COST ACCOUNTING AND QUANTITATIVE ANALYSIS

Foundation stage
December 2001

MARKING SCHEME

CIPFA

Question 1

(a) Overhead Analysis Sheet

	Machining	**Assembly**	**Maintenance**	**Stores**	**Total**
	£	**£**	**£**	**£**	**£**
Indirect materials	100,000	100,000	45,000	9,000	254,000
Indirect wages	100,000	98,500	92,500	46,000	337,000
Managers salaries (employees)	30,000	30,000	10,000	10,000	80,000
Depreciation of machines (value)	120,000	30,000	-	-	150,000
Heating & lighting (area)	10,000	15,000	10,000	15,000	50,000
Building insurance (area)	5,000	7,500	5,000	7,500	25,000
Insurance of machines (value)	12,000	3,000	-	-	15,000
Rent and rates (area)	20,000	30,000	20,000	30,000	100,000
	397,000	314,000	182,500	117,500	1,011,000
					4

Need to reapportion stores and maintenance departments.

	Machining	**Assembly**	**Stores**	**Maintenance**	
Stores (using issues)	40%	40%		20%	
Maintenance (using maintenance hours)	50%	25%	25%		*2*

(ie reciprocal service costs)

N.B: Using specified order of closure:-
Would expect to close maintenance first as it does 25% of its work for stores, which is larger than the 20% stores does for maintenance. (See Drury page 103).

	Machining	**Assembly**	**Maintenance**	**Stores**	
Apportion maintenance (50% 25% 25%)	91,250	45,625	(182,500)	45,625	
Apportion stores (50% 50%)	81,562	81,563	Nil	(163,125)	*4*
Total	569,812	441,188			*(10)*

(b) Overhead Absorption Rate for machinery department is:

$\frac{£569,812}{50,000 \text{ machine hours}}$ = £11.40 per machine hour *1½*

Overhead Absorption Rate for assembly department is:

$\frac{£441,188}{75,000 \text{ labour hours}}$ = £5.88 per labour hour *1 ½*

(3)

(c) Reasons to use standard costs and activity:

- need to charge overheads to customers throughout costing period
- not practical to wait till end of costing period
- helps smooth out seasonal fluctuations
- helps planning
- charge consistent prices to customers

1 mark for each reason, up to a maximum of 3

Problems:

- can cause problem of under/over absorption
- may not recover full costs

1 mark for each problem, up to a maximum of 2

(5)

(d) Expected cost of materials:

£900 x 0.2	=	180
£1,200 x 0.5	=	600
£1,600 x 0.3	=	480
Total		1,260

Price for Order AXB 03:

	Units	£/unit	Total £	
Direct Materials			1,260	*2*
Direct Labour	25 hrs	£8/hr	200	*1*
Indirect Costs				
Assembly	25 hrs	£5.88	147	*1*
Machine	20 hrs	£11.40	228	*1*
Total Costs			1,835	
Plus 25%			459	*1*
Total Price			2,294	*1*
				(7)

(25)

NB the 25 labour hours are assumed to be spent in the Assembly department and 20 machine hours in the Machining department. No information is given in the question to the contray. However, should a student make a clearly stated different assumption then full credit will be given).

Question 2

(a)

Process A Cost Account

	kg	per kg	£			kg	per kg	£	
Woodpulp	2,500	£9	22,500	½	Normal Loss-10%	350	£1	350	½
Viscose	1,000	£2.50	2,500	½					
Stirrers (400 hrs x £15)			6,000	½	Abnormal Loss	150	£15	2,250	*1*
Checkers (200 hrs x £25)			5,000	½					
Overheads (£25,000 x 32%)	Flat rate Oncost		3,600 8,000	*1*	Process B	3,000	£15	45,000	*1½*
			47,600					47,600	
									6

Workings

Cost per kg

$$= \frac{\text{Total Cost - Scrap Value on Normal Loss}}{\text{Normal Units Produced}}$$

$$= \frac{£47{,}600 - £350}{3{,}150 \text{ kgs}} = £15 \text{ per kg}$$

Process B Cost Account

	Kg	per kg	£			kg	per kg	£	
Transfer from Process A	3,000	£15	45,000		Normal Loss (3,200 x20%)	640	£2	1,280	½
Finishing agent	200	£50	10,000	½					
Finishing staff (200 hrs x £20)			4,000	½	Transfer to Finished Stock	2,700	£25	67,500	*1*
Overheads (£10,000 x10%)	Flat rate Oncost		1,280 5,000	*1*					
Abnormal Gain	140	£25	3,500	*1 ½*					
			68,780					68,780	*5*
									(11)

Workings

Cost per kg

$$= \frac{\text{Total Cost - Scrap Value on Normal Loss}}{\text{Normal Units Produced}}$$

$$= \frac{£65{,}280 - £1{,}280}{2{,}560 \text{ kgs}} = £25 \text{ per kg}$$

(b) Marks to be awarded are shown in italics.

