كلية التقنية الالكترونية — College of Electronic Technology - Tripoli

قســم الاتصالات. أسئلة الامتحان النهائي لمادة: أجهزة اتصالات II.

لطلبة الفصل: السادس. رمز المادة: CM312 التاريخ: 2018-07-16 م

الفصل الدراسي: ربيع 2018 — اسم الأستاذ/المنسق: حسام الدين الهنشيري. الزمن: ساعتان. الدرجة القصوى: 50 درجة

اسم الطالب: ....، رقم القيد: ....

(يسمح للطالب بإدخال ورقة قوانين جهة واحدة A4 وجداول Erlang مع ضرورة كتابة الاسم عليها وتسليمها مع كراسة الاجابة)

Q1. (10 Marks) A satellite at a distance of 40000 km from an earth station is transmitting an **Effective Isotropic Radiated Power** of **20 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 **received power** by the antenna?

Q2. (6 Marks) Find the **round-trip delay** of data sent between a satellite and the earth for **LEO at 500 km** above earth, **MEO at 8,000 km** above earth, and **GEO at 35,786 km** above earth assuming the **speed of light is 3×10^8 m/s**. If the **maximum acceptable delay** for a voice system is **30 milliseconds**, which of these satellite systems would be **acceptable for two-way voice communication**?

Q3. (8 Marks, 2 each) 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** and **per cluster**.
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 120°** sectored antennas.
d) **Traffic capacity loss** due to trunking the traffic channels when going from **omnidirectional to 60°** sectored antennas.

Q4. (9 Marks, 3 each) For a **cellular system** with **cluster size of 4**, and **hexagon cell area of 6 km²**

A. Calculate the **co-channel distance** and **co-channel reuse ratio**?
B. **Derive the relationship** formula between the **co-channel reuse ratio** and the **number of cells per cluster**?
C. What are **co-channel** and **adjacent channel interference**? And how they can be **reduced**?

Q5. (17 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. In Single Cell Systems ....

   a) No handover   b) High capacity   c) Both (a and b)

5. First Generation (1G) Cellular Mobile Radio Systems use
   a) Analog / AM / FDMA   b) Analog / FM / FDMA   c) Analog / FM / TDMA

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

   a) True   b) False

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قسم الاتصالات.
أسئلة الامتحان النهائي لمادة: أجهزة اتصالات II.
لطلبة الفصل: السادس.   رمز المادة: CM312   التاريخ: 16-07-2018 م
اسم الأستاذ/المنسق: حسام الدين الهنشيري.
الفصل الدراسي: ربيع 2018
اسم الطالب: ....
الزمن: ساعتان.   الدرجة القصوى: 50 درجة
رقم القيد: ....

7. 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

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

    a) MSISDN   b) IMSI   c) MSRN

9. Which type of coding provides error protection in GSM

    a) Encryption coding   b) Convolutional coding   c) GMSK

10. .... connects PLMN with other networks

    a) MSC   b) GMSC   c) BSC

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

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

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

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

13. 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

14. Fixed Channel Allocation has

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

15. GSM-R Standard is used for

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

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

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

17. In GSM system Kc key is used for

    a) Cyphering   b) Authentication   c) Triples generation

18. Modulation technique used in GSM is:

    a) 8ASK   b) GMSK   c) 8PSK

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

    a) MSC   b) VLR   c) HLR

20. The function of MSC is

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

21. In the GPRS network, which is the interface to other data networks?

    a) GGSN   b) SGSN   c) PCU

22. The PCU is responsible for

    a) Radio Resource management   b) Ciphering   c) Charging

و الترميز

أسئلة الامتحان النهائي لمادة: أجهزة اتصالات II.   قسـم الاتصالات.   كلية التقنية الالكترونية
التاريخ: 16-07-2018 م   رمز المادة: CM312   لطلبة الفصل: السادس.   College of Electronic Technology - Tripoli
الدرجة القصوى: 50 درجة   الزمن: ساعتان.   اسم الأستاذ/المنسق: حسام الدين الهنشيري.   الفصل الدراسي: ربيع 2018
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23. 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

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

   a) True   b) False

25. Modulation technique used in EDGE is ....

   a) 8ASK   b) GMSK   c) 8PSK

26. ....is used overcome near far problem.

