

DR. V. N. BRIMS
M.M.S.-FIRST YEAR, IIND SEMESTER

MMS END SEMESTER TEST

DATE: 20/04/2007

MAX. TIME ALLOWED 3 HRS

MARKS : 100

SUB: FINANCIAL MANAGEMENT.

INSTRUCTIONS:

1. Q.1 AND Q.4 ARE COMPULSORY.
2. ATTEMPT ANY ONE FROM Q.2 AND Q.3.
3. ANSWERBOOKS WILL BE ASSESSED FOR THEIR CONCEPTUAL INTEGRITY RATHER THAN ARITHMETICAL ACCURACY.
4. MARKS TO THE QUESTIONS ARE ALLOCATED AS FOLLOWS:

QUESTION NOS.	TOPICS	MARKS
1.	DELL'S CASE	40%
2.	FIVE YEAR FINANCIAL PLAN	30%
3.	INVETSMET DECISIONS	30%
4.	DESCRIPTIVE QUESTION	30%

MARKS WILL BE DEDUCTED FOR WANT OF NEATNESS AND PRESENTATION.

5. WISH YOU GOOD LUCK.

THE CODE OF HONOUR IN OPERATION & YOU ARE REQUIRED TO ADHERE TO THE SAME.

DELL'S CASE

Q.1)

- a) Discuss the profile of Dell as an outstanding Company. List the redeeming features.
- b) Apply all the financial Management & Management tools & techniques you have studied so far in evaluating the performance of Dell in managing its working capital.
- c) Evaluate the roll of negative working capital in business, Dell or otherwise.



RICHARD RUBACK

Dell's Working Capital

Dell Computer Corporation had reported impressive growth for fiscal-year 1996 with its sales up 52% over the prior year. Industry analysts anticipated the personal computer market to grow 20% annually over the next three years, and Michael Dell expected that his company, with its build-to-order manufacturing system, would continue its double-digit growth. Although Dell Computer had financed its recent growth internally, management needed a plan for financing the future growth.

Company Background

Dell Computer Corporation was founded in 1984 by then nineteen-year-old Michael Dell. The company designed, manufactured, sold and serviced high performance personal computers (PCs) compatible with industry standards. Initially, the company purchased IBM compatible personal computers, upgraded them, then sold the upgraded PCs directly to businesses by mail order. Subsequently, Dell began to market and sell its own brand personal computer, taking orders over a toll free telephone line, and shipping directly to customers.

Selling directly to customers was Dell's core strategy. Sales were primarily generated through advertising in computer trade magazines and, eventually, in a catalog. Dell combined this low cost sales/distribution model with a production cycle that began after the company received a customer's order. This build-to-order model enabled Dell to deliver a customized order within a few days, something its competitors could not do. Dell was also the first in the industry to provide toll-free telephone and on-site technical support in an effort to differentiate itself in customer service.

Dell's Inventory Management

Dell built computer systems after the company received the customer's order. In contrast, the industry leaders built to forecast and maintained sizeable finished goods inventory in their stock or at their channel partners. Dell's build-to-order manufacturing process yielded low finished goods inventory balances. By the mid-1990s Dell's work-in-process (WIP) and finished goods inventory as a percent of total inventory ranged from 10% to 20%. This contrasted sharply with the industry leaders, such as Compaq, Apple and IBM, whose WIP and finished goods inventory typically ranged from 50% to 70% of total inventory, not including inventory held by their resellers.

Professor Richard Ruback and Research Associate Aldo Sicla prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

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Dell maintained an inventory of components. The cost of individual components, such as processor chips, comprised about 80% of the cost of a PC. As new technology replaced old, the prices of components fell by an average of 30% a year.¹ Dell ordered components based on sales forecasts. Components were sourced from about 80 suppliers in the mid-1990s – down from a high of 200 or more. Dell issued "releases" for a certain amount of product from a supplier's inventory on a regular basis, depending upon the forecast.² Suppliers, many of whom had warehouses close to Dell's Austin Texas and Ireland plants, delivered parts to Dell, often on a daily basis.

As Michael Dell explained, "other companies had to maintain high levels of inventory to stock reseller and retail channels. Because we built only what our customers wanted when they wanted it, we didn't have a lot of inventory taking up space and soaking up capital."³ As such, Dell's supply of inventory was significantly lower than its competitors, providing a competitive advantage.

Table A Days Supply of Inventory (DSI)^a

	1993 ^b	1994 ^{b*}	1995 ^b
Dell Computer	55	33	32
Apple Computer	52	85	54
Compaq Computer	72	60	73
IBM	64	57	48

Source: Dell Computer Corporation Fiscal 1993-1995 Annual Reports; case writer estimates from Apple Computer, Compaq Computer, and IBM Fiscal 1992-1994 Annual Reports.

