CIMA

Management Accounting Pillar

Managerial Level Paper

P2 – Management Accounting - Decision Management

23 May 2007 – Wednesday Morning Session

Instructions to candidates

You are allowed three hours to answer this question paper.
You are allowed 20 minutes reading time **before the examination begins** during which you should read the question paper and, if you wish, highlight and/or make notes on the question paper. However, you will **not** be allowed, **under any circumstances**, to open the answer book and start writing or use your calculator during the reading time.
You are strongly advised to carefully read ALL the question requirements before attempting the question concerned (that is, all parts and/or sub-questions). The requirements for the questions in Sections B and C are contained in a dotted box.
ALL answers must be written in the answer book. Answers or notes written on the question paper will **not** be submitted for marking.
Answer the ONE compulsory question in Section A. This has eight sub-questions and is on pages 2 to 4.
Answer ALL THREE compulsory questions in Section B on pages 6 to 9.
Answer TWO of the three questions in Section C on pages 10 to 15.
Maths Tables and Formulae are provided on pages 17 to 19. These pages are detachable for ease of reference.
The list of verbs as published in the syllabus is given for reference on the inside back cover of this question paper.
Write your candidate number, the paper number and examination subject title in the spaces provided on the front of the answer book. Also write your contact ID and name in the space provided in the right hand margin and seal to close.
Tick the appropriate boxes on the front of the answer book to indicate which questions you have answered.

P2 – Decision Management

TURN OVER

SECTION A – 20 MARKS

[the indicative time for answering this section is 36 minutes]

ANSWER *ALL* EIGHT SUB-QUESTIONS

Instructions for answering Section A:

The answers to the eight sub-questions in Section A should ALL be written in your answer book.

Your answers should be clearly numbered with the sub-question number and then ruled off, so that the markers know which sub-question you are answering. **For multiple choice questions, you need only write the sub-question number and the letter of the answer option you have chosen.** You do not need to start a new page for each sub-question.

For sub-questions **1.6, 1.7** and **1.8** you should show your workings as marks are available for the method you use to answer these sub-questions.

Question One

1.1 An investment project that requires an initial investment of $500,000 has a residual value of $130,000 at the end of five years. The project's cash flows have been discounted at the company's cost of capital of 12% and the resulting net present value is $140,500. The profitability index of the project is closest to:

A 0·02

B 0·54

C 0·28

D 0·26

(2 marks)

1.2 A project has a net present value of $320,000.

The sales revenues for the project have a total pre-discounted value of $900,000 and a total present value of $630,000 after tax.

The sensitivity of the investment to changes in the value of sales is closest to:

A $310,000

B $580,000

C 51%

D 36%

(2 marks)

1.3 A company provides a number of different services to its customers from a single office. The fixed costs of the office, including staff costs, are absorbed into the company's service costs using an absorption rate of $25 per consulting hour based on a budgeted activity level of 100,000 hours each period.

Fee income and variable costs are different depending on the services provided, but the average contribution to sales ratio is 35%. The breakeven fee income each period is closest to:

A $1,400,000

B $11,500,000

C $875,000

D $7,143,000

(2 marks)

1.4 A company has recently completed the production of the first unit of a new product. The time taken for this was 12 minutes. The company expects that there will be a 75% learning rate for this product.

Calculate the total time expected to produce the first four units.

(2 marks)

The following data are given for sub-questions 1.5 and 1.6 below

An investment project with no residual value has a net present value of $87,980 when it is discounted using a cost of capital of 10%. The annual cash flows are as follows:

Year	*$*
0	(200,000)
1	80,000
2	90,000
3	100,000
4	60,000
5	40,000

1.5 Calculate the Accounting Rate of Return of the project using the average investment value basis.

(2 marks)

1.6 Calculate the Internal Rate of Return of the project.

(3 marks)

TURN OVER

1.7 A company manufactures three products. Each of these products use the same type of material but in different quantities. The unit selling prices, cost and profit details are as follows:

Product	*X* *$/unit*	*Y* *$/unit*	*Z* *$/unit*
Selling price	23	26	28
Direct materials	6	8	6
Direct labour	8	6	8
Variable overhead	2	3	3
Fixed overhead	4	5	6
Profit	3	4	5

The direct material used on all three products costs $10 per kg. The material available is expected to be limited to 600 kgs for the next accounting period. The maximum demand for each of the products during the next accounting period is expected to be as follows:

X 240 units Y 600 units Z 400 units

No inventories of finished products are held.

