Examen de rattrapage du module IT.2407
Cellular and IoT Technologies
All documents and a calculator are authorized
Duration 2H00

For each question, indicate in your grid the right or the multiple right answers. You are not penalized if you make a wrong choice. Good Luck

1	a
2	c
3	b
4	a,b,d, e
5	b
6	c
7	b et c
8	b et c
9	b et d
10	a
11	b et c et e
12	a et c
13	c
14	d
15	a
16	a
17	b

Question 1:
The procedure used to connect a user to a cellular network in a foreign country is known as:

a. Roaming
b. Handover
c. Cell selection

Question 2:
When a user is moving in a car and is in idle mode, the procedure used to enable the connection of the user to the cellular network is:

a. Roaming
b. Handover
c. Cell selection

Question 3:
When a user is moving in a car and is in active mode (in a call), the procedure used to enable the connection of the user to the cellular network is:

a. Roaming
b. Handover
c. Cell selection

Question 4:
The hard handover is used in the following networks:

a. 2G
b. 3G with TDD mode
c. 3G with FDD mode
d. 4G with TDD and FDD mode
e. 5G with TDD and FDD mode

Question 5:
The hard handover enables the connection of a mobile user to:

a. Simultaneously two cells when the mobile is in idle mode
b. Simultaneously two cells when the mobile is in an active mode
c. One cell at the same time when the mobile is in active mode
d. One cell at the same time when the mobile is in idle mode

Question 6:
Let U denote a user in a cell UMTS transmitting with SF = 256 and a QPSK constellation with coding rate 3/4. We recall that the chirp data rate in 3G is 3.84 Mb/s. What is the useful data rate offered to this user?

a. 11.25 kb/s
b. 3.84 Mb/s
c. 22.5 kb/s
d. 256 kb/s

Question 7:
In a 3G cell, there are different classes of users: 60 users use SF = 128 and N others use SF. = 256. The cell is well dimensioned if:

a. N = 256 users
b. N = 136 users
c. N = 128 users
d. N = 60 users

Question 8:
In a 3G cell, there are different classes of users: 60 users use SF = 128 and N others use SF. = 256. The cell is well dimensioned if:

a. N = 256 users
b. N = 136 users
c. N = 128 users
d. N = 60 users

Question 9:
In a 3.5 cell, the radio condition of a given user using a SF = 128 and a QPSK modulation with a coding rate ½ improves. The number of users in the cell remains the same and we assume that the number of active users is equal to the maximum. What can be done by the network to increase the data rate of the user?

a. Decrease the spreading factor
b. Increase the modulation order
c. Increase the coding rate
d. Decrease the coding rate

Question 10:
The scrambling sequence decreases:
a. The inter-cell interference
b. The intra-cell interference
c. Does not have impact on the interference

Question 11:
The 4G and the 5G networks are:
a. Circuit-switch based networks
b. Packet-switch based networks
c. The resource allocation is made in a dynamic way
d. The same resource is affected to a communication it is released
e. IP based networks

Question 12:
The voice services are offered in 4G and 5G through the:
a. IP multimedia subsystem
b. Circuit switching services
c. Call switch fallback services

Question 13:
We consider a 5G communication requiring a time transmission interval of 0.25 ms. What is the subcarrier spacing?
a. 15 kHz
b. 30 kHz
c. 60 kHz
d. 120 kHz

Question 14:
Assuming that all the resource elements are dedicated for data transmission, what is the data rate of a 4G communication using a 16QAM constellation with a coding rate 1/2 when one resource block is allocated to this user?

a. 672 kb/s
b. 168 kb/s
c. 3.84 Mb/s
d. 336 kb/s

Question 15:
Assuming that all the resource elements are dedicated for data transmission, what is the data rate of a 4G communication using a 16QAM constellation with a coding rate 1/2 when two resources blocks are allocated to this user?

a. 672 kb/s
b. 168 kb/s
c. 3.84 Mb/s
d. 336 kb/s

Question 16:
Assuming that all the resource elements are dedicated for data transmission, what is the data rate of a 4G communication using a 16QAM constellation with a coding rate 1/2 when a spatial multiplexing mode is used with a 2x2 MIMO scheme?

a. 672 kb/s
b. 168 kb/s
c. 3.84 Mb/s
d. 336 kb/s

Question 17:
What is the maximal total data rate in an LTE-Advanced network when **five** bands of 20 MHz are aggregated and knowing the highest modulation and coding scheme scheme is 64QAM-5/6?

a. 672 Mb/s
b. 420 Mb/s
c. 3.84 Mb/s
d. 336 Mb/s