

gy - BMEVIHIAB04 2023/24/1

Started on	Wednesday, 10 January 2024, 12:15 PM
State	Finished
Completed on	Wednesday, 10 January 2024, 12:46 PM
Time taken	30 mins 43 secs
Grade	95.00 out of 100.00

Question 1

Correct

Mark 3.00 out of 3.00

Flag question

Given a binary linear code with the following parity check matrix:

$$\mathbf{H} = \begin{pmatrix} 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{pmatrix}$$

What is the value of the parameter n ? (3p)

Expected format: a number, for example: 17 or 3.

Answer: 7

The correct answer is: 7

Question 2

Correct

Mark 2.00 out of 2.00

Flag question

What is the value of the parameter k ? (2p)

Expected format: a number, for example: 17 or 3.

Answer: 4

The correct answer is: 4

Question 3

Incorrect

Mark 0.00 out of 5.00

Flag question

Can this be a Hamming code correcting every single error? (5p)

Select one:

- ☒ Yes ✗
- ☐ No

The correct answer is:
No

Question 4

Correct

Mark 10.00 out of 10.00

Flag question

What is the detected error vector at the receiver side if the received vector is $\mathbf{v} = (0000110)$? (10 p)

Expected format: sequence of zeros and ones with brackets, for example: (1001001) or (11111). (The vectors in the examples do not necessarily have the same dimension as the solution!)

Answer: (0010000)

The correct answer is: (0010000)

Question 5

Correct

Mark 20.00 out of 20.00

Flag question

Indicate the correct statements by a tick! (20p)

To score 20p you must indicate all the correct statements, otherwise 0p is given!

Select one or more:

- ☐ a. Every Hamming code is capable of correcting $\left\lfloor \frac{n-k}{2} \right\rfloor$ errors.
- ☐ b. The RSA algorithm does not use prime numbers in the keys.
- ☐ c. The average codelength of the Huffman codes are longer than the average codelengths achieved by Shannon Fano codes.
- ☐ d. In the case of a binary cyclic codes the the error vectors belonging to a given syndrome vector have the same weights.
- ☒ e. In the case of a linear cyclic code, when dividing the code polynomial with the generator polynomial the remainder of the division is always zero. ✓

The correct answer is:

In the case of a linear cyclic code, when dividing the code polynomial with the generator polynomial the remainder of the division is always zero.

Question 6

Correct

Mark 10.00 out of 10.00

Flag question

If $p_1 = 13, p_2 = 17$ in the case of an RSA algorithm what is $\Phi(m)$? (10p)

Expected format: a number, for example: 17 or 3.

Answer: 192 ✓

The correct answer is: 192

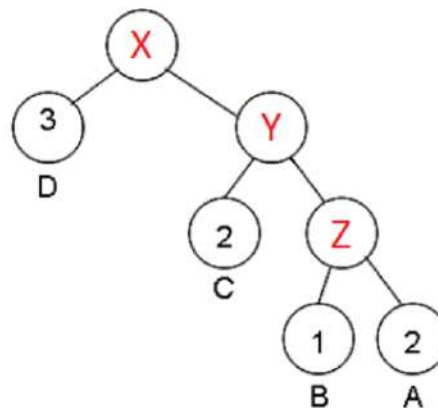
Question 7

Correct

Mark 4.00 out of 4.00

Flag question

Fill in the values in the nodes of the graph to obtain the tree of an adaptive Huffman coder!



What is the value of X? (4p)

Expected format: a number, for example: 17 or 3.

Answer: 8 ✓



Expected format: a number, for example: 17 or 3.

Answer: 8



The correct answer is: 8

Question 8

Correct

Mark 3.00 out of 3.00

Flag question

What is the value of Y ? (3p)

Expected format: a number, for example: 17 or 3.

Answer: 5



The correct answer is: 5

Question 9

Correct

Mark 3.00 out of 3.00

Flag question

What is the value of Z ? (3p)

Expected format: a number, for example: 17 or 3.

Answer: 3



The correct answer is: 3

Question 10

Correct

Mark 3.00 out of 3.00

Flag question

Given an RS code capable of correcting every single error over $GF(8)$.

What is the value of the parameter n ? (3p)

Expected format: a number, for example: 17 or 3.

Answer: 7



The correct answer is: 7

Question 11

Correct

Mark 2.00 out of 2.00

Flag question

What is the value of the parameter k ? (2p)

Expected format: a number, for example: 17 or 3.

Answer: 5



The correct answer is: 5

Question 12

Question 12

Correct

Mark 10.00 out of 10.00

Flag question

Give the generator polynom! In the result please give only the powers of y ! (10p)

Expected format: sequence of comma-separated numbers, without spaces, for example: 1,2,8,10 or 1,3,5,7,9,4,2. For example if the generator polynom is $y^2x^3 + y^0x^2 + y^3x + y^3$, then the expected solution is 2,0,3,3. (The polynoms in the examples do not necessarily have the same dimension as the solution!)

The power table over $GF(8)$ is:

1	1	7	14	21
y	y	8	15	22
y^2	y^2	9	16	23
$y+1$	y^3	10	17	24
y^2+y	y^4	11	18	25
y^2+y+1	y^5	12	19	26
y^2+1	y^6	13	20	27

Answer: 0,4,3



The correct answer is: 0,4,3

Question 13

Correct

Mark 5.00 out of 5.00

Flag question

How many delay elements included in the shift register which implements the encoding function? (5p)

Expected format: a number, for example: 17 or 3.

Answer: 2



The correct answer is: 2

Question 14

Correct

Mark 5.00 out of 5.00

Flag question

The length of the message vectors of a binary Hamming code is 11, give the length of the codeword! (5p)

Expected format: a number, for example: 17 or 3.

Answer: 15



The correct answer is: 15

Question 15

Correct

Mark 5.00 out of 5.00

Flag question

What is the entropy of a source emitting 8 possible symbols subject to uniform distribution? (5p)

Expected format: a number, rounded to two decimal places, for example: 17.21 or 3.6.

Answer: 3



The correct answer is: 3

Question **16**

Correct

Mark 10.00 out
of 10.00

🚩 Flag question

The correct answer is: 3

Running a small-size RSA algorithm

$p_1 = 3, p_2 = 5, e = 3, x = 3$, determine the cyphertext y ! (10p)

Expected format: a number, for example: 17 or 3.

Answer: 12



The correct answer is: 12

Finish review