

## ALGO MCQ

1. The array-based implementation of a recursive list is ?

- ✓  (a) static
- (b) linked
- ✓  (c) contiguous
- (d) dynamic

2. The linked-list implementation is ?

- ~~(a) static~~
- (b) ecstatic
- ~~(c) contiguous~~
- ✓  (d) dynamic

3. The linked-list implementation of a queue is not possible ?

- ✓  (a) false
- (b) true

4. A stack is a structure intrinsically ?

- ✓  (a) Recursive
- (b) Iterative
- (c) Repetitive
- (d) Alternative

5. A queue is a structure ?

- (a) LIFO
- (b) PIPO
- ✓  (c) FIFO
- (d) FILO

6. Which operations do operation1 and operation2 represent in the following axiom (where e is an element and x a stack)  $\text{operation1}(\text{operation2}(e, x)) = x$  ?

- ~~(a) operation1 = top, operation2 = pop~~
- ~~(b) operation1 = pop, operation2 = top~~
- (c) operation1 = top, operation2 = push
- ✓  (d) operation1 = pop, operation2 = push

7. What do  $x$ , operation1 and operation2 represent in the following axiom (where  $e$  is an element) ?

$$\text{isempty}(x) = \text{false} \Rightarrow \text{operation1}(\text{operation2}(x, e)) = \text{operation2}(\text{operation1}(x), e)$$

- (a)  $x$  is a queue, operation1 = enqueue, operation2 = dequeue
- (b)  $x$  is a stack, operation1 = pop, operation2 = push
- (c)  $x$  is a queue, operation1 = dequeue, operation2 = enqueue
- (d)  $x$  is a stack, operation1 = insert, operation2 = push

8. The important thing in the set is ?

- (a) the position of an element in a set
- (b) the place of an element in a set
- (c) The fact that an element belongs to a set
- (d) The order of an element in a set

9. Which operation allows us to know the number of occurrences of an element in a multi-set ?

- (a) count
- (b) account
- (c) occ
- (d) card
- (e) nboccurrences

10. An element can not be present several times in a set.

- (a) false
- (b) true



# MCQ 5

Monday, 4 December

## Question 11

Consider the sequence  $(u_n)$  defined by:  $u_0 = 2$  and  $\forall n \in \mathbb{N}, u_{n+1} = u_n + n^2 + 1$ . Then:

- a.  $(u_n)$  is increasing
- b.  $(u_n)$  is decreasing
- c.  $(u_n)$  is not monotonic

## Question 12

For all  $n \in \mathbb{N}$ , consider the sum  $S_n = \sum_{k=0}^n \frac{1}{2^k}$ . Then:

- a.  $S_n = 2 \left(1 - \frac{1}{2^n}\right)$
- b.  $S_n = 2 \left(\frac{1}{2^n} - 1\right)$
- c.  $S_n = 2 \left(1 - \frac{1}{2^{n+1}}\right)$
- d.  $S_n = 2 \left(\frac{1}{2^{n+1}} - 1\right)$
- e. None of the others

## Question 13

Let  $(u_n)$  be a geometric sequence of common ratio  $q \in \mathbb{R}$ , such that  $u_0 = 4$ . Then:

- a. If  $q > 1$ ,  $(u_n)$  tends to  $+\infty$ .
- ~~b. If  $q \leq 1$ ,  $(u_n)$  tends to 0.~~
- c. If  $q < 1$ ,  $(u_n)$  tends to 0.
- ~~d. If  $q = -2$ ,  $(u_n)$  tends to  $-\infty$ .~~
- e. None of the others

### Question 14

Select the correct answer(s)

- a. The sequence  $(u_n) = (e^n)$  is convergent
- b. The sequence  $(v_n) = (\sin(n))$  is convergent
- c. The sequence  $(w_n) = (\ln(n+1))$  is convergent
- d. The sequence  $(x_n) = \left(\sin\left(\frac{1}{n+1}\right)\right)$  is convergent
- e. None of the others

### Question 15

Consider two sequences  $(u_n)$  and  $(v_n)$  such that for all  $n \in \mathbb{N}$ ,  $u_n \leq v_n$ .