Calculate the optimum product mix for the next accounting period.

(3 marks)

1.8 A company is launching a new product. Market research shows that if the selling price of the product is $100 then demand will be 1,200 units, but for every $10 increase in selling price there will be a corresponding decrease in demand of 200 units and for every $10 decrease in selling price there will be a corresponding increase in demand of 200 units. The estimated variable costs of the product are $30 per unit. There are no specific fixed costs but general fixed costs are absorbed using an absorption rate of $8 per unit.

Calculate the selling price at which profit is maximised.

Note: When Price = a-bx then Marginal Revenue = a-2bx

(4 marks)

(Total for Section A = 20 marks)

Reminder

All answers to Section A must be written in your answer book. Answers to Section A written on the question paper will **not** be submitted for marking.

End of Section A
Section B starts on page 6

Section B starts on the next page

TURN OVER

SECTION B – 30 MARKS

[the indicative time for answering this section is 54 minutes]

ANSWER *ALL* THREE QUESTIONS

Question Two

A company is planning to launch a new product. It has already carried out market research at a cost of $50,000 and as a result has discovered that the market price for the product should be $50 per unit. The company estimates that 80,000 units of the product could be sold at this price before one of the company's competitors enters the market with a superior product. At this time any unsold units of the company's product would be of no value.

The company has estimated the costs of the initial batch of the product as follows:

	$000
Direct materials	200
Direct labour ($10 per hour)	250
Other direct costs	100

Production was planned to occur in batches of 10,000 units and it was expected that an 80% learning curve would apply to the direct labour until the fourth batch was complete. Thereafter the direct labour cost per batch was expected to be constant. No changes to the direct labour rate per hour were expected.

The company introduced the product at the price stated above, with production occurring in batches of 10,000 units. Direct labour was paid using the expected hourly rate of $10 and the company is now reviewing the profitability of the product. The following schedule shows the actual direct labour cost recorded:

Cumulative number of batches	*Actual cumulative direct labour cost*
	$000
1	280
2	476
4	809
8	1,376

Required:

(i) Calculate the revised expected cumulative direct labour costs for the four levels of output given the actual cost of $280,000 for the first batch.

(ii) Calculate the actual learning rate exhibited at each level of output.

(iii) Discuss the implications of your answers to (i) and (ii) for the managers of the company.

(10 marks)

(Total for Question Two = 10 marks)

Section B continues on the opposite page

Question Three

A company operates a fleet of three canal boats that provide cruises for tourists around the canals of a city. The company seeks your advice as to whether it is better to replace its boats every year, every two years or every three years. The company has provided the following data:

	$
Annual sales revenue from operating each boat	800,000
Purchase cost of each boat	400,000

Operating costs, which include maintenance, servicing, and similar costs are paid at the end of each year. Operating costs and end of year trade-in values vary depending on the age of the boat and are as follows for each year of the boat's life:

Year	*Operating Costs*	*Trade-in values*
	$	*$*
1	300,000	240,000
2	400,000	150,000
3	600,000	80,000

These costs do not include depreciation or any other fixed costs of providing the tourist service. These other fixed costs are a constant $100,000 per year regardless of the age of the boat.

The company uses an 8% cost of capital for its investment decisions.

Required:

(a) Produce calculations to determine the optimum replacement cycle of the boats and state clearly your recommendations. Ignore taxation.

(6 marks)

The same company is also considering investing in one of three marketing campaigns to increase its profitability. All three marketing campaigns have a life of five years, require the same initial investment and have no residual value. The company has already evaluated the marketing campaigns taking into consideration the range of possible outcomes that could result from the investment. A summary of the calculations is shown below:

Marketing Campaign	*J*	*K*	*L*
Expected Net Present Value	$400,000	$800,000	$400,000
Standard Deviation of Net Present Value	$35,000	$105,000	$105,000

Required:

(b)

(i) Explain the meaning of the data shown above; and

(ii) Briefly explain how the data may be used by the company when choosing between alternative investments.