^a DSI = (Net Ending Inventory)/(Quarterly COGS/90 Days)

^b Dell's fiscal calendar ends in January; Apple's in September; Compaq and IBM's in December. The DSI for 1995 represents Dell's DSI for the quarter ended on 1/29/95, Apple's on 9/30/94, and Compaq's and IBM's on 12/31/94.

September 1990 - August 1993

In 1990, Dell had only 1% of the U.S. PC market share.⁴ Michael Dell anticipated that the fragmented PC industry was ready for a consolidation and that Dell was too small to survive a consolidation. At the time Michael Dell explained, "I realized we had to decide whether we should stay the size we were – and face the consequences – or go for big time growth... Obviously, we went for growth – in one big leap."⁵

On September 10, 1990, in an attempt to capture sales from small businesses and first time consumers, Dell announced it was breaking from its direct-only business model and would begin to

¹ Anon, "Selling PCs like Bananas," *The Economist*, London, October 5, 1996, p. 63.

² Clare Goldsberry, "Computer Makers May Overcome JIT Troubles," *Plastics News*, August 15, 1994, p. 20.

³ Michael Dell with Catherine Fredman, "Direct from Dell, Strategies That Revolutionized an Industry," 1999, p. 22.

⁴ Jan Rivkin and Michael Porter, "Matching Dell," *IBS case*, '99 156, June 6, 1999, p. 15.

⁵ Michael Dell with Catherine Fredman, "Direct from Dell, Strategies That Revolutionized an Industry," 1999, p. 43.

sell its PCs⁶ through CompUSA (formerly SoftWarehouse Superstores). Over the next two and a half years, Dell expanded this indirect distribution channel by adding other mass market retailers (i.e., Staples, Inc.) and marketing its Precision line exclusively through Price Club. Additionally the company continued aggressive pursuit of foreign markets, relying on resellers to distribute Dell product when timing limitations or infrastructure obstacles complicated direct distribution. Annual sales increased by 268% within two years, compared to industry growth of 5%, and moved Dell into the top five in worldwide market share.⁷ Exhibit 1 details sales growth for Dell and the PC industry.

In August 1993, Dell reported a \$76 million dollar loss for the second quarter of 1993, its first loss. The loss was tied to \$71 million in charges relating to the sell-off of excess inventory and the cost of scrapping a disappointing notebook computer line.⁸ The company also took restructuring charges to consolidate European operations that had become redundant and inefficient. Dell's profit margin fell to 2% for the first quarter, ending May 2, 1993, — well below the company's target of 5% that they had achieved or exceeded for 11 consecutive quarters. With \$32 million in cash and cash equivalents, analysts thought Dell had enough cash and credit to last at least another year, but many wondered if the company had the resources to keep pace should the battle for market share intensify.⁹

Like many companies, we were always focused on our profit and loss statement. But cash flow was not a regularly discussed topic. It was as if we were driving along, watching only the speedometer, when in fact we were running out of gas.¹⁰

September 1993 – January 1996

Dell shifted its focus from exclusively growth to liquidity, profitability, and growth. It adopted company-wide metrics around the new focus, requiring each business unit to provide detailed profit & loss statements. In July 1994, less than a year after shifting the company's focus, Dell exited the low margin indirect retail channel where, CFO Tom Meredith noted, "we were losing our shirts."¹¹ Late in 1995, Dell instituted goals on ROIC (Return on Invested Capital) and CCC (Cash Conversion Cycle). Exhibit 2 presents Dell's CCC performance. The company took measures to improve its internal systems for forecasting, reporting, and inventory control. A new vendor certification program was put in place, reducing the number of suppliers, ensuring component quality, and improving delivery performance. Dell also brought in seasoned managers to lead the company during its next stage.

These changes, combined with Dell's re-entry into the notebook market, and its rapid introduction of computer systems based on Intel Corporation's new Pentium microprocessor chip, fueled the company's recovery. Dell's direct contact with customers helped it anticipate demand for newly developed Pentium-based systems and its low inventory of 386 and 486 technology made it less costly for it to move quickly. Dell beat the competition to the market place with Pentium-based

⁶ Systems sold through the retail channel were limited to certain predetermined configurations and were not customized.

⁷ Jan Rivkin and Michael Porter, "Matching Dell," IBS Case 799-158, June 6, 1999, p. 15.

⁸ Kyle Pope, "Dell Computer Posts Loss for Quarter, Backs Away From Forecast of Rebound," *Wall Street Journal*, August 18, 1993, p. B6.

