

KATHMANDU UNIVERSITY
End Semester Examination
March/April, 2017

Marks Scored:

Level : B. E.

Year : IV

Exam Roll No. :

Time: 30 mins

Course : ETEG 429

Semester : I

F. M. : 10

Registration No.:

Date APR 10 2017

SECTION "A"

[20Q × 0.5 = 10 marks]

Choose the most appropriate option.

1. In, available bandwidth is divided into small spectra and allocated to each user.
a. TDMA b. CDMA c. FDMA d. SDMA
2. AMPS isgeneration cellular communication system.
a. 1st b. 2nd c. 3rd d. 4th
3. In an IS-95 system, the frequency re-use factor is normally considered as
a. 1 b. 3 c. 5 d. 9
4. 3G W-CDMA is also known as
a. DECT b. UMTS c. DCS-1800 d. ETACS
5. CDMA 2000 1 × EV provisions channel allocation of
a. 200 kHz b. 1.25 MHz c. 5 MHz d. 30 MHz
6. In a cellular system, interface between mobile subscriber and cell-site is known as.
a. A interface b. Air interface c. A-bis interface d. B interface
7. Multiple antennas at receiver provide space diversity to counteract the effect of
a. Fading b. Multipath interference
c. Co-channel interference d. Adjacent channel interference
8. During call orientation, a call initiation message is sent on
a. Forward control channel b. Reverse control channel
c. Forward voice channel d. Reverse voice channel
9. Theis database that contains information about the identity of mobile equipment that prevents calls from stolen, unauthorized, or defective mobile stations.
a. EIR b. HLR c. AUC d. XME
10.indicates the ability of a subscriber to access a cellular system during busiest hour.
a. Erlang b. Grade of Service c. Service quality d. Probability of collision

11. If **A** represents the call request rate and **B** represents the call holding rate, then the traffic intensity can be related as
 - a. $A \times B$
 - b. A/B
 - c. $A-B$
 - d. $A+B$
12. If each mobile subscriber averages two calls per hour at an average call duration of three minutes then the traffic intensity per mobile subscriber is equal to
 - a. 0.1 Erlangs
 - b. 10 Erlangs
 - c. 2 Erlangs
 - d. 3 Erlangs
13. The propagation path loss
 - a. Increases with frequency but decreases with distance
 - b. Decreases with frequency as well as distance
 - c. Increases with frequency as well as distance
 - d. Is independent of frequency and distance
14. The difference in free-space propagation path loss between two locations at 2 Km and 8 Km from transmitter is
 - a. 6 dB
 - b. 12 dB
 - c. 20 dB
 - d. 40 dB
15. The propagation path loss in a mobile radio environments increases by 40 dB for every increase in distance between the cell-site and mobile subscriber by times.
 - a. 2
 - b. 4
 - c. 8
 - d. 10
16. If BTS antenna height is doubled, there will be
 - a. An increase in propagation path loss by 6 dB
 - b. Reduction in path loss by 6 dB
 - c. Reduction in path loss by 12 dB
 - d. No change in path loss
17. A cellular network is reconfigured with a frequency reuse pattern of 7 instead of 4. The increase in overall system capacity is approximately equals to
 - a. 1.7 times
 - b. 2 times
 - c. 4 times
 - d. 7 times
18. First text sent as SMS was
 - a. O Canada
 - b. Mr. Watson come here, I want to see you
 - c. Test SMS
 - d. Merry Christmas
19. In CDMA system, handoff is used.
 - a. Soft handoff
 - b. Hard handoff
 - c. Soft and hard handoff
 - d. Vertical handoff
20. is a concept of allocating separate antenna beams to each of the mobile device in 5G networks.
 - a. BDMA
 - b. BAMA
 - c. BSMA
 - d. SSMA

KATHMANDU UNIVERSITY
End Semester Examination
March/April, 2017

APR 10 2017

Level : B. E.
Year : IV
Time : 2 hrs. 30 mins.

Course : ETEG 429
Semester : I
F. M. : 40

SECTION "B"

Attempt *ALL* questions. Each question carries 5 marks. Marks are indicated inside brackets.

1. a. Define three different signal propagation ranges? [3]
b. Write briefly on hybrid TDMA/FDMA system and highlight its advantages? [2]
2. a. What paradigm shift did we achieve in mobile communication field after introduction of concept of cellular mobile communication? [2]
b. Show that the co-channel reuse ratio is given by $Q = \sqrt{3N}$ in cellular mobile communication, where $N=i^2+ij+j^2$. [3]
[Hint: Use the cosine law and the hexagonal cell geometry].
3. a. Write difference between circuit switching and packet switching mechanism? [2]
b. Briefly explain the following terms: [3]
 - i. Hard handoff
 - ii. Soft handoff
 - iii. Vertical handoff
4. a. What are three different channel assignments techniques commonly practiced in cellular communication? [3]
b. Write briefly on concept of Femto cell. [2]
5. a. Relate between multipath propagation and ISI. [3]
b. What is the received power (in dBm) in free space of a signal whose transmit power is 10 watt and carrier frequency is 5 GHz if the receiver is at a distance of 1.5 km? [2]
[Hint: Assume antenna gains to be 1 and $L=1$].
6. a. Why Hata model is developed although there was Okumura model already in practice? [1]
b. Using Hata model, determine the path loss of 900 MHz cellular system from a base station with the height of 100 m and mobile station with antenna height of 2 m for urban city and rural area, respectively. Assume the distance between the mobile and the base station is 4 km. Explain qualitatively the path-loss differences for these two environments. [4]
[Hint: select the appropriate correct mobile antenna correction factor from the following
$$a(h_{re}) = (1.1 \log f_c - 0.7)h_{re} - (1.56 \log f_c - 0.8) \text{ dB}$$
$$a(h_{re}) = 3.2(\log 11.75h_{re})^2 - 4.97 \text{ dB for } f_c \geq 300 \text{ MHz}$$
$$a(h_{re}) = 8.29(\log 1.54h_{re})^2 - 1.1 \text{ dB for } f_c \leq 300 \text{ MHz}]$$
7. Draw GSM Network Layout and describe function of each unit. [5]
8. a. Briefly summarize the history of GSM network development in context of Nepal. [3]
b. Envision some futuristic cellular communication applications and explain why do you think such development is necessary? [2]

