

[arch - 1 April](#)

are a highly motivated student, who takes full responsibility for your learning. A reflective learner, who recognises areas for development and is committed to personal improvement. An organised learner who always completes class work and homework to a very high standard.

Question 1

Correct

Mark 1.00 out of 1.00

Write the floating point number -456×10^0 as a real number.

Answer: -456



The correct answer is: -456

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:06	Saved: -456	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **2**

Correct

Mark 2.00 out of 2.00

The following numbers are written in base 2 complements with an eight bit word;

A = 11110100 and B = 00001011.

What is B-A?

Answer: 00010111



The correct answer is: 00010111

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:18	Saved: 10111	Answer saved	
3	3/04/22, 13:31	Saved: 00010111	Answer saved	
4	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **3**

Correct

Mark 1.00 out of 1.00

Write the real number 0.002567 in floating point notation **with a mantissa of five digits**.

When answering the above question use the E notation to express the powers of 10. For example, 1.23×10^6 is represented as $1.23 \times 10E6$. (which is $12300 \times 10E2$ with a mantissa of five digits).

Answer: 

The correct answer is: $25670 \times 10E-7$

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:21	Saved: $25670 \times 10E-7$	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **4**

Correct

Mark 1.00 out of 1.00

All electronic signals (both digital and analog) degrade as they move down a line.

Select one:

☒ True ☐ False

The correct answer is 'True'.

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:21	Saved: True	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **5**

Correct

Mark 1.00 out of 1.00

Write the real number -596.886 in floating point notation **with a mantissa of five digits**.

When answering the above question use the E notation to express the powers of 10. For example, 1.23×10^6 is represented as $1.23 \times 10E6$. (which is $12300 \times 10E2$ with a mantissa of five digits).

Answer: 

The correct answer is: -59689 10E-2

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:23	Saved: -58689*10E-2	Answer saved	
3	3/04/22, 14:33	Saved: -59689*10E-2	Answer saved	
4	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **6**

Correct

Mark 1.00 out of 1.00

Is the perception of light brightness from the sun an example of a analogue or a discrete data type?

Select one:

- ☒ a. Analogue ✓
- ☐ b. Discrete

The correct answer is: Analogue

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:23	Saved: Analogue	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **7**

Complete

Not graded

Huffman tree is constructed for the following data: {A, B, C, D, E} with frequency {0.17, 0.11, 0.24, 0.33 and 0.15} respectively. 100 00 01101 is decoded as::

Answer: CDDDB

The correct answer is: BACE

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 15:59	Saved: CDDDB	Answer saved	
3	3/04/22, 16:05	Attempt finished	Complete	0.00

Question 8

Incorrect

Mark 0.00 out of 1.00

The run-length compression method done in class works on numeric data.

Select one:

☒ True ✖

☐ False

The correct answer is 'False'.

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:25	Saved: False	Answer saved	
3	3/04/22, 14:39	Saved: True	Answer saved	
4	3/04/22, 16:05	Attempt finished	Incorrect	0.00

Question 9

Correct

Mark 2.00 out of 2.00

Using 2s complement notation with a word length of 6 bits, let $A=111110$ and $B=000010$.

Compute, using complements arithmetic: $A+B$

Answer: 000000



The correct answer is: 000000

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:31	Saved: 000000	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question 10

Correct

Mark 2.00 out of 2.00

With a total range of 0-99 with 0-49 for positive numbers and 50-99 for negative numbers, compute the 10s complements representation of -13.

Answer: 87



The correct answer is: 87

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:33	Saved: 87	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question 11

Correct

Mark 3.00 out of 3.00

Using 2s complement notation with a word length of 6 bits, let A=111110 and B=000010.

Compute, using complements arithmetic: -B

Answer: 111110



The correct answer is: 111110

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:34	Saved: 111110	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	3.00

Question 12

Complete

Not graded

A text is made up of the characters a, b, c, d, e each occurring with the probability 0.11, 0.40, 0.16, 0.09 and 0.24 respectively. The optimal Huffman coding technique will have the average length of : (to 2 decimal places)

Answer: 2.80

The correct answer is: 2.16

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 16:00	Saved: 2.80	Answer saved	
3	3/04/22, 16:05	Attempt finished	Complete	0.00

Question **13**

Correct

Mark 1.00 out of 1.00

Write the floating point number 567567×10^{-5} as a real number.