⁹ Peter Burrows and Stephanie Anderson Forest, "Dell Computer Goes Into the Shop," *Business Week*, July 1993, p. 38.

¹⁰ Michael Dell with Catherine Preddman, "Direct from DFIJ, Strategies That Revolutionized an Industry," 1999, p. 47.

¹¹ Rahul Jacob, "The Resurrection of Michael Dell," *Fortune*, September 18, 1995, p. 117.

products and was the first in the industry to achieve volume production of systems with the 120 mhz Pentium processor.¹² Exhibit 3 presents Dell's percent of computer system sales by processor type.

In July 1995, Dell became the first manufacturer to convert its entire major product line to the Pentium technology.¹³ By that time, in less than two years, the Pentium chip was at 133 MHz - the ninth upgrade. Dell was able to offer faster systems at the same price that rivals were marketing older Pentium technology. Because of its low finished goods inventory, Dell didn't have to dismantle PCs to replace the microprocessor when Intel Corporation discovered its Pentium chip was flawed in 1994. It was able to quickly manufacture systems with the "updated" Pentium chip, while others (i.e., Compaq) were still selling flawed systems from inventory. In a similar vein, Dell was able to begin shipping its Dell Dimension systems equipped with Microsoft Corporation's new Windows 95 operating system on August 25, 1995 - the very day Microsoft launched the product. As a direct marketer, Dell was able to bring new component technology to the market within an average of 35 days - a third of the time it took competitors to move a new product through indirect channels.¹⁴

The Future

For its 1996 fiscal year, ended January 31, 1996, Dell reported revenue of \$5.3 billion with net income of \$272 million, or 5.1% of sales. Revenue was up 52% over the prior year compared with an industry increase of 31%. Exhibits 4 and 5 presents Dell's Income Statement and Balance Sheet, respectively. Though favorable, the 1996 results suffered somewhat from component shortages. Michael Dell predicted the company's growth rate for the next year would again outpace the industry's growth.

¹² Anon, "Dell First to Ship Systems with New Pentium Processor," *PR Newswire*, April 19, 1995.

¹³ Anon, "Dell Taking Orders for Factory-Installed Windows '95 on Dell Dimension Desktop PCs," *PR Newswire*, August 2, 1995.

¹⁴ Judy Ward, "Runaway horse: Michael Dell wants to rein in growth; shareholders want whip," *Financial World*, October 24, 1995, p. 36.

Exhibit 1 Dell's annual worldwide sales dollar growth versus industry.

Calendar Year	Dell ^a	Industry
1991	63%	-2%
1992	126%	7%
1993	43%	15%
1994	21%	37%
1995	52%	31%

Source: Dell Computer Corporation Fiscal 1996 Annual Report; case writer estimates from industry market share data from International Data Corporation.

^aDell's fiscal year closest in alignment to calendar year stated.

Exhibit 2 Working Capital Financial Ratios for Dell.

	DSI ^a	DSO ^b	DPO ^c	CCC ^d
Q193	40	54	46	48
Q293	44	51	55	40
Q393	47	52	51	48
Q493	55	54	53	56
Q194	55	58	56	57
Q294	41	53	43	51
Q394	33	53	45	41
Q494	33	50	42	41
Q195	32	53	45	40
Q295	35	49	44	40
Q395	35	50	46	39
Q495	32	47	44	35
Q196	34	47	42	39
Q296	36	50	43	43
Q396	37	49	43	43
Q496	31	42	33	40

Source: Dell Computer Corporation fiscal 1993-1996 annual and quarterly reports.

^aDSI (Days Sales of Inventory) = Net Inventory / (Quarterly COGS/90).

^bDSO (Days Sales Outstanding) = Net Accounts Receivables / (Quarterly Sales/90).

^cDPO (Days Payables Outstanding) = Accounts Payables / (Quarterly COGS/90).

^dCCC (Cash Conversion Cycle) = DSI + DSO - DPO.

Exhibit 3 Percent of Dell Computer Systems Sales by Microprocessor.

Computer Systems	FY94	FY95	FY96
386 models	7%	0%	0%
486 models	92%	71%	25%
Pentium models	1%	29%	75%

Source: Dell Computer Corporation Fiscal 1994-96 Annual Reports.

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Exhibit 4 Profit & Loss Statements for Dell Computer Corporation (millions of dollars).

Fiscal Year	1996	1995	1994	1993	1992
Sales	\$5,296	\$3,475	\$2,873	\$2,014	\$890
Cost of Sales	4,229	2,737	2,440	1,585	608
Gross Margin	1,067	738	433	449	282
Operating Expenses	690	489	472	310	215
Operating Income	377	249	(39)	139	67
Financing & Other Income	6	(36)	0	4	7
Income Taxes	111	64	(3)	41	23
Net Profit	272	149	(38)	102	51

Source: Dell Computer Corporation Fiscal 1996 Annual Report.

