

UNIVERSITY OF BOLTON
FACULTY OF ADVANCED ENGINEERING AND
SCIENCES
BSc(HONS) CIVIL ENGINEERING
SEMESTER ONE EXAMINATION 2011/2012
PROJECT MANAGEMENT
MODULE NO: BLT3026

Date: Monday 16 January 2012

Time: 10.00 am – 12.00 noon

INSTRUCTIONS TO CANDIDATES:

There are **FOUR** questions.

Answer **ANY THREE** questions.

All questions carry equal marks.

This examination paper carries a total of 75 marks.

Marks for parts of questions are shown in brackets.

Annuity tables are attached.

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Semester One Examination 2011/2012
Project Management
Module No. BLT3026

1. a. Discuss the areas of difference between project and general management.

(5 marks)

b. Identify and describe two categories of design activity.

(10 marks)

c. Discuss the formation of the project brief and the progression of the project design phase.

(10 marks)

Total 25 marks

2. a. Distinguish between the *Value*, the *Cost* and the *Worth* of a product.

(5 marks)

b. Discuss the procedure that is likely to be followed during a value planning workshop.

(15 marks)

c. Describe a technique used to facilitate functional analysis in the value management process.

(5 marks)

Total 25 marks

Please turn the page

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3. a. Describe and evaluate the Average Rate of Return method of investment appraisal.

(5 marks)

- b. A civil engineering contractor is reviewing his plant maintenance policy. Currently he operates on an unplanned basis but feels that the use of either a corrective or a preventative system may be more advantageous. Projected costs of the alternative systems are shown in the table below.

yr	A, existing alternative	B, corrective alternative	C, preventative alternative
0	-	50,000	100,000
1	100,000	85,500	72,000
2	100,000	85,500	72,000
3	100,000	85,500	72,000
4	100,000	85,500	72,000
5	100,000	85,500	72,000

Carry out an investment appraisal using the internal rate of return technique. Comment on the results obtained and, given that the company requires a minimum rate of return for investment of around 11%, advise the company on the viability of the proposals.

(10 marks)

- c. A regional contractor with a minor works department is about to purchase a mini- excavator. The cash price of the machine is £25,000.

However, the contractor has negotiated a deal whereby he will initially lease the excavator for a payment of £6,000 each year over a 3 year period and, at the end of the 3 year period, will purchase the machine for a residual value to be calculated using a 12% depreciation rate.

The contractor expects to keep the excavator for a total period of 6 years and at that time would expect to sell the machine on for a price to be determined using a 15% depreciation rate over the 6 year period.

Question 3 continued over the page...

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Question 3 continued

The excavator will require an overhaul at the end of year 3 and, in addition a thorough service at the end of each year (except end year 3). The cost of the overhaul will be £3500 and each service is expected to cost £850.

If the cost of capital to the contractor is 10% pa, calculate the equivalent annual cost of owning the excavator.

(10 marks)

Total 25 marks

Please turn the page

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4. a. Discuss the major elements of the decision making process

(10 marks)

- b. A contractor is considering the prospect of expanding his operations. If he maintains activity at current levels he will need to replace certain existing equipment at a cost of £100,000. He reckons that he would then have a 0.75 prospect of earning £80,000 each year over the next 5 years. However, he feels that there may be a fall in demand for this type of work and estimates a 0.25 probability of his earnings being reduced to £35,000 pa over the 5 year period.

The expansion plan would involve an initial investment of £350,000 and with the resources acquired he estimates there would be a 0.6 probability of gaining several contracts to produce earnings of £175,000 pa for 5 years. He recognises a 0.4 probability of not winning sufficient contracts when his income would amount to £90,000 pa.

If he pursued the expansion plan and found he was not winning sufficient contracts he would need to make a further decision after 1 year. He could mount an intensive marketing campaign or sell off surplus resources or attempt to build up his reputation with clients over a period of time.

The marketing initiative would cost in the region of £50,000 but, with a 0.75 probability of success could lead to more contracts being obtained and an income of £200,000 achieved during the following 4 years. There would be a 0.25 probability of the campaign failing and, in this event earnings would amount to £120,000 over the following 4 year period.

If resources were sold the contractor could expect to receive £200,000.

The attempt to build up his reputation would lead to earnings of £120,000 for the first two years followed by 2 years in which he would earn £150,000.