(You may choose to round-off two decimal places)

Answer: 5.68



The correct answer is: 5.67567

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:35	Saved: 5.68	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **14**

Correct

Mark 2.00 out of 2.00

What would be the result of computing $-26-26$ in the 10s complement representation with a total range of 0-99 with 0-49 for positive numbers and 50-99 for negative numbers?

Select one:

- ☐ a. Underflow
- ☒ b. Overflow ✓
- ☐ c. -52 in range
- ☐ d. 52 in range

The correct answer is: Overflow

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:37	Saved: Overflow	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question 15

Correct

Mark 2.00 out of 2.00

With a total range of 0-99 with 0-49 for positive numbers and 50-99 for negative numbers, compute the following 10 complements sum: 48-26. If you choose to indicate the overflow, please indicate it in brackets.

Answer: 22



The correct answer is: (1)22

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:44	Saved: 22	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question 16

Correct

Mark 2.00 out of 2.00

Encode the following string with a run-length code: CCCCCCTTTTGGGGGGGA

Answer: *C7*T4*G8A



The correct answer is: *C7*T4*G8A

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:45	Saved: *C7*T4*G8A	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **17**

Correct

Mark 1.00 out of 1.00

Is morse code an analogue or discrete data type?

Select one:

- ☒ a. Discrete ✓
- ☐ b. Analogue

The correct answer is: Discrete

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:45	Saved: Discrete	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **18**

Complete

Not graded

Which of these is true about electronic signals?

- ☐ a. The voltage of a signal (both digital and analog) fluctuates due to environmental effects,
- ☐ b. A digital signal has only a high or low state,
- ☐ c. As soon as an analog signal degrades, information is lost.
- ☒ d. All the above.

Your answer is correct.

The correct answer is:

All the above.

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:47	Saved: All the above.	Answer saved	
3	3/04/22, 16:05	Attempt finished	Complete	0.00

Question **19**

Correct

Mark 1.00 out of 1.00

Write the floating point number -245×10^8 as a real number.

Answer: 

The correct answer is: -24500000000

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:48	Saved: -24500000000	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **20**

Correct

Mark 1.00 out of 1.00

How many bits are required to represent a 6-sided die?

- ☒ a. 3 ✓
- ☐ b. 2
- ☐ c. 8
- ☐ d. 6

Your answer is correct.

The correct answer is:

3

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:49	Saved: 3	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **21**

Correct

Mark 1.00 out of 1.00

Using 2s complement notation with a word length of 6 bits, let $A=111110$ and $B=000010$.

Compute, using complements arithmetic: $-(-A)$.

Answer: 111110



The correct answer is: 111110

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:50	Saved: 111110	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **22**

Correct

Mark 1.00 out of 1.00

If a digital signal is not always reclocked immediately, then all information will be lost.

Select one:

☐ True

☒ False ✓

The correct answer is 'False'.

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:53	Saved: False	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **23**

Correct

Mark 2.00 out of 2.00

Calculate the 2's complement of $(-114)_{10}$, where the number of bits is 9.

Answer: ✓

Represent 114 as a binary number with 9 bits. Then flip the bits and add 1.

or:

General formula is $2^k - x$.

$k=9$,

$x = (114)_{10} = (001110010)_2$,

$2^9 = (100000000)_2$,

So $100000000 - 001110010 = 110001110$

The correct answer is: 110001110

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:55	Saved: 110001110	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **24**

Correct

Mark 1.00 out of 1.00

There are 386 students enrolled in the BCO course, how many bits are required to represent all the different students?

- ☐ a. 10
- ☒ b. 9 ✓
- ☐ c. None of the above
- ☐ d. 8

Your answer is correct.

The correct answer is:

9

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:56	Saved: 9	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **25**

Correct

Mark 1.00 out of 1.00

Analog data can be perfectly represented by a computer.

Select one:

☐ True

☒ False ✓

The correct answer is 'False'.

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:56	Saved: False	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **26**

Correct

Mark 1.00 out of 1.00

Write the real number 678910 in floating point notation **with a mantissa of five digits**.

When answering the above question use the E notation to express the powers of 10. For example, 1.23×10^6 is represented as $1.23 \times 10E6$. (which is $12300 \times 10E2$ with a mantissa of five digits).

Answer: 67891*10E1



The correct answer is: 67891*10E1

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:57	Saved: 67891*10	Answer saved	
3	3/04/22, 15:02	Saved: 67891*10E1	Answer saved	
4	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **27**

Correct

Mark 2.00 out of 2.00

Calculate the 3's complement of $(-13)_{10}$, where the number of digits is 4.

Ensure that there are no spaces in your answer.

