COST ACCOUNTING AND QUANTITATIVE ANALYSIS

Foundation stage
June 2003

MARKING SCHEME

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Question 1

(a) Marginal costing

		Month 1 £				Month 2 £	
Sales	(18,000 x £30)	540,000	½	Sales	(21,500 x £30)	645,000	½
				Opening stock		34,000	
Production cost				Production cost			
	(20,000 x £17)	340,000			(20,000 x £17)	340,000	
	(20,000 x £3)	60,000			(20,000 x £3)	60,000	
		400,000	½			434,000	½
Less closing stock	(2,000 x £17)	34,000	½	Less closing stock	(500 x £17)	8,500	½
Cost of sales		366,000		Cost of sales		425,500	
	Profit	174,000	½		**Profit**	219,500	½
		540,000				645,000	

4 marks for marginal costing statement

Absorption costing

		Month 1 £				Month 2 £	
Sales	(18,000 x £30)	540,000	½	Sales	(21,500 x £30)	645,000	½
				Opening stock		40,000	
Production cost				Production cost			
	(20,000 x £17)	340,000			(20,000 x £17)	340,000	
	(20,000 x £3)	60,000			(20,000 x £3)	60,000	
		400,000	½			440,000	½
Less closing stock	(2,000 x £20)	40,000	½	Less closing stock	(500 x £20)	10,000	½
Cost of sales		360,000		Cost of sales		430,000	
	Profit	180,000	½		**Profit**	215,000	½
		540,000				645,000	

4 marks for absorption costing statement

(8)

(b) Reconciliation of Reported Profits

½ mark for heading

Month 1	**£**	
Absorption costing profit	180,000	
Less fixed costs absorbed in closing stock (2,000 units x £3)	6,000	½
Marginal costing profit	174,000	½

Month 2	**£**	
Absorption costing profit	215,000	
Plus fixed costs absorbed in opening stock	6,000	½
	221,000	
Less fixed costs absorbed in closing stock (500 units x £3)	1,500	½
Marginal costing profit	219,500	½

(3)

(c) Advantages and disadvantages of each approach

Absorption:	Pros -	Shows full cost (for pricing). Managers responsible for all resources consumed in product/service. For external reporting usual to use absorption approach which matches revenue with expenditure.	*1*
	Cons-	Arbitrary apportionment and absorption bases.	*1*
Marginal:	Pros -	Useful for short run decisions. Best for pricing spare capacity/special orders.	*1*
	Cons-	Might ignore fixed costs. Might underprice and not recover fixed overheads.	*1*

(4)

(d) (Note: a two tail test is required because since the average resistance is not claimed to be a maximum or minimum. A *t* test is appropriate since the sample size is small (< 30) and d is unknown. It is assumed that the population distribution is normal).

x	Mean	(X – mean)	$(X - \text{mean})^2$
41	39	2	4
39	39	0	0
37	39	-2	4
40	39	1	1
38	39	-1	1
195			10

So mean resistance of sample is 39 ohms. (195 ÷ 5) *1*

Standard deviation of sample is v (10÷4(n – 1)) ie v 2.5 = 1.5811 ohms *1*

Set up the hypothesis test:

Null hypothesis H_0 $\mu = 40$ ohms
Alternative hypothesis H_0 $\mu \neq 40$ ohms *1*

Standard error is 1.5811 ÷ v 5 = 0.7071 *1½*

So $t = \frac{40 - 39}{0.7071}$ ie 1.4142 *1½*

At 5% significance level and with (5 – 1) ie 4 degrees of freedom, the critical value from tables is 2.776 and so statistically the null hypothesis would be accepted. *2*

(8)

(e) Difference between Type 1 and Type 2 errors when conducting Hypothesis tests.

Type 1 error: Reject a true hypothesis – incorrect decision. *1*

Type 2 error: Accept a false hypothesis – incorrect decision. *1*

(2)

(25)

Question 2

(a) (i) and (ii) Contract Account for Bridge

		£			£
Materials	½	900,000	Materials on site	½	50,000
Direct Wages	*1*	870,000	WIP	½	40,000
			Cost of work certified	½	2,020,000
Managers salaries	½	200,000			
Equipment depn	½	20,000			
Machine hire	½	100,000			
Overheads	½	20,000			
		2,110,000			2,110,000

Profit and Loss for year ended 31 December 2002

Cost of work certified		2,020,000	Value of work certified	½	2,800,000
Profit taken	*1½*	494,000			
Profit not taken	½	286,000			
		2,800,000			2,800,000

Balances at 31 December 2002

WIP	40,000	Wages accrued	20,000
Materials on site	50,000	Profit not taken	286,000

1

Equipment Depreciation:
Net book value £200,000. Depreciate at 10% for 12 months = £20,000

