SOLUTION - MANAGEMENT ACCOUNTING AND CONTROL MAY 2007

QUESTION 1

(a) Since the VC is the same for each option and increases at the same rate as the price, the price which maximizes revenue will also maximize contribution.

Therefore Expected Revenue at ¢5,000:
(0.10 x 175,000 + 0.20 x 275,000 + 0.40 x 350,000 + 0.20 x 375,000 + 0.10 x 400,000) x ¢5,000
= 327,500 x 5,000
= 1,637,500,000

Expected revenue at ¢8,000:
(0.10 x 160,000 + 0.20 x 190,000 + 0.40 x 210,000 + 0.20 x 230,000 + 0.10 x 260,000) x ¢8,000
= 210,000 x ¢8,000
= 1,680,000,000

Therefore the price which maximises the expected revenue contribution is ¢8,000 per packet.

Expected NVP over first five years of operations.

NB

- The maximized contribution is at ¢8,000 for 210,000 packets.
- Operations can only start in 12 months time, therefore FCs and VCs are first brought into the appraisal two years from now and so will have two years inflation applicable.

¢'m	Year						
	0	1	2	3	4	5	6
Building	(250)	-	-	-	-	-	-
Alterations	-	(150)	-	-	-	-	-
Motorcycles	-	-	(400)	-	-	-	-
Fixed Costs	-	-	(875)	(945)	(1,020)	(1,102)	(1,190)
Variable Costs	-	-	(232)	(243)	(255)	(268)	(281)
Working Capital	-	(50)	-	-	-	-	-
Revenue	-	-	1,852	1,945	2,042	2,144	2,251
Realisable Value	-	-	-	-	-	-	1,000
Net Cash Flow	(250)	(200)	345	757	767	774	1,780
DCF	1	0.87	0.76	0.66	0.57	0.50	0.43
PV	(250)	(174)	262	500	437	387	765

:. Expected NPV = ¢1,927,000,000

QUESTION 2

(a)

i) There are significant similarities between Residual Income (RI) and Economic Value Added (EVA). In both, the basic measure is the profit for the division less an interest charge based on the net assets that have been invested in the division. This results in an absolute value, whereas Return on Investment (ROI) yields a percentage or relative measure. There are considerable theoretical advantages for the absolute measure.

The major differences between the two are that EVA has a number of complications or developments from the simple RI. EVA adjusts the operating profit to bring 'accounting profit' in line with a measure of 'economic profit'. The major long-term expenditure, such as R & D or marketing costs for a new product, can be capitalized over the expected useful life of the expenditure. More complex forms of depreciation are used, and taxation is treated in a more complex manner.

EVA also calculates the interest charge in a more complex manner than was traditionally the case for RI.

ii) Controllability is defined as 'the degree of influence that a specific manager has over costs, revenues or other items in question'. The controllability principle is that managers should be held responsible for costs that they have direct control over. For example, a divisional manager would not be held responsible for the allocation of central costs to her department if she has no control over the magnitude or incurrence of these costs. Under this principle, it would be held that dysfunctional consequences would arise if managers were held accountable for costs over which they have no control.

An alternative view argues that there are considerable advantages to be gained in holding managers responsible for costs even when they do not have any direct control over them. For example, it stops managers from treating some costs as 'free goods' and therefore stops them from over-using these goods and services. Further holding managers responsible for items outside their control may encourage them to become more involved with such issues and, as a result, the total cost may be reduced or goods or services may be provided more efficiently.

There is no clear evidence as to which of these views will produce the best performance from a division or a division manager.

iii) The basic analysis of transfer pricing assumes that one of the key objectives in setting such prices is that relevant divisions can be evaluated effectively, that is, that transfer price will not distort the divisional performance evaluation. In practice however, the existence of divisions in different countries, and particularly different systems of taxation, can add another objective. It may be valued to the company to set transfer prices to minimize overall group tax liabilities and maximize overall group profits. For example, profits could be reduced in a country with high taxation and increased in a country