- a. If  $(v_n)$  converges then  $(u_n)$  converges
- b. If  $\lim_{n \rightarrow +\infty} u_n = +\infty$  then  $\lim_{n \rightarrow +\infty} v_n = +\infty$
- c. If  $\lim_{n \rightarrow +\infty} v_n = 2$  and  $(u_n)$  converges, then  $\lim_{n \rightarrow +\infty} u_n = 2$
- d. None of the others

### Question 16

Let  $(u_n)$  be the sequence defined for all  $n \in \mathbb{N}^*$  by  $u_n = \frac{\cos(n)}{n}$ . The limit of  $(u_n)$  as  $n$  approaches  $+\infty$  is:

- a.  $+\infty$
- b. 0
- c. 1
- d. -1
- e. None of the others

### Question 17

Let  $(u_n)$  be a positive sequence.

- a. If  $(u_n)$  is increasing, then  $(u_n)$  converges
- b. If  $(u_n)$  is decreasing, then  $(u_n)$  converges
- c.  $(u_n)$  is lower bounded
- d.  $(u_n)$  is upper bounded
- e. None of the others

### Question 18

Which of these properties is(are) true?

- a. "A strictly increasing sequence always tends to  $+\infty$ "
- b. "A bounded sequence always converges"
- c. "A divergent sequence always tends to  $+\infty$  or to  $-\infty$ "
- d. "If two sequences  $(u_n)$  and  $(v_n)$  both diverge, then the sequence  $(u_n + v_n)$  diverges too"
- e. None of these properties are true

### Question 19

Consider two adjacent sequences  $(u_n)$  and  $(v_n)$ . Then:

- a.  $(u_n)$  and  $(v_n)$  both converge to 0.
- b.  $\lim_{n \rightarrow +\infty} u_n - v_n = 0$
- c. A possible example is:  $(u_n) = \left(\frac{1}{n+1}\right)$  and  $(v_n) = \left(\frac{1}{\sqrt{n+1}}\right)$
- d. None of the others

### Question 20

What can you say about  $\lim_{n \rightarrow +\infty} \frac{n+1}{n}$ ?

- a. It exists and is equal to 0
- b. It exists and is equal to  $+\infty$
- c. It exists and is equal to 1
- d. It does not exist

# MCQ Electronics – InfoS1

Read the questions AND the answers provided (pay attention to the numbering of the answers)

Consider a resistor  $R$ , a capacitor with capacitance  $C$  and a coil with inductance  $L$ . (Q21&22)

**Q21.** The coil and the capacitor are associated in series. What is the resulting complex equivalent impedance  $\underline{Z}$  ?

- a.  $\underline{Z} = L + C$
- b.  $\underline{Z} = \frac{1-LC\omega^2}{jC\omega}$
- c.  $\underline{Z} = jC\omega + \frac{1}{jL\omega}$
- d.  $\underline{Z} = j(L + C)\omega$

**Q22.** What is the phase shift of the current crossing  $\underline{Z}$  with respect to the voltage between its terminals?

- a.  $+\frac{\pi}{2}$
  - b.  $-\frac{\pi}{2}$
  - c.  $-\pi$
  - d.  $\pm\frac{\pi}{2}$  depending on frequency
- $Z \approx$

**Q23.** What does the argument of the complex impedance of a dipole stand for?

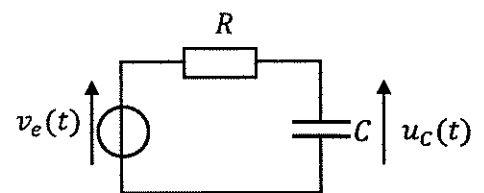
- a. The phase shift of the voltage between its terminals with respect to the current crossing it
- b. The voltage instantaneous value
- c. The ratio between the RMS values of current and voltage related to the dipole
- d. The phaseshift with respect to the origin

**Q24.** Consider the diagram on the opposite where

$$v_e(t) = V_E \cdot \sqrt{2} \sin(\omega t).$$

The formula for the complex amplitude of the voltage between capacitor terminals is:

- a.  $\underline{U}_C = \frac{1}{1+jRC\omega} \cdot V_E$
- b.  $\underline{U}_C = \frac{1}{RC+L} \cdot V_E$   
*not same unit*
- c.  $\underline{U}_C = \frac{jC\omega}{R+jC\omega}$
- ~~d.  $\underline{U}_C = \frac{C}{R+C} \cdot V_E \sin(\omega t)$~~