Normal Loss Account

	£		£	
Process A	350	Bank	350	*1*
Process B	1,280	Abnormal Gain	280	
		Bank (500 x £2)	1,000	*1*
	1,630		1,630	

Abnormal Gain Account

	£			£
Normal Loss (140 x £2)	280	*1*	Process B	3,500
Profit & Loss A/C	3,220	*1*		
	3,500			3,500

Abnormal Loss Account

	£		£	
Process A	2,250	Bank (150 x £1)	150	*1*
		Profit & Loss A/C	2,100	*1*
	2,250		2,250	

(6)

(c) Calculation of Mean and Standard Deviation (using the six values given for the previous periods):

	X	$(X-\bar{X})$	$(X-\bar{X})^2$
	2,460	(150)	22,500
	2,600	(10)	100
	2,650	40	1,600
	2,520	(90)	8,100
	2,790	180	32,400
	2,620	10	100
Σ	15,640		64,800

$$\bar{X} = \frac{\sum X}{n} = \frac{15{,}640}{6} = 2{,}610 \quad \text{(rounded from 2606.67)}$$

$$S = \sqrt{\frac{\sum(X - X^2)}{n-1}} = \sqrt{\frac{64{,}800}{5}} = 113.84$$

2

Setting up the null hypothesis (and assuming that this is a two tail test ie testing that "normal output should be expected to be 2,500kg" per the question requirement. Could also have used a one tail test if testing the Managing Director's comment re: "significantly higher").

H_0: $\mu = 2{,}500$ kg
H_1: $\mu \neq 2{,}500$ kg *1*

This is a small sample (less than 30) so have to use "t" statistic/test

Calculate t statistic : $\dfrac{m - \bar{x}}{SE}$

SE: $\dfrac{S}{\sqrt{n}} = \dfrac{113.84}{\sqrt{6}} = 46.74$ *1*

t: $\dfrac{2{,}610 - 2{,}500}{46.47} = 2.37$ *1*

Compare to critical value in student's T distribution table at n-1 degrees of freedom (in this case 6-1 = 5) so value is 2.571 *1*

Conclusion: At the 95% significance level, there is insufficient evidence to reject the null hypothesis. The value of losses should remain at 2,500kg, but a larger sample should be taken to enable a more precise estimate of the true average losses. *2*

(NB. It is possible to use the last 5 output figures for testing – as the quote in the question implies. Alternatively, could use the output in part (a) as well as the six given figures and test using seven outputs).
Some slight differences may arise due to roundings/non roundings of figures but full credit will be given where students demonstrate correct methodology and follow calculations through appropriately. *(8)*

(25)

Question 3

(a) Different types of standard cost.

Basic standard -	Original benchmark/specification, used for long run comparisons
Ideal standard -	Assumes 100% efficiency all the time May also not include all costs/delays which are inevitable/part of production process. Should not be used for cost comparison/control purposes.
Attainable standard –	Attainable under normal (efficient) operating conditions.
Current standard –	Attainable standard kept updated for price changes.

1½ marks each for identification and explanation with a maximum of 6

Public sector use?

Unlikely to be used in purest/strictest form because most public sector is "service" based output with different customers/needs/quality issues etc. Would need to be a repetitive "product" based area – not impossible (eg school meals ?? output from a council run workshop? Etc) *2*

(8)

(b) 1,200 Grommits actually produced

Standard cost of 1

Materials	1 kg @ £2 per kg	= £2
Labour		
Turners	2 hrs @ 10	= £20
Finishers	1 hr @ 8	= £8
Standard Cost		= £30

Actuals

Materials	1,500 kg @ £2.20 per kg	= £3,300
Labour		
Turners	2,500 hrs @ 9.5	= £23,750
Finishers	1,200 hr @ 8.2	= £9,840

