ALGO
QCM

1. **Un arbre général dont les noeuds contiennent des valeurs est ?**
   (a) valué
   (b) étiqueté
   (c) valorisé
   (d) évalué

2. **Parmi les constituants d'un arbre général, on trouve ?**
   (a) un noeud
   (b) une forêt
   (c) une liste de noeud
   (d) une liste d'arbres généraux

3. **Dans un arbre général, une branche est le chemin obtenu à partir de la racine jusqu'à ?**
   (a) un noeud interne de l'arbre
   (b) une feuille de l'arbre
   (c) la racine du premier sous-arbre
   (d) le racine du dernier sous-arbre

4. **Dans le parcours profondeur d'un arbre général, quels ordres ne sont pas des ordres induits ?**
   (a) Préfixe
   (b) Infixe
   (c) Intermédiaire
   (d) Suffixe

5. **Dans un arbre général, un noeud possédant juste 1 fils est appelé ?**
   (a) noeud interne
   (b) noeud externe
   (c) feuille
   (d) point simple
   (e) point double

6. **Combien d'ordre de passages induit le parcours en profondeur main gauche d'un arbre général ?**
   (a) 1
   (b) 2
   (c) 2 et demi
   (d) 3
   (e) 4

7. **La hauteur d'un arbre général réduit à un noeud racine est ?**
   (a) -1
   (b) 0
   (c) 1

8. **Un arbre général ?**
   (a) Possède au moins 2 sous-arbres
   (b) ne peut pas être vide
   (c) Possède un nombre indéterminé de sous-arbres
   (d) Possède au moins 1 sous-arbre

9. **Une forêt est ?**
   (a) une liste d'arbres
   (b) éventuellement vide
   (c) une liste de noeuds
   (d) toujours pleine

10. **Lors d'une recherche si la clé recherchée n'est pas trouvée, on parle de recherche ?**
    (a) négative
    (b) positive
    (c) affirmative
    (d) logique
    (e) cognitive

QCM 5

lundi 14 février 2022

Question 11

Soient E un $\mathbb{R}$-espace vectoriel, $(u, v, w) \in E^3$ et $\alpha \in \mathbb{R}$. On a

(a) $2.u + (2.v - w) = 2.(v + u) - w$

(b) $u + v = w + u \implies v = w$

c. $\alpha.u = 0_E \implies u = 0_E$

d. Aucune des autres réponses

Question 12

Parmi les ensembles suivants, quels sont ceux qui sont des $\mathbb{R}$-espaces vectoriels ?

~~a.~~ $E = \{(x, y) \in \mathbb{R}^2,\ x \geq 0\}$

(b) $\mathbb{R}^{\mathbb{N}}$

~~c.~~ $F = \{f : \mathbb{R} \longrightarrow \mathbb{R},\ f \text{ croissante}\}$

(d) $\mathbb{R}[X]$

e. Aucune des autres réponses

Question 13

Soient E un $\mathbb{R}$-espace vectoriel et F un sous-espace vectoriel de E. On sait que

a. $\forall (u, v) \in E^2,\ u + v \in F$

(b) $\forall (u, v) \in F^2,\ u + v \in F$

(c) $0_E \in F$

(d) F est un $\mathbb{R}$-espace vectoriel.

e. Aucune des autres réponses

3

Question 14

Dans $\mathbb{R}^3$, on considère les vecteurs $u = (1, 0, 1)$, $v = (-1, 1, 1)$ et $w = (0, 1, 2)$. On a

(a) w est une combinaison linéaire de u et de v.

b. w n'est pas une combinaison linéaire de u et de v.

(c.) Le vecteur $2.u + v$ est une combinaison linéaire de u, v et w.

d. Le vecteur $2.u + v$ n'est pas une combinaison linéaire de u, v et w.

Question 15

Soient E un $\mathbb{R}$-espace vectoriel, F et G deux sous-espaces vectoriels de E. Alors

a. $F \cup G$ est un sous-espace vectoriel de E.