By use of decision analysis technique, present the contractor's plans in a structured format and carry out a full analysis before identifying the option (either maintaining current levels or expanding) which will produce the highest expected monetary value. Assume the cost of capital to the contractor is 10%.

(15 marks)

Total 25 marks

END OF QUESTIONS

ANNUITY TABLES

TABLE I. TERMINAL VALUE OF A SINGLE SUM AT COMPOUND INTEREST

The amount to which £1 will increase in n years with interest rate r per annum $= (1+r)^n$. (See note A)

n (years)	Interest % (=100 <i>r</i>)									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
1	1.0100	1.0150	1.0200	1.0250	1.0300	1.0350	1.0400	1.0450	1.0500	1.0550
2	1.0201	1.0302	1.0404	1.0506	1.0609	1.0712	1.0816	1.0920	1.1025	1.1130
3	1.0303	1.0457	1.0612	1.0769	1.0927	1.1087	1.1249	1.1412	1.1576	1.1742
4	1.0406	1.0614	1.0824	1.1038	1.1255	1.1475	1.1699	1.1925	1.2155	1.2388
5	1.0510	1.0773	1.1041	1.1314	1.1593	1.1877	1.2167	1.2462	1.2763	1.3070
6	1.0615	1.0934	1.1262	1.1597	1.1941	1.2293	1.2653	1.3023	1.3401	1.3788
7	1.0721	1.1098	1.1487	1.1887	1.2299	1.2723	1.3159	1.3609	1.4071	1.4547
8	1.0829	1.1265	1.1717	1.2184	1.2668	1.3168	1.3686	1.4221	1.4775	1.5347
9	1.0937	1.1434	1.1951	1.2489	1.3048	1.3629	1.4233	1.4861	1.5513	1.6191
10	1.1046	1.1605	1.2190	1.2801	1.3439	1.4106	1.4802	1.5530	1.6289	1.7081
11	1.1157	1.1779	1.2434	1.3121	1.3842	1.4600	1.5395	1.6229	1.7103	1.8021
12	1.1268	1.1956	1.2682	1.3449	1.4258	1.5111	1.6010	1.6959	1.7959	1.9012
13	1.1381	1.2136	1.2936	1.3785	1.4685	1.5640	1.6651	1.7722	1.8856	2.0058
14	1.1495	1.2318	1.3195	1.4130	1.5126	1.6187	1.7317	1.8519	1.9799	2.1161
15	1.1610	1.2502	1.3459	1.4483	1.5580	1.6753	1.8009	1.9353	2.0789	2.2325
16	1.1726	1.2690	1.3728	1.4845	1.6047	1.7340	1.8730	2.0224	2.1829	2.3553
17	1.1843	1.2880	1.4002	1.5216	1.6528	1.7947	1.9479	2.1134	2.2920	2.4848
18	1.1961	1.3073	1.4282	1.5597	1.7024	1.8575	2.0258	2.2085	2.4066	2.6215
19	1.2081	1.3270	1.4568	1.5986	1.7535	1.9225	2.1068	2.3079	2.5269	2.7656
20	1.2202	1.3469	1.4859	1.6386	1.8061	1.9898	2.1911	2.4117	2.6533	2.9178
25	1.2824	1.4509	1.6406	1.8539	2.0938	2.3632	2.6658	3.0054	3.3864	3.8134
30	1.3478	1.5631	1.8114	2.0976	2.4273	2.8068	3.2434	3.7453	4.3219	4.9840
35	1.4166	1.6839	1.9999	2.3732	2.8139	3.3336	3.9461	4.6673	5.5160	6.5138
40	1.4889	1.8140	2.2080	2.6851	3.2620	3.9593	4.8010	5.8164	7.0400	8.5133
45	1.5648	1.9542	2.4379	3.0379	3.7816	4.7024	5.8412	7.2482	8.9850	11.127
50	1.6446	2.1052	2.6916	3.4371	4.3839	5.5849	7.1067	9.0326	11.467	14.542
55	1.7286	2.2679	2.9717	3.8888	5.0821	6.6331	8.6464	11.256	14.636	19.006
60	1.8167	2.4432	3.2810	4.3998	5.8916	7.8781	10.519	14.027	18.679	24.840