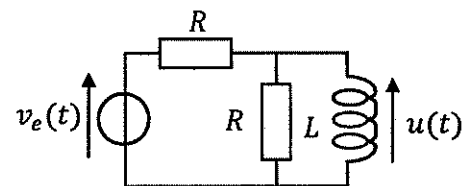


**Q25.** Consider the diagram on the opposite where

$$v_e(t) = V_E \cdot \sqrt{2} \sin(\omega t):$$

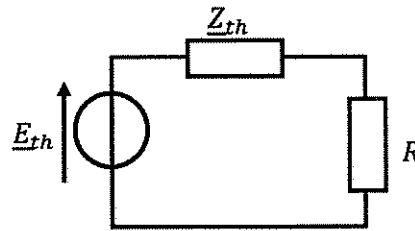
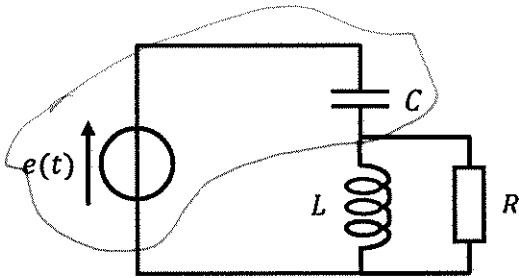
The formula for the complex amplitude related to the voltage  $u(t)$  is give by:

$$\underline{U} = \frac{jL\omega}{R + jL\omega}$$



- a.  $\underline{U} = \frac{jLR\omega}{R+jL\omega} V_E$  ✓  c.  $\underline{U} = \frac{jL\omega}{R+2jL\omega} \cdot V_E$   
~~b.  $\underline{U} = \frac{RL}{R+L} \cdot V_E \cdot \sqrt{2} \sin(\omega t)$~~  d.  $\underline{U} = \frac{V_E}{2+jRL\omega}$

Consider the diagram on the left where  $e(t) = E \cdot \sqrt{2} \cdot \sin(\omega t)$ . We want to determine the Thévenin equivalent seen by the resistor  $R$ . In complex representation, we get the diagram on the right (Q26&27)



Q26. What is the formula for  $\underline{E}_{th}$  ?

- a-  $\underline{E}_{th} = \frac{L}{C(1-LC\omega^2)} E$  c-  $\underline{E}_{th} = \frac{L}{1+LC} E$   
 b-  $\underline{E}_{th} = E$  ✓  d-  $\underline{E}_{th} = -\frac{LC\omega^2}{1-LC\omega^2} E$

Q27. What is the formula for  $\underline{Z}_{th}$  ?

- a-  $\underline{Z}_{th} = \frac{LC}{L+C}$  c-  $\underline{Z}_{th} = \frac{1-LC\omega^2}{jC\omega}$   
 b-  $\underline{Z}_{th} = \frac{jL\omega}{1+LC\omega^2}$  ✓  d-  $\underline{Z}_{th} = \frac{jL\omega}{1-LC\omega^2}$

Q28. What is the unit for  $C\omega$  ?

- ✓  a. Siemens ~~b. Hertz~~  c. Ohms d. No unit

Q29. A capacitor at very low frequencies operates like?

- a. A wire ~~c. A resistor~~  
 ✓  b. An open switch ~~d. A voltage source~~

Q30. An inductor at very high frequencies operates like?

- a. A closed switch ✓  c. An open switch  
~~b. A resistor~~ ~~d. A voltage source~~

# Test 7

## Computer Architecture

Monday 4 December 2023

For all the questions, one or more answers are possible.

31.  $A + B.C =$

- A.  $(A + B).(A + C)$   
 B.  $(A + B).(B + C)$   
 C.  $(A + C).(B + C)$   
 D. None of these answers.

32.  $A + \bar{A}.B + \bar{A}.B.C + \bar{A}.B.C.D =$

- A. 0  
 B. 1  
 C. None of these answers.  
 D.  $A + B$

33.  $X = A.B + \bar{A}.B + \bar{A}.\bar{B}$

- A. X is a minterm canonical form.  
 B. None of these answers.  
 C. X is a product of sums.  
 D. X is a maxterm canonical form.