(b) $F \cap G$ est un sous-espace vectoriel de E.

c. $F \cap G = \{0_E\}$

d. Aucune des autres réponses

Question 16

On considère les deux sous-espaces vectoriels de $\mathbb{R}^3$ suivants :

$$F = \{(x, y, z) \in \mathbb{R}^3,\ x + 2y + z = 0\} \quad \text{et} \quad G = \{(x, y, z) \in \mathbb{R}^3,\ x = 0\}$$

On a

(a) $u = (0, 2, -4) \in F \cap G$

(b.) F et G sont deux plans de $\mathbb{R}^3$

c. F et G sont deux droites de $\mathbb{R}^3$

d. $F \cap G = \{0_{\mathbb{R}^3}\}$

e. Aucune des autres réponses

Question 17

Soient E un $\mathbb{R}$-espace vectoriel, F et G deux sous-espaces vectoriels de E. L'affirmation :

$$\forall (u, v) \in F \times G,\ u + v \in F + G$$

(a) est vraie

b. est fausse.

Question 18

On considère une fonction dérivable une infinité de fois sur $\mathbb{R}$ telle qu'au voisinage de 0, $f(x) = 2x - 3x^2 + o(x^2)$. Au voisinage de 0, on a

a. $f(x) \sim 0$

b. $f(x) \sim x$

c. $f(x) \sim 2x$

d. $f(x) \sim -3x^2$

e. Aucune des autres réponses

Question 19

Au voisinage de 0, on a

a. $\ln(1-x) = x - \frac{x^2}{2} + \frac{x^3}{3!} + o(x^3)$

b. $\ln(1-x) = -x + \frac{x^2}{2} - \frac{x^3}{3!} + o(x^3)$

c. $\ln(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3!} + o(x^3)$

d. Aucune des autres réponses

Question 20

Au voisinage de 0, on a

a. $\sin(x) = x - \frac{x^3}{3} + o(x^3)$

b. $\sin(x) = x - \frac{x^3}{6} + o(x^4)$

c. $\sin(x) = x - \frac{x^3}{3!} + o(x^5)$

d. Aucune des autres réponses

5

MCQ 5, 14/2 (Art 5,6)

Article 5: Parents think they know what is best for schools. But they often don't.

For questions 21-25 choose the ONE correct answer.

21. Which statement is true?

a) The article deals with parents' reactions to certain schoolbooks and topics.
b) The article tackles the issue of racism in schools.
c) The writer never gives her opinion about the issues raised.
d) The writer refers solely to incidents in a New York school district.

22. When the author writes "He's literally stealing from children a tool they could use to navigate their world",

a) she is talking about a geography book.
b) she is criticising the man, because she sees the book as a useful resource.
c) she is saying that it is wrong to steal from children.
d) she is agreeing with the man that the tool should be banned.

23. The article mentions that the book "It's Perfectly Normal: Changing Bodies, Growing Up, Sex, and Sexual Health" horrifies some people. Why is this?

a) The book should be banned.
b) Children should not be obliged to read such books.
c) It deals with topics like abortion, homosexuality and AIDS that some people disapprove of.
d) It is aimed at children who are too young for such topics.

24. Climate change...

a) was not connected to the Californian wildfires.
b) is a topic that was acknowledged by all parents.
c) is a great example to enable intergenerational learning.
d) was a book published in "Nature".

25. What conclusion could NOT be drawn from the article?

a) Children can come home from school and educate their parents.
b) Some parents do not want their children to have information they need.
c) Teachers and schools should be trusted to choose the materials studied.
d) Parents should get involved in their child's education and not be afraid to protest.

Article 7: Why people believe Covid conspiracy theories: could folklore hold the answer?

26. How did researchers map coronavirus conspiracy theories?

(A) They used AI to extract key people, things and relationships.
B) They created an online survey and distributed it to thousands of users.
C) They developed a theory based on Greek mythology.
D) They analysed Donald Trump's Twitter account.

