



CHARTERED ACCOUNTANTS EXAMINATIONS

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PROFESSIONAL LEVEL

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P2: ADVANCED MANAGEMENT ACCOUNTING

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TUESDAY 14 JUNE 2016

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TOTAL MARKS – 100; TIME ALLOWED: THREE (3) HOURS

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**INSTRUCTIONS TO CANDIDATES**

1. You have fifteen (15) minutes reading time. Use it to study the examination paper carefully so that you understand what to do in each question. You will be told when to start writing.
2. This paper is divided into TWO sections:  
Section A: One (1) compulsory question.  
Section B: Four (4) Optional questions. Attempt any three (3) questions.
3. Enter your student number and your National Registration Card number on the front of the answer booklet. Your name must **NOT** appear anywhere on your answer booklet.
4. Do **NOT** write in pencil (except for graphs and diagrams).
5. **Cell Phones** are **NOT** allowed in the Examination Room.
6. The marks shown against the requirement(s) for each question should be taken as an indication of the expected length and depth of the answer.
7. All workings must be done in the answer booklet.
8. Discount Factor tables/Present Value and Annuity Tables are attached at the end of the question paper.
9. Graph paper (if required) is provided at the end of the answer booklet.

## SECTION A:

**This is a compulsory question and must be attempted.**

### **QUESTION ONE**

- (a) Ulemu Ltd has an ambitious growth programme. It intends to employ a flexible manufacturing programme to produce a microscopic scanner whose life is expected to be three years, namely 2016, 2017 and 2018. The total market size for the scanners over the years will be 1,600,000, 2,400,000 and 1,200,000, respectively.

The marketing director of Ulemu Ltd has forecast sales quantity (Q) ('000 scanners) and selling price per unit (P) for each of the years 2016 – 2018 and expressed this in the form of price/demand equation as  $P = 140 - 0.30Q$ . Marginal costs are estimated to be K50 per scanner.

The marketing director further states that 2016 market share is extremely critical in the sense that Ulemu Ltd's annual sales for 2017 and 2018 will be expected to increase or decrease from the 2016 level achieved in relation to the change in overall marketing size from one year to the next up to the maximum manufacturing capacity of Ulemu Ltd. The selling prices of scanners set in 2017 and 2018 will be set using the  $P = 140 - 0.30Q$  price/demand equation.

Other relevant information (future incremental costs) is as follows:

Year	2015	2016	2017	2018	2019
Manufacturing Equipment Cost	<b>K'000</b> 4,000	<b>K'000</b> -	<b>K'000</b> -	<b>K'000</b> -	<b>K'000</b> -
Equipment Scrap Value	-	-	-	-	800
Sales Promotion Costs	2,400	2,000	1,600	-	-
Specific Fixed Costs	-	1,200	1,200	1,200	-
Working Capital	400*	-	-	-	-

\*Working capital will be expected to be released at the end of the life of the scanners. Ulemu Ltd is liable to pay tax on its profit at the rate of 30% and tax is paid one year in arrears. The manufacturing equipment does not qualify for writing down allowances. A post tax cost of capital of 10% should be used to evaluate this investment.

#### **Required:**

- (i) Calculate the Net Present Value (NPV) assuming a selling price in 2016 of K120 and advise whether the investment is worthwhile. (12 marks)

- (ii) Calculate the Internal Rate of Return (IRR). (4 marks)
- (iii) Calculate the payback period to 2 decimal places. (3 marks)
- (iv) Calculate by how much (in % terms) the incremental fixed costs have to change before the NPV becomes zero. Explain what the figure you have calculated indicates. (2 marks)
- (b) Ulemu Ltd has five other mutually exclusive projects. The projects will each last for one year only and their net cash inflow will be determined by the prevailing market conditions. The forecast annual cash inflows (already discounted) and their respective probabilities are shown below:

		Projects (K' millions)				
		V	W	X	Y	Z
Market Share	Probability					
Weak	30%	2,000	1,600	1,800	1,440	2,400
Good	50%	1,880	2,200	1,600	1,600	2,000
Excellent	20%	2,200	2,280	1,900	1,680	1,700

**Required:**

- (i) Evaluate the above projects and make a recommendation as to which project should be selected. (2 marks)
- (ii) Calculate the maximum sum payable for the perfect information. (3 marks)
- (c) Ulemu Ltd manufactures hospital equipment. The company's existing costing system uses a single overhead rate, based on revenue, to charge the costs of support activities to the products. Concern has been raised about the inaccuracy of product costs and the Finance manager has initiated a project to implement an activity-based costing (ABC) system.

