



Performance Pillar

P2 – Performance Management

21 November 2012 – Wednesday Afternoon Session

**Instructions to candidates**

You are allowed three hours to answer this question paper.
You are allowed 20 minutes reading time <b>before the examination begins</b> during which you should read the question paper and, if you wish, make annotations on the question paper. However, you will <b>not</b> be allowed, <b>under any circumstances</b> , 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 <b>not</b> 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 6.
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

## 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.

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### Question One

A company has developed a new product. The following information was prepared by the trainee accountant for presentation at the first performance review meeting for the new product.

Standard labour wage rate	\$12 per labour hour
Standard labour hours per unit	25 hours
Output to date	32 units
Actual labour hours worked	460 hours
Labour efficiency variance	\$4,080 favourable

The Management Accountant pointed out that this analysis ignored the learning curve and that 25 hours was the time taken for the first unit. The Management Accountant said that a better representation of the performance would be obtained by splitting the variance into planning and operating elements and calculated them to be as shown below:

Labour efficiency planning variance	\$4,320 favourable
Labour efficiency operating variance	\$240 adverse

*Required:*

- (a) **Calculate** the learning rate that the Management Accountant assumed when recalculating the variances.

*(6 marks)*

- (b) **Explain** TWO reasons why it is important for production planning and control purposes to identify the learning curve.

*(4 marks)*

*(Total for Question One = 10 marks)*

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## Question Two

A newly formed engineering company has just completed its first three months of trading. The company manufactures only one type of product. The external accountant for the company has produced the following statement to present at a meeting to review performance for the first quarter.

### Performance report for the quarter ending 31 October 2012

	Budget		Actual		Variance
Sales units	12,000		13,000		1,000
Production units	14,000		13,500		(500)
	<b>\$000</b>	<b>\$000</b>	<b>\$000</b>	<b>\$000</b>	<b>\$000</b>
<b>Sales</b>		<b>360</b>		<b>385</b>	<b>25</b>
Direct materials	70		69		1
Direct labour	140		132		8
Variable production overhead	42		43		(1)
Fixed production overhead	84		85		(1)
Inventory adjustment	(48)		(12)		(36)
<b>Cost of sales</b>		<b>288</b>		<b>317</b>	<b>(29)</b>
<b>Gross profit</b>		<b>72</b>		<b>68</b>	<b>(4)</b>

The external accountant has stated that he values inventory at the budgeted total production cost per unit.

*Required:*

- (a) **Produce** an amended statement for the quarter ending 31 October 2012 that is based on a flexed budget.

*(6 marks)*

- (b) **Explain** ONE benefit and ONE limitation of the statement you have produced.

*(4 marks)*

*(Total for Question Two = 10 marks)*

*Section A continues on the next page*

TURN OVER

### Question Three

KL is a transport company that has recently won a five-year government contract to provide rail transport services. The company appointed a new Director to take responsibility for the government contract. She has worked in various positions in other rail transport companies for a number of years. She has put together a team of managers by recruiting some of her former colleagues and some of KL's current managers.

The contract stipulates that the company should prepare detailed budgets for its first year of operations to show how it intends to meet the various operating targets that are stated in the contract. The new Director is undecided about whether she should prepare the budgets herself or whether she should involve her management team, including the newly recruited managers, in the process.

*Required:*

**Produce** a report, addressed to the new Director, that discusses participative budgeting.

Note: your report must

- explain TWO potential benefits and TWO potential disadvantages of involving the new and existing managers in the budget setting process.
- provide a recommendation to the new Director.

*(10 marks)*

*(Total for Question Three = 10 marks)*

#### Question Four

A manufacturing company is reviewing its progress towards meeting its objective of having a reputation for producing high quality products. Extracts from the company's records for each of the years ended 30 September 2011 and 2012 are shown below.

	2012	2011
% of units rejected by customers	12%	20%
% of units rejected before delivery	12%	3%
Costs as % of revenue		
Raw material inspection	8%	3%
Direct material	18%	20%
Direct labour	13%	12%
Training	8%	4%
Preventative machine maintenance	8%	2%
Machine breakdown maintenance	5%	10%
Finished goods inspection	7%	1%

*Required:*

- (a) **Explain** each of the four quality cost classifications using examples from the above data.

*(4 marks)*

- (b) **Discuss**, using the above data, the relationship between conformance costs and non-conformance costs and its importance for this company.