27. According to the article, why do people tend to believe things that seem so wrong?

A) Because of the use of social media.
B) Due to the presence of overload of information and multitasking.
(C) As an after effect of disastrous events and in the presence of the lack of trusted information.
D) As a result of lack of proper education.

28. According to the article, why is Bill Gates at the heart of certain coronavirus conspiracy theories?

A) He wrote a paper on vaccination and immunology.
(B) Due to his influence in technology and global health.
C) He created a multi-million-dollar company.
D) Due to his intricate knowledge of I.T.

29. Which of the following is NOT mentioned in the article?

A) Many people are worried and suspicious about the foundation and philanthropy of Bill Gates.
B) In folklore, it is quite usual to stick to what most people say even if that is baseless.
C) The faulty vaccination movement is compared to poisoning the wells in folklore.
(D) Jeff Bezos is thought to be at the centre of the conspiracy theory web, by many people.

30. In 16th and 17th century Denmark, which events provoked stories about witches?

(A) Floods, poisonous algae and industrialisation
B) The plague, poisonous algae, and floods
C) Poisonous algae, industrialisation, and the plague
D) Floods, the plague and industrialisation

The Encryption Wars: Everything Has Changed, and Nothing Has Changed

By Susan Landau | November 18, 2015

1 It's tempting to respond to the Paris attacks by giving security agencies more access to secure communication networks, but that could be a mistake.

2 When eight men carrying assault rifles and wearing suicide vests killed 129 people in Paris last week, the issue of access to encrypted communications again **reared its head**. If the attackers planned their assault over secure data networks, doesn't it make sense to give law enforcement organizations access to those networks?

3 **Not necessarily. The real question is whether anything has changed since the White House decided not to seek controls on encryption last month.** In light of the carnage in Paris, even raising the issue may seem cold-blooded. In the wake of such an attack it is tempting to react with, "Let us do anything we can to prevent another such attack. Make law enforcement access to communications easy." But there are national security reasons why routinely securing communications is important.

4 Such security decisions should be done with deliberation and thought, and not as a hurried emotional response to a crisis. (The latter can lead to actions that ultimately diminish security). A careful analysis shows nothing has substantively changed from when the White House made its decision last month. This rests on four observations:

5 The first is that no open society can be fully protected against attacks involving a handful of participants. It is extremely hard to accept that our societies will continue to be subject to such threats, and everyone—from local police to mayors to prime ministers and presidents—wants to promise that no terrorist attack will ever happen on their watch. Yet they cannot. To expect that law enforcement will always uncover plots involving a small group of collaborators means accepting a level of surveillance **inimical** to the very notion of an open and free society.

6 The second observation formed part of the rationale behind the White House decision. Manufacturing in modern societies consists of producing intellectual property— the design of airplanes, pharmaceuticals, software, hardware, etcetera. In such societies securing bits and bytes is crucial for industry and national security. This means securing both communications and data at rest, with cryptography as an essential tool to do so.

7 The third observation is that governments' desire for "exceptional access"—secured communications accessible to law enforcement under court order—has two very serious costs. First, the complexity exceptional access adds makes it far more difficult to get security right. Second, it prevents the deployment of two modern security tools: forward secrecy and authenticated encryption. Forward secrecy makes communications ephemeral; the encryption key disappears when the conversation ends, which means an intruder—a cyber thief—can only capture new data, not old. Authenticated encryption simultaneously secures and encrypts; if law enforcement insists on exceptional access, then these steps must be separated, increasing the risk for data compromise. Thus, designing communications systems for exceptional access means we make data theft easier. But such direction runs contrary to our national security interests.

Turn to the next page

8 The fourth observation is that there is a solution to the above conundrum. End-to-end encryption of communications doesn't prevent investigators from wiretapping but it does require the use of a somewhat different set of techniques. Every electronic communications device—every phone, tablet, laptop—has exploitable vulnerabilities. These enable remotely loading wiretaps onto a device. It's a complex, two-step process. First law enforcement must remotely "hack" into a device to determine what operating system and applications are running on it; then authorities must revisit the device to download a wiretap using a vulnerability present in the operating system or one of the applications. This approach is very similar to how cyber theft is done, the difference being this "lawful hacking" is done under legal authority. This technique has been used by both law enforcement and national security agencies to read traffic of targets.

