CIMA

Performance Pillar

P2 – Performance Management

22 May 2013 – Wednesday Afternoon 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, make annotations 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 this 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).
ALL answers must be written in the answer book. Answers written on the question paper will **not** be submitted for marking.
You should show all workings as marks are available for the method you use.
ALL QUESTIONS ARE COMPULSORY.
Section A comprises 5 questions and is on pages 2 to 5.
Section B comprises 2 questions and is on pages 6 to 9.
Maths tables and formulae are provided on pages 11 to 14.
The list of verbs as published in the syllabus is given for reference on page 15.
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.

TURN OVER

P2 – Performance Management

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[You are advised to spend no longer than 18 minutes on each question in this section.]

ANSWER *ALL* FIVE QUESTIONS IN THIS SECTION. EACH QUESTION IS WORTH 10 MARKS. YOU SHOULD SHOW YOUR WORKINGS AS MARKS ARE AVAILABLE FOR THE METHOD YOU USE.

Question One

A tree farm supplies shrubs to two customers. Each shrub has a selling price of $60. It costs $25 to grow a shrub and get it to the point of sale. Additional costs incurred by the farm are $100 per order fulfilled and delivery costs of $500 per order delivered.

Details of two of the farm's customers (B and C) for the previous period are as follows:

	Customer B	**Customer C**
Shrubs purchased	960	650
Discount allowed	15%	20%
Orders fulfilled	8 (each for 120 shrubs)	10 (each for less than 100 shrubs)
Deliveries made	8	0

Customers are given a 15% discount on orders for 100 shrubs or more.

Customer C is given a 20% discount for collecting the shrubs using its own transport.

Required:

Evaluate the two customers. (Your answer should include customer profitability statements and appropriate measures.)

(Total for Question One = 10 marks)

Question Two

A new product has a budgeted total profit of $75,000 from the first 64 units. The time taken to produce the first unit was 225 hours. The labour rate is $40 per hour. A 90% learning curve is expected to apply indefinitely.

Note: The learning index for a 90% learning curve is -0.152

> *Required:*
>
> **Calculate** the sensitivity of the budgeted total profit from the first 64 units to independent changes in:
>
> (i) The labour rate
> (ii) The learning rate.
>
> *(Total for Question Two = 10 marks)*

Question Three

PP is a telecoms provider. It has been operating for five years and has experienced good results; profits have increased by an average of 15% each year. It is accepted within the company that this success has been the result of the continuous stream of new and varied 'cutting edge' products that PP offers. The Research and Development Division has enjoyed the freedom of working with the directive of "Be creative".

The Director of the Research and Development Division of PP is not happy. At a recent board meeting she said:

"The Research and Development Division is finding it extremely difficult to maintain its current levels of achievement. The Division is suffering from a lack of funds as a result of PP's budgeting system. We receive an uplift of 5% each year from the previous year's budget. This does not provide the necessary funds or freedom to be able to keep the company ahead of the competition. I would like to see incremental budgeting replaced by zero based budgeting in my division".

> *Required:*
>
> **Discuss** the potential **disadvantages** of implementing zero based budgeting for the allocation of funds to the Research and Development Division from the perspective of the Director of Research and Development.
>
> *(Total for Question Three = 10 marks)*

Section A continues on the next page

Question Four

The owner, Z, of a business has been attending a course on scenario planning and decision making. As a result of that advice the owner has produced, by using cost volume and profit analysis, 12 scenarios for a new product that the business will launch in the near future. There are four possible marketing packages that could be used (A, B, C or D) and there are three possible market conditions (poor, average or good) that could be encountered. The Net Present Value of the cash flows resulting from each of the scenarios is shown in the table below.

| Market conditions | Marketing package | | | |
	A $000	B $000	C $000	D $000
Poor	180	230	220	190
Average	190	200	210	275
Good	550	260	210	500

Unfortunately Z missed the session on how to deal with risk and uncertainty. He has sent the above table to the tutor for the course and has asked for help. The tutor replied "I will send you some notes. Based on your table you will need the methods in the section on 'Uncertainty'. If you can estimate the probability of each type of market condition occurring you need 'Risk based methods'. However, whichever method you use, your decision will be influenced by your attitude."

Required:

Note: calculations are NOT required.

Explain FOUR methods that could help Z to decide which marketing package to choose. Your answer should include THREE methods to deal with uncertainty, ONE method to deal with risk, and an explanation of the "attitude" that would be associated with the decision maker using each of the four methods.