Exhibit 5 Balance Sheets for Dell Computer Corporation (millions of dollars).

	Year Ended		
	January 28, 1996	January 29, 1995	January 30, 1994
Current Assets:			
Cash	55	43	3
Short Term Investments	591	484	334
Accounts Receivables, net	726	538	411
Inventories	429	293	220
Other	156	112	80
Total Current Assets	1,957	1,470	1,048
Property, Plant & Equipment, net	179	117	87
Other	12	7	5
Total Assets	2,148	1,594	1,140
Current Liabilities:			
Accounts Payable	466	403	NA
Accrued and Other Liabilities	473	349	NA
Total Current Liabilities	939	752	538
Long Term Debt	113	113	100
Other Liabilities	123	77	31
Total Liabilities	1,175	942	669
Stockholders' Equity:			
Preferred Stock*	6	120	NA
Common Stock*	430	242	NA
Retained Earnings	570	311	NA
Other	(33)	(21)	NA
Total Stockholders' Equity	973	652	471
	2,148	1,594	1,140

Source: Dell Computer Corporation Fiscal 1994-1996 Annual Reports.

*1,190,000 shares of preferred stock converted to common stock in fiscal year 1996.

Q.2) Develop a five-year financial plan for a company based on the following assumptions:

	Year 1	Year 2	Year 3	Year 4	Year 5
Net assets (100)	\$1,500	-	-	-	-
Debt/Equity	0.25:1	0.25:1	0.50:1	0.50:1	0.50:1
Return on Net Assets (after taxes)	8%	9%	10%	10%	10%
Interest rate (after taxes)	4.5	4.5	5.0	5.0	5.0
Dividend payout	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{2}$
Number of shares	200,000	-	-	-	-

a) Calculate all relevant financial results, such as earnings per share, return on equity, growth in equity and growth in earnings. Discuss your assumptions and findings.

b) Demonstrate the sensitivity of earnings per share, return on equity and growth in equity by varying the conditions in Year 5 as follows:

debt/equity, 0.75:1; return on net assets, 11 percent; interest rate, 4.5 percent; and dividend payout, two thirds. Discuss your findings.

Q.3) An investment proposition costing \$60,000 is expected to result in the following aftertax cash inflows over seven years:

Year	
1	\$10,000
2	15,000
3	15,000
4	20,000
5	15,000
6	10,000
7	5,000

- Calculate the net present value at 10 percent and at 16 percent.
- Determine the internal rate of return (yield) of the proposition.
- If the annual cash flows were an even \$13,000 per year for seven years, what would be the net present value at 10 percent?
- What level of annual cash flows would be required to yield a 16 percent return?
- How would the results of (a) and (b) change if there is a cash inflow (salvage value) of \$10,000 at the end of Year 7?
- How would the result of (d) change if there were a cash inflow (salvage value) of \$10,000 at the end of Year 7?

Q.4) Discuss the following in the context of what you have understood from the proceedings in the class: (any five)

1. Liquidity and Profitability are at loggerheads.
2. More sales do not mean more profits.
3. More Assets mean more Profits.
4. More Sales or Assets mean Higher Market Capitalisation.
5. Debt is cheaper than Equity.
6. Leverage will always boost Return on Equity.
7. Nominal Rates of Interest versus Real Rates of Interest.
8. Negative or Zero Working Capital helps to maximize ROI.
9. Ratios are only guide to decision making. In fact, decision making starts where formulae ends.
10. NPV is superior to IRR.
11. Physical Planning Precedes financial planning.
12. Minimum Acceptable Rate of Return is always greater than or equal to Cost of Capital
Thus: $R > K_o$
 R = minimum acceptable rate of return.
 K_o = cost of capital
13. Tax Adjusted inputs drive investments decisions.
14. Operating Leverage v/s Financial Leverage.
15. Stakeholders Welfare v/s Shareholders Welfare.