(4 marks)

(Total for Question Three = 10 marks)

Question Four

Z is one of a number of companies that produce three products for an external market. The three products, R, S and T may be bought or sold in this market.

The common process account of Z for March 2007 is shown below:

	Kg	*$*		*Kg*	*$*
Inputs:					
Material A	1,000	3,500	Normal loss	500	0
Material B	2,000	2,000	Outputs:		
Material C	1,500	3,000	Product R	800	3,500
Direct labour		6,000	Product S	2,000	8,750
Variable overhead		2,000	Product T	1,200	5,250
Fixed cost		1,000			
Totals	4,500	17,500		4,500	17,500

Z can sell products R, S or T after this common process or they can be individually further processed and sold as RZ, SZ and TZ respectively. The market prices for the products at the intermediate stage and after further processing are:

Market prices per kg:

	$
R	3·00
S	5·00
T	3·50
RZ	6·00
SZ	5·75
TZ	6·75

The specific costs of the three individual further processes are:

Process R to RZ	variable cost of $1·40 per kg, no fixed costs
Process S to SZ	variable cost of $0·90 per kg, no fixed costs
Process T to TZ	variable cost of $1·00 per kg, fixed cost of $600 per month

The question requirement is on the opposite page

Required:

(a) Produce calculations to determine whether any of the intermediate products should be further processed before being sold. Clearly state your recommendations together with any relevant assumptions that you have made.

(3 marks)

(b) Produce calculations to assess the viability of the common process:

(i) assuming that there is an external market for products R,S and T; and

(ii) assuming that there is **not** an external market for products R,S and T.

State clearly your recommendations.

(7 marks)

(Total for Question Four =10 marks)

(Total for Section B = 30 marks)

End of Section B
Section C starts on the next page

TURN OVER

SECTION C – 50 MARKS

[the indicative time for answering this section is 90 minutes]

ANSWER *TWO* QUESTIONS OUT OF THREE

Question Five

X operates in an economy that has almost zero inflation. Management ignores inflation when evaluating investment projects because it is so low as to be considered insignificant. X is evaluating a number of similar, alternative investments. The company uses an after tax cost of capital of 6% and has already completed the evaluation of two investments. The third investment is a new product that would be produced on a just-in-time basis and which is expected to have a life of three years. This investment requires an immediate cash outflow of $200,000, which does not qualify for tax depreciation. The expected residual value at the end of the project's life is $50,000. A draft financial statement showing the values that are specific to this third investment for the three years is as follows:

	Year 1 *$*	*Year 2* *$*	*Year 3* *$*
Sales	230,000	350,000	270,000
Production costs:			
Materials	54,000	102,000	66,000
Labour	60,000	80,000	70,000
Other*	80,000	90,000	80,000
Profit	36,000	78,000	54,000
Closing receivables	20,000	30,000	25,000
Closing payables	6,000	9,000	8,000

*Other production costs shown above include depreciation calculated using the straight line method.

The company is liable to pay corporation tax at a rate of 30% of its profits. One half of this is payable in the same year as the profit is earned, the remainder is payable in the following year.

Required:

(a) Calculate the net present value of the above investment proposal.

(10 marks)

(b) Explain how the above investment project would be appraised if there were to be a change in the rate of inflation so that it became too significant to be ignored.

(5 marks)

The evaluations of the other two investments are shown below:

Investment	*Initial investment*	*Net Present Value*
	$	*$*
W	300,000	75,000
Y	100,000	27,000

The company only has $400,000 of funds available. All of the investment proposals are non-divisible. None of the investments may be repeated.

Required:

(c) Recommend, with supporting calculations, which of the three investment proposals should be accepted.

(3 marks)

(d)

(i) Briefly explain gain sharing arrangements.

(3 marks)

(ii) Explain the reasons why X might not want to overcome its investment funding limitations by using a gain sharing arrangement.

(4 marks)

(Total for Question Five = 25 marks)

Section C continues on the next page

Question Six

H, a printing company, uses traditional absorption costing to report its monthly profits.