*(6 marks)*

*(Total for Question Four = 10 marks)*

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*Section A continues on the next page*

TURN OVER

### Question Five

CDE has recently won a contract to supply a component to a major car manufacturer that is about to launch a new range of vehicles. This is a great success for the design team of CDE as the component has many unique features and will be an important feature of some of the vehicles in the range.

CDE is currently building a specialised factory to produce the component. The factory will start production on 1 January 2013. There is an expected demand for 140,000 units of the component in 2013.

#### Forecast sales and production costs for 2013:

Quarter	1	2	3	4
Sales (units)	19,000	34,000	37,000	50,000
Variable production cost per unit	\$ 60	\$ 60	\$ 65	\$ 70

Fixed production overheads for the factory are expected to be \$2.8 million in 2013.

A decision has to be made about the production plan. The choices are:

#### Plan 1: Produce at a constant rate of 35,000 units per quarter

Inventory would be used to cover fluctuations in quarterly demand. Inventory holding costs will be \$13 per unit and will be incurred quarterly based on the average inventory held in each of the four quarters.

#### Plan 2: Use a just-in-time (JIT) production system

The factory would be able to produce 36,000 units per quarter in 'normal' time and up to a further 20,000 units in 'overtime'. However, each unit produced in 'overtime' would incur additional costs equal to 40% of the forecast variable production cost per unit for that quarter.

*Required:*

- (a) **Produce** calculations using the above data to show which of the two plans would incur the lowest total cost in 2013.

*(6 marks)*

- (b) **Explain** TWO reasons why the decision about the production plan should not be based on your answer to part (a) alone.

*(4 marks)*

*(Total for Question Five = 10 marks)*

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*(Total for Section A = 50 marks)*

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*End of Section A  
Section B starts on page 8*

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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

#### Scenario for parts (a) and (b)

Company WX manufactures a number of finished products and two components. Three finished products (P1, P2, and P3) and two components (C1 and C2) are made using the same resources (but in different quantities). The components are used internally by the company when producing other products but they are not used in the manufacture of P1, P2 or P3.

Budgeted data for December for P1, P2, P3, C1 and C2 are as follows:

	<b>P1</b>	<b>P2</b>	<b>P3</b>	<b>C1</b>	<b>C2</b>
	<i>500</i>	<i>400</i>	<i>600</i>	<i>250</i>	<i>150</i>
	<i>\$/unit</i>	<i>\$/unit</i>	<i>\$/unit</i>	<i>\$/unit</i>	<i>\$/unit</i>
Units demanded	500	400	600	250	150
Selling price	155	125	175	-	-
Direct labour (\$10/hour)	25	15	30	10	15
Direct material (\$50/kg)	10	20	20	5	10
Variable production overhead (\$40/machine hour)	10	15	20	10	20
Fixed production overhead (\$20/labour hour)	50	30	60	20	30
Gross profit	60	45	45	-	-

#### Further information for December:

**Direct labour:** 4,300 hours are available.

**Direct material:** 420 kgs are available.

**Machine hours:** no restrictions apply.

**Components:** C1 and C2 are readily available from external suppliers for \$50 and \$80 per unit respectively. The external suppliers are reliable and the quality of the components is similar to that of those manufactured by the company.

#### *Required:*

- (a) **Produce** calculations to determine the optimal production plan for P1, P2, P3, C1 and C2 during December.

**Note:** it is not possible to produce partly finished units or to hold inventory of any of these products or components.

*(10 marks)*



- (b) There is a possibility that more of the direct material may become available during December. The shadow price per kg of the direct material has been calculated to be \$200, \$187.50 and \$175 depending on how much extra becomes available.

*Required:*

**Explain** the shadow prices of \$200, \$187.50 and \$175 for the direct material. Your answer should show the changes to the resource usage and the production plan for each of the shadow prices.

*(6 marks)*

**Scenario for parts (c) and (d)**

Company YZ manufactures products L, M and N. These products are always sold in the ratio 9L:6M:5N. The budgeted sales volume for December is a total of 14,000 units. The budgeted sales volumes, selling price per unit and variable cost per unit for each of the products are shown below:

	<b>L</b>	<b>M</b>	<b>N</b>
Sales budget (units)	6,300	4,200	3,500
	\$	\$	\$
Selling price per unit	300	600	230
Variable cost per unit	100	300	50

The budgeted fixed costs of the company for December are \$2.7 million.