(Total for Question Four = 10 marks)

Section A continues on the next page

Question Five

The modern dynamic business environment has been described as a "buyer's market" in which companies must react to the rapidly changing characteristics of the market and the needs of customers. Many managers have criticised traditional forms of budgeting for being too restrictive and for being of little use for performance management and control.

Required:

> **Explain** how the principles of "Beyond Budgeting" promote a cultural framework that is suitable for the modern dynamic business environment.
>
> *(Total for Question Five = 10 marks)*

(Total for Section A = 50 marks)

End of Section A
Section B starts on page 6

SECTION B – 50 MARKS

[You are advised to spend no longer than 45 minutes on each question in this section.]

ANSWER *BOTH* QUESTIONS IN THIS SECTION. EACH QUESTION IS WORTH 25 MARKS.   YOU SHOULD SHOW YOUR WORKINGS AS MARKS ARE AVAILABLE FOR THE METHOD YOU USE.

Question Six

A company manufactures three products D, E and F which use the same resources (but in different amounts). In addition to these resources each unit of Product F uses a component which the company currently purchases from an external supplier for $80. The demand for the products in Month 1 and the details per unit of the three products are as shown below:

	D	E	F
Demand (units)	2,400	2,200	3,000
	$	$	$
Selling price	112	136	153
Component			80
Direct materials ($4 per kg)	12	16	12
Skilled labour ($16 per hour)	16	24	8
Unskilled labour ($12 per hour)	18	12	9
Variable overhead ($3 per machine hour)	12	12	9

The fixed costs of the company are $150,000 per month.

The company has reverse engineered the component and has realised that it could make the component in-house. The cost of making a component is shown below:

	$
Direct materials ($4 per kg)	12
Skilled labour ($16 per hour)	16
Unskilled labour ($12 per hour)	3
Variable overhead ($3 per machine hour)	6

There would be no incremental fixed costs incurred as a result of making the component in-house.

In Month 1 the maximum availability of skilled labour is 5,400 hours but all other resources are readily available.

The company bases all short term decisions on profit maximisation.

Required:

(a) **Calculate** the optimum production plan for Month 1 and the resulting profit. (Note: The company would either buy the component or make it in-house; it would not do a mixture of the two options.)

(11 marks)

For legal reasons it will not be possible to produce Product F in Month 2.

Demand for products D and E will be 3,000 units each in Month 2. No inventories can be held.

The availability of resources in Month 2 is as follows:

Direct materials	16,000	kg
Skilled labour	5,400	hours
Unskilled labour	5,000	hours
Machine hours	19,600	hours

Required:

(b)

(i) **Identify** the objective function and the constraints to be used in a linear programming model to determine the optimum production plan for Month 2.

(4 marks)

(ii) The solution to the linear programming model shows that the only binding constraints in Month 2 are those for skilled labour and unskilled labour.

Produce, using simultaneous equations, the optimum production plan and resulting profit for Month 2. (You are NOT required to draw or sketch a graph.)

(4 marks)

(c) It has now been decided that Product F will be redesigned. A team will be formed with representatives from various departments in the company to undertake a Value Analysis exercise on Product F.

Required:

Describe the stages involved in a Value Analysis exercise.

(6 marks)

(Total for Question Six = 25 marks)

Section B continues on the next page

Question Seven

S Division and R Division are two divisions in the SR group of companies. S Division manufactures one type of component which it sells to external customers and also to R Division.

Details of S Division are as follows:

Market price per component	$200
Variable cost per component	$105
Fixed costs	$1,375,000 per period
Demand from R Division	20,000 components per period
Capacity	35,000 components per period

R Division assembles one type of product which it sells to external customers. Each unit of that product requires two of the components that are manufactured by S Division.

Details of R Division are as follows:

Selling price per unit	$800
Variable cost per unit:	
Two components from S	2 @ transfer price
Other variable costs	$250
Fixed costs	$900,000 per period
Demand	10,000 units per period
Capacity	10,000 units per period

Group Transfer Pricing Policy

Transfers must be at opportunity cost.
R must buy the components from S.
S must satisfy demand from R before making external sales.

Required:

(a) **Calculate** the profit for each division if the external demand per period for the components that are made by S Division is:

  (i)   15,000 components
  (ii)   19,000 components
  (iii) 35,000 components

(12 marks)

(b) **Calculate** the financial impact on the Group if R Division ignored the transfer pricing policy and purchased all of the 20,000 components that it needs from an external supplier for $170 each. Your answer must consider the impact at each of the three levels of demand (15,000, 19,000 and 35,000 components) from external customers for the component manufactured by S Division.

