CELL (5I050) - TD 2

Exercise 1:

5 000 users are connected to a switch. During the 6 peak hours, 120 000 have been switched by this switch. The duration of each call is about 3 minutes. What is the traffic of each user?

Exercise 2:

Two switches are interconnected by 3 trunks. The traffic between these two switches is of 0.2 Erlangs. What is the call blocking probability of this system?

Offered traffic flow A in erlang

n	Loss probability (E)										n
	0.00001	**0.00005**	**0.0001**	**0.0005**	**0.001**	**0.002**	**0.003**	**0.004**	**0.005**	**0.006**	
1	.00001	.00005	.00010	.00050	.00100	.00200	.00301	.00402	.00503	.00604	**1**
2	.00448	.01005	.01425	.03213	.04576	.06534	.08064	.09373	.10540	.11608	**2**
3	.03980	.06849	.08683	.15170	.19384	.24872	.28851	.32099	.34900	.37395	**3**
4	.12855	.19554	.23471	.36236	.43927	.53503	.60209	.65568	.70120	.74124	**4**
5	.27584	.38851	.45195	.64857	.76212	.89986	.99446	1.0692	1.1320	1.1870	**5**
6	.47596	.63923	.72826	.99567	1.1459	1.3252	1.4468	1.5421	1.6218	1.6912	**6**
7	.72378	.93919	1.0541	1.3922	1.5786	1.7984	1.9463	2.0614	2.1575	2.2408	**7**
8	1.0133	1.2816	1.4219	1.8298	2.0513	2.3106	2.4837	2.6181	2.7299	2.8266	**8**
9	1.3391	1.6595	1.8256	2.3016	2.5575	2.8549	3.0526	3.2057	3.3326	3.4422	**9**
10	1.6970	2.0689	2.2601	2.8028	3.0920	3.4265	3.6480	3.8190	3.9607	4.0829	**10**
11	2.0849	2.5059	2.7216	3.3294	3.6511	4.0215	4.2661	4.4545	4.6104	4.7447	**11**
12	2.4958	2.9671	3.2072	3.8781	4.2314	4.6368	4.9038	5.1092	5.2789	5.4250	**12**
13	2.9294	3.4500	3.7136	4.4465	4.8306	5.2700	5.5588	5.7807	5.9638	6.1214	**13**
14	3.3834	3.9523	4.2388	5.0324	5.4464	5.9190	6.2291	6.4670	6.6632	6.8320	**14**

Exercise 3:

We have traffic of 150 Erlangs between two central offices. Calculate the number of trunks needed so that the call blocking probability does not exceed 10-4? (Use two methods to find the answer: Erlang-B table and the approximation formula.)

Exercise 4:

Consider an area covering a population of 20 000 clients. Each client has a traffic of 0.015 Erlangs. 24 frequencies are available and allocated to cells following a frequency reuse pattern with K = 3. Suppose that each cell uses 5 physical channels for SDCCH and common control channels. What is the number of cells needed to cover this area so that the call blocking probability does not exceed 1%?