Overheads:
Charged at 10% of management salaries = 10% x £200,000 = £20,000

Attributable profit:
Notional profit: Value of work certified – cost of work certified
£2,800,000 - £2,020,000 = £780,000

Proportion of way through contract:

Value of work certified/contract value = £2,800,000/£6,000,000 = 47%

Therefore the proportion of profit to be shown on the P&L is:

2/3 x £780,000 x 95% = £494,000 *8½*

Contract Account for Tunnel

		£			£
Materials	½	550,000	Materials on site	½	20,000
Direct Wages	*1*	760,000	WIP	½	20,000
			Cost of work certified	½	1,690,000
Manager salaries	½	250,000			
Equipment depn	½	45,000			
Plant hire	½	100,000			
Overheads	½	25,000			
		1,730,000			1,730,000

Profit and Loss for year ended 31 December 2002

Cost of work certified	1,690,000	Value of work certified	½	1,500,000
		Loss reported	*1*	190,000
	1,690,000			1,690,000

Balances at 31 December 2002

WIP	20,000
Materials on site	20,000
Wages prepaid	40,000

1

Equipment Depreciation:
Net book value £450,000. Depreciate at 10% for 12 months = £45,000

Overheads:
Charged at 10% of management salaries = 10% x £250,000 = £25,000

Attributable loss:
Notional loss: Value of work certified – cost of work certified
£1,500,000 – £1,690,000 = £190,000 *7½*

(16)

(iii) Reported profit should be less than notional profit to account for the prudence concept. *1*
For the Bridge contract, the notional profit should be reduced by 1/3 to account for the uncertainty due to being only part way through the contract, and should be reduced by a further 5% due to the retention. *1*
When a loss is made (as with the Tunnel contract), the full value of the loss should be reported, no matter how complete or incomplete the contract is. *1*

(3)

(b) Correlation between charge and number of vehicles.

X	Y	X^2	Y^2	XY
£s	000 per week			
0.8	69	0.64	4,761	55.2
0.9	66	0.81	4,356	59.4
1.0	61	1.00	3,721	61.0
1.1	57	1.21	3,249	62.7
1.2	51	1.44	2,601	61.2
5.00	304	5.1	18,688	299.5

1

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)}\sqrt{(n\sum y^2 - (\sum y)^2}}$$

$$r = \frac{5 \times 299.5 - (5 \times 304)}{\sqrt{(5 \times 5.1 - 5^2)}\sqrt{(5 \times 18688 - 304^2)}}$$

1

$$r = \frac{-22.5}{\sqrt{0.5}\sqrt{1024}} \qquad r = \frac{-22.5}{22.627} \qquad r = -0.994$$

1

So a very strong negative correlation indicating that as the price/charge increases then the number of vehicles goes down. *1*

Assumptions: Not necessarily a causal relationship.

Not certain that effect will continue in same way at prices outside the given range.

Might be other factors eg competition, advertising etc.

(1 mark per valid assumption, maximum of 2 marks)

(6)

(25)

Question 3

(a) FIFO

Date	Receipt (kilos)	Price £	Total Receipt £	Issues (kilos)	Price £	Total issues £	Stock (kilos)	Stock Price £	Stock Value £
OS	80	20.00	1,600				80	20.00	1,600
3 May	100	22.00	2,200						
							80	20.00	1,600]
							100	22.00	2,200]
8 May				80	20.00	1,600]			
				70	22.00	1,540]	30	22.00	660
9 May	300	25.00	7,500				30	22.00	660]
							300	25.00	7,500]
16 May				30	22.00	660]			
				170	25.00	4,250]	130	25.00	3,250
17 May	120	30.00	3,600				130	25.00	3,250]
							120	30.00	3,600]
28 May				130	25.00	3,250]	100	30.00	3,000
				20	30.00	600]			
	600		14,900	500		11,900	100		3,000

2 *2*

(Credit should be awarded for method.)

LIFO

Date	Receipt (kilos)	Price £	Total Receipt £	Issues (kilos)	Price £	Total Issues £	(kilos)	Stock Price £	Value £	
OS	80	20.00	1,600				80	20.00	1,600	
3 May	100	22.00	2,200							
							80	20.00	1,600]	
							100	22.00	2,200]	
8 May				100	22.00	2,200]				
				50	20.00	1,000]	30	20.00	600	
9 May	300	25.00	7,500				30	20.00	600]	
							300	25.00	7,500]	
							30	20.00	600]	
16 May				200	25.00	5,000]	100	25.00	2,500]	
17 May	120	30.00	3,600				30	20.00	600]	
							100	25.00	2,500]	
							120	30.00	3,600]	
28 May				30	25.00	750]	30	20.00	600]	
				120	30.00	3,600]	70	25.00	1,750]	
	600		14,900	500		12,550	100		2,350	*2*
						2				