Materials Cost Variance
(1,200 x 2) – (1,500 x 2.2)
2,400 – 3,300 = £900 (A)

Materials Price Variance:
1,500 kg (2 – 2.20) = £300 (A)

Materials Usage Variance:
(1,200 kg – 1,500 kg) x 2 = £600 (A)

1 mark per variance up to a maximum of 3

Labour Cost variance

	Turners	(1,200 x 20) – 23,750	=	£250 (F)
	Finishers	(1,200 x 8) – 9,840	=	£240 (A)
Rate:	Turners	2,500 hrs (10 - 9.5)	=	1,250 (F)
	Finishers	1,200 hrs (8 - 8.2)	=	240 (A)
Eff:	Turners	(2,400 – 2,500) x 10	=	1,000 (A)
	Finishers	(1,200 – 1,200) x 8	=	Nil

1 mark per variance up to a maximum of 6

(9)

(c)

(i) Characteristics of a normal distribution

- It is a continuous distribution.
- It is a perfectly symmetrical bell shaped curve.
- The "tails" of the distribution continually approach, but never touch, the horizontal axis.
- The mean, mode and median pass through the peak of the curve and precisely bisect the area under the curve into two equal halves.
- The distribution is fully defined by the mean and standard deviation.

1 mark per point up to maximum of 4

(ii) Mean is 1,356 grommits *1*

Standard deviation is 400. So Z score is $\frac{1500 - 1356}{400} = 0.36$ *2*

From tables there is 35.94 % chance of Grommit production being more than 1,500. *1*

(8)

(25)

Question 4

(a) Costs in the question are a mix of variable, semi-variable, semi-fixed and fixed. Costs need to be analysed between fixed and variable. Semi-variable costs should be split into their fixed and variable elements using the High/Low method:

Direct Labour: (semi-fixed)	Fixed at £272,000 up to 2,000 sessions Above 2,000 sessions fixed at £297,000
Direct Materials: (variable)	£36,000 / 1,800 sessions = £20 per session
Other Direct Expend: (semi-variable)	(£20,600 - £17,700) / (2,200 – 1,800) = £7.25 variable £17,700 – (£7.25 x 1,800) = £4,650 fixed
Heat, Light & Power: (semi-variable)	(£6,400 – 5,600) / (2,200 – 1,800) = £2 variable £5,600 – (£2 x 1,800) = £2,000 fixed
Overheads:	Fixed at £120,000

<u>Cost for 1,996 sessions:</u>

		£	
Direct Labour (fixed)		272,000	*½*
Direct Materials (£20 x 1,996)		39,920	*1*
Other Direct Expenditure:			
Fixed	4,650		
Variable (£7.25 x 1,996)	<u>14,471</u>	19,121	*2*
Heat, Light and Power			
Fixed	2,000		
Variable (£2 x 1,996)	<u>3,992</u>	5,992	*2*
Overheads (fixed)		<u>120,000</u>	*½*
		<u>457,033</u>	
			(6)

(b) Forecast

Year	Quarter	Sessions	4 Qtr Moving Ave	Centred	Actual / centred(%)	Forecast Period	Forecast
1999	Q1	500					
	Q2	450					
			505.5				
	Q3	517		506.125	102%	0	
			506.75				
	Q4	555		507	109%	1	
			507.25				
2000	Q1	505		508	99%	2	
			508.75				
	Q2	452		509.375	89%	3	
			510				
	Q3	523		510.75	102%	4	
			511.5				
	Q4	560		512.375	109%	5	
			513.25				
2001	Q1	511		513.75	99%	6	
			514.25				
	Q2	459				7	
	Q3	527				8	
	Q4					9	
2002	Q1					10	514
	Q2					11	463
	Q3					12	532
	Q4					13	570
			2	*2*	*2*		*3*

Average quarterly increase in sessions:

From 506.125 sessions in Q3 of 1999 to 513.75 in Q1 of 2001. Increase of 7.625 over 6 quarters = 1.271 sessions per quarter.

