DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

CIMA

Performance Pillar

P2 – Performance Management

19 November 2014 – 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 7.
Section B comprises 2 questions and is on pages 8 to 11.
Maths tables and formulae are provided on pages 13 to 16.
The list of verbs as published in the syllabus is given for reference on page 19.
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 – Performance Management

TURN OVER

[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

PK is a large public company in the telecommunications sector. One of its main planning and control tools is the preparation and use of traditional annual budgets. Whilst this may be appropriate for the Sales and Manufacturing divisions, it draws criticisms from the directors of divisions such as Training and Education, Advertising and Publicity, and Research and Development who are responsible for large amounts of discretionary expenditure. These directors have submitted a joint report to the Finance Director which suggests that Zero-Based Budgeting (ZBB) should be used for their respective divisions.

The Finance Director has agreed to use the Research and Development division as a pilot for ZBB for the next financial year.

Required:

Explain Zero-Based Budgeting and the main stages that would need to be undertaken to introduce it into the Research and Development Division.

(Total for Question One = 10 marks)

Question Two

CD manufactures and sells a number of products. All of its products have a life cycle of less than one year. CD uses a four stage life cycle model (Introduction, Growth, Maturity and Decline).

CD has recently developed an innovative product. It was decided that it would be appropriate to adopt a market skimming pricing policy for the launch of the product.

However CD expects that other companies will try to join the market very soon.

This product is currently in the Introduction stage of its life cycle and is generating significant unit profits. However, there are concerns that these current unit profits will not continue during the other stages of the product's life cycle.

Required:

Explain, with reasons, the changes, if any, to the unit selling price **AND** the unit production cost that could occur when the product moves from the previous stage into each of the following stages of its life cycle:

(i)   Growth
(ii)   Maturity

(Total for Question Two = 10 marks)

Section A continues on the next page

Question Three

A company is developing a new product. During its expected life, 16,000 units of the product will be sold for $82 per unit.

Production will be in batches of 1,000 units throughout the life of the product. The direct labour cost is expected to reduce due to the effects of learning for the first eight batches produced. Thereafter, the direct labour cost will remain constant at the same cost per batch as the 8th batch.

The direct labour cost of the first batch of 1,000 units is expected to be $35,000 and a 90% learning effect is expected to occur.

The direct material and other non-labour related variable costs will be $40 per unit throughout the life of the product.

There are no fixed costs that are specific to the product.

> *Required:*
>
> *(a)*
> (i) **Calculate** the expected direct labour cost of the 8th batch.
>
> *(4 marks)*
>
> (ii) **Calculate** the expected contribution to be earned from the product over its lifetime.
>
> *(2 marks)*
>
> Note: The learning index for a 90% learning curve = -0.152

It is now thought that a learning effect will continue for all of the 16 batches that will be produced.

> *(b)* **Calculate** the rate of learning required to achieve a lifetime product contribution of $400,000, assuming that a constant rate of learning applies throughout the product's life.
>
> *(4 marks)*
>
> *(Total for Question Three = 10 marks)*

Section A continues on the opposite page

Question Four

YY is a large banking organisation. It has a branch in most of the towns in the country in which it operates. The bank's business is mainly concerned with private individuals. It is a very 'traditional' bank that offers only 'over the counter' services during limited opening hours.

At a recent board meeting, the directors of the bank stated that they were worried that the bank was losing customers to the new style banks that offer a much more friendly service, longer opening hours, internet banking and a diverse range of banking services.

It has now been decided that the bank will pursue strategies to achieve the goal of being "The bank that people choose" and will use a balanced scorecard to monitor progress towards that goal.

Required:

Produce, for each of the three non-financial perspectives of a balanced scorecard, an objective and a performance measure that the bank could use. (In your answer you must state each perspective, and the objective and performance measure for that perspective and explain why they support the goal of YY becoming "The bank that people choose".)

(Total for Question Four = 10 marks)

Section A continues on the next page

Question Five

A company sells three products: D, E and F. The market for the products dictates that the numbers of products sold are always in the ratio of 3D:4E:5F.

Budgeted sales volumes and prices, and cost details for the previous period were as follows:

	D	E	F
Sales units	300	400	500
Selling price per unit	$80	$55	$70
Contribution to sales ratio	70%	65%	50%

The budgeted total fixed costs for that period were $31,200.

Required:

    (a)   **Calculate** for that period:

        (i)   the break-even sales revenue.

        (ii)   the volume of each product that would have needed to be sold if the company had wanted to earn a profit of $29,520 in that period.

(6 marks)

The budget for the previous period was based on the company having a 20% share of the total market of 6,000 units.

It has now been realised that the size of the market had been under-estimated. The actual total market size for that period was 7,500 units.