   a) Sectorization   b) Power control   c) Rake receiver

27. The modulation technique used in IS-95 is ....

   a) QPSK   b) 8PSK   c) 16PSK

28. Spreading can be done by.............

   a) Direct Sequence   b) Time hopping   c) Both (a and b)

29. The access technique which enables sending on the same frequency and at the same time is.............

   a) CDMA   b) OFDMA   c) Both (a and b)

30. Hard handover is done in...........

   a) GSM   b) IS-95   c) Both (a and b)

31. Cell splitting .... co-channel interference.

   a) Increase   b) Decrease   c) does not affect

32. Cell splitting technique...............the capacity

   a) Increase   b) Decrease   c) does not affect

33. Cell sectoring technique...............the capacity

   a) Increase   b) Decrease   c) does not affect

34. Timeslot represents........................

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

Good Luck

Erlang B Traffic Table

Maximum Offered Load Versus B and N
B is in %

N/B	0.01	0.05	0.1	0.5	1.0	2	5	10	15	20	30	40
1	.0001	.0005	.0010	.0050	.0101	.0204	.0526	.1111	.1765	.2500	.4286	.6667
2	.0142	.0321	.0458	.1054	.1526	.2235	.3813	.5954	.7962	1.000	1.449	2.000
3	.0868	.1517	.1938	.3490	.4555	.6022	.8994	1.271	1.603	1.930	2.633	3.480
4	.2347	.3624	.4393	.7012	.8694	1.092	1.525	2.045	2.501	2.945	3.891	5.021
5	.4520	.6486	.7621	1.132	1.361	1.657	2.219	2.881	3.454	4.010	5.189	6.596
6	.7282	.9957	1.146	1.622	1.909	2.276	2.960	3.758	4.445	5.109	6.514	8.191
7	1.054	1.392	1.579	2.158	2.501	2.935	3.738	4.666	5.461	6.230	7.856	9.800
8	1.422	1.830	2.051	2.730	3.128	3.627	4.543	5.597	6.498	7.369	9.213	11.42
9	1.826	2.302	2.558	3.333	3.783	4.345	5.370	6.546	7.551	8.522	10.58	13.05
10	2.260	2.803	3.092	3.961	4.461	5.084	6.216	7.511	8.616	9.685	11.95	14.68
11	2.722	3.329	3.651	4.610	5.160	5.842	7.076	8.487	9.685	10.86	13.33	16.31
12	3.207	3.878	4.231	5.279	5.876	6.615	7.950	9.474	10.78	12.04	14.72	17.95
13	3.713	4.447	4.831	5.964	6.607	7.402	8.835	10.47	11.87	13.22	16.11	19.60
14	4.239	5.032	5.446	6.663	7.352	8.200	9.730	11.47	12.97	14.41	17.50	21.24
15	4.781	5.634	6.077	7.376	8.108	9.010	10.63	12.48	14.07	15.61	18.90	22.89