N. B. Answers must be brief, focused and to the point.

TABLE S-1

Present Value of Single Sum of \$1 Received or Paid at End of Period

Period of Receipt or Payment	1%	2%	3%	5%	6%	8%	10%	12%	14%	15%	16%	18%	20%	22%	24%	25%	26%	28%	30%	35%	40%	45%
1	0.990	0.980	0.962	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.862	0.847	0.833	0.820	0.806	0.800	0.794	0.781	0.769	0.741	0.714	0.690
2	0.980	0.961	0.925	0.907	0.890	0.857	0.826	0.797	0.769	0.756	0.743	0.718	0.694	0.672	0.650	0.640	0.630	0.610	0.592	0.549	0.510	0.476
3	0.971	0.942	0.889	0.863	0.840	0.794	0.751	0.712	0.675	0.658	0.641	0.609	0.579	0.551	0.524	0.512	0.500	0.477	0.455	0.406	0.364	0.328
4	0.961	0.904	0.855	0.823	0.792	0.735	0.683	0.636	0.592	0.572	0.552	0.516	0.482	0.451	0.423	0.410	0.397	0.373	0.350	0.301	0.260	0.226
5	0.951	0.906	0.822	0.784	0.747	0.681	0.621	0.567	0.519	0.497	0.478	0.437	0.402	0.370	0.341	0.329	0.315	0.291	0.269	0.223	0.186	0.156
6	0.942	0.888	0.790	0.746	0.705	0.630	0.564	0.507	0.456	0.432	0.410	0.370	0.335	0.303	0.275	0.262	0.250	0.227	0.207	0.165	0.133	0.108
7	0.933	0.871	0.760	0.711	0.668	0.583	0.513	0.452	0.400	0.376	0.354	0.314	0.279	0.249	0.222	0.210	0.198	0.178	0.159	0.122	0.095	0.074
8	0.923	0.853	0.731	0.677	0.627	0.540	0.467	0.404	0.351	0.327	0.305	0.266	0.233	0.204	0.179	0.168	0.157	0.139	0.123	0.091	0.068	0.051
9	0.914	0.837	0.703	0.645	0.592	0.500	0.424	0.361	0.308	0.284	0.263	0.225	0.194	0.167	0.144	0.134	0.125	0.108	0.094	0.067	0.048	0.035
10	0.905	0.820	0.676	0.614	0.558	0.463	0.386	0.322	0.270	0.247	0.227	0.191	0.162	0.137	0.116	0.107	0.099	0.085	0.073	0.050	0.035	0.024
11	0.896	0.804	0.650	0.585	0.527	0.429	0.350	0.287	0.237	0.215	0.195	0.162	0.135	0.112	0.094	0.086	0.079	0.066	0.056	0.037	0.025	0.017
12	0.887	0.788	0.625	0.557	0.497	0.397	0.319	0.257	0.208	0.187	0.168	0.137	0.112	0.092	0.076	0.069	0.062	0.052	0.043	0.027	0.018	0.012
13	0.879	0.773	0.601	0.530	0.469	0.368	0.290	0.229	0.182	0.163	0.145	0.116	0.093	0.075	0.061	0.055	0.050	0.040	0.033	0.020	0.013	0.008
14	0.870	0.758	0.577	0.505	0.442	0.340	0.263	0.205	0.160	0.141	0.125	0.098	0.078	0.062	0.048	0.044	0.039	0.032	0.025	0.015	0.009	0.006
15	0.861	0.743	0.555	0.481	0.417	0.315	0.238	0.183	0.140	0.123	0.108	0.084	0.065	0.051	0.040	0.036	0.031	0.025	0.020	0.011	0.006	0.004
16	0.853	0.728	0.534	0.458	0.394	0.292	0.218	0.163	0.123	0.107	0.093	0.071	0.054	0.042	0.032	0.028	0.025	0.019	0.015	0.008	0.005	0.003
17	0.844	0.714	0.513	0.436	0.371	0.270	0.198	0.146	0.108	0.093	0.080	0.060	0.045	0.034	0.026	0.023	0.020	0.015	0.012	0.006	0.003	0.002
18	0.836	0.700	0.494	0.416	0.350	0.250	0.180	0.130	0.095	0.081	0.069	0.051	0.038	0.028	0.021	0.018	0.016	0.012	0.009	0.005	0.002	0.001
19	0.828	0.686	0.475	0.396	0.331	0.232	0.164	0.116	0.083	0.070	0.060	0.043	0.031	0.023	0.017	0.014	0.012	0.009	0.007	0.003	0.002	0.001
20	0.820	0.673	0.456	0.377	0.312	0.215	0.149	0.104	0.073	0.061	0.051	0.037	0.026	0.019	0.014	0.012	0.010	0.007	0.005	0.002	0.001	0.001
21	0.811	0.660	0.439	0.359	0.294	0.199	0.135	0.090	0.064	0.053	0.044	0.031	0.022	0.015	0.011	0.009	0.008	0.006	0.004	0.002	0.001	0.001
22	0.803	0.647	0.422	0.342	0.278	0.184	0.123	0.080	0.056	0.046	0.038	0.026	0.018	0.013	0.009	0.007	0.006	0.004	0.003	0.001	0.001	0.001
23	0.795	0.634	0.406	0.326	0.262	0.170	0.112	0.074	0.049	0.040	0.033	0.022	0.015	0.010	0.007	0.006	0.005	0.003	0.002	0.001	0.001	0.001
24	0.788	0.622	0.390	0.310	0.247	0.158	0.102	0.066	0.043	0.035	0.028	0.019	0.013	0.008	0.006	0.005	0.004	0.003	0.002	0.001	0.001	0.001
25	0.780	0.610	0.375	0.295	0.233	0.146	0.092	0.058	0.038	0.030	0.024	0.016	0.010	0.007	0.005	0.004	0.003	0.002	0.001	0.001	0.001	0.001
26	0.772	0.598	0.361	0.281	0.220	0.135	0.084	0.053	0.033	0.026	0.021	0.014	0.009	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001
27	0.764	0.586	0.347	0.266	0.207	0.125	0.078	0.047	0.029	0.023	0.018	0.011	0.007	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001
28	0.757	0.574	0.333	0.253	0.196	0.116	0.069	0.042	0.026	0.020	0.016	0.010	0.006	0.004	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001
29	0.749	0.563	0.321	0.243	0.185	0.107	0.063	0.037	0.022	0.017	0.014	0.008	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
30	0.742	0.552	0.308	0.231	0.174	0.096	0.057	0.033	0.020	0.015	0.012	0.007	0.004	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
35	0.706	0.500	0.253	0.181	0.130	0.066	0.036	0.019	0.010	0.008	0.006	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
40	0.672	0.453	0.208	0.142	0.097	0.045	0.022	0.011	0.005	0.004	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
45	0.639	0.410	0.171	0.111	0.073	0.031	0.014	0.006	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
50	0.608	0.372	0.141	0.087	0.054	0.021	0.009	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
60	0.550	0.305	0.095	0.054	0.030	0.010	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