The following information is available for three of its main products, Microscopes, Endoscopes and Scanners. The project team has collected the following data on each of the three products.

<b>Product Information</b>	<b>Microscope</b>	<b>Endoscope</b>	<b>Scanner</b>
Selling price per unit	K4,000	K5,000	K3,000
Number of units produced per annum	300	400	200
Average production time per unit	1.0 hours	0.6 hours	0.75 hours
Number of quality checks per unit	1.0	0.5	2
Number of Packages per unit	1.5	1.0	0.5
Direct material cost per unit	K600	K900	K750
% of faulty units	4%	2.5%	5%
Rework cost per faulty unit	K150	K150	K150
Direct labour cost per unit	K200	K100	K150

The project team has obtained the following information about the support activities.

<b>Activity</b>	<b>Cost Driver</b>	<b>Overheads K000</b>
Quality costs	Number of quality checks	432
Operating Production plant	Production time	724.5
Packaging costs	Number of packages	270.75
Administration	Sales revenue	608
Other overheads	Number of production units	460.8

**Required:**

- (i) Calculate the profit per unit for each of the three products, using the current basis for charging the costs of support activities to products. (5 marks)
- (ii) Calculate the profit per unit for each of the three products using activity-based costing.

(9 marks)

**[Total: 40 marks]**

## SECTION B

Attempt any **THREE (3)** out of **FOUR (4)** questions in this section

### QUESTION TWO

Nanduba Ltd manufactures various types of light bulbs. All the bulbs are in continuous mass production. Each of these bulbs incorporates three types of raw material and semi-finished items which are bought from outside suppliers.

With the introduction of energy saver bulbs, the sales of the bulbs have been declining. Nanduba Ltd is considering a proposal to discontinue these bulbs and replace them with a large range of differentiated products. These new products would be highly customised and be frequently renewed to adopt the latest technologies and allow for market changes. They would be produced in short, discontinuous batches - with production lines switching frequently from one product to another.

#### **Required:**

- (a) Explain life cycle costing, and whether it would be appropriate given the changes in the character of the operation. (10 marks)
- (b) Nanduba Ltd wishes to launch a new product. Market research has forecast that at a price of K50 annual demand will be 600 units. Further analysis of this market research indicates that for every K5 increase in selling price, annual demand will correspondingly reduce by 100 units and vice-versa, i.e. a K5 decrease in price results in annual demand increasing by 100 units. Direct material, labour and variable overheads are expected to be K7.5 per unit, K5 per unit and K2.5 per unit, respectively. General fixed costs are absorbed using a factory wide absorption rate of K5 per unit.

Note that if  $P = a - bQ$  then  $MR = a - 2bQ$  [you may counter-check this on your formula sheet provided in this exam paper]

#### **Required:**

- (i) Calculate the optimal quantity and optimal selling price. (6 marks)
- (ii) Explain two (2) reasons why this optimal price you have derived in (b) (i) above may not be used in practice. (4 marks)

**[Total: 20 marks]**

### **QUESTION THREE**

Divisions Petauke (P) and Katete (K) are part of the Eastern Oriental (EO) Group. Division P produces an intermediate product, CC. "CC" has an external market which fully utilizes its production capacity. The external market price is K25. In assessing divisional performance the EO group uses both the Return On Investment (ROI) and the Residual Income (RI).

#### **Required:**

- (a) (i) Explain the situation in which Division P can transfer "CC" to Division K at a price which is less than K25. (4 marks)
- (ii) With regard to the scenario above, suggest two (2) reasons why the management of the EO Group chose to use the RI in conjunction with ROI to measure the performance of the divisions. (2 marks)
- (b) In addition to the intermediate product "CC", Division P produces three finished products, D, E and F. Each product has an external market. The following information is relevant to these products:

	D	E	F
External market price per unit (K)	96	92	80
Variable Cost of Production in Division P (K)	66	48	56
Labour hours per unit in Division P	6hrs	8hrs	4hrs

Product E can also be transferred to Division K but the maximum quantity that might be transferred is 600 units of product E.