16	5.339	6.250	6.722	8.100	8.875	9.828	11.54	13.50	15.18	16.81	20.30	24.54
17	5.911	6.878	7.378	8.834	9.652	10.66	12.46	14.52	16.29	18.01	21.70	26.19
18	6.496	7.519	8.046	9.578	10.44	11.49	13.39	15.55	17.41	19.22	23.10	27.84
19	7.093	8.170	8.724	10.33	11.23	12.33	14.32	16.58	18.53	20.42	24.51	29.50
20	7.701	8.831	9.412	11.09	12.03	13.18	15.25	17.61	19.65	21.64	25.92	31.15
21	8.319	9.501	10.11	11.86	12.84	14.04	16.19	18.65	20.77	22.85	27.33	32.81
22	8.946	10.18	10.81	12.64	13.65	14.90	17.13	19.69	21.90	24.06	28.74	34.46
23	9.583	10.87	11.52	13.42	14.47	15.76	18.08	20.74	23.03	25.28	30.15	36.12
24	10.23	11.56	12.24	14.20	15.30	16.63	19.03	21.78	24.16	26.50	31.56	37.78
25	10.88	12.26	12.97	15.00	16.13	17.51	19.99	22.83	25.30	27.72	32.97	39.44
26	11.54	12.97	13.70	15.80	16.96	18.38	20.94	23.89	26.43	28.94	34.39	41.10
27	12.21	13.69	14.44	16.60	17.80	19.27	21.90	24.94	27.57	30.16	35.80	42.76
28	12.88	14.41	15.18	17.41	18.64	20.15	22.87	26.00	28.71	31.39	37.21	44.41
29	13.56	15.13	15.93	18.22	19.49	21.04	23.83	27.05	29.85	32.61	38.63	46.07
30	14.25	15.86	16.68	19.03	20.34	21.93	24.80	28.11	31.00	33.84	40.05	47.74
31	14.94	16.60	17.44	19.85	21.19	22.83	25.77	29.17	32.14	35.07	41.46	49.40
32	15.63	17.34	18.21	20.68	22.05	23.73	26.75	30.24	33.28	36.30	42.88	51.06
33	16.34	18.09	18.97	21.51	22.91	24.63	27.72	31.30	34.43	37.52	44.30	52.72
34	17.04	18.84	19.74	22.34	23.77	25.53	28.70	32.37	35.58	38.75	45.72	54.38
35	17.75	19.59	20.52	23.17	24.64	26.44	29.68	33.43	36.72	39.99	47.14	56.04
36	18.47	20.35	21.30	24.01	25.51	27.34	30.66	34.50	37.87	41.22	48.56	57.70
37	19.19	21.11	22.08	24.85	26.38	28.25	31.64	35.57	39.02	42.45	49.98	59.37
38	19.91	21.87	22.86	25.69	27.25	29.17	32.62	36.64	40.17	43.68	51.40	61.03
39	20.64	22.64	23.65	26.53	28.13	30.08	33.61	37.72	41.32	44.91	52.82	62.69
40	21.37	23.41	24.44	27.38	29.01	31.00	34.60	38.79	42.48	46.15	54.24	64.35
41	22.11	24.19	25.24	28.23	29.89	31.92	35.58	39.86	43.63	47.38	55.66	66.02
42	22.85	24.97	26.04	29.09	30.77	32.84	36.57	40.94	44.78	48.62	57.08	67.68
43	23.59	25.75	26.84	29.94	31.66	33.76	37.57	42.01	45.94	49.85	58.50	69.34