It is seeking to increase its business by winning work from new customers. It now has the opportunity to prepare a quotation for a large organisation that currently requires a new catalogue of its services.

A technical report on the resource requirements for the catalogues has been completed at a cost of $1,000 and its details are summarised below:

Production period
It is expected that the total time required to print and despatch the catalogue will be one week.

Material A
10,000 sheets of special printing paper will be required. This is a paper that is in regular use by H and the company has 3,400 sheets in inventory. These originally cost $1·40 per sheet but the current market price is $1·50 per sheet. The resale price of the sheets held in inventory is $1·20 per sheet.

Material B
This is a special ink that H will need to purchase at a cost of $8 per litre. 200 litres will be required for this catalogue but the supplier has a minimum order size of 250 litres. H does not foresee any other use for this ink, but will hold the surplus in inventory. H's inventory policy is to review slow moving items regularly. The cost of any inventory item that has not been used for more than 6 months is accounted for as an expense of the period in which that review occurs.

Direct labour
Sufficient people are already employed by H to print the catalogue, but some of the printing will require overtime working due to the availability of a particular machine that is used on other work. The employees are normally paid $8 per hour, the order will require 150 hours of work and 50 of these hours will be in excess of the employees' normal working week. A rate of $10 per hour is paid for these overtime hours. Employees are paid using an hourly rate with a guaranteed minimum wage for their normal working week.

Supervision
An existing supervisor will take responsibility for the catalogue in addition to her existing duties. She is not currently fully employed and receives a salary of $500 per week.

Machinery
Two different types of machine will be required:

Machine A will print the catalogues. This is expected to take 20 hours of machine time. The running cost of machine A is $5 per hour. There is currently 30 hours of unused time on machine A per week that is being sold to other printers for $12 per hour.

Machine B will be used to cut and bind the catalogues. This machine is being used to full capacity in the normal working week and this is why there is a need to work overtime. The catalogue will require 25 machine hours and these have a running cost of $4 per hour.

Despatch
There will be a delivery cost of $400 to transport the catalogues to the customer.

Fixed overhead costs
H uses a traditional absorption costing system to attribute fixed overhead costs to its work. The absorption rate that it uses is $20 per direct labour hour.

Profit mark-up
H applies a 30% mark-up to its costs to determine its selling prices.

Required:

(a) In order to assist the management of H in preparing its quotation, prepare a schedule showing the relevant costs for the production of the catalogues. State clearly your reason for including or excluding each value that has been provided in the above scenario.

(15 marks)

(b) Explain how the use of relevant costs as the basis of setting a selling price may be appropriate for short-term pricing decisions but may be inappropriate for long-term pricing decisions. Your answer should also discuss the conflict between reporting profitability within a traditional absorption costing system and the use of relevant cost based pricing.

(10 marks)

(Total for Question Six = 25 marks)

Section C continues on the next page

Question Seven

D provides a motorist rescue service to its members. At present all members pay a basic fee of $100 per year but D is considering the introduction of different fees for members depending on the data they provide when joining the service. The number of members, and therefore the fee income of D, is uncertain but the following estimates have been made:

Number of members	*Probability*
20,000	0·3
30,000	0·5
40,000	0·2

Required:

(a) Calculate the expected annual fee income of D.

(2 marks)

The operating costs to be incurred by D have been analysed between call-out costs and administration costs. These operating costs have been assumed to vary in relation to the number of members and consequently the average costs per member for next year are expected to be:

Call-out cost per member for the year	$50
Administration cost per member for the year	$10

Each of these operating costs may vary by plus or minus 20%. There is equal probability of these costs being as expected, 20% higher, or 20% lower. In addition D expects to incur annual fixed costs of $1,100,000.

Required:

(b) Using Expected Values, calculate the breakeven number of members.

(3 marks)

(c) Prepare a two-way data table that shows the nine possible profit values.

(6 marks)

(d) Explain the meaning of table that you have produced in *(c)* above and, by including appropriate probability values, how it may be used by management.