34.  $X = \bar{B} + A.C$

What is the minterm canonical form of X?

- A.  $(\bar{A} + \bar{C} + B).(\bar{A} + C + B).(A + \bar{C} + B)$   
 B.  $\bar{A}.\bar{C}.\bar{B} + \bar{A}.\bar{C}.B + A.\bar{C}.\bar{B} + A.\bar{C}.B + A.C.\bar{B} + A.C.B$   
 C.  $(A + C + \bar{B}).(A + \bar{C} + \bar{B}).(\bar{A} + C + \bar{B})$   
 D.  $A.C.B + A.\bar{C}.B + \bar{A}.C.B + \bar{A}.\bar{C}.B + \bar{A}.\bar{C}.\bar{B}$

35.  $X = \bar{B} + A.C$

What is the maxterm canonical form of X?

- A.  $(\bar{A} + \bar{C} + B).(\bar{A} + C + B).(A + \bar{C} + B)$   
 B.  $A.C.B + A.\bar{C}.B + \bar{A}.C.B + \bar{A}.\bar{C}.B + \bar{A}.\bar{C}.\bar{B}$   
 C.  $(A + C + \bar{B}).(A + \bar{C} + \bar{B}).(\bar{A} + C + \bar{B})$   
 D.  $\bar{A}.\bar{C}.\bar{B} + \bar{A}.\bar{C}.B + A.\bar{C}.\bar{B} + A.C.\bar{B} + A.C.B$



36. In a Karnaugh map, two cells are adjacent when:

- A. Only one variable does not change between the two cells.
- B. All the variables change between the two cells.
- ✓  C. Only one variable changes between the two cells.
- D. None of these answers.

37. In a Karnaugh map:

- ~~A.~~ The smaller the number of circles, the larger the number of variables in a term.
- ✓  B. The smaller the circle, the larger the number of variables in the term.
- ~~C.~~ The smaller the number of circles, the larger the number of terms in the expression.
- ~~D.~~ The smaller the circle, the larger the number of terms in the expression.

38. In a Karnaugh map:

- A. The number of circles must be as large as possible.
- B. The size of a circle must be as small as possible.
- ✓  C. The number of circles must be as small as possible.
- ✓  D. The size of a circle must be as large as possible.

39. In a Karnaugh map, the number of circles gives:

- A. The number of uncomplemented variables of the Boolean expression.
- ✓  B. The number of terms of the Boolean expression.
- C. The number of complemented variables of the Boolean expression.
- D. None of these answers.

40. In a four-variable Karnaugh map:

- ✓  A. All the ones must be circled.
- ✓  B. It is possible to group some 1s to the left with some 1s to the right.
- ✓  C. It is possible to group some 1s to the top with some 1s to the bottom.
- D. None of these answers.

Graph 4: 'What college classes may look like in 2025'

41. Which of these is the most appropriate introductory sentence to this graph?

~~a.~~ This graph shows the distribution of online and hybrid classes during the pandemic in different parts of the US.

✓  b. This graph illustrates the projection of the percentage of classes that will be fully online and fully in person during the year 2025.

~~c.~~ This graph shows the projection of the total number of classes that will be fully online and fully in person during the year 2025.

~~d.~~ This graph shows the impact of online classes on students during the pandemic.

42. This graph was made from \_\_\_\_\_.

a. Information from an article.

b. A questionnaire distributed in schools.

✓  c. An online survey.

d. A study done by researchers in Harvard.

43. This graph is a \_\_\_\_\_ graph.

a. bar

b. line

✓  c. segmented bar

d. histogram

44. 'The provided graph has a margin of error of 5 to 6 percentage points.' ---- This statement is \_\_\_\_.

