



Performance Pillar

P2 – Performance Management

Thursday 29 August 2013

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 4.
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.

P2 – Performance Management

TURN OVER

SECTION A – 50 MARKS

[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

The standard selling price and costs per unit of a new product for the first period are shown below:

Selling price		\$
		750
Materials	6 kg at \$50 per kg	300
Labour (see below)	20 hours at \$10 per hour	200
Variable overheads	25 machine hours at \$4 per machine hour	100
Fixed overheads (see below)		120

Labour hours

The labour hours are the average labour hours per unit based on the budgeted output for the period of 128 units and the assumption that a 90% learning curve will apply throughout the period. The learning index for a 90% learning curve is -0.152.

Fixed overheads

The fixed overheads are specific fixed overheads for this product and the absorption rate was based on the budgeted output for the period of 128 units.

Required:

- (a) **Calculate** the sensitivity of the budgeted profit for the period for this product to a change in the price per kg of materials.
(2 marks)
- (b) **Calculate** the budgeted labour hours for the first unit of this product to be produced.
(4 marks)
- (c) **Calculate** the sensitivity of the budgeted profit for the period for this product to a change in the rate of learning.
(4 marks)

Note: all workings must be shown.

(Total for Question One = 10 marks)

Question Two

A factory uses a standard absorption costing system. The fixed production overhead absorption rate is based on labour hours. Extracts from the budgeted and actual results for the previous period are shown below:

	Budget	Actual
Output (units)	1,500	1,600
Fixed production overhead	\$300,000	\$310,000
Labour hours	600	580

Required:

(a) **Calculate:**

- (i) The fixed production overhead expenditure variance
- (ii) The fixed production overhead volume variance

(3 marks)

The factory is thinking of introducing an activity based costing system. An analysis of the fixed production overheads for the previous period showed that included in the budgeted fixed production overheads of \$300,000 was \$72,000 for materials handling. Costs for materials handling are incurred when materials are shipped from the storage area to the processing plant. Further analysis revealed:

	Budget	Actual
Materials handling costs	\$72,000	\$69,000
Number of material shipments	90	85
Total quantity of materials shipped	360 tonne	348 tonne

Required:

(b) **Calculate** using activity based costing principles:

- (i) The materials handling shipment expenditure variance
- (ii) The materials handling shipment efficiency variance

(7 marks)

(Total for Question Two = 10 marks)

Section A continues on the next page

TURN OVER

Question Three

Required:

Discuss how activity based costing could improve the linkage between cost control and responsibility accounting at each of the four levels of the activity based costing hierarchy of activities.

(Total for Question Three = 10 marks)

Question Four

Required:

Compare and contrast feedforward and feedback controls by using a budgeting system to explain your points.

(Total for Question Four = 10 marks)

Question Five

Many service organisations, for example banks, have outsourced their customer liaison and support service operations to “inbound call centres”. Inbound call centres deal with product support or information enquiries from customers.

Required:

Explain, in the context of the modern business environment, the advantages and disadvantages of outsourcing customer liaison and product support to “inbound call centres”.

(Total for Question Five = 10 marks)

(Total for Section A = 50 marks)

End of Section A. Section B starts on page 6

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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 produces three products (X, Y and Z) from the same resources (but in different quantities). Extracts from the original budget for Month 11 are shown below:

	X	Y	Z
Selling price (\$ per unit)	24	41	42
Total cost (\$ per unit)	20	20	35
Labour hours per unit	0.5	1.5	1.5
Machine hours per unit	1	2	0.75
Production and sales (units)	10,000	6,000	10,000

Variable costs are 40% of the total cost of each unit.

Fixed costs are absorbed at the rate of 150% of variable costs based on the budgeted production quantities as shown above.

It has now become known that during Month 11 essential maintenance work will have to be carried out. This will limit the availability of resources to:

Labour hours:	12,500 hours
Machine hours:	30,000 hours

Required:

- (a) **Produce**, using marginal costing principles, a columnar statement that shows the profit maximising production plan for Month 11 and the resulting profit or loss.
(9 marks)
- (b) **Calculate** the three shadow prices for labour hours. Your answer must state the range of labour hours that each shadow price covers.
(5 marks)

Question six continues on the opposite page

Marketing intelligence has now revealed that a new competitor is about to enter the market in Month 11 with a product that is much better than Product Y. It has therefore been decided that production of Product Y will stop immediately. The competitor will also sell products that will have an impact on the demand for Products X and Z.

Further work by the Marketing Department has revealed the relationships between the selling price and the monthly demand for Product X, and also for Product Z, as shown in the table below. There is no relationship between Product X and Product Z other than they use the same resources. The products must be produced separately, each in batches of 1,000 units.