Weighted Average

Date	Receipt (kilos)	Price £	Total Receipt £	Issues (kilos)	Price £	Total Issues £	(kilos)	Stock Price £	Value £	
OS	80	20	1,600				80	20.0000	1,600.00	
3 May	100	22	2,200				180	21.1111	3,800.00	
8 May				150	21.1111	3,166.67	30	21.1110	633.33	
9 May	300	25	7,500				330	24.6465	8,133.33	
16 May				200	24.6465	4,929.3	130	24.6465	3,204.03	
17 May	120	30	3,600				250	27.2161	6,804.03	
28 May				150	27.2161	4,082.42	100	27.2161	2,721.61	
	600		14,900	500		12,178.3	100		2,721.61	*2*
						2				

Total part (a) (12)

(b) Alternative methods:

NIFO – Next In First Out.
The price of the next receipt coming in is used – equivalent to current price. Will reflect market prices.

Standard Cost.
Can use an estimated standard cost throughout the costing period. Accepting that real prices may be more or less than that. Possible administration savings etc.

Replacement Cost.
Price at current replacement cost. Benefit of latest prices but might be cumbersome if volatile prices.

HIFO – Highest prices.
Highest In, First Out. Price using highest price paid. Will always cover costs but danger perhaps of being non-competitive.

Specific Price.
Can use a predetermined specific price. (For example if wanting to subsidise costs).

1 mark per valid method up to 3 marks for listing
1 mark per valid description, up to a maximum of 3

(6)

(c) Allocation – overhead costs can be directly attributed to cost centres (eg metered electricity).

Apportionment – overhead costs have to be attributed to cost centres using bases of apportionment (eg floor area).

Absorption – overheads (usually production only) are absorbed (charged) into cost units using absorption bases (eg per labour hour or machine hour).

(1 mark for each explanation)
(3)

(d)

Wilko Minerals
Rising each month at 0.2%

End of year: $(1.002)^{36}$ x £32 = 1.07458 x £32 = £34.39 *2*

Ashworth Aggregates
Rising each quarter by 0.7%

End of year: $(1.007)^{12}$ x £32 = £1.08731 x £32 = £34.79 *2*

(4)

(25)

Question 4

(a) Wiring Dept. £500,000 / 50,000m hrs = £10 per machine hour

Assembly Dept. £450,000 / 90,000 Lab hrs = £5 per labour hour

(1½ marks for each calculation)
(3)

(b) Special Order XYZ

Materials: 800 + 200	= 1,000	½
Direct labour: 160 + 190	= 350	½
Overheads: Wiring dept. 21machine hours @ £10 per machine hour	= £210	½
Assembly dept 30 labour hours @ £5 per labour hour	= £150	½
Total production costs	= £1,710	*1*

(3)

(c) Under/Over Absorption

Wiring dept: Actual overhead £520,000
Overhead absorbed £520,000 (52,000 actual m hrs @ 10 per mach hr)

Therefore NIL under/over absorption. *2*

Assembly dept: Actual overhead £440,000
Overhead absorbed £400,000(80,000 actual lab hrs @ £5 per lab hr)

Therefore £40,000 UNDER absorbed. *2*

Reasons: Assembly department

Activity: Primarily because "lost" 10,000 labour hrs so didn't/couldn't charge out or absorb 10,000 lab hrs @ £5 ie "lost" £50,000 of absorption. *1*

Expenditure: BUT this was partly offset by the fact that overheads actually turned out to be less than expected ie. Budgeted overhead £450,000 but Actual overhead was only £440,000 ie £10,000 less. *1*

Wiring department

Activity: 2,000 hours over estimate (52,000 actual – 50,000 estimate) x £10 = £20,000 over absorbed. *1*

Expenditure: Over budget (£520,000 actual – £500,000 estimate) = £20,000 over spent. *1*

Net Effect Nil

(8)

(d) Four other absorption bases which could be used are:

Labour cost percentage rate.

Materials cost percentage rate.

Prime cost percentage rate.

Cost unit rate. *(1 mark for each)*
(4)

(e)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Wire (km)	24	22	26	23	27	26	25	28	23	26	24	27

Mode (most common value) is **26** km *1*

Median (middle value) is **25.5** km (nb in this case an even number of values so take mid point between 6 th and 7 th – ie 25 and 26 km) *1½*

Mean value is 301 ÷ 12 ie **25.083** km *1½*

Advantages:
Mode – most common value – can be useful for retailer stocking most popular sizes (eg shoes, shirts, blouses etc).

Median – middle value – if data has few very large or small values, then can be more representative than mean. Not affected so much by extreme values.