(6 marks)

(c) The Organisation for Economic Co-operation and Development (OECD) produced guidelines with the aim of standardising national approaches to transfer pricing. The guidelines state that where necessary transfer prices should be adjusted using an "arm's length" price.

Required:

  Explain:

  (i)   An "arm's length" price
  (ii)   The THREE methods that tax authorities can use to determine an "arm's length" price

(7 marks)

(Total for Question Seven = 25 marks)

(Total for Section B = 50 marks)

End of question paper

Maths tables and formulae are on pages 11 to 14

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PRESENT VALUE TABLE

Present value of 1 unit of currency, 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 TABLE

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

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	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	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	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	4.793	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

PROBABILITY

$A \cup B = $ **A or B**. $A \cap B = $ **A and B** (overlap).
$P(B \mid A) = $ probability of B, **given** A.

Rules of Addition
If A and B are mutually exclusive: $P(A \cup B) = P(A) + P(B)$
If A and B are not mutually exclusive: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Rules of Multiplication
If A and B are *independent*: $P(A \cap B) = P(A) * P(B)$
If A and B are **not** *independent*: $P(A \cap B) = P(A) * P(B \mid A)$

$E(X) = \sum$ (probability * payoff)

DESCRIPTIVE STATISTICS

Arithmetic Mean

$$\bar{x} = \frac{\sum x}{n} \qquad \bar{x} = \frac{\sum fx}{\sum f} \quad \text{(frequency distribution)}$$

Standard Deviation

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{n}} \qquad SD = \sqrt{\frac{\sum fx^2}{\sum f} - \overline{x^2}} \quad \text{(frequency distribution)}$$

INDEX NUMBERS

Price relative $= 100 * P_1/P_0$ Quantity relative $= 100 * Q_1/Q_0$

Price:

$$\frac{\sum w * \left(\dfrac{P_1}{P_o} \right)}{\sum w} \times 100$$

Quantity:

$$\frac{\sum w * \left(\dfrac{Q_1}{Q_o} \right)}{\sum w} \times 100$$

TIME SERIES

Additive Model

$$\text{Series} = \text{Trend} + \text{Seasonal} + \text{Random}$$

Multiplicative Model

$$\text{Series} = \text{Trend} * \text{Seasonal} * \text{Random}$$

FINANCIAL MATHEMATICS

Compound Interest (Values and Sums)
Future Value S, of a sum of X, invested for n periods, compounded at $r\%$ interest

$$S = X[1 + r]^n$$

Annuity
Present value of an annuity of £1 per annum receivable or payable for n years, commencing in one year, discounted at $r\%$ per annum:

$$PV = \frac{1}{r}\left[1 - \frac{1}{[1+r]^n}\right]$$

Perpetuity
Present value of £1 per annum, payable or receivable in perpetuity, commencing in one year, discounted at $r\%$ per annum:

$$PV = \frac{1}{r}$$

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.

INVENTORY MANAGEMENT

Economic Order Quantity

$$EOQ = \sqrt{\frac{2C_oD}{C_h}}$$

where: C_o = cost of placing an order
   C_h = cost of holding one unit in inventory for one year
   D = annual demand

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
Level 1 - KNOWLEDGE		
What you are expected to know.	List	Make a list of
	State	Express, fully or clearly, the details/facts of
	Define	Give the exact meaning of
Level 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 or purpose of
	Identify	Recognise, establish or select after consideration
	Illustrate	Use an example to describe or explain something
Level 3 - APPLICATION		
How you are expected to apply your knowledge.	Apply	Put to practical use
	Calculate	Ascertain or reckon mathematically
	Demonstrate	Prove with certainty or to exhibit by practical means
	Prepare	Make or get ready for use
	Reconcile	Make or prove consistent/compatible
	Solve	Find an answer to
	Tabulate	Arrange in a table
Level 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	Build up or compile
	Discuss	Examine in detail by argument
	Interpret	Translate into intelligible or familiar terms
	Prioritise	Place in order of priority or sequence for action
	Produce	Create or bring into existence
Level 5 - EVALUATION		
How are you expected to use your learning to evaluate, make decisions or recommendations.	Advise	Counsel, inform or notify
	Evaluate	Appraise or assess the value of
	Recommend	Advise on a course of action

Performance Pillar

Management Level Paper

P2 – Performance Management

May 2013

Wednesday Afternoon Session