n (years)	Interest % (=100 <i>r</i>)									
	6.0	6.5	7.0	7.5	8.0	9.0	10.0	12.0	15.0	20.0
1	1.0600	1.0650	1.0700	1.0750	1.0800	1.0900	1.1000	1.1200	1.1500	1.2000
2	1.1236	1.1342	1.1449	1.1556	1.1664	1.1881	1.2100	1.2544	1.3225	1.4400
3	1.1910	1.2079	1.2250	1.2423	1.2597	1.2950	1.3310	1.4049	1.5209	1.7280
4	1.2625	1.2865	1.3108	1.3355	1.3605	1.4116	1.4641	1.5735	1.7490	2.0736
5	1.3382	1.3701	1.4026	1.4356	1.4693	1.5386	1.6105	1.7623	2.0114	2.4883
6	1.4185	1.4591	1.5007	1.5433	1.5869	1.6771	1.7716	1.9738	2.3131	2.9860
7	1.5036	1.5540	1.6058	1.6590	1.7138	1.8280	1.9487	2.2107	2.6600	3.5832
8	1.5938	1.6550	1.7182	1.7835	1.8509	1.9926	2.1436	2.4760	3.0590	4.2998
9	1.6895	1.7626	1.8385	1.9172	1.9990	2.1719	2.3579	2.7731	3.5179	5.1598
10	1.7908	1.8771	1.9672	2.0610	2.1589	2.3674	2.5937	3.1058	4.0456	6.1917
11	1.8983	1.9992	2.1049	2.2156	2.3316	2.5804	2.8531	3.4785	4.6524	7.4301
12	2.0122	2.1291	2.2522	2.3818	2.5182	2.8127	3.1384	3.8960	5.3502	8.9161
13	2.1329	2.2675	2.4098	2.5604	2.7196	3.0658	3.4523	4.3635	6.1528	10.699
14	2.2609	2.4149	2.5785	2.7524	2.9372	3.3417	3.7975	4.8871	7.0757	12.839
15	2.3966	2.5718	2.7590	2.9589	3.1722	3.6425	4.1772	5.4736	8.1371	15.407
16	2.5404	2.7390	2.9522	3.1808	3.4259	3.9703	4.5950	6.1304	9.3576	18.488
17	2.6928	2.9170	3.1588	3.4194	3.7000	4.3276	5.0545	6.8660	10.761	22.186
18	2.8543	3.1067	3.3799	3.6758	3.9960	4.7171	5.5599	7.6900	12.375	26.623
19	3.0256	3.3086	3.6165	3.9515	4.3157	5.1417	6.1159	8.6128	14.232	31.948
20	3.2071	3.5236	3.8697	4.2479	4.6610	5.6044	6.7275	9.6463	16.367	38.338
25	4.2919	4.8277	5.4274	6.0983	6.8485	8.6231	10.835	17.000	32.919	95.396
30	5.7435	6.6144	7.6123	8.7530	10.063	13.268	17.449	29.960	66.212	237.38
35	7.6861	9.0623	10.677	12.569	14.785	20.414	28.102	52.800	133.18	590.67
40	10.286	12.416	14.974	18.044	21.725	31.409	45.259	93.051	267.86	1469.8
45	13.765	17.011	21.002	25.905	31.920	48.327	72.890	163.99	538.77	3657.3
50	18.420	23.307	29.457	37.190	46.902	74.358	117.39	289.00	1083.7	9100.4
55	24.650	31.932	41.315	53.391	68.914	114.41	189.06	509.32	2179.7	22644
60	32.988	43.750	57.946	76.649	101.26	176.03	304.50	897.59	4384.1	56346

TABLE 2. PRESENT VALUE OF A SINGLE SUM

The present value of £1 n years hence, when discounted at interest rate r per annum = $(1+r)^{-n}$. (See note B)