1. To find present value (PV) of future amount: $PV = \text{Factor} \times \text{Amount}$
2. To find future amount representing given PV: $\text{Amount} = PV/\text{Factor}$

3. To find period given future amount, PV and yield: $\text{Factor} = PV/\text{Amount}$; locate in column
4. To find yield given future amount, PV and period: $\text{Factor} = PV/\text{Amount}$; locate in row

LE 6-II

Present Value of \$1 per Period Received or Paid at End of Period (Annuity)

	1%	2%	4%	5%	6%	8%	10%	12%	14%	15%	16%	18%	20%	22%	24%	25%	26%	28%	30%	35%	40%	45%	50%
0.990	0.990	0.982	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.852	0.847	0.833	0.820	0.806	0.800	0.794	0.781	0.769	0.741	0.714	0.690	0.667	0.647
1.970	1.942	1.886	1.859	1.833	1.793	1.756	1.720	1.680	1.647	1.626	1.605	1.586	1.528	1.492	1.457	1.440	1.424	1.392	1.361	1.289	1.224	1.165	1.111
2.941	2.884	2.775	2.722	2.673	2.577	2.487	2.402	2.322	2.283	2.246	2.174	2.106	2.042	1.981	1.952	1.923	1.868	1.816	1.696	1.589	1.493	1.407	1.322
3.902	3.808	3.630	3.545	3.465	3.312	3.170	3.037	2.914	2.855	2.798	2.690	2.599	2.494	2.404	2.362	2.320	2.231	2.166	1.997	1.849	1.720	1.605	1.498
4.853	4.713	4.452	4.329	4.212	3.992	3.791	3.605	3.433	3.352	3.274	3.127	2.991	2.864	2.745	2.699	2.635	2.537	2.436	2.220	2.035	1.876	1.737	1.624
5.795	5.601	5.242	5.075	4.917	4.623	4.355	4.112	3.899	3.784	3.685	3.498	3.336	3.167	3.020	2.951	2.885	2.759	2.643	2.385	2.198	1.983	1.824	1.707
6.728	6.472	6.002	5.786	5.582	5.206	4.868	4.564	4.268	4.160	4.039	3.812	3.605	3.416	3.242	3.161	3.083	2.937	2.802	2.508	2.263	2.057	1.893	1.771
7.652	7.325	6.733	6.463	6.210	5.747	5.335	4.968	4.638	4.487	4.344	4.078	3.837	3.619	3.421	3.329	3.241	3.076	2.925	2.598	2.331	2.108	1.922	1.801
8.566	8.162	7.435	7.108	6.802	6.247	5.759	5.328	4.946	4.772	4.607	4.303	4.031	3.786	3.566	3.463	3.366	3.184	3.019	2.665	2.379	2.144	1.948	1.828
9.471	8.983	8.111	7.722	7.380	6.710	6.145	5.660	5.218	5.019	4.833	4.494	4.192	3.923	3.682	3.571	3.465	3.269	3.092	2.715	2.414	2.168	1.966	1.847
10.368	9.787	8.760	8.307	7.887	7.139	6.495	5.937	5.453	5.234	5.029	4.656	4.327	4.038	3.776	3.656	3.544	3.335	3.147	2.752	2.430	2.185	1.977	1.859
11.255	10.575	9.385	8.863	8.384	7.536	6.814	6.194	5.660	5.421	5.187	4.793	4.439	4.127	3.851	3.725	3.606	3.387	3.190	2.779	2.456	2.196	1.985	1.868
12.134	11.343	9.986	9.253	8.653	7.704	7.103	6.424	5.843	5.583	5.342	4.910	4.533	4.203	3.912	3.780	3.658	3.427	3.223	2.799	2.468	2.204	1.990	1.874
13.004	12.106	10.563	9.898	9.295	8.244	7.587	6.828	6.202	5.924	5.668	5.208	4.814	4.465	4.162	4.024	3.895	3.659	3.449	2.914	2.477	2.210	1.993	1.878