9 This solution is more expensive for law enforcement than if communications were unencrypted (and thus always accessible under a wiretap). But the latter puts all communications at risk. Encouraging widespread use of encryption while employing vulnerabilities for wiretapping allows targeting the bad guys and securing everyone else.

10 Last week everything changed and nothing did. For Parisians, a certain joie de vivre disappeared. Sitting in outdoor cafés and going to music clubs and soccer stadiums is likely to be difficult for quite some time. And fears have escalated for people in New York City, London, Madrid, Brussels, Beirut, Delhi, Mumbai and elsewhere.

11 The French have taught us many things. One is that *plus ça change, plus c'est la même chose* (the more things change, the more they stay the same). The realities regarding encryption have not changed. A careful analysis determined that securing private communications end to end is crucial for national security. In no way do the horrific events of last week change that conclusion.

31. What does the idiom "**reared its head**" in paragraph 2 mean?
    a. Has been dealt with.
    b. Is being ignored.
    c. A problem that needs to be dealt with.
    d. None of the above

32. What does the highlighted sentence in paragraph 3 imply?
    a. People want the White House to control encryption.
    b. The White House currently has control over encryption.
    c. The White House wants to control encryption.
    d. None of the above

33. What can be understood from paragraph 4?
    a. Taking rash decisions is not recommended after such a crisis.
    b. The authorities need to think through all possibilities before choosing a solution.
    c. Neither of the above
    d. A and B

34. What can be understood form the word "**inimical**" in paragraph 5?
    a. Something helpful.
    b. Something hostile.
    c. Neither of the above
    d. A and B

35. What can be understood from paragraph 6?
    a. Secured cryptography is necessary.
    b. There should be two different levels of cryptography.
    c. Secured communication is opposed to intellectual property.
    d. None of the above.

36. In paragraph 7, separating both steps, securing and encrypting, will mainly...
    a. increase data exposure.
    b. help law enforcement to gain "exceptional access".
    c. be contrary to our national security interests.
    d. All of the above

37. In Paragraph 8, how can the law enforcement gain access to different devices?
    a. Hack the OS, and then find the weakness in order to download a wiretap.
    b. Find the weakness in order to hack into the wiretap of the OS.
    c. Wiretap the OS in order to download a wiretap using a vulnerability in the OS.
    d. None of the above

38. Wiretapping is a very common technique used most often by whom?
    a. Law enforcement
    b. NSA
    c. Hackers
    d. All of the above

39. In paragraph 9, what solution is the most expensive for law enforcement?
    a. "Exceptional access"
    b. Wiretapping
    c. Both of the above
    d. None of the above

40. What is the conclusion of this article?
    a. The debate over security and private communication has evolved in recent years.
    b. Nothing has changed concerning national security.
    c. Securing private communication is still a crucial debate.
    d. None of the above

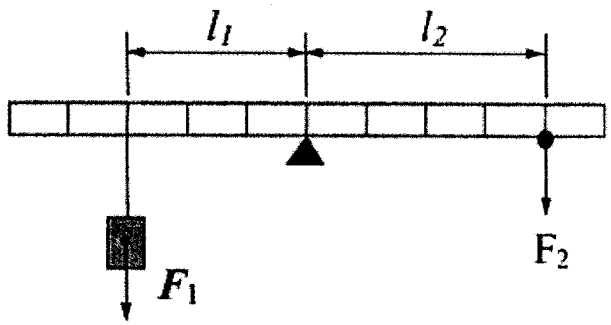
QCM Physique/Electronique – InfoS2

Pensez à bien lire les questions ET les réponses proposées

Q41. L'unité du moment d'une force est :