*Required:*

- (c) **Calculate** the number of units of each product that must be sold for Company YZ to break even in December given the current sales mix ratio.

*(4 marks)*

- (d) The Sales Manager has now said that to be able to sell 6,300 units of product L in December it will be necessary to reduce the selling price of product L.

**Calculate** the sensitivity of Company YZ's total budgeted profit for December to a change in the selling price per unit of product L.

*(5 marks)*

*(Total for Question Six = 25 marks)*

*Section B continues on the next page*

## Question Seven

### Scenario for part (a)

The OB group has two divisions: the Optics Division and the Body Division. The Optics Division produces optical devices, including lenses for cameras. The lenses can be sold directly to external customers or they can be transferred to the Body Division where they are sold with a camera body as a complete camera.

#### Optics Division

The relationship between the selling price of a lens and the quantity demanded by external customers is such that at a price of \$6,000 there will be no demand but demand will increase by 600 lenses for every \$300 decrease in the price. The variable cost of producing a lens is \$1,200. The fixed costs of the division are \$12 million each year. The Optics Division has the capacity to satisfy the maximum possible demand if required.

#### Body Division

After the lens has been included with a body to make a complete camera the relationship between selling price and demand is such that at a price of \$8,000 there will be no demand for the complete camera but demand will increase by 300 complete cameras for every \$100 decrease in the price. The Body Division has annual fixed costs of \$15 million and has the capacity to satisfy the maximum possible demand if required. The total variable costs of a camera body and packaging it with a lens are \$1,750 (this does not include the cost of a lens).

Note: If  $P = a - bx$  then Marginal Revenue (MR) will be given by  $MR = a - 2bx$ .

#### *Required:*

- (a) **Calculate** the total revenue that would be generated by the complete cameras if:
- (i) the Manager of the Optics Division set the transfer price of a lens equal to the selling price which would be set to maximise profits from the sale of lenses to external customers;
  - (ii) the transfer price of a lens was set to maximise the profits of the OB group from the sale of complete cameras.

*(10 marks)*

### Scenario for parts (b) and (c)

The FF group is a divisionalised company that specialises in the production of processed fish. Each division is a profit centre. The Smoke Division (SD) produces smoked fish. The Packaging Division (PD) manufactures boxes for packaging products.

#### Smoke Division (SD)

The Manager of SD has just won a fixed price contract to supply 500,000 units of smoked fish to a chain of supermarkets. This will fully utilise the capacity of SD for the next year. Budget details for the next year are:

Variable cost per unit	\$12.00 (excluding the box)
Fixed costs	\$6.0 million
Revenue	\$13.5 million
Output	500,000 units of smoked fish

Each unit of smoked fish requires one box.

### Packaging Division (PD)

The Packaging Division has agreed to supply 500,000 boxes to SD at the same price that it sells boxes to external customers. Budget details for PD (including the order from SD) for the next year are:

Variable production cost	\$1.40 per box
Fixed costs	\$2.4 million
Output	4.48 million boxes
Capacity	4.50 million boxes

### Company Policy

It has been announced today that FF will be introducing a new performance appraisal system. The Divisional Managers will only be paid a bonus if the profit of their division is at least 12% of assets consumed during the next year. The value of the assets consumed is assumed to be the same as the fixed costs.

#### *Required:*

(b) **Calculate**, following the change to the company policy:

(i) the minimum price per box that PD would be willing to charge;

*(3 marks)*

(ii) the maximum price per box that SD would be willing to pay.

*(4 marks)*

*(Total for part (b) = 7 marks)*

(c) The Manager of SD is unhappy about paying the same price per box as an external customer and thinks that transfer prices should be set using an opportunity cost-based approach.

**Discuss** the view that transfer prices should be set using opportunity cost. You should use the data from the FF group to illustrate your answer.

*(8 marks)*

*(Total for Question Seven = 25 marks)*

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*(Total for Section B = 50 marks)*

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*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 ( $n$ )	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 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 ( $n$ )	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



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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
<b>Level 1 - KNOWLEDGE</b> 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
<b>Level 2 - COMPREHENSION</b> 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
<b>Level 3 - APPLICATION</b> 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
<b>Level 4 - ANALYSIS</b> 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
<b>Level 5 - EVALUATION</b> 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*

*November 2012*

*Wednesday Afternoon Session*