The maximum external sales are:

D : 1,600 units

E : 1,000 units

F : 600 units

Instead of receiving transfers of product E from Division P, Division K could purchase identical units of product E on the external market at a cheaper price of K90 per unit.

#### **Required:**

Calculate a transfer price or transfer prices for each unit of product E if total labour hours available in Division P are:

- (i) 15,200 hours (3 marks)
- (ii) 22,400 hours (5 marks)

- (c) Another division of the EO Group, the Mutare Division, is based in a country called Zimbabwe. All profits earned in Zimbabwe are taxed at 40%. Division P pays tax in Zambia at 35%.

**Required:**

Comment on three (3) major international Transfer Pricing issues which can arise in multinational companies. (6 marks)

**[Total: 20 marks]**

**QUESTION FOUR**

Nanzila Ltd is a newly formed decorating company that has operated without a known learning rate. Recently it entered into a contract with a government ministry to decorate its offices throughout the country. Management has estimated that the first batch of offices would take 20 hours with an expected learning rate of 75%. The standard direct labour cost of one batch of 10 offices is K360.

This assumes a standard time of 10 hours, costing K36 per hour. The standard time of 10 direct labour hours is the average time expected per batch based on a total of 64 batches.

Nanzila Ltd has so far completed decorating 32 batches and the total actual direct labour cost was K10,479. The following direct labour variances have also been calculated:

Direct labour rate K255 Adverse

Direct labour efficiency K2,673 Adverse

**Required:**

- (a) Calculate the actual rate of learning that occurred. (5 marks)
- (b) Calculate the total direct labour cost that the company will incur assuming that the actual rate of learning and the actual labour rate is used. (4 marks)
- (c) Comment on the cause of the labour efficiency variance. (1 mark)
- (d) Nanzila Ltd also trades as Colour Mix enterprise with a plant producing multiple paints. One of these paints is made by mixing three chemicals.

The standard material cost details for 1 litre of this paint is as follows:

Standard material cost of 1 litre of paint:

	K
0.20 litres of chemical A @ K15 per litre	3.00
0.15 litres of chemical B @ K10 per litre	1.50
0.25 litres of chemical C @ K7 per litre	1.75

Recently there was a general increase of 5% in the prices of the chemicals.

During the period Colour Mix produced 3,750 litres of this paint using the following chemicals:

- 1,200 litres of chemical A costing K3,600
- 500 litres of chemical B costing K925
- 1,000 litres of chemical C costing K1,700

**Required:**

Calculate the following variances:

- (i) direct material mix (3 marks)
- (ii) direct material yield (2 marks)
- (iii) direct material price planning (3 marks)
- (iv) direct material price operational (2 marks)

**[Total: 20 marks]**

**QUESTION FIVE**

Water Is Life (WIL), is a non-profit organization, whose main objective is to supply clean water to the communities in sub-urban and rural areas in several sub-saharan nations.

John Samatamba, a celebrated water engineer, has been the WIL Country Director, in country Y for the past two (2) years. He has questioned the logic of budgeting every year when his organization is financed by well-wishers abroad. He has always stated that there is a better way to be accountable to the stakeholders other than through budgetary process. Samatamba believes changing the systems will not help at all.

The project accountant has always emphasized on changing the current incremental budgeting system to a zero based system. He has observed that motivation in the process has been missing for a long time.

**Required:**

Write a report to the Country Director including the following:

- (a) Explaining the incremental budgeting (5 marks)
- (b) Describe the zero based budgeting including its strengths and weaknesses. (10 marks)
- (c) Discuss Five (5) factors that may arise as a result of the absence of motivation in budgeting. (5 marks)

**[Total: 20 marks]**

**END OF PAPER**

## Formulae Sheet

### Learning curve

$$Y = ax^b$$

Where Y = cumulative average time per unit to produce x units

a = the time taken for the first unit of output

x = the cumulative number of units produced

b = the index of learning ( $\log LR / \log 2$ )

