كلية التقنية الالكترونية
College of Electronic Technology - Tripoli

قســـم الاتصالات.   أسئلة الامتحان النهائي لمادة: أجهزة اتصالات II.
لطلبة الفصل: السادس.   رمز المادة: CM312   التاريخ: 24-09-2019
اسم الأستاذ/المنسق: حسام الدين الهنشيري.   الزمن: ساعتان.   الدرجة القصوى: 50 درجة
الفصل الدراسي: ربيع 2019
سم الطالب: ....، رقم القيد: ....
(يسمح للطالب بادخال ورقة قوانين جهة واحدة A4 وجداول Erlang مع ضرورة كتابة الاسم عليها وتسليمها مع كراسة الاجابة)

Q1. (6 Marks) A satellite at a **distance of 40000 km** from an earth station radiates a **power of 3 W** from an antenna with a **gain of 15 dB** in the direction of the earth station. If the receiving antenna has an **effective area** of **10 m²**, find the **flux density** and the **power received** by the antenna?

Q2. (6 Marks) An **earth station antenna** is located at **89°W longitude** and **35°N latitude**. It is intended to transmit and receive signals to a satellite in **geostationary** orbit at **82°W longitude**. Calculate **Satellite Range** from earth station?

Q3. (6 Marks) Derive the **co-channel reuse ratio** for a **hexagonal geometry**, where $N = i^2 + ij + j^2$ is used to find the nearest co-channel neighbors for a particular cell?

Q4. (8 Marks) A **cellular system** with **cluster size of 7**, probability of **blocking of 1%**, average **call duration of 2 minutes**, each user has a **call rate of 1 call per hour**, and omnidirectional antenna cells with **60 traffic channels each**. Assuming that **blocked call cleared** system is used, **Find** the following:

a) **Maximum number of users** that can be supported per cell.
b) **Co-channel reuse ratio** and **frequency reuse distance**, if the **cell radius is 1.3 km**.
c) **Traffic capacity loss** due to trunking the traffic channels when going from **omnidirectional** to 60° sectored antennas.
d) What is **co-channel interference**? And how it can be **reduced**?

Q5. (12 Marks) Consider a **GSM** system with spectrum allocation of **890-915MHz UL** and **935-960MHz DL**, with **channel spacing of 200 kHz** and a reserved **guard band of 100 kHz** at the **beginning** and the **end** for each of the UL and DL spectrum and **8 voice channels per digital channel**.

A. How many **voice channels** in this system?
B. Calculate the **cluster size N** for this system if the required signal to interference ratio S/I is **14 dB** and the **path loss exponent n= 4**? (Assume that there are **6 co-channels cells** in the first tier, and all of them are **at the same distance from the mobile**)
C. Calculate the **Co-channel distance**?
D. What is the **number of voice channels per cell** in GSM under the given **S/I condition**?
E. How many omnidirectional **base stations** having **2 km coverage radius** are required to cover an area of **312 km²**? Use the **hexagonal** cell shape?
F. What is the **maximum number of simultaneous users** in the network?

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لفصل الدراسي: ربيع 2019   اسم الأستاذ/المنسق: حسام الدين الهنشيري.

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.... رقم القيد: ....

(12 Marks, 0.5 each) Choose the correct answer: (_your selection must be on the exam paper_)

1. Modulation used in GPS is called Direct Sequence Spread Spectrum

   a) True   b) False

2. The rain attenuation is caused by .... of electromagnetic waves

   a) Scattering   b) Absorption   c) Both (a and b)

3. Cellular communication systems are ....

   a) Simplex   b) Half duplex   c) Full duplex

4. First Generation (1G) Cellular Mobile Radio Systems use

   a) Analog / AM / FDMA   b) Analog / FM / FDMA   c) Analog / FM / TDMA

5. Power control enables MS's and BTS s to increase or decrease the transmission power

   a) True   b) False

6. Which one of the following is NOT a technique to reduce the effects of multi-path fading?

   a) Frequency hopping   b) Equalization   c) Sectorization   d) Diversity

7. ....is the dialed number to reach to MS

   a) MSISDN   b) IMSI   c) MSRN

8. Which type of coding provides error protection in GSM

   a) Encryption coding   b) Convolutional coding   c) GMSK

9. .... connects PLMN with other networks

   a) MSC   b) GMSC   c) BSC

10. One of the main Cellular System problems is interference due to ....

    a) Trunking   b) Sectoring   c) Frequency re-use

11. Frequency re-use is used to ....

    a) Reduce interference   b) Increases capacity   c) Both (a and b)

12. If cluster size (N = 7) and cell Radius (R = 1.5km), then the co-channel re-use ratio is

    a) 4.58   b) 5.66   c) 6.87

13. Fixed Channel Allocation has

    a) High call setup delay   b) Channel Borrowing   c) Maximum frequency reuse

14. GSM-R Standard is used for

    a) Rural environment   b) Railway   c) Both (a and b)

15. Transcoding and Rate Adaptation Unit (TRAU) is used for

    a) Speech compression   b) Rate Adaptation   c) Both (a and b)

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16. In GSM system Kc key is used for

   a) Cyphering   b) Authentication   c) Triples generation

17. Modulation technique used in GSM is:

   a) 8ASK   b) GMSK   c) 8PSK

18. Temporary information of users is stored in ....

   a) MSC   b) VLR   c) HLR

19. The function of MSC is

   a) Paging   b) Channel coding   c) Switching and call routing

20. The new Hardware elements have to be implemented for GPRS network are ....

   a) GGSN and SGSN   b) GGSN, SGSN and PCU   c) GMSC/HLR/EIR

21. With GPRS it is possible to combine 1-8 physical channels for one user

   a) True   b) False

22. Modulation technique used in EDGE is ....

   a) 8ASK   b) GMSK   c) 8PSK

23. ....is used overcome near far problem.

   a) Sectorization   b) Power control   c) Rake receiver

24. Cell splitting .... co-channel interference.

   a) Increase   b) Decrease   c) does not affect

25. Cell splitting technique...............the capacity

   a) Increase   b) Decrease   c) does not affect

26. Cell sectoring technique...............the capacity

   a) Increase   b) Decrease   c) does not affect

27. Timeslot represents.........................

   a) Physical channel   b) logic channel   c) control channel

Good luck