Mean – arithmetical (or geometrical) average – includes all values and can be used for subsequent statistical calculations.

(1 mark for each well described advantage)
3

(7)

(25)

Question 5

(a) (i) Using least squares

X	y	x^2	Xy
21	380	441	7,980
40	462	1,600	18,480
50	558	2,500	27,900
60	580	3,600	34,800
42	486	1,764	20,412
33	396	1,089	13,068
246	2,862	10,994	122,640

1

Variable cost per unit

$$b = \frac{(6 \times 122,640) - (246 \times 2,862)}{(6 \times 10,994) - 246^2} = \frac{31,788}{5,448} = £5.8348 \text{ per unit}$$

3

Fixed costs per month

$$a = \frac{2,862 - (5.8348 \times 246)}{6} = \frac{1,426.64}{6} = £237,773$$

3

Alternative – (a) using normal equations

$\Sigma y = n\,a + b\,\Sigma x$
$\Sigma xy = a\,\Sigma x + b\,\Sigma x\hat{}2$

2,862 = 6a + 246b
122,640 = 246a + 10,994b

Multiply the first equation by 246/6 and subtract
117,342 = 246a + 10,086b
122,640 = 246a + 10,994b

5,298 = 908b

5.8348 = b = variable cost per unit *3*

Substituting
2,862 = 6a + 246b
2,862 - 1,435.361 = 6a
237.773 = a = fixed cost per month *3*

(ii) Using High low

Variable cost

Difference in cost	580 - 380	=	200	= £5.1282 per unit	
Difference in output	60 - 21		39		*1*

Fixed cost

	Total cost				580	
	- Variable cost	5.1282	x	60	=	307.692
	Fixed cost (£000)				=	272.308
Or	Total cost				380	
	- Variable cost	5.1282	x	21	=	107.6922
	Fixed cost (£000)				=	272.308 *2*

(10)

(b) Using least squares method

Sales/Production (000 units)		180	
	£		
Variable costs– production overheads	5.8348		
Variable costs – direct costs	12.0000		
Variable costs – total per unit £		17.8348	
Variable costs total £000		3,210.264	
Fixed costs			
Production overheads per month	237.773		
General overheads per month	70.000		
Fixed costs per month	307.773		
X number of months	3		
		923.319	
Total cost (£000)		4,133.583	

2

Using High low

Sales/production (000 units)		180	
	£		
Variable costs – production overheads	5.1282		
Variable costs – direct costs	12.0000		
Variable costs – total per unit £		17.1282	
Variable costs total £000		3,083.076	
Fixed costs			
Production overheads per month	272.308		
General overheads per month	70.000		
Fixed costs per month	342.308		
x number of months	3	1,026.924	
Total costs (£000)		4,110.000	*2*

(4)

(c) Students should comment on the difference between the forecasts and suggest that this might be due to the fact that High Low picks extremes which are least likely to be typical, whereas the least squares method brings in all values. *2*

Further valid comment on the particular figures used – that in two future months the budgeted activity slightly exceeds the range of the previous month's experience, the highest being April's 60,000 units. Therefore the calculations are even more doubtful. *1*

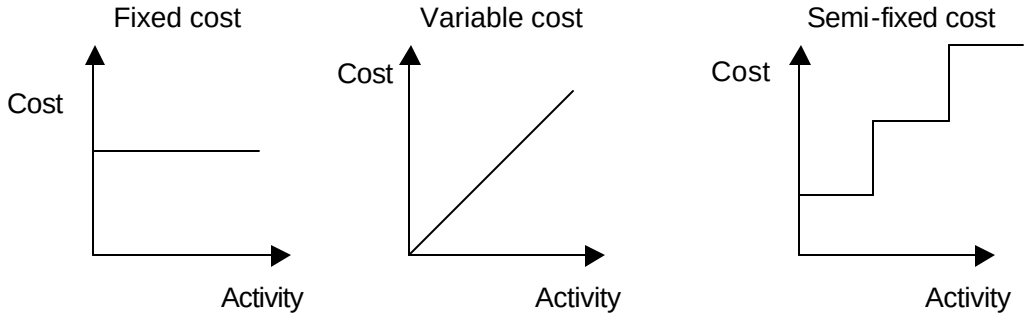
Doubts about using the past to forecast the future should be expressed, together with the risks of underestimating the cost. *2*

(5)

(d) Fixed cost – cost not affected (in short term or within range of output) by changes in activity. *1*

Variable cost – cost directly affected by change in activity. *1*

Semi-fixed cost – also known as stepped cost. A cost which remains fixed until certain defined activity levels when it changes (in series of steps). *1*



(1 mark for general shape of each graph being correct, neatness, axes labelled etc) 3

(6)

(25)