✓  a. True

b. False

c. Not given

45. The bars in this graph represent \_\_\_\_\_.

- a. Each type of student.
- b. Different types of classes.
- ~~c. The number of students in different universities.~~

✓ ~~d. 100% of the survey sample for each type of student.~~

Grammar:

Questions 46-50, choose the MOST APPROPRIATE answer in each case:

46. My mother \_\_\_\_\_ in Scotland.

- a. has grown up
- b. did grow up
- ✓  c. grew up
- d. grewed up

47. This is simply the most delicious dish I \_\_\_\_\_.

- a. ever ate
- ~~b. eaten~~
- ~~c. ate~~
- ✓ d. have ever eaten

48. Shakespeare \_\_\_\_\_ many world famous theatre plays.

- ✓ a. has written
- b. wrote
- ~~c. writed~~
- ~~d. have written~~

49. Mary isn't here. She's on holiday leave; she \_\_\_\_\_ to Egypt.

- ✓ a. 's gone
- b. has been
- c. went
- d. is gone

50. \_\_\_\_\_ painting the bedroom yet?' 'Not yet. I'll finish it tomorrow.'

- ~~a. Are you finishing~~
- ~~b. Will you finish~~
- ✓  c. Have you finished
- ~~d. Finish~~

Identify the error in each of the following sentences:

51. There is a report in today's newspaper that the bank announces bankruptcy late last week.
- a. today's
  - b. that
  - ✓ c. announces
  - d. late
52. Many conference attendees were late because the hotel was located far than anyone had anticipated.
- a. attendees
  - b. were
  - c. located
  - ✓ d. far
53. Mr. Spencer advised me talking to my colleague about the problem before filing an official complaint against her.
- a. advised *to talk*
  - b. me
  - ✓ c. talking
  - d. filing
54. The officers of Tiffany & Company decided that they could establish a new branch of their store at Paris.
- a. could
  - b. a
  - c. branch
  - ✓ d. at
55. It was not a regular luncheon meeting; it was held in the more exclusive restaurant downtown.
- a. it
  - b. held
  - ✓ c. more
  - d. downtown
56. A new shopping mall is being planned for the residential area where new home are being built at a rapid rate.
- a. shopping
  - ✓ b. home
  - c. being
  - d. rapid
57. Mrs. Pham wanted to know when was the last staff meeting so she could plan the next one.
- a. when
  - ✓ b. was
  - c. last
  - d. could
58. Engineers and scientists have had no trouble finding high-level, high-paying positions who have experience.
- a. have had
  - b. trouble
  - ✓ c. positions
  - d. have
59. The opinion holding by most investors is to buy now.
- ✓ a. holding
  - b. by
  - c. most
  - d. is
60. All the people who is interested in working on the proposal should be invited to tomorrow's meeting.
- ✓ a. is
  - b. in
  - c. should
  - d. tomorrow's

1. Samuel Marrazzo est, à l'EPITA, prof de ?

- (a) Electronique
- (b) Physique
- (c) Algorithmique
- (d) Rien

2. Pour obtenir la traduction Français-Anglais des termes informatiques, on peut aller sur le site ?

- (a) En2fr.fr
- (b) dutobic.fr
- (c) fr2en.fr
- (d) bitoduc.fr

3. Altran a perdu combien ?

- (a) 20M€
- (b) 60M€
- (c) 21M€
- (d) 61M€

4. En 2021 combien d'entreprise sondées ont dit avoir été attaquées :

- (a) 54%
- (b) 46%
- (c) 100%
- (d) 73%

5. Les attaques sont en premier lieu du ?

- (a) phishing
- (b) feeding
- (c) footing
- (d) forcing

6. De quelles catégories d'attaques on se protège principalement ?

- (a) SPAM
- (b) Attaques Opportunistes
- (c) Déni de service
- (d) Gouvernements, concurrents, ....

7. L'exploit Eternal blue a été développé par :

- (a) CIA
- (b) DGA
- (c) NSA
- (d) un truc qui ne finit pas en A

8. Combien Toyota s'est fait voler de profils clients en 2019 ?

- (a) 2.1Millions
- (b) 3.1Millions
- (c) 4.1Millions
- (d) 5.1Millions

9. L'acronyme RCE signifie :

- (a) Remote Command Execution
- (b) Remote Code Execution
- (c) Remote Cours Epita
- (d) Regular and Common Expressions

10. Quelle vulnérabilité en 2021 a fait trembler le monde informatique ?

- (a) Eternal blue
- (b) Eternal romance
- (c) Log4j
- (d) Dirty Cow