n (years)	Interest % (=100 r)									
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5
1	0.99010	0.98522	0.98039	0.97561	0.97087	0.96618	0.96154	0.95694	0.95238	0.94787
2	0.98030	0.97066	0.96117	0.95181	0.94260	0.93351	0.92456	0.91573	0.90703	0.89845
3	0.97059	0.95632	0.94232	0.92860	0.91514	0.90194	0.88900	0.87630	0.86384	0.85161
4	0.96098	0.94218	0.92385	0.90595	0.88849	0.87144	0.85480	0.83856	0.82270	0.80722
5	0.95147	0.92826	0.90573	0.88385	0.86261	0.84197	0.82193	0.80245	0.78353	0.76513
6	0.94205	0.91454	0.88797	0.86230	0.83748	0.81350	0.79031	0.76790	0.74622	0.72525
7	0.93272	0.90103	0.87056	0.84127	0.81309	0.78599	0.75992	0.73483	0.71068	0.68744
8	0.92348	0.88771	0.85349	0.82075	0.78941	0.75941	0.73069	0.70319	0.67684	0.65160
9	0.91434	0.87459	0.83676	0.80073	0.76642	0.73373	0.70259	0.67290	0.64461	0.61763
10	0.90529	0.86167	0.82035	0.78120	0.74409	0.70892	0.67556	0.64393	0.61391	0.58543
11	0.89632	0.84893	0.80426	0.76214	0.72242	0.68495	0.64958	0.61620	0.58468	0.55491
12	0.88745	0.83639	0.78849	0.74356	0.70138	0.66178	0.62460	0.58966	0.55684	0.52598
13	0.87866	0.82403	0.77303	0.72542	0.68095	0.63940	0.60057	0.56427	0.53032	0.49856
14	0.86996	0.81185	0.75788	0.70773	0.66112	0.61778	0.57748	0.53997	0.50507	0.47257
15	0.86135	0.79985	0.74301	0.69047	0.64186	0.59689	0.55526	0.51672	0.48102	0.44793
16	0.85282	0.78803	0.72845	0.67363	0.62317	0.57671	0.53391	0.49447	0.45811	0.42458
17	0.84438	0.77637	0.71416	0.65720	0.60502	0.55720	0.51337	0.47318	0.43630	0.40245
18	0.83602	0.76491	0.70016	0.64117	0.58739	0.53836	0.49363	0.45280	0.41552	0.38147
19	0.82774	0.75361	0.68643	0.62553	0.57029	0.52016	0.47464	0.43330	0.39573	0.36158
20	0.81954	0.74247	0.67297	0.61027	0.55368	0.50257	0.45639	0.41464	0.37689	0.34273
25	0.77977	0.68921	0.60953	0.53939	0.47761	0.42315	0.37512	0.33273	0.29530	0.26223
30	0.74192	0.63976	0.55207	0.47674	0.41199	0.35628	0.30832	0.26700	0.23138	0.20064
35	0.70591	0.59387	0.50003	0.42137	0.35538	0.29998	0.25342	0.21425	0.18129	0.15352
40	0.67165	0.55126	0.45289	0.37243	0.30656	0.25257	0.20829	0.17193	0.14205	0.11746
45	0.63905	0.51171	0.41020	0.32917	0.26444	0.21266	0.17120	0.13796	0.11130	0.08988
50	0.60804	0.47500	0.37153	0.29094	0.22811	0.17905	0.14071	0.11071	0.08720	0.06877
55	0.57853	0.44093	0.33650	0.25715	0.19677	0.15076	0.11566	0.08884	0.06833	0.05262
60	0.55045	0.40930	0.30478	0.22728	0.16973	0.12693	0.09506	0.07129	0.05354	0.04026