LR = the learning rate as a decimal

### Demand curve

$$P = a - bQ$$

$$b = \frac{\text{change in price}}{\text{change in quantity}}$$

a = price when Q = 0

$$MR = a - 2bQ$$

### Modified Internal Rate of Return

$$MIRR = \left[ \frac{PV_R}{PV_I} \right]^{\frac{1}{n}} (1 + r_e) - 1$$

### Present Value Table

Present value of 1 i.e.  $(1 + r)^{-n}$

Where  $r$  = discount rate  
 $n$  = number of periods until payment

Periods (n)	Discount rate (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	1
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	2
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	3
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	4
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	5
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	6
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	7
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	8
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	9
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	10
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	11
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	12
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	13
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	14
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	15
(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	1
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694	2
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579	3
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482	4
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402	5
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335	6
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279	7
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233	8
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194	9
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162	10
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135	11
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112	12
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093	13
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078	14
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065	15

### Annuity Table

Present value of an annuity of 1 i.e.  $\frac{1 - (1 + r)^{-n}}{r}$

Where  $r$  = discount rate  
 $n$  = number of periods

Periods (n)	Discount rate (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	1
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	2
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	3
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	4
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	5
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	6
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	7
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	8
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	9
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	10
11	10.37	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	11
12	11.26	10.58	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	12
13	12.13	11.35	10.63	9.986	9.394	8.853	8.358	7.904	7.487	7.103	13
14	13.00	12.11	11.30	10.56	9.899	9.295	8.745	8.244	7.786	7.367	14
15	13.87	12.85	11.94	11.12	10.38	9.712	9.108	8.559	8.061	7.606	15
(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	1
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528	2
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106	3
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589	4
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991	5
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326	6
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605	7
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837	8
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031	9
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192	10
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327	11
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439	12
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533	13
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611	14
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675	15

**JUNE 2016: ADVANCED MANAGEMENT ACCOUNT (P2)**

**SOLUTIONS**

**SOLUTION ONE**

a)

i) NPV Model

Year	2015	2016	2017	2018	2019
Year	0	1	2	3	4
Equipment	(4,000)	-	-	-	-
Scrap Value					800
Working Capital	(400)			400	
Tax payable	-	720	(440)	(960)	(765)
Cash Profit	(2,400)	1,467	3,200	2,550	-
Net Cash flow	(6,800)	2,187	2,760	1,990	35
Discount factor @ 10%	1.0	0.909	0.826	0.751	0.683
PV	(6,800)	1,988	2,280	1,494	24

NPV (1,014)

Advice: On financial grounds, the investment is not acceptable because the NPV is negative.

ii) IRR

Net Cash flow	(6,800)	2,187	2,760	1,990	35
Discount factor @ 1%	1.0	0.990	0.980	0.971	0.961
PV	(6,800)	2,165	2,705	1,932	34

NPV 36

$$\begin{aligned}
 \text{IRR} &= A\% + \frac{P}{P+N}(B\% - A\%) \\
 &= 1\% + \frac{36}{36+1,016}(10\% - 1\%) \\
 &= 1\% + 0.31\% \\
 &= \underline{1.3\%}
 \end{aligned}$$

iii) Payback Period

Year	Cashflow	K'000
		Cumulative Cashflow
0	(6,800)	(6,800)
1	2,187	(4,613)
2	2,760	(1,853)
3	1,990	137

$$\text{Payback period} = 2 + \frac{1,853}{1,990} = \underline{2.93 \text{ years}}$$

$$\text{iv) Sensitivity Factor} = \frac{(1,014)}{1,200 \times 2.487} \times 10\%$$

$$= \underline{(34\%)}$$

Incremental fixed costs have to decrease by 34% before the NPV becomes zero.

Workings

W.1 Selling Price Per Scanner & Sales Volume

$$P = 140 - 0.30Q \text{ ('000s)}$$

$$Q = \frac{140-120}{0.30} = \underline{66,667}$$

$$2016 = \underline{66,667}$$

$$2017 = \underline{100,000} \text{ (66,667 x 150\% market size increase)}$$

$$2018 = \underline{50,000} \text{ (100,000 x 50\% market size decrease)}$$

W.2 Selling Prices

$$2016 : K120$$

$$2017 : K110 \quad [140 - 0.3 \times 100]$$

$$2018 : K125 \quad [140 - 0.3 \times 50]$$

W.3 CASH PROFITS

	2015	2016	2017	2018
Selling price per unit		120	110	125
Variable cost per unit		(50)	(50)	(50)
Contribution per unit		70	60	75
Total Contribution (K'000) [x 66,667/100,000/50,000]		4,667	6,000	3,750
Specific Fixed Costs		(1,200)	(1,200)	(1,200)
Sales Promotion	(2,400)	(2,000)	(1,600)	-
Cash Profit	(2,400)	1,467	3,200	2,550
Tax @ 30%	720	(440)	(960)	(765)

b)