(a.) $N.m$ b. N/m c. m/N d. $N.m^{-1}$

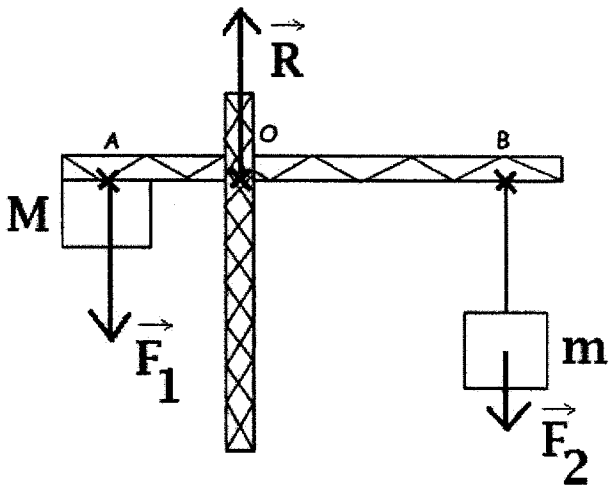
Q42. D'après le schéma ci-contre, si la norme de F_1 vaut $4N$, alors la norme que doit avoir F_2 pour que le système soit à l'équilibre vaut :



a. $4N$ c. $12N$

(b.) $3N$ d. $0{,}75N$

Le schéma ci-contre représente la situation à considérer pour les questions 43 à 45. On sait que : $F_1 = 4000\ N$; $AO = 10m$ et $OB = 40m$.



Q43. D'après le schéma ci-contre, une condition nécessaire pour que la grue soit à l'équilibre est :

a. $m = 4M$

(b.) $m = \frac{M}{4}$

c. $m = M$

d. Cela n'a aucune importance

Q44. Pour calculer la valeur de F_2, il faut choisir comme pivot :

a. Le point A

b. Le point B

(c.) Le point O

d. On peut choisir n'importe lequel des trois points.

Q45. Si on considère la masse de la structure horizontale qui repose sur O négligeable devant $M + m$, la valeur de la norme de R est de :

a. $4000N$ c. $6000N$

(b.) $5000N$ d. On ne peut pas le calculer

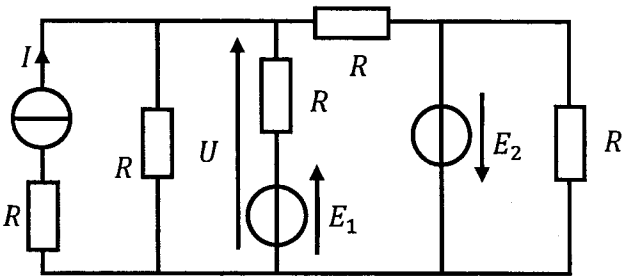
Q46. Quelle est la bonne formule ?

(a.) $U = \frac{R.I+E_1-E_2}{3}$

b. $U = R.I + E_1 - E_2$

c. $U = \frac{R.I+E_1-E_2}{5}$

d. $U = \frac{R.I+E_1-E_2}{4}$



Q47. Quelles sont les affirmations correctes (2 réponses). En régime continu (constant) :

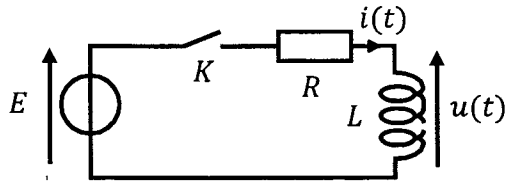
a. Un condensateur se comporte comme un fil.

(b.) Un condensateur se comporte comme un interrupteur ouvert.

(c.) Une bobine se comporte comme un fil.

d. Une bobine se comporte comme un interrupteur ouvert.

Soit le circuit ci-dessous. A $t = 0$, on ferme K ($i(t) = 0$ pour $t < 0$)



Q48. Que vaut $u(t)$ juste après avoir fermé K.

(a) E ~~b.~~ $\frac{E}{R}$ c. 0 ~~d.~~ $L.\frac{du}{dt}$

Q49. Que vaut u quand le régime permanent est atteint.