n (years)	Interest % (=100 r)									
	6	6.5	7	7.5	8	9	10	12	15	20
1	0.94340	0.93897	0.93458	0.93023	0.92593	0.91743	0.90909	0.89286	0.86957	0.83333
2	0.89000	0.88166	0.87344	0.86533	0.85734	0.84168	0.82645	0.79719	0.75614	0.69444
3	0.83962	0.82785	0.81630	0.80496	0.79383	0.77218	0.75131	0.71178	0.65752	0.57870
4	0.79209	0.77732	0.76290	0.74880	0.73503	0.70843	0.68301	0.63552	0.57175	0.48225
5	0.74726	0.72988	0.71299	0.69656	0.68058	0.64993	0.62092	0.56743	0.49718	0.40188
6	0.70496	0.68533	0.66634	0.64796	0.63017	0.59627	0.56447	0.50663	0.43233	0.33490
7	0.66506	0.64351	0.62275	0.60275	0.58349	0.54703	0.51316	0.45235	0.37594	0.27908
8	0.62741	0.60423	0.58201	0.56070	0.54027	0.50187	0.46651	0.40388	0.32690	0.23257
9	0.59190	0.56735	0.54393	0.52158	0.50025	0.46043	0.42410	0.36061	0.28426	0.19381
10	0.55839	0.53273	0.50835	0.48519	0.46319	0.42241	0.38554	0.32197	0.24718	0.16151
11	0.52679	0.50021	0.47509	0.45134	0.42888	0.38753	0.35049	0.28748	0.21494	0.13459
12	0.49697	0.46968	0.44401	0.41985	0.39711	0.35553	0.31863	0.25668	0.18691	0.11216
13	0.46884	0.44102	0.41496	0.39056	0.36770	0.32618	0.28966	0.22917	0.16253	0.09346
14	0.44230	0.41410	0.38782	0.36331	0.34046	0.29925	0.26333	0.20462	0.14133	0.07789
15	0.41727	0.38883	0.36245	0.33797	0.31524	0.27454	0.23939	0.18270	0.12289	0.06491
16	0.39365	0.36510	0.33873	0.31439	0.29189	0.25187	0.21763	0.16312	0.10686	0.05409
17	0.37136	0.34281	0.31657	0.29245	0.27027	0.23107	0.19784	0.14564	0.09293	0.04507
18	0.35034	0.32189	0.29586	0.27205	0.25025	0.21199	0.17986	0.13004	0.08081	0.03756
19	0.33051	0.30224	0.27651	0.25307	0.23171	0.19449	0.16351	0.11611	0.07027	0.03130
20	0.31180	0.28380	0.25842	0.23541	0.21455	0.17843	0.14864	0.10367	0.06110	0.02608
25	0.23300	0.20714	0.18425	0.16398	0.14602	0.11597	0.09230	0.05882	0.03038	0.01048
30	0.17411	0.15119	0.13137	0.11422	0.09938	0.07537	0.05731	0.03338	0.01510	0.00421
35	0.13011	0.11035	0.09366	0.07956	0.06763	0.04899	0.03558	0.01894	0.00751	0.00169
40	0.09722	0.08054	0.06678	0.05542	0.04603	0.03184	0.02209	0.01075	0.00373	0.00068
45	0.07265	0.05879	0.04761	0.03860	0.03133	0.02069	0.01372	0.00610	0.00186	0.00027
50	0.05429	0.04291	0.03395	0.02689	0.02132	0.01345	0.00852	0.00346	0.00092	0.00011
55	0.04057	0.03132	0.02420	0.01873	0.01451	0.00874	0.00529	0.00196	0.00044	0.00004
60	0.03031	0.02286	0.01726	0.01305	0.00988	0.00568	0.00328	0.00111	0.00023	0.00002

TABLE 3. PRESENT VALUE OF AN ANNUITY

The present value of £1 per annum for n years when discounted at interest rate r per annum $= \frac{1 - (1+r)^{-n}}{r}$. (See note C)
 The amount per annum to redeem a loan of £1 at the end of n years and provide interest on the outstanding balance at r per annum can be determined from the reciprocals of values in this table. (See note D)

n (years)	Interest % (=100 <i>r</i>)									
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5
1	0.9901	0.9852	0.9804	0.9756	0.9709	0.9662	0.9615	0.9569	0.9524	0.9479
2	1.9704	1.9559	1.9416	1.9274	1.9135	1.8997	1.8861	1.8727	1.8594	1.8463
3	2.9410	2.9122	2.8839	2.8560	2.8286	2.8016	2.7751	2.7490	2.7232	2.6979
4	3.9020	3.8544	3.8077	3.7620	3.7171	3.6731	3.6299	3.5875	3.5460	3.5052
5	4.8534	4.7826	4.7135	4.6458	4.5797	4.5151	4.4518	4.3900	4.3295	4.2703
6	5.7955	5.6972	5.6014	5.5081	5.4172	5.3286	5.2421	5.1579	5.0757	4.9955
7	6.7282	6.5982	6.4720	6.3494	6.2303	6.1145	6.0021	5.8927	5.7864	5.6830
8	7.6517	7.4859	7.3255	7.1701	7.0197	6.8740	6.7327	6.5959	6.4632	6.3346
9	8.5660	8.3605	8.1622	7.9709	7.7861	7.6077	7.4353	7.2688	7.1078	6.9522
10	9.4713	9.2222	8.9826	8.7521	8.5302	8.3166	8.1109	7.9127	7.7217	7.5376
11	10.3676	10.0711	9.7868	9.5142	9.2526	9.0015	8.7605	8.5289	8.3064	8.0925
12	11.2551	10.9075	10.5753	10.2578	9.9540	9.6633	9.3851	9.1186	8.8633	8.6185
13	12.1337	11.7315	11.3484	10.9832	10.6350	10.3027	9.9856	9.6829	9.3936	9.1171
14	13.0037	12.5434	12.1062	11.6909	11.2961	10.9205	10.5631	10.2228	9.8986	9.5896
15	13.8650	13.3432	12.8493	12.3814	11.9379	11.5174	11.1184	10.7395	10.3797	10.0376
16	14.7179	14.1313	13.5777	13.0550	12.5611	12.0941	11.6523	11.2340	10.8378	10.4622
17	15.5622	14.9076	14.2919	13.7122	13.1661	12.6513	12.1657	11.7072	11.2741	10.8646
18	16.3983	15.6725	14.9920	14.3534	13.7535	13.1897	12.6593	12.1600	11.6896	11.2461
19	17.2260	16.4262	15.6785	14.9789	14.3238	13.7098	13.1339	12.5933	12.0853	11.6077
20	18.0455	17.1686	16.3514	15.5892	14.8775	14.2124	13.5903	13.0079	12.4622	11.9504
25	22.0231	20.7196	19.5234	18.4244	17.4131	16.4815	15.6221	14.8282	14.0939	13.4139
30	25.8077	24.0158	22.3964	20.9303	19.6004	18.3920	17.2920	16.2889	15.3725	14.5337
35	29.4086	27.0756	24.9986	23.1452	21.4872	20.0007	18.6646	17.4610	16.3742	15.3906
40	32.8347	29.9158	27.3555	25.1028	23.1148	21.3551	19.7928	18.4016	17.1591	16.0461
45	36.0945	32.5523	29.4902	26.8330	24.5187	22.4954	20.7200	19.1563	17.7741	16.5477
50	39.1961	34.9997	31.4236	28.3623	25.7298	23.4556	21.4822	19.7620	18.2559	16.9315
55	42.1472	37.2715	33.1748	29.7140	26.7744	24.2641	22.1086	20.2480	18.6335	17.2252
60	44.9550	39.3803	34.7609	30.9087	27.6756	24.9447	22.6235	20.6380	18.9293	17.4500