- i) V :  $(2,000 \times 0.3 + 1,880 \times 0.5 + 2,200 \times 0.2) = \underline{1,980}$   
W:  $(1,600 \times 0.3 + 2,200 \times 0.5 + 2,280 \times 0.2) = \underline{2,036}$   
X :  $(1,800 \times 0.3 + 1,600 \times 0.5 + 1,900 \times 0.2) = \underline{1,720}$   
Y :  $(1,440 \times 0.3 + 1,600 \times 0.5 + 1,680 \times 0.2) = \underline{1,568}$   
**Z :  $(2,400 \times 0.3 + 2,000 \times 0.5 + 1,700 \times 0.2) = \underline{2,060}$**

Advice: Project Z should be selected because it has the highest EV of cash inflows.

ii)

Market State	Choice	Cash Inflow	Proby	EV
Weak	Z	2,400	0.3	720
Good	W	2,200	0.5	1,100
Excellent	W	2,280	0.2	456
EV of cashflow with perfect information				2,276
EV of cashflow with imperfect information				2,060
Value of perfect information				216

c) i) Using the current method of absorbing overheads based on total revenue

<b>Details</b>	<b>Microscope</b>	<b>Endoscope</b>	<b>Scanner</b>
Selling price	K4,000	K5,000	K3,000
Direct Material	(K600)	(K900)	(K750)
Rework costs	(K6)	(K3.75)	(K7.5)
Direct labour	(K200)	(K100)	(K150)
Contribution	K3,194.00	K3,996.25	K2,092.50
Overheads	(K2,627.40)	(K3,284.30)	(K1,970.60)
<b>Profit per unit</b>	<b><u>K566.60</u></b>	<b><u>K711.95</u></b>	<b><u>K121.90</u></b>

Calculation of overhead absorption rate;

$K2,496,050/K3,800,000 \times 100 = 65.65\%$  of revenue

ii) Using ABC

<b><u>Details</u></b>	<b><u>Microscope</u></b>	<b><u>Endoscope</u></b>	<b><u>Scanner</u></b>
Quality costs	K144,000	K96,000	K192,000
Operating production	K315,000	K252,000	K157,500
Packaging costs	K128,250	K114,000	K28,500
Administration	K192,000	K320,000	K96,000
Other overheads	<u>K153,600</u>	<u>K204,800</u>	<u>K102,400</u>
Total overheads	K932.850	K986,800	K576,400
Number units	300	400	200
Overhead/unit	<u>(K3,109.50)</u>	<u>(K2,467.00)</u>	<u>(K2,882.00)</u>
Contribution	<u>K3,194.00</u>	<u>K3,996.25</u>	<u>K2,092.50</u>
<b>Profit per unit</b>	<b><u>K84.50</u></b>	<b><u>K1,529.25</u></b>	<b><u>(K789.50)</u></b>

## **SOLUTION TWO**

(a) *Life cycle*

The life cycle approach to determining product profitability

Life cycle costing is an alternative to the traditional approach to determining product profitability.

Using life cycle costing, all costs such as production, R&D, development are traced to individual products over complete life cycles.

A product's profitability is therefore assessed over its entire life not on a periodic basis as in traditional profitability analysis.

Under a traditional approach costs also tend to be accumulated according to function; research, design, development and customer service costs incurred on all products during a period are realised and recorded as a period expense.

Actual plus projected costs and revenues and original (or revised) budgeted life cycle costs and revenues for a product are then compared (replacing the traditional comparisons between budgeted and actual costs on a month by month basis). Such comparisons allow for the refinement of future decisions about product design, lead to more effective resource allocation and show whether expected savings from using new production methods or technology have been realised.

### *Product life cycles and Nanduba Ltd*

Within the environment being considered by Nanduba Ltd for its site, the duration of product life cycles will decrease as the pace of technological change increases and consumer demand becomes more sophisticated.