44	24.33	26.53	27.64	30.80	32.54	34.68	38.56	43.09	47.09	51.09	59.92	71.01
45	25.08	27.32	28.45	31.66	33.43	35.61	39.55	44.17	48.25	52.32	61.35	72.67
46	25.83	28.11	29.26	32.52	34.32	36.53	40.55	45.24	49.40	53.56	62.77	74.33
47	26.59	28.90	30.07	33.38	35.22	37.46	41.54	46.32	50.56	54.80	64.19	76.00
48	27.34	29.70	30.88	34.25	36.11	38.39	42.54	47.40	51.71	56.03	65.61	77.66
49	28.10	30.49	31.69	35.11	37.00	39.32	43.53	48.48	52.87	57.27	67.04	79.32
50	28.87	31.29	32.51	35.98	37.90	40.26	44.53	49.56	54.03	58.51	68.46	80.99
51	29.63	32.09	33.33	36.85	38.80	41.19	45.53	50.64	55.19	59.75	69.88	82.65
52	30.40	32.90	34.15	37.72	39.70	42.12	46.53	51.73	56.35	60.99	71.31	84.32
53	31.17	33.70	34.98	38.60	40.60	43.06	47.53	52.81	57.50	62.22	72.73	85.98
54	31.94	34.51	35.80	39.47	41.51	44.00	48.54	53.89	58.66	63.46	74.15	87.65
55	32.72	35.32	36.63	40.35	42.41	44.94	49.54	54.98	59.82	64.70	75.58	89.31
56	33.49	36.13	37.46	41.23	43.32	45.88	50.54	56.06	60.98	65.94	77.00	90.97
57	34.27	36.95	38.29	42.11	44.22	46.82	51.55	57.14	62.14	67.18	78.43	92.64
58	35.05	37.76	39.12	42.99	45.13	47.76	52.55	58.23	63.31	68.42	79.85	94.30
59	35.84	38.58	39.96	43.87	46.04	48.70	53.56	59.32	64.47	69.66	81.27	95.97
60	36.62	39.40	40.80	44.76	46.95	49.64	54.57	60.40	65.63	70.90	82.70	97.63
61	37.41	40.22	41.63	45.64	47.86	50.59	55.57	61.49	66.79	72.14	84.12	99.30
62	38.20	41.05	42.47	46.53	48.77	51.53	56.58	62.58	67.95	73.38	85.55	101.0
63	38.99	41.87	43.31	47.42	49.69	52.48	57.59	63.66	69.11	74.63	86.97	102.6
64	39.78	42.70	44.16	48.31	50.60	53.43	58.60	64.75	70.28	75.87	88.40	104.3
65	40.58	43.52	45.00	49.20	51.52	54.38	59.61	65.84	71.44	77.11	89.82	106.0
66	41.38	44.35	45.85	50.09	52.44	55.33	60.62	66.93	72.60	78.35	91.25	107.6
67	42.17	45.18	46.69	50.98	53.35	56.28	61.63	68.02	73.77	79.59	92.67	109.3
68	42.97	46.02	47.54	51.87	54.27	57.23	62.64	69.11	74.93	80.83	94.10	111.0
69	43.77	46.85	48.39	52.77	55.19	58.18	63.65	70.20	76.09	82.08	95.52	112.6
70	44.58	47.68	49.24	53.66	56.11	59.13	64.67	71.29	77.26	83.32	96.95	114.3
71	45.38	48.52	50.09	54.56	57.03	60.08	65.68	72.38	78.42	84.56	98.37	116.0
72	46.19	49.36	50.94	55.46	57.96	61.04	66.69	73.47	79.59	85.80	99.80	117.6
73	47.00	50.20	51.80	56.35	58.88	61.99	67.71	74.56	80.75	87.05	101.2	119.3
74	47.81	51.04	52.65	57.25	59.80	62.95	68.72	75.65	81.92	88.29	102.7	120.9
75	48.62	51.88	53.51	58.15	60.73	63.90	69.74	76.74	83.08	89.53	104.1	122.6
76	49.43	52.72	54.37	59.05	61.65	64.86	70.75	77.83	84.25	90.78	105.5	124.3
77	50.24	53.56	55.23	59.96	62.58	65.81	71.77	78.93	85.41	92.02	106.9	125.9
78	51.05	54.41	56.09	60.86	63.51	66.77	72.79	80.02	86.58	93.26	108.4	127.6
79	51.87	55.25	56.95	61.76	64.43	67.73	73.80	81.11	87.74	94.51	109.8	129.3
80	52.69	56.10	57.81	62.67	65.36	68.69	74.82	82.20	88.91	95.75	111.2	130.9
81	53.51	56.95	58.67	63.57	66.29	69.65	75.84	83.30	90.08	96.99	112.6	132.6
82	54.33	57.80	59.54	64.48	67.22	70.61	76.86	84.39	91.24	98.24	114.1	134.3
83	55.15	58.65	60.40	65.39	68.15	71.57	77.87	85.48	92.41	99.48	115.5	135.9
84	55.97	59.50	61.27	66.29	69.08	72.53	78.89	86.58	93.58	100.7	116.9	137.6
85	56.79	60.35	62.14	67.20	70.02	73.49	79.91	87.67	94.74	102.0	118.3	139.3
86	57.62	61.21	63.00	68.11	70.95	74.45	80.93	88.77	95.91	103.2	119.8	140.9
87	58.44	62.06	63.87	69.02	71.88	75.42	81.95	89.86	97.08	104.5	121.2	142.6
88	59.27	62.92	64.74	69.93	72.82	76.38	82.97	90.96	98.25	105.7	122.6	144.3
89	60.10	63.77	65.61	70.84	73.75	77.34	83.99	92.05	99.41	107.0	124.0	145.9
90	60.92	64.63	66.48	71.76	74.68	78.31	85.01	93.15	100.6	108.2	125.5	147.6