n (years)	Interest % (=100 <i>r</i>)									
	6	6.5	7	7.5	8	9	10	12	15	20
1	0.9434	0.9390	0.9346	0.9302	0.9259	0.9174	0.9091	0.8929	0.8696	0.8333
2	1.8334	1.8206	1.8080	1.7956	1.7833	1.7591	1.7355	1.6901	1.6257	1.5278
3	2.6730	2.6485	2.6243	2.6005	2.5771	2.5313	2.4869	2.4018	2.2832	2.1065
4	3.4651	3.4258	3.3872	3.3493	3.3121	3.2397	3.1699	3.0373	2.8550	2.5887
5	4.2124	4.1557	4.1002	4.0459	3.9927	3.8897	3.7908	3.6048	3.3522	2.9906
6	4.9173	4.8410	4.7665	4.6938	4.6229	4.4859	4.3553	4.1114	3.7845	3.3255
7	5.5824	5.4845	5.3893	5.2966	5.2064	5.0330	4.8684	4.5638	4.1604	3.6046
8	6.2098	6.0888	5.9713	5.8573	5.7466	5.5348	5.3349	4.9676	4.4873	3.8372
9	6.8017	6.6561	6.5152	6.3789	6.2469	5.9952	5.7590	5.3282	4.7716	4.0310
10	7.3601	7.1888	7.0236	6.8641	6.7101	6.4177	6.1446	5.6502	5.0188	4.1925
11	7.8869	7.6890	7.4987	7.3154	7.1390	6.8052	6.4951	5.9377	5.2337	4.3271
12	8.3838	8.1587	7.9427	7.7353	7.5361	7.1607	6.8137	6.1944	5.4206	4.4392
13	8.8527	8.5997	8.3577	8.1258	7.9038	7.4869	7.1034	6.4235	5.5831	4.5327
14	9.2950	9.0138	8.7455	8.4892	8.2442	7.7862	7.3667	6.6282	5.7245	4.6106
15	9.7122	9.4027	9.1079	8.8271	8.5595	8.0607	7.6061	6.8109	5.8474	4.6755
16	10.1059	9.7678	9.4466	9.1415	8.8514	8.3126	7.8237	6.9740	5.9542	4.7296
17	10.4773	10.1106	9.7632	9.4340	9.1216	8.5436	8.0216	7.1196	6.0472	4.7746
18	10.8276	10.4325	10.0591	9.7060	9.3719	8.7556	8.2014	7.2497	6.1280	4.8122
19	11.1581	10.7347	10.3356	9.9591	9.6036	8.9501	8.3649	7.3658	6.1982	4.8435
20	11.4699	11.0185	10.5940	10.1945	9.8181	9.1285	8.5136	7.4694	6.2593	4.8696
25	12.7834	12.1979	11.6536	11.1469	10.6748	9.8226	9.0770	7.8431	6.4641	4.9476
30	13.7648	13.0587	12.4090	11.8104	11.2578	10.2737	9.4269	8.0552	6.5660	4.9789
35	14.4982	13.6870	12.9477	12.2725	11.6546	10.5668	9.6442	8.1755	6.6166	4.9915
40	15.0463	14.1455	13.3317	12.5944	11.9246	10.7574	9.7791	8.2438	6.6418	4.9966
45	15.4558	14.4802	13.6055	12.8186	12.1084	10.8812	9.8628	8.2825	6.6543	4.9986
50	15.7619	14.7245	13.8007	12.9748	12.2335	10.9617	9.9148	8.3045	6.6605	4.9995
55	15.9905	14.9028	13.9400	13.0836	12.3186					
60	16.1614	15.0330	14.0392	13.1594	12.3766					