13.865	12.849	11.118	10.379	9.712	8.559	7.806	7.011	6.347	6.047	5.775	5.282	4.875	4.515	4.201	4.058	3.928	3.708	3.483	2.928	2.484	2.214	1.995	1.880
14.718	13.578	11.652	10.838	10.106	8.851	7.924	7.074	6.365	6.047	5.769	5.252	4.827	4.457	4.133	4.000	3.871	3.645	3.415	2.840	2.400	2.128	1.909	1.794
15.562	14.292	12.116	11.274	10.477	9.122	8.092	7.120	6.373	6.047	5.749	5.222	4.775	4.391	4.060	3.929	3.798	3.569	3.334	2.748	2.311	2.036	1.817	1.702
16.398	14.992	12.659	11.690	10.829	9.372	8.201	7.210	6.467	6.129	5.818	5.273	4.812	4.419	4.080	3.949	3.798	3.569	3.329	2.728	2.294	2.016	1.797	1.682
17.225	15.678	13.134	12.086	11.158	9.604	8.385	7.366	6.550	6.198	5.877	5.316	4.844	4.442	4.097	3.962	3.799	3.539	3.311	2.698	2.266	1.985	1.766	1.651
18.046	16.351	13.599	12.463	11.470	9.818	8.514	7.469	6.623	6.259	5.929	5.353	4.870	4.460	4.110	3.954	3.808	3.546	3.316	2.695	2.267	1.983	1.764	1.649
18.857	17.011	14.029	12.821	11.784	10.017	8.645	7.562	6.687	6.312	5.975	5.384	4.891	4.475	4.121	3.963	3.816	3.551	3.320	2.692	2.268	1.981	1.762	1.647
19.660	17.658	14.451	13.163	12.042	10.201	8.772	7.645	6.743	6.359	6.011	5.410	4.909	4.488	4.130	3.970	3.822	3.556	3.323	2.693	2.270	1.980	1.761	1.646
20.456	18.292	14.857	13.489	12.303	10.371	8.893	7.718	6.792	6.399	6.044	5.432	4.925	4.499	4.137	3.976	3.827	3.559	3.325	2.694	2.271	1.981	1.762	1.647
21.243	18.914	15.247	13.799	12.550	10.529	8.985	7.794	6.835	6.434	6.073	5.451	4.937	4.507	4.143	3.981	3.831	3.562	3.327	2.695	2.272	1.982	1.763	1.648
22.023	19.523	15.622	14.094	12.783	10.675	9.077	7.843	6.873	6.464	6.097	5.467	4.948	4.514	4.147	3.985	3.834	3.564	3.329	2.696	2.273	1.983	1.764	1.649
22.795	20.121	15.983	14.375	13.003	10.810	9.151	7.896	6.906	6.491	6.118	5.480	4.956	4.520	4.151	3.988	3.837	3.566	3.330	2.696	2.274	1.984	1.765	1.650
23.560	20.707	16.330	14.643	13.211	10.935	9.237	7.943	6.935	6.514	6.136	5.492	4.964	4.524	4.154	3.990	3.839	3.567	3.331	2.697	2.275	1.985	1.766	1.651
24.318	21.281	16.663	14.898	13.406	11.051	9.307	7.984	6.961	6.534	6.152	5.502	4.970	4.528	4.157	3.992	3.840	3.568	3.331	2.697	2.276	1.986	1.767	1.652
25.068	21.844	16.984	15.141	13.591	11.158	9.370	8.022	6.983	6.551	6.166	5.510	4.975	4.531	4.159	3.994	3.841	3.569	3.332	2.697	2.277	1.987	1.768	1.653
25.808	22.396	17.292	15.372	13.765	11.258	9.427	8.065	7.003	6.566	6.177	5.517	4.979	4.534	4.160	3.995	3.842	3.569	3.332	2.697	2.278	1.988	1.769	1.654
26.538	22.939	17.585	15.574	13.928	11.354	9.464	8.116	7.020	6.577	6.175	5.523	4.982	4.541	4.164	3.998	3.845	3.571	3.333	2.697	2.279	1.989	1.770	1.655