(a.) 0 b. E c. $\frac{E}{R}$ d. $R.E$

Q50. Quelle équation permettra de déterminer l'expression du courant $i(t)$?

~~a.~~ $\frac{di}{dt} + \frac{1}{LR}.i = 0$

(b.) $\frac{di}{dt} + \frac{R}{L}.i = \frac{E}{L}$

c. $\frac{di}{dt} + \frac{L}{R}.i = \frac{E}{R}$

d. $\frac{di}{dt} + \frac{R}{L}.i = E$

QCM 5
Architecture des ordinateurs

Lundi 14 février 2022

Pour toutes les questions, une ou plusieurs réponses sont possibles.

11. Une bascule RS asynchrone (R et S sont actifs à l'état haut) peut être fabriquée à l'aide de :
    - (A.) Deux portes NON-OU.
    - B. Deux portes NON-ET.
    - C. Deux portes OU EXCLUSIF.
    - D. Une porte NON-OU et une porte NON-ET.

12. Une bascule RS maître-esclave :
    - A. Copie l'entrée R sur la sortie Q à chaque front montant de l'horloge.
    - B. Peut modifier la sortie Q uniquement sur les fronts montants de l'horloge.
    - (C.) Peut modifier la sortie Q uniquement sur les fronts descendants de l'horloge.
    - D. Peut modifier la sortie Q sur les fronts montants et descendants de l'horloge.

13. Donnez la représentation IEEE 754, en simple précision, du nombre suivant : **79,25**
    - A. Aucune de ces réponses.
    - B. 01000010100111110000000000000000
    - (C.) 01000010100111101000000000000000
    - D. 01000010100111100000000000000000

14. Donnez la représentation IEEE 754, en double précision, du nombre suivant : **79,25**
    - A. Aucune de ces réponses.
    - B. $4053E00000000000_{16}$
    - C. $4053C00000000000_{16}$
    - (D.) $4053D00000000000_{16}$

15. Donnez la représentation associée au codage IEEE 754 double précision suivant :
    0000 2900 0000 0000$_{16}$
    - A. 40×2^{-1034}
    - B. 39×2^{-1034}
    - (C.) Aucune de ces réponses.
    - D. 41×2^{-1035}

13

16. Choisir la réponse correcte :
    A. Une bascule JK ne possède pas de mise à 0.
    B. Une bascule JK ne possède pas de mise à 1.
    C. Une bascule JK ne possède pas d'état interdit.
    D. Une bascule JK ne possède pas d'état mémoire.

17. Lorsque les entrées J et K d'une bascule synchronisée sur front montant sont toujours à 1 :
    A. La sortie ne change jamais.
    B. La sortie est toujours à 1.
    C. La sortie bascule à chaque front montant du signal d'horloge.
    D. Aucune de ces réponses.

18. Lorsque les entrées J et K d'une bascule synchronisée sur front descendant sont toujours à 0 :
    A. La sortie ne change jamais.
    B. La sortie est toujours à 0.
    C. La sortie bascule à chaque front descendant du signal d'horloge.
    D. Aucune de ces réponses.

19. Une bascule JK synchronisée sur front montant est constituée d'une bascule RS synchronisée sur front montant avec :
    A. $S = J.\overline{Q}$ et $R = K.Q$
    B. $S = J.\overline{Q}$ et $R = K.\overline{Q}$
    C. $S = J.Q$ et $R = K.\overline{Q}$
    D. Aucune de ces réponses.

20. Pour une bascule JK :
    A. Quand l'entrée *preset* est active, la sortie Q est mise à 0 quel que soit l'état des autres entrées.
    B. Quand l'entrée *preset* est active, la sortie Q est mise à 1 quel que soit l'état des autres entrées.
    C. Quand l'entrée *preset* est inactive, la sortie Q est mise à 0 quel que soit l'état des autres entrées.
    D. Aucune de ces réponses.