(4 marks)

Now that you have presented your calculations and explanations to the Management Team of D they have questioned the validity of the assumption that costs are caused by and therefore vary in relation to the number of members. They referred to the activities that are performed by the company:

- Processing applications for membership;
- Operating the call centre that deals with logging and scheduling rescues;
- Providing patrol vehicles and mechanics for breakdown assistance;
- Recording details of the time taken to respond to members' rescues;
- Recording details of the costs incurred in carrying out each rescue.

The Management Team collectively agreed that your assumption that operating costs are driven by the number of members was too simplistic and that in future the Administration department should request the following information from members:

- Member's date of birth;
- Member's address;
- Number of years the member has been a qualified driver;
- Age of vehicle;
- Make and model of vehicle;
- Average annual mileage.

Required:

(e) Explain how and why the collection of this data from members might improve the information that would be available to the Management Team.

(10 marks)

(Total for Question Seven = 25 marks)

(Total for Section C = 50 marks)

End of question paper.

Maths Tables and Formulae are on pages 17 to 19

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PRESENT VALUE TABLE

Present value of \$1, that is $(1+r)^{-n}$ where r = interest rate; n = number of periods until payment or receipt.

Periods	Interest rates (r)									
(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149

Periods	Interest rates (r)									
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.079	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026

Cumulative present value of $1 per annum, Receivable or Payable at the end of each year for *n* years $\frac{1-(1+r)^{-n}}{r}$

Periods (*n*)	Interest rates (*r*)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514

Periods (*n*)	Interest rates (*r*)									
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	7.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870

FORMULAE

Time series

Additive model:

Series = Trend + Seasonal + Random

Multiplicative model:

Series = Trend*Seasonal*Random

Regression analysis

The linear regression equation of Y on X is given by:

$$Y = a + bX \quad \text{or} \quad Y - \bar{Y} = b(X - \bar{X}),$$

where:

$$b = \frac{\text{Covariance}(XY)}{\text{Variance}(X)} = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 - (\sum X)^2}$$

and $a = \bar{Y} - b\bar{X}$

or solve

$$\sum Y = na + b\sum X$$

$$\sum XY = a\sum X + b\sum X^2$$

Exponential $Y = ab^x$

Geometric $Y = aX^b$

Learning curve

$$Y_x = aX^b$$

where:

Y_x = the cumulative average time per unit to produce X units;

a = the time required to produce the first unit of output;

X = the cumulative number of units;

b = the index of learning.

The exponent b is defined as the log of the learning curve improvement rate divided by log 2.

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LIST OF VERBS USED IN THE QUESTION REQUIREMENTS

A list of the learning objectives and verbs that appear in the syllabus and in the question requirements for each question in this paper.

It is important that you answer the question according to the definition of the verb.

LEARNING OBJECTIVE	VERBS USED	DEFINITION
1 KNOWLEDGE		
What you are expected to know.	List	Make a list of
	State	Express, fully or clearly, the details of/facts of
	Define	Give the exact meaning of
2 COMPREHENSION		
What you are expected to understand.	Describe	Communicate the key features
	Distinguish	Highlight the differences between
	Explain	Make clear or intelligible/State the meaning of
	Identify	Recognise, establish or select after consideration
	Illustrate	Use an example to describe or explain something
3 APPLICATION		
How you are expected to apply your knowledge.	Apply	To put to practical use
	Calculate/compute	To ascertain or reckon mathematically
	Demonstrate	To prove with certainty or to exhibit by practical means
	Prepare	To make or get ready for use
	Reconcile	To make or prove consistent/compatible
	Solve	Find an answer to
	Tabulate	Arrange in a table
4 ANALYSIS		
How are you expected to analyse the detail of what you have learned.	Analyse	Examine in detail the structure of
	Categorise	Place into a defined class or division
	Compare and contrast	Show the similarities and/or differences between
	Construct	To build up or compile
	Discuss	To examine in detail by argument
	Interpret	To translate into intelligible or familiar terms
	Produce	To create or bring into existence
5 EVALUATION		
How are you expected to use your learning to evaluate, make decisions or recommendations.	Advise	To counsel, inform or notify
	Evaluate	To appraise or assess the value of
	Recommend	To advise on a course of action

Management Accounting Pillar

Managerial Level

P2 – Management Accounting – Decision Management

May 2007

Wednesday Morning Session