179	130.69	135.33	137.55	143.41	146.35	149.63	151.76	153.39	154.73	155.88	**179**
180	131.55	136.21	138.44	144.32	147.26	150.56	152.70	154.33	155.68	156.84	**180**
181	132.41	137.08	139.32	145.22	148.18	151.49	153.63	155.27	156.62	157.79	**181**
182	133.27	137.96	140.20	146.13	149.09	152.41	154.57	156.21	157.57	158.74	**182**
183	134.13	138.84	141.09	147.03	150.01	153.34	155.50	157.16	158.52	159.69	**183**
184	134.99	139.71	141.97	147.94	150.93	154.27	156.44	158.10	159.46	160.64	**184**
185	135.85	140.59	142.86	148.85	151.84	155.20	157.38	159.04	160.41	161.59	**185**
186	136.71	141.47	143.74	149.75	152.76	156.13	158.31	159.98	161.36	162.54	**186**
187	137.57	142.35	144.63	150.66	153.68	157.06	159.25	160.93	162.31	163.50	**187**
188	138.43	143.22	145.52	151.57	154.59	157.99	160.19	161.87	163.25	164.45	**188**
189	139.29	144.10	146.40	152.47	155.51	158.91	161.12	162.81	164.20	165.40	**189**
190	140.16	144.98	147.29	153.38	156.43	159.84	162.06	163.76	165.15	166.35	**190**
191	141.02	145.86	148.18	154.29	157.35	160.77	163.00	164.70	166.10	167.31	**191**
192	141.88	146.74	149.07	155.20	158.27	161.70	163.94	165.64	167.05	168.26	**192**
193	142.75	147.62	149.96	156.11	159.19	162.64	164.87	166.59	168.00	169.21	**193**
194	143.61	148.50	150.85	157.01	160.10	163.57	165.81	167.53	168.95	170.16	**194**
195	144.48	149.38	151.73	157.92	161.02	164.50	166.75	168.48	169.90	171.12	**195**
196	145.34	150.26	152.62	158.83	161.94	165.43	167.69	169.42	170.85	172.07	**196**
197	146.21	151.15	153.51	159.74	162.86	166.36	168.63	170.36	171.79	173.03	**197**
198	147.07	152.03	154.40	160.65	163.78	167.29	169.57	171.31	172.74	173.98	**198**
199	147.94	152.91	155.29	161.56	164.70	168.22	170.51	172.25	173.69	174.93	**199**
200	148.80	153.79	156.18	162.47	165.62	169.15	171.45	173.20	174.65	175.89	**200**
201	149.67	154.68	157.07	163.38	166.54	170.09	172.39	174.15	175.60	176.84	**201**
	0.00001	**0.00005**	**0.0001**	**0.0005**	**0.001**	**0.002**	**0.003**	**0.004**	**0.005**	**0.006**	
n	**Loss probability (E)**										**n**

n = 51 - 101

Offered traffic flow A in erlang

n	**Loss probability (E)**										**n**
	0.007	**0.008**	**0.009**	**0.01**	**0.02**	**0.03**	**0.05**	**0.1**	**0.2**	**0.4**	
51	37.754	38.134	38.480	38.800	41.189	42.892	45.533	50.644	59.746	82.652	**51**
52	38.639	39.024	39.376	39.700	42.124	43.852	46.533	51.726	60.985	84.317	**52**
53	39.526	39.916	40.273	40.602	43.060	44.813	47.534	52.808	62.224	85.981	**53**
54	40.414	40.810	41.171	41.505	43.997	45.776	48.536	53.891	63.463	87.645	**54**
55	41.303	41.705	42.071	42.409	44.936	46.739	49.539	54.975	64.702	89.310	**55**
56	42.194	42.601	42.972	43.315	45.875	47.703	50.543	56.059	65.942	90.974	**56**
57	43.087	43.499	43.875	44.222	46.816	48.669	51.548	57.144	67.181	92.639	**57**
58	43.980	44.398	44.778	45.130	47.758	49.635	52.553	58.229	68.421	94.303	**58**
59	44.875	45.298	45.683	46.039	48.700	50.602	53.559	59.315	69.662	95.968	**59**
60	45.771	46.199	46.589	46.950	49.644	51.570	54.566	60.401	70.902	97.633	**60**
61	46.669	47.102	47.497	47.861	50.589	52.539	55.573	61.488	72.143	99.297	**61**
62	47.567	48.005	48.405	48.774	51.534	53.508	56.581	62.575	73.384	100.96	**62**
63	48.467	48.910	49.314	49.688	52.481	54.478	57.590	63.663	74.625	102.63	**63**
64	49.368	49.816	50.225	50.603	53.428	55.450	58.599	64.750	75.866	104.29	**64**
65	50.270	50.723	51.137	51.518	54.376	56.421	59.609	65.839	77.108	105.96	**65**
66	51.173	51.631	52.049	52.435	55.325	57.394	60.619	66.927	78.350	107.62	**66**
67	52.077	52.540	52.963	53.353	56.275	58.367	61.630	68.016	79.592	109.29	**67**
68	52.982	53.450	53.877	54.272	57.226	59.341	62.642	69.106	80.834	110.95	**68**
69	53.888	54.361	54.793	55.191	58.177	60.316	63.654	70.196	82.076	112.62	**69**
70	54.795	55.273	55.709	56.112	59.129	61.291	64.667	71.286	83.318	114.28	**70**
71	55.703	56.186	56.626	57.033	60.082	62.267	65.680	72.376	84.561	115.95	**71**
72	56.612	57.099	57.545	57.956	61.036	63.244	66.694	73.467	85.803	117.61	**72**