Increasing automation will mean that up to 90% of product life cycle costs will be determined 'up front' by decisions made early within the product's life cycle.

Benefits of life cycle costing for Nanduba Ltd

The introduction of life cycle costing by Nanduba Ltd would ensure that the tightest cost controls were at the design stage of potential new products, the point at which the majority of costs are committed.

Initial product proposals would be far more carefully costed, which would be particularly important as Nanduba Ltd has little experience of working in the new environment. This understanding of the product costs will enable an appropriate pricing structure to be developed.

The system would assist in the planning and control of their products' life cycle costs and would monitor spending and commitments to spend during the early stages of the products' life cycles.

Life cycle costing increases the visibility of costs such as those associated with research, design, development and customer service, and also enables individual product profitability to be more fully understood by attributing all costs to products. This will provide Nanduba Ltd with more accurate feedback information on its success or failure in developing its new products. This will be vital in Nanduba Ltd's intended operating environment, in which the ability to produce new and updated versions of its products will be of vital importance to its survival.

#### *Drawbacks of life cycle costing for Nanduba Ltd*

If Nanduba Ltd achieve the proposed degree of flexibility, however, and if product life cycles become too short (they do intend to renew products frequently), it may not be realistic to install a cost tracking system which produces reports sufficiently promptly for remedial action to be effective.

Too much time may be spent on producing product budgets than merited by the potential benefits. If this is the case, Nanduba Ltd would be advised to rely on a range of non-financial indicators to help with the monitoring and control of costs.

#### *Conclusion*

Bearing in mind the above benefits and drawbacks, lifecycle costing is likely to be appropriate for Nanduba, as it will help to control all costs, set appropriate selling prices and ensure that the products do return a product across their lives.

$$(b) (i) P = a - bQ$$

$$P = \text{Price a quantity "Q"}$$

$$a = \text{Price where demand} = \text{Zero}$$

$$b = \frac{\text{Change in price}}{\text{Change in quantity}}$$

$$a = P + bQ$$

$$= 50 + \frac{5}{100} \times 600$$

$$= 50 + 30$$

$$= \underline{\underline{K80}}$$

$$P = 80 - 0.05Q$$

Profits are maximized where:

Marginal Revenue (MR) = Marginal Costs (MC)

$$a - 2bQ = 7.5 + 5 + 2.5$$

$$80 - 2 \times \frac{5}{100} Q = 15$$

$$80 - 0.1Q = 15$$

$$80 - 15 = 0.1Q$$

$$Q = \frac{65}{0.1}$$

∴ Optimal Quantity = 650 units

Optimal Price

$$P = 80 - 0.05Q$$

$$Q = 650$$

$$P = 80 - 0.05 \times 650$$

$$P = \underline{\underline{K47.5}}$$

ii) This price may not be used in practice for a number of reasons.

- The optimal model assumes a static relationship between price and demand. However, in practice this relationship changes from time to time.
- The model also assumes that price is the only factor that determines demand. But in practice factors (both endogenous and exogenous variables) such as advertising, tastes, fashion, trends, competitor reaction and economic factors (interest rates, exchange rates, inflation, etc) all influence demand.
- The marginal or variable cost per unit is assumed to be constant at all levels of activity. For example, in the above question, the variable cost of K15 per unit is assumed to be for the activity range of 0 – 1,600 [ $\frac{80}{0.05} = 1,600$ ]. This may not hold true in the long run.
- The marginal cost is assumed to be mostly influenced by volume. Marginal Costs are driven also by factors other than volume e.g. age of machinery, technology, etc.

[N.B. Only two reasons are required from candidates].

### **SOLUTION THREE**

a)

- i) The normal criterion would be that division P should be able to charge division K with the market price for product "CC". The reasoning for this would be that the opportunity cost forgone by the group would be the contribution earned by division P from the external sale. Internal transfers between divisions in a group may not incur some costs which apply to external sales. For example, the packaging costs

may be significantly reduced and transport may be arranged more cheaply on group vehicles. In this case the opportunity foregone by the group must be adjusted by the external costs which have been avoided. If division P transfers at a price which is reduced by the costs avoided, it will still report the same profit and its rate of return will be unaffected.

