits, so if you encode it into a bit sequence, binary sequence, and produce a total of 16 bits.
(https://simple.wikipedia.org/wiki/Hexadecimal)

b) when the sequence starts with 0, the number is positive or 0.
when the sequence starts with 1, the number is negative or less than 0.

0100 0101 converts to 8-bit two's complement: 1011 1011 = x
1011 0110 converts to 8-bit two's complement: 0100 1010 = y

So,

Powers	-128	64	32	16	8	4	2	1
Diff	59							
digits	1	0	1	1	1	0	1	1

1011 1011 = -128*1 +64* 0 + 32*1 + 16*1 + 8*1 + 4*0 + 2*1 + 1*1 = -128 + 32 + 16 + 8 + 2 + 1= -69

Powers	-128	64	32	16	8	4	2	1
Diff	126	62	30	14	6	2	0	
digits	0	1	0	0	1	0	1	0

0100 1010 = 128*0 + 64*1 + 32*0 + 16*0 + 8*1 + 4*0 + 2*1 + 1*0 = 64 + 8 + 2 =74

So,
x= -69 , negative
y = 74 , positive

c) x + y = -69 + 74 = 5

$$\begin{array}{l} 1011\ 1011 \\ \underline{0100\ 1010\ +} \\ \underline{1\ 1111\ 0100\ carries} \\ 1\ 0000\ 0101\ solution \end{array}$$

In 8-bit two's complement, 0000 0101 represents 4 + 1 =5.

d) Hex = 9b45
in ASCII, 9 = 57th hex =39
b = 98th hex = 62
4 = 52th hex =34
5 = 53th hex = 35
Four characters represented in UTF-8 are 39 62 34 35.

Character encoding is a method of converting text data into binary numbers. This means that a particular character is assigned a unique numeric value and can be converted into a binary language. The ASCII code consists of 7 bits and can be represented by 128 characters, including letters, numbers, special characters and symbols for English. However, the ASCII code alone cannot express every language. The solution is Unicode. UTF-8 is an encoding method using Unicode, which uses one byte of English/numeric/symbol, while other languages use one byte to four bytes. UTF-8 Unicode is 100% compatible with ASCII code in English. (100 words)

e)

Real number (base 10)	Scientific notation (base 10)	mantissa	exponent
10.25	$1.025 * 10^1$	1.025	1

base 2 representation: $(1010.01)_2$
scientific representation in base 2: $1.01001*2^3$
mantissa:1.01001
sign bit: 0 (it is positive number)
exponent bits (11bits): 1 + 1023 =1024, so the exponent 11 bits will be 10000000010
fraction bits (52bits): mantissa is 1.01001 (ignore the sign), so the fraction bits will be 01000000 00100100 10000000 00000000 00000000 00000000 00000000 00000000
so the overall 64 bit sequence is: 0100 00000010 01000000 00100100 10000000 00000000 00000000 00000000 00000000 00000000

base 2 representation: $(101.001)_2$
scientific representation in base 2: $1.01001*2^2$
mantissa:1.01001
sign bit: 0 (it is positive number)
exponent bits (11bits): 2 + 1023 =1025, so the exponent 11 bits will be 10000000001
fraction bits (52bits): mantissa is 1.01001 (ignore the sign), so the fraction bits will be 01000000 00010100 10000000 00000000 00000000 00000000 00000000 00000000
so the overall 64 bit sequence is: 0100 00000001 01000000 00010100 10000000 00000000 00000000 00000000 00000000 00000000

Because both 10.25 and 5.125 have the same value of mantissa (1.01001), fraction bits are the same, but exponent bits are different. Therefore, the two representation of overall 64 bits look very similar. (33 words)

Q2)-a)-i)
a)-ii)
a)-iii)
b)-i)
b)-ii)
c)
d)-i)
d)-ii)

Q3)-a) CISC commands are 1 to 15 bytes in length, so requiring 5 to 6 bytes commands to load the 32-bit constant into the 32-bit register. RISC command is fixed at 4 bytes. Therefore, RISC requires two (or more) 4 bytes commands to load the 32bit constant into the register. Therefore, the RISC file is likely to be larger. (55 words)

b)

2. addi $t1, $zero, 5

$t1	9	9	9	9	?
$t2	10	10	10	10	10
$s0	10	10	10	10	10

c)

6 addi $t1 , $zero , 4
7 addi $t2 , $zero , 5

Q4)-a)-i) MAC addresses are assigned by the company that created the network interface controller (NIC card) and stored on hardware. It assigns a unique address that does not overlap with other MAC addresses and consists of 48 bits. MAC addresses uniquely identify each node in that segment and can help distinguish frames for a specific host. (55 words)

a)-ii) IP address is the address of 32 bits assigned to the interface of the host or router equipment. This address allows devices to recognize and communicate with each other. (29 words)

a)-iii) The port is a "logical connection" and is used by client programs as a way to specify specific server programs on the network, especially when using the Internet protocol TCP/IP. This means that each application (service) is assigned its only logical address, the Port number, so that the transport layer can distinguish the application. (54 words)

a)-iv) Indicates the location of the send byte flow of data within the TCP segment. Packets that are delivered to different hosts are delivered across multiple different paths, which can cause the packet to be in reverse order. (37 words)

b) I think we should choose one with a small packet size. Because on the network, multiple computers, not one computer, receive data simultaneously, and if you don't send it separately, other computers have to wait until one computer receives all data. I think it's efficient to divide data into smaller pieces and send and receive data. (56 words)

c)-i) Correct. but using other devices.

c)-ii) Incorrect. MAC address is arbitrarily changed due to personal problems (e.g. blocking specific sites, etc.).

c)-iii) Correct. In the physical layer, the information in the data is converted to an electrical bolt (volt) and sent through the medium to the other person's receiving device.

c)-iv) Incorrect.

c)-v) Incorrect. HTTP is extensible. That is, because of scalability, it is used today to post (POST) content to the server, such as images and video or HTML form results, as well as hypertext documents.