Answer: ✓

General formula is $3^k - x$, where:

$k = 4$

$x = (13)_{10} = 111$

Therefore, $3^4 - 13 = 10000 - 111 = 2222 - 111 + 1 = 2112$

The correct answer is: 2112

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 13:59	Saved: 2112	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **28**

Correct

Mark 2.00 out of 2.00

Using 2s complement notation with a word length of 6 bits, let A=111110 and B=000010.
Compute, using complements arithmetic: B-A

Answer: 000100



The correct answer is: 000100

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:02	Saved: 000100	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **29**

Correct

Mark 3.00 out of 3.00

What compression ratio do you obtain when compressing the following string: CCCCTTTTGGGGGGGA

Give your answer as a ratio (eg. 13/25).

Answer:

5/8

✓

The correct answer is: 10/16

Response history				
Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:04	Saved: 5/8	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	3.00

Question **30**

Complete

Not graded

We have a list of numbers from 0 to 499, what is the least number of bits needed to expand the list by adding negative representations of itself?

Answer:

The correct answer is: 1

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:09	Saved: 10	Answer saved	
3	3/04/22, 16:05	Attempt finished	Complete	0.00

Question **31**

Correct

Mark 3.00 out of 3.00

Using 2s complement notation with a word length of 6 bits, let A=111110 and B=000010.

Compute, using complements arithmetic: -A

Answer: 

The correct answer is: 10

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:10	Saved: 000010	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	3.00

Question **32**

Correct

Mark 2.00 out of 2.00

Convert 13 in decimal to binary using 6 bit 2^s complement representation.

Answer: 001101



The correct answer is: 001101

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:12	Saved: 001101	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **33**

Correct

Mark 4.00 out of 4.00

Data compression is the process of taking a data set and arranging or coding it so that it takes up less memory in the computer.

An important example is the JPEG image compression method.

For example, a picture of 5 megabytes can be quite well represented in, say, 100 kilobytes.

The compression ratio is defined as: (volume required for the compressed data) / (volume required for the original data).

What is the compression ratio of the JPEG example given above?

NB: Give your answer as a fraction or round-off two decimal places.

Answer: 0.02



The correct answer is: 1/50

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:13	Saved: 0.02	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	4.00

Question **34**

Correct

Mark 2.00 out of 2.00

With a total range of 0-99 with 0-49 for positive numbers and 50-99 for negative numbers, compute the following 10 complements sum: -26-13. If you choose to indicate the overflow, please indicate it in brackets.

Answer: 61



The correct answer is: (1)61

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:19	Saved: 61	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **35**

Correct

Mark 2.00 out of 2.00

Find the string that led to the code: *\$4xx*p3s*p4

Answer: \$\$\$\$xxpppspppp



The correct answer is: \$\$\$\$xxpppspppp

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:20	Saved: \$\$\$\$xxpppspppp	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **36**

Correct

Mark 2.00 out of 2.00

With a total range of 0-99 with 0-49 for positive numbers and 50-99 for negative numbers, compute the 10s complements representation of -26.

Answer:



The correct answer is: 74

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:20	Saved: 74	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **37**

Complete

Not graded

What is the compression ratio of **Huffman** if it was compressed using Huffman encoding (give answer as a percentage eg. for 50% you would fill in **50**) (Rounded to 2 decimal points)

Answer:

The correct answer is: 32.14

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 16:05	Saved: 37.5	Answer saved	
3	3/04/22, 16:05	Attempt finished	Complete	0.00

Question **38**

Correct

Mark 2.00 out of 2.00

Using 2s complement notation with a word length of 6 bits, let $A=111110$ and $B=000010$.

Compute, using complements arithmetic: $A-B$.

Answer: 

The correct answer is: 111100

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:26	Saved: 111100	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	2.00

Question **39**

Correct

Mark 1.00 out of 1.00

What is the process by which we regain the original shape of a signal?

- ☒ a. Reclocking ✓
- ☐ b. Rethinking
- ☐ c. Reshaping
- ☐ d. Rechoking

Your answer is correct.

The correct answer is:
Reclocking

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:26	Saved: Reclocking	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

Question **40**
Correct
Mark 1.00 out of 1.00

How many states can we represent with 16 bits?

Answer: 

The correct answer is: 65536

Response history

Step	Time	Action	State	Marks
1	3/04/22, 13:05	Started	Not yet answered	
2	3/04/22, 14:27	Saved: 65536	Answer saved	
3	3/04/22, 16:05	Attempt finished	Correct	1.00

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