- ii) The use of Residual Income helps to overcome many of the disadvantages of Return on Investment. In particular, it reduces the temptation on the part of management to reject projects with returns greater than the hurdle rate required by the group, but acceptance of which would cause a lowering in the division's current level of return on investment. Thus, any project that generates a positive residual income enhances corporate performance. Consequently the use of Residual Income is more consistent than ROI with the objective of maximisation of the total profitability of the EO Group. Thus, RI could also be used as a basis for management incentive schemes. A further advantage of the RI approach lies in the fact that it is possible to apply different cost of capital percentage rates to investments that have different levels of risk. Also, the use of the RI approach serves to provide a focus on the cost of funds to divisional managers.

[N.B. Three reasons are given but only two are required]

b) Confirmation of limiting factor

D: 1,600 x 6hrs =	9,600
E: 1,000 x 8hrs =	8,000
F: 600 x 4hrs =	<u>2,400</u>
Total required (excluding transfers)	20,000
Available	<u>15,200</u>
Shortfall	4,800
Add: Product E	
Transfers (600x8hrs)	<u>4,800</u>
Total Shortfall	<u><u>9,600</u></u>

∴ Labour hours are limiting factor. Production and transfers should be in the order of contribution per limiting factor.

	D	E	F
Selling price per unit (K)	96	92	80
Variable Cost of Production in Division P (K)	66	48	56
Contribution per unit	30	44	24
	÷	÷	÷
Labour hours per unit in Division P	6hrs	8hrs	4hrs
Contribution per hr	<u>K5</u>	<u>K5.5</u>	<u>K6</u>

Priority Ranking

3<sup>rd</sup>

2<sup>nd</sup>

1<sup>st</sup>

Conclusion: 4,800hrs for product E transfers will come from the least profitable product D – at an opportunity cost. In the case of 22,400 hours, there are 2,400 surplus hours. However, if transfers have to be effected, there will be 2,400 hours shortfall. These will be achieved at the expense of product D production.

i) Transfer price = Variable Cost + Opportunity cost  
= K48 + 8hrs x K5 = K88

Transfer 600 units @ K88

ii) Transfer Price 1 = 300 units @ K48  
Transfer Price 2 = 300 units @ K88

- c) When determining transfer prices the management of the EO Group should consider the following issues:

### **Taxation**

Taxation in a large number of multinational organisations the issues relating to taxation take precedence over other transfer pricing issues and significant amounts of management time are spent attempting to determine the transfer prices that will minimise tax paid on a global basis. Transfer prices should be set in a way that minimises the taxation payable by the organisation as a whole. Management should be cognisant of the fact that anti-avoidance legislation exists to prevent companies using transfer policies to divert profits to subsidiaries/divisions based abroad.

### **Import duties/tariffs**

Import duties/tariffs can prove problematic. Again, whilst it is desirable that transfer prices be kept as low as possible in order to minimise the payment of duty in countries that impose import tariffs based on the 'value' of incoming goods, it should be borne in mind that governments are mindful of such practices and may invoke similar policies to that of anti-avoidance legislation.

### **Currency fluctuations**

Currency fluctuations can also prove problematic as they give rise to exchange risk. Many international organisations attempt to reduce their exposure to exchange risk by paying early or late to 'profit' from the anticipated movements in exchange. Whilst the management of EO Group should give careful consideration regarding which currencies to invoice in and which currencies to settle invoices etc, management should avoid the temptation to use transfer prices as a means of moving funds from a weaker currency into a stronger currency.

## Repatriation of funds

Repatriation of funds must be considered when dealing with countries, which have a high inflation rate or stringent foreign exchange regulations. It is imperative that transfer prices are only set after giving due consideration to which countries and in what currencies cash balances should be determined.

*[N.B. Minority interests, and anti-dumping legislation could also have been discussed. Though four issues are discussed, candidates are required to explain any three issues]*

## SOLUTION FOUR

(a) The standard cost of the actual hours worked was  $K10,479 - K255 = K10,224$ .  
At K36 per hour the actual hours worked were  $K10,224 / K36 = 284$  hours.  
So the average time per batch for the first 32 batches was  $284 / 32 = 8.875$  hours per batch.

32 batches represent 5 doublings of output.

The learning rate was therefore:

$$5 \sqrt{8.875 / 20} = 0.85 = 85\%$$

(b) Actual labour rate paid =  $10,479 / 284 = K36.90$  per hour.