During that period the company actually sold 1,740 units for a total of $109,500. Unit variable costs were as expected but total fixed costs were 10% higher than budgeted.

The company reports variances using a standard marginal costing system.

Question Five continues on the next page

Required:

(b) **Calculate** for the company for the previous period:

(i) The market size variance.

(ii) The market share variance.

(4 marks)

(Total for Question Five = 10 marks)

(Total for Section A = 50 marks)

End of Section A

Section B starts on page 8

[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

AC manufactures three products, X, Y and Z using the same production line.
Details of the three products are shown below:

	X	**Y**	**Z**
Selling price per unit $	28.00	36.00	42.00
Variable cost per unit $	12.00	10.00	21.50
Processing time per unit	2 hours	4 hours	2 hours

The production line has a capacity of 30,000 processing hours per month and is not used to make any other products. The monthly demand for the products at the current selling prices is as follows:

X: 8,000 units
Y: 6,000 units
Z: 6,000 units

No inventories are held.

Required:

(a)   **Calculate** the optimum production plan and the resulting contribution per month based on the above information.

(4 marks)

AC's Managing Director has now completed a review of the market and has decided to discontinue Product Y. It has been established that a new competitor has entered the market with a product that is technically superior to Product Y. Also, the competitor seems to be adopting a market penetration pricing policy and AC will not be able to match the low selling price.

The review established that for Product X the monthly demand would be 8,000 units at a selling price of $28 per unit, and that for Product Z the monthly demand would be 6,000 units at a selling price of $42 per unit. For both products, a reduction in the selling price of $1 per unit would increase demand by 1,000 units and an increase in the selling price of $1 per unit would reduce demand by 1,000 units. This relationship will exist for all levels of monthly demand.

The current machinery necessitates that production runs must be for 1,000 units.

Required:

(b) **Calculate** the optimum monthly production plan and the resulting contribution. (Note: the maximum processing time is 30,000 hours per month).

(8 marks)

A machine can be hired that would enable processing time to be increased to 60,000 hours per month. The machine does not have to be set up for production runs of 1,000 units.

Required:

(c) **Calculate** the maximum amount per month that should be paid to hire the machine.

Note: If P = a - bx then MR = a - 2bx

(8 marks)

The Production Director has suggested that the Managing Director was too hasty when making the decision to discontinue Product Y and should have subjected Product Y to a "value analysis" exercise.

Required:

(d) **Discuss** the view that subjecting Product Y to a value analysis exercise could have led to that product not being discontinued.

(5 marks)

(Total for Question Six = 25 marks)

Section B continues on the next page

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Question Seven

AA and BB are two divisions of the ZZ group. The AA division manufactures electrical components which it sells to other divisions and external customers.

The BB division has designed a new product, Product B, and has asked AA to supply the electrical component, Component A, that is needed in the new product. This will be a completely new style of component. Each unit of Product B will require one Component A. This component will not be sold by AA to external customers. AA has quoted a transfer price to BB of $45 for each unit of Component A.

It is the policy of the ZZ group to reward managers based on their individual division's return on capital employed.

Details of the monthly production for each division are as follows:

AA division

Output	Component A will be produced in batches of 1,000 units. The maximum capacity is 6,000 components per month.
Variable cost	$15 per component
Fixed costs	$50,000 (these are incurred specifically to produce Component A)

BB division

Output	Product B will be produced in batches of 1,000 units. The maximum customer demand is 6,000 units of Product B per month.
Variable cost	$9 per unit plus the cost of Component A
Fixed costs	$75,000 (these are incurred specifically to produce Product B)

The relationship between monthly customer demand and the selling price of Product B is shown below:

Demand	Selling price per unit
1,000 units	$120
2,000 units	$110
3,000 units	$100
4,000 units	$90
5,000 units	$80
6,000 units	$67

Required:

(a) **Calculate**, based on a transfer price of $45 per Component A, the monthly profit that would be earned as a result of selling Product B by:

    (i)   BB division
    (ii) AA division
    (iii) ZZ group

(9 marks)

(b) **Calculate** the maximum monthly profit from the sale of Product B for the ZZ group.

(4 marks)

(c) **Calculate**, using the marginal cost of Component A as the transfer price, the monthly profit that would be earned as a result of selling Product B by:

    (i)   BB division
    (ii) AA division
    (iii) ZZ group

(5 marks)

(d) **Discuss**, using the above scenario, the problems of setting a transfer price and suggest a transfer pricing policy that would help the ZZ group to overcome the transfer pricing problems that it faces.

(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 13 to 16

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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

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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

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

Standard Deviation

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

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

Series = Trend + Seasonal + Random

Multiplicative Model

Series = Trend * Seasonal * 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

$$EOQ = \sqrt{\frac{2C_o D}{C_h}}$$

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

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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
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

November 2014

Wednesday Afternoon Session