TABLE 4. SINKING FUND

The amount per annum for n years at interest rate r per annum needed to accumulate to $£1 = \{r/((1+r)^n - 1)\}$. (See note E)
 The amount to which $£1$ per annum will increase in n years when accumulated at interest rate r per annum can be determined from the reciprocals of values in this table. (See note E)

		Interest % (= 100r)									
n (years)	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	
2	0.49751	0.49628	0.49505	0.49383	0.49261	0.49140	0.49020	0.48900	0.48780	0.48662	
3	0.33002	0.32838	0.32675	0.32514	0.32353	0.32193	0.32035	0.31877	0.31721	0.31565	
4	0.24628	0.24444	0.24262	0.24082	0.23903	0.23725	0.23549	0.23374	0.23201	0.23029	
5	0.19604	0.19409	0.19216	0.19025	0.18835	0.18648	0.18463	0.18279	0.18097	0.17918	
6	0.16255	0.16053	0.15853	0.15655	0.15460	0.15267	0.15076	0.14888	0.14702	0.14518	
7	0.13863	0.13656	0.13451	0.13250	0.13051	0.12854	0.12661	0.12470	0.12282	0.12096	
8	0.12069	0.11858	0.11651	0.11447	0.11246	0.11048	0.10853	0.10661	0.10472	0.10286	
9	0.10674	0.10461	0.10252	0.10046	0.09843	0.09645	0.09449	0.09257	0.09069	0.08884	
10	0.09558	0.09343	0.09133	0.08926	0.08723	0.08524	0.08329	0.08138	0.07950	0.07767	
11	0.08645	0.08429	0.08218	0.08011	0.07808	0.07609	0.07415	0.07225	0.07039	0.06857	
12	0.07885	0.07668	0.07456	0.07249	0.07046	0.06848	0.06655	0.06467	0.06283	0.06103	
13	0.07241	0.07024	0.06812	0.06605	0.06403	0.06206	0.06014	0.05828	0.05646	0.05468	
14	0.06690	0.06472	0.06260	0.06054	0.05853	0.05657	0.05467	0.05282	0.05102	0.04928	
15	0.06212	0.05994	0.05783	0.05577	0.05377	0.05183	0.04994	0.04811	0.04634	0.04463	
16	0.05794	0.05577	0.05365	0.05160	0.04961	0.04768	0.04582	0.04402	0.04227	0.04058	
17	0.05426	0.05208	0.04997	0.04793	0.04595	0.04404	0.04220	0.04042	0.03870	0.03704	
18	0.05098	0.04881	0.04670	0.04467	0.04271	0.04082	0.03899	0.03724	0.03555	0.03392	
19	0.04805	0.04588	0.04378	0.04176	0.03981	0.03794	0.03614	0.03441	0.03275	0.03115	
20	0.04542	0.04325	0.04116	0.03915	0.03722	0.03536	0.03358	0.03188	0.03024	0.02868	
25	0.03541	0.03326	0.03122	0.02928	0.02743	0.02567	0.02401	0.02244	0.02095	0.01955	
30	0.02875	0.02664	0.02465	0.02278	0.02102	0.01937	0.01783	0.01639	0.01505	0.01381	
35	0.02400	0.02193	0.02000	0.01821	0.01654	0.01500	0.01358	0.01227	0.01107	0.00997	
40	0.02046	0.01843	0.01656	0.01484	0.01326	0.01183	0.01052	0.00934	0.00828	0.00732	
45	0.01771	0.01572	0.01391	0.01227	0.01079	0.00945	0.00826	0.00720	0.00626	0.00543	
50	0.01551	0.01357	0.01182	0.01026	0.00887	0.00763	0.00655	0.00560	0.00478	0.00406	
55	0.01373	0.01183	0.01014	0.00865	0.00735	0.00621	0.00523	0.00439	0.00367	0.00305	
60	0.01224	0.01039	0.00877	0.00735	0.00613	0.00509	0.00420	0.00345	0.00283	0.00231	