Learning index =  $\log 0.85 / \log 2 = -0.2345$

$$Y = 20 \times 64^{-0.2345} = 7.54 \text{ hours}$$

$$\text{Total cost of direct labour} = 7.54 \times 64 \times K36.90 = K17,806.46$$

(c) The variance could have been caused by the difference in the learning rates.

(d) (i) Material mix variance

Chemical	AQSM (Ltrs)	AQAM (Ltrs)	DIFFERENCE (Ltrs)	RATE (K)	VARIANCE (K)
A	900	1200	300(A)	15	4,500(A)
B	675	500	175(F)	10	1,750(F)
C	1125	1000	125(F)	7	875(F)
TOTALS	2700	2700	-		<u>1,875(A)</u>

(ii) Material Yield variance

Standard yield =  $2700 / 0.6 = 4,500$

Actual yield 3,750

Difference in yield 750 (A)

Standard cost/ltr X 6.25

Variance K4,687.50 (A)

(iii) Material price planning

Chemical	Original price (K)	Revised Price (K)	DIFFERENCE (K)	Actual Qty	VARIANCE (K)
A	15	15.75	0.75(A)	1,200	900(A)
B	10	10.50	0.50(A)	500	250(A)
C	7	7.35	0.35(A)	1,000	350(A)
TOTALS			-		<u>1500(A)</u>

(iv) Material price operational

Chemical	Revised cost	Actual cost	VARIANCE (K)
A	18,900	3,600	15,300(F)
B	5,250	925	4,325 (F)
C	7,350	1,700	<u>5,650(F)</u>
TOTALS			<u>25,2750(F)</u>

**SOLUTION FIVE**

To: The Country Director

From: Management Accountant

Date: 15<sup>th</sup> December 2015

Subject: Budgeting

A budget is plan expressed in the monetary terms. Planning is the design of a detailed future and of effective ways of bringing it about. WIL has various activities that should be coordinated if it is to remain relevant. These activities could be coordinated using detailed plans usually referred to as budgets. This report explains two budgeting systems namely incremental and zero based. It also looks at the budget as a motivation tool.

(a) Incremental Budgeting

This is a traditional approach to setting a budget and involves basing next year's budget on the current year's results plus an extra amount for estimated growth or inflation next year.

This approach has both advantages and disadvantages.

Advantage

- Easy to prepare

Disadvantages

- Does not take account of alternative options
- Does not look for ways of improving performance
- Only works if current operations are as effective, efficient and economical as they can be
- Encourages slack in the budget setting process

(b) Zero-base budgeting

This a method of budgeting that is mainly used in non-profit organizations but it can also be applied to discretionary costs and support activities in profit organizations. It seeks to overcome the deficiencies of incremental budgeting. ZBB works from the premise that projected expenditure for existing programmes should start from base zero with each

year's budgets being complied as if the programmes were being launched for the first time. The budget users should present their requirements for appropriations in such a way that funds can be allocated on the basis of cost-benefit or some similar kind of evaluative analysis. The cost-benefit approach is an attempt to ensure 'value for money'; it questions long-standing assumptions and serves as a tool for systematically examining and perhaps abandoning any unproductive projects.

#### Strengths

- Provides a budgeting and planning tool for management that responds to changes in the business environment
- Requires the organization to look very closely at its cost behavior patterns
- Results in a more efficient allocation of resources

#### Weaknesses

- Requires a lot of management time and paperwork
- Requires training in the use of ZBB techniques so that these are applied properly
- Requires a participative approach so the organization must have a suitable culture.

#### (c) Motivation in budgeting

##### Planning stage:

If managers participate in preparing a budget in inappropriate circumstances then the following may happen.

- i) They may complain that they are too busy to spend much time on budgeting.
- ii) They may build in slack to their expenditure estimates and lobby for a high budget expenditure allowance.
- iii) They may base future plans on past results, instead of using the opportunity for formalized planning to look at alternative options and new ideas.

##### Implementation stage

- i) Managers might put in only just enough effort to achieve budget targets, without trying to beat targets.
- ii) A formal budget might encourage rigidity and discourage flexibility in operational decision making.
- iii) Co-operation and communication between managers might be minimal.

Signed

**END OF SOLUTIONS**