27.258	23.472	17.865	15.753	14.080	11.448	9.495	8.167	7.037	6.587	6.173	5.528	4.987	4.544	4.166	3.999	3.846	3.571	3.333	2.697	2.280	1.990	1.771	1.656
27.968	23.995	18.132	15.909	14.223	11.540	9.521	8.217	7.052	6.597	6.171	5.532	4.990	4.547	4.168	4.000	3.846	3.571	3.333	2.697	2.281	1.991	1.772	1.657
28.668	24.508	18.390	16.054	14.358	11.630	9.543	8.266	7.066	6.606	6.169	5.536	4.993	4.549	4.169	4.000	3.846	3.571	3.333	2.697	2.282	1.992	1.773	1.658
29.358	25.011	18.638	16.194	14.485	11.718	9.562	8.314	7.079	6.615	6.167	5.539	4.996	4.551	4.170	4.000	3.846	3.571	3.333	2.697	2.283	1.993	1.774	1.659
30.038	25.504	18.877	16.323	14.606	11.804	9.579	8.361	7.091	6.624	6.165	5.542	4.999	4.552	4.171	4.000	3.846	3.571	3.333	2.697	2.284	1.994	1.775	1.660
30.708	26.000	19.107	16.443	14.721	11.888	9.594	8.407	7.103	6.633	6.163	5.544	4.999	4.553	4.172	4.000	3.846	3.571	3.333	2.697	2.285	1.995	1.776	1.661
31.368	26.497	19.328	16.554	14.830	11.970	9.608	8.452	7.115	6.642	6.161	5.546	4.999	4.554	4.173	4.000	3.846	3.571	3.333	2.697	2.286	1.996	1.777	1.662
32.018	26.986	19.540	16.658	14.933	12.050	9.620	8.496	7.126	6.650	6.159	5.547	4.999	4.554	4.174	4.000	3.846	3.571	3.333	2.697	2.287	1.997	1.778	1.663
32.658	27.467	19.744	16.756	15.031	12.128	9.631	8.539	7.137	6.658	6.157	5.548	4.999	4.555	4.175	4.000	3.846	3.571	3.333	2.697	2.288	1.998	1.779	1.664
33.288	27.940	19.940	16.848	15.126	12.204	9.641	8.581	7.147	6.666	6.155	5.549	4.999	4.555	4.176	4.000	3.846	3.571	3.333	2.697	2.289	1.999	1.780	1.665
33.908	28.406	20.128	16.935	15.217	12.278	9.650	8.622	7.157	6.674	6.153	5.550	4.999	4.555	4.177	4.000	3.846	3.571	3.333	2.697	2.290	2.000	1.781	1.666
34.518	28.865	20.309	17.018	15.304	12.350	9.659	8.663	7.167	6.682	6.151	5.551	4.999	4.555	4.178	4.000	3.846	3.571	3.333	2.697	2.291	2.001	1.782	1.667
35.118	29.317	20.482	17.094	15.387	12.421	9.667	8.703	7.177	6.690	6.149	5.552	4.999	4.555	4.179	4.000	3.846	3.571	3.333	2.697	2.292	2.002	1.783	1.668
35.708	29.762	20.648	17.166	15.466	12.490	9.675	8.744	7.187	6.698	6.147	5.553	4.999	4.555	4.180	4.000	3.846	3.571	3.333	2.697	2.293	2.003	1.784	1.669
36.288	30.201	20.807	17.234	15.542	12.558	9.683	8.784	7.197	6.706	6.145	5.554	4.999	4.555	4.181	4.000	3.846	3.571	3.333	2.697	2.294	2.004	1.785	1.670
36.858	30.634	20.959	17.300	15.616	12.625	9.690	8.824	7.207	6.714	6.143	5.555	4.999	4.555	4.182	4.000	3.846	3.571	3.333	2.697	2.295	2.005	1.786	1.671
37.418	31.061	21.104	17.363	15.688	12.691	9.697	8.863	7.217	6.722	6.141	5.556	4.999	4.555	4.183	4.000	3.846	3.571	3.333	2.697	2.296	2.006	1.787	1.672
37.968	31.482	21.251	17.424																				