2

Average seasonal variation: (%)

	Q1	Q2	Q3	Q4
1999			102%	109%
1999	99%	89%	102%	109%
2000	99%			
Average	99%	89%	102%	109%

Therefore, forecast using y = 506.125 + 1.271x and adjust seasonally per above table. *3*

(14)

(c) Comment

The projected cost is higher due to the higher projected activity. This has increased all the variable costs and has increased the semi-fixed direct labour costs as the 2,000 session threshold has been exceeded and a new member of staff needs to be employed. *1*

The forecast activity figures are different because the Director of Activity based his/her projection on 2001 data, and on only three quarters worth of data. This produced an underestimation of 2002 activity because of: *2*

- General trend is for an increase in sessions year on year (so sessions in 2002 are likely to be greater than in 2001). *1*
- The seasonal trend shows the highest activity in quarter 4 of each year. The Director of Activities only used quarters 1 to 3 in the activity projection so the average for the year is too low. *1*

(5)

(25)

Question 5

Poplar Products Ltd.

(a) **FIFO**

Date	Receipt (kilos)	Price £/kg	Total Value £	Issues (kilos)	Price £/kg	Value of issues £	Stock Balances (kilos)	Price £/kg	Value £	
2.Sept	1,000	16.00	16,000				1,000		16,000	
8Sept	2,000	17.00	34,000				3,000		50,000	
10 Sept				500	16.00	8,000	2,500		42,000	
20 Sept				500	16.00	8,000				
				200	17.00	3,400	1,800		30,600	
21 Sept	2,500	15.00	37,500				4,300		68,100	
2 Oct	1,500	18.00	27,000				5,800		95,100	
19 Oct				1,800	17.00	30,600				
				700	15.00	10,500	3,300		54,000	
26 Oct	2,000	20.00	40,000				5,300		94,000	
5 Nov	1,000	22.00	22,000				6,300		116,000	
12 Nov				1,800	15.00	27,000				
				1,100	18.00	19,800	3,400		69,200	
17 Nov	1,500	24.00	36,000				4,900		105,200	
			212,500			107,300				*1*
			2			*2*				
										(5)

Cumulative Weighted Average

Date	Receipt (kilos)	Price £/kg	Total Value £	Issues (kilos)	Price £/kg	Value of Issues £	Stock Balances (kilos)	Price £/kg	Value £	
2 Sept	1,000	16.00	16,000				1,000	16.000	16,000	
8 Sept	2,000	17.00	34,000				3,000	16.667	50,000	
10 Sept				500	16.667	8,334	2,500	16.667	41,666	
20 Sept				700	16.667	11,667	1,800	16.667	30,000	
21 Sept	2,500	15.00	37,500				4,300	15.698	67,500	
2 Oct	1,500	18.00	27,000				5,800	16.293	94,500	
19 Oct				2,500	16.293	40,733	3,300	16.293	53,767	
26 Oct	2,000	20.00	40,000				5,300	17.692	93,767	
5 Nov	1,000	22.00	22,000				6,300	18.376	115,767	
12 Nov				2,900	18.376	53,290	3,400	18.376	62,477	
17 Nov	1,500	24.00	36,000				4,900	20.097	98,477	
			212,500			114,024				*1*
			2			*2*				*(5)*

(10)

(b) Periodic weighted average method.

Under this method a retrospective average price is calculated at the end of the period. NB with the cumulative average price method it is usual to recalculate the new average price whenever a new receipt of material occurs. Thus with the "periodic" method calculations are easier/less frequent. The method has to be applied retrospectively because not all the information needed to calculate the issue price is available until the end of the period.

1 mark for explaining "retrospective at end of year"
1 mark for saying "cumulative is recalculated when new material received"
2 marks for stating "easier and less frequent, and information not available till end of period"
(4)

(c) Rising each month at 2%

End of year: $(1.02)^{12} \times £24 = £30.44$ (a 26.8% increase)
1 *1 ½*

Rising each quarter by 3%

End of year: $(1.03)^4 \times £24 = £27.01$ (a 12.5% increase) *(5)*
1 *1 ½*

(d) In times of rising prices stock brought earlier will have cost less than the latest stock bought in. Using a LIFO approach, the costs/value of the stock recently bought in is used to price issues. This means that materials left in stock will be valued at the lower/older prices. SSAP 9 states that the LIFO approach does not bear a reasonable relationship to actual costs during a period and implies that this method is not suitable for external reporting. It is also necessary to compare stock values with net realisable value to cater for situations where stock may have become obsolete/deteriorated/unsaleable.

2 marks for explaining that earlier bought stock is cheaper and using LIFO stock values can be much lower
2 marks for stating that these lower/outdated values ***not*** *acceptable for external reporting per SSAP 9*
2 marks for mentioning net realisable value and obsolete/unsaleable stock

(6)

(25)