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قسـم الاتصالات.
اسئلة الامتحان النهائي لمادة: أجهزة اتصالات II.

رمز المادة: CM312   التاريخ: 2018-02-07 م   لطلبة الفصل: السادس.

الدرجة القصوى: 50 درجة   الزمن: ساعتان.   اسم الأستاذ/المنسق: حسام الدين الهنشيري.   ل الدراسي: خريف 2017

الطالب: ....   رقم القيد: ....

(يسمح للطالب بإدخال ورقة قوانين جهة واحدة A4 مع ضرورة كتابة الاسم عليها وتسليمها مع كراسة الاجابة)

Q1. (6 Marks) An Earth station antenna has a diameter of 18 meters with an overall efficiency of 70%. The received signal is at 4.15 GHz and at this frequency system noise temperature is 85 K.

   a) Calculate the earth station G/T under these conditions?   (3 Marks)

   b) Which band has the greatest rain attenuation of Ka, C, V, and Ku bands? (Explain)   (3 Marks)

Q2. (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?

Q3. (6 Marks) A 4 GHz receiver consists of an RF stage gain 25 dB, noise figure 0.42 dB; a **down-converter** with gain 10 dB, noise figure 3.44 dB, and an IF stage with gain 15 dB, noise figure 7.14 dB.

   a) Draw the equivalent communications receiver.   (2 Marks)

   b) Calculate the overall noise figure.   (2 Marks)

   c) Calculate the system noise temperature.   (2 Marks)

Q4. (15 Marks, 3 each) 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 120° sectored antennas.

   d) Traffic capacity loss due to trunking the traffic channels when going from omnidirectional to 60° sectored antennas.

   e) What is co-channel interference? And how it can be reduced?

Q5. (17 Marks, 0.5 each) Choose the correct answer: (*your selection must be on the exam paper*)

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   a) True   b) False

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

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3. Cellular communication systems are ....

   a) Simplex   b) Half duplex   c) Full duplex

4. In Single Cell Systems ....

   a) No handover   b) High capacity   c) Both (a and b)

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

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قسم الاتصالات   أسئلة الامتحان النهائي لمادة: أجهزة اتصالات I.
لطلبة الفصل: السادس   رمز المادة: CM312   التاريخ: 2018-02-07 م

العمل الدراسي: خريف 2017   اسم الأستاذ/المنسق: حسام الدين الهنشيري   الزمن: ساعتان   الدرجة القصوى:
رقم الطالب: ....   رقم القيد: ....

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

   a) True   b) False

7. 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

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

   a) MSISDN   b) IMSI   c) MSRN

9. Which type of coding provides error protection in GSM

   a) Encryption coding   b) Convolutional coding   c) GMSK

10. .... connects PLMN with other networks

    a) MSC   b) GMSC   c) BSC

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

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

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

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

13. 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

14. Fixed Channel Allocation has

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

15. GSM-R Standard is used for

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

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

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

17. In GSM system Kc key is used for

    a) Cyphering   b) Authentication   c) Triples generation

18. Modulation technique used in GSM is:

    a) 8ASK   b) GMSK   c) 8PSK

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

    a) MSC   b) VLR   c) HLR

20. The function of MSC is

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

21. In the GPRS network, which is the interface to other data networks?

    a) GGSN   b) SGSN   c) PCU

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اسم الطالب: ....   ، رقم القيد: ....

22. The PCU is responsible for

   a) Radio Resource management   b) Ciphering   c) Charging

23. 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

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

   a) True   b) False

25. Modulation technique used in EDGE is ....

   a) 8ASK   b) GMSK   c) 8PSK

26. ....is used overcome near far problem.

   a) Sectorization   b) Power control   c) Rake receiver

27. The modulation technique used in IS-95 is ....

   a) QPSK   b) 8PSK   c) 16PSK

28. Spreading can be done by............

   a) Direct Sequence   b) Time hopping   c) Both (a and b)

29. The access technique which enables sending on the same frequency and at the same time is............

   a) CDMA   b) OFDMA   c) Both (a and b)

30. Hard handover is done in...........

   a) GSM   b) IS-95   c) Both (a and b)

31. Cell splitting .... co-channel interference.

   a) Increase   b) Decrease   c) does not affect

32. Cell splitting technique...............the capacity

   a) Increase   b) Decrease   c) does not affect

33. Cell sectoring technique...............the capacity

   a) Increase   b) Decrease   c) does not affect

34. Timeslot represents.........................

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

Good luck