Demand (units)	Selling price (\$)	
	Product X	Product Z
2,000	28	66
4,000	27	60
6,000	26	54
8,000	25	48
10,000	24	42
12,000	23	36
14,000	22	30
16,000	21	24

The table should be interpreted as follows:

If the selling price of Product X was set at \$28 then up to 2,000 units could be sold. To sell more than 2,000 units it would be necessary to reduce the price. For example, if the price was reduced to \$25 per unit up to 8,000 units could be sold. The only selling prices that would be used are those shown in the table.

Required:

(c) Calculate:

(i) The revised optimum production plan for Products X and Z.

(9 marks)

(ii) The total contribution that the plan in (c)(i) would earn.

(2 marks)

(Total for Question Six = 25 marks)

Section B continues on page 8

TURN OVER

Question Seven

HPR harvests, processes and roasts coffee beans. The company has two divisions:

Division P is located in Country Y. It harvests and processes coffee beans. The processed coffee beans are sold to Division R and external customers.

Division R is located in Country Z. It roasts processed coffee beans and then sells them to external customers.

Countries Y and Z use the same currency but have different taxation rates.

The budgeted information for the next year is as follows:

Division P

Capacity	1,000 tonnes
External demand for processed coffee beans	800 tonnes
Demand from Division R for processed coffee beans	625 tonnes
External market selling price for processed coffee beans	\$11,000 per tonne
Variable costs	\$7,000 per tonne
Annual fixed costs	\$1,500,000

Division R

Sales of roasted coffee beans	500 tonnes
Market selling price for roasted coffee beans	\$20,000 per tonne

The production of 1 tonne of roasted coffee beans requires an input of 1.25 tonnes of processed coffee beans. The cost of roasting is \$2,000 per tonne of input plus annual fixed costs of \$1,000,000.

Transfer Pricing Policy of HPR

Division P must satisfy the demand from Division R for processed coffee beans before selling any to external customers.

The transfer price for the processed coffee beans is variable cost plus 10% per tonne.

Taxation

The rate of taxation on company profits is 45% in Country Y and 25% in Country Z.

Required:

(a)

- (i) **Produce** statements that show the budgeted profit after tax for the next year for each of the two divisions. Your profit statements should show sales and costs split into external sales and internal transfers where appropriate.

(8 marks)

- (ii) **Discuss** the potential tax consequences of HPR's current transfer pricing policy.

(6 marks)

- (b) **Produce** statements that show the budgeted contributions that would be earned by each of the two divisions if HPR's head office changed its policy to state that transfers must be made at opportunity cost. Your statements should show sales and costs split into external sales and internal transfers where appropriate.

(6 marks)

- (c) **Explain** TWO behavioural issues that could arise as a result of the head office of HPR imposing transfer prices instead of allowing the divisional managers to set the prices.

(5 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 (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	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	0.705	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 (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	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 unit of currency 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	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

$A \cup B = \mathbf{A \text{ or } B}$. $A \cap B = \mathbf{A \text{ and } B}$ (overlap).
 $P(B | A)$ = 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**: $P(A \cap B) = P(A) * P(B | A)$

$$E(X) = \sum (\text{probability} * \text{payoff})$$

DESCRIPTIVE STATISTICS

Arithmetic Mean

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

Standard Deviation

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

INDEX NUMBERS

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

Price:
$$\frac{\sum w * \left(\frac{P_1}{P_0}\right)}{\sum w} * 100$$

Quantity:
$$\frac{\sum w * \left(\frac{Q_1}{Q_0}\right)}{\sum w} * 100$$

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

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

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

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 State Define	Make a list of Express, fully or clearly, the details/facts of Give the exact meaning of
Level 2 - COMPREHENSION What you are expected to understand.	Describe Distinguish Explain Identify Illustrate	Communicate the key features Highlight the differences between Make clear or intelligible/State the meaning or purpose of Recognise, establish or select after consideration Use an example to describe or explain something
Level 3 - APPLICATION How you are expected to apply your knowledge.	Apply Calculate Demonstrate Prepare Reconcile Solve Tabulate	Put to practical use Ascertain or reckon mathematically Prove with certainty or to exhibit by practical means Make or get ready for use Make or prove consistent/compatible Find an answer to Arrange in a table
Level 4 - ANALYSIS How are you expected to analyse the detail of what you have learned.	Analyse Categorise Compare and contrast Construct Discuss Interpret Prioritise Produce	Examine in detail the structure of Place into a defined class or division Show the similarities and/or differences between Build up or compile Examine in detail by argument Translate into intelligible or familiar terms Place in order of priority or sequence for action Create or bring into existence
Level 5 - EVALUATION How are you expected to use your learning to evaluate, make decisions or recommendations.	Advise Evaluate Recommend	Counsel, inform or notify Appraise or assess the value of Advise on a course of action

Performance Pillar

Management Level Paper

P2 – Performance Management

September 2013