		Interest % (= 100r)									
n (years)	6	6.5	7	7.5	8	9	10	12	15	20	
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	
2	0.48544	0.48426	0.48309	0.48193	0.48077	0.47847	0.47619	0.47170	0.46512	0.45455	
3	0.31411	0.31258	0.31105	0.30954	0.30803	0.30505	0.30211	0.29635	0.28798	0.27473	
4	0.22859	0.22690	0.22523	0.22357	0.22192	0.21867	0.21547	0.20923	0.20027	0.18629	
5	0.17740	0.17563	0.17389	0.17216	0.17046	0.16709	0.16380	0.15741	0.14832	0.13438	
6	0.14336	0.14157	0.13980	0.13804	0.13632	0.13292	0.12961	0.12323	0.11424	0.10071	
7	0.11914	0.11733	0.11555	0.11380	0.11207	0.10869	0.10541	0.09912	0.09036	0.07742	
8	0.10104	0.09924	0.09747	0.09573	0.09401	0.09067	0.08744	0.08130	0.07285	0.06061	
9	0.08702	0.08524	0.08349	0.08177	0.08008	0.07680	0.07364	0.06768	0.05957	0.04808	
10	0.07587	0.07410	0.07238	0.07069	0.06903	0.06582	0.06275	0.05698	0.04925	0.03852	
11	0.06679	0.06506	0.06336	0.06170	0.06008	0.05695	0.05396	0.04842	0.04107	0.03110	
12	0.05928	0.05757	0.05590	0.05428	0.05270	0.04965	0.04676	0.04144	0.03448	0.02526	
13	0.05296	0.05128	0.04965	0.04806	0.04652	0.04357	0.04078	0.03568	0.02911	0.02062	
14	0.04758	0.04594	0.04434	0.04280	0.04130	0.03843	0.03575	0.03087	0.02469	0.01689	
15	0.04296	0.04135	0.03979	0.03829	0.03683	0.03406	0.03147	0.02682	0.02102	0.01388	
16	0.03895	0.03738	0.03586	0.03439	0.03298	0.03030	0.02782	0.02339	0.01795	0.01144	
17	0.03544	0.03391	0.03243	0.03100	0.02963	0.02705	0.02466	0.02046	0.01537	0.00944	
18	0.03236	0.03085	0.02941	0.02803	0.02670	0.02421	0.02193	0.01794	0.01319	0.00781	
19	0.02962	0.02816	0.02675	0.02541	0.02413	0.02173	0.01955	0.01576	0.01134	0.00646	
20	0.02718	0.02576	0.02439	0.02309	0.02185	0.01955	0.01746	0.01388	0.00976	0.00536	
25	0.01823	0.01698	0.01581	0.01471	0.01368	0.01181	0.01017	0.00750	0.00470	0.00212	
30	0.01265	0.01158	0.01059	0.00967	0.00883	0.00734	0.00608	0.00414	0.00230	8.46 -4*	
35	0.00897	0.00806	0.00723	0.00648	0.00580	0.00464	0.00369	0.00232	0.00113	3.39 -4*	
40	0.00646	0.00569	0.00501	0.00440	0.00386	0.00296	0.00226	0.00130	5.62 -4*	1.36 -4*	
45	0.00470	0.00406	0.00350	0.00301	0.00259	0.00190	0.00139	7.36 -4*	2.79 -4*	5.47 -5*	
50	0.00344	0.00291	0.00246	0.00207	0.00174	0.00123	8.59 -4*	4.17 -4*	1.39 -4*	2.20 -5*	
55	0.00253	0.00210	0.00174	0.00143	0.00118						
60	0.00187	0.00152	0.00123	0.00100	0.00080						

* The figures -4 or -5 indicate that the figures preceding them should be multiplied by 10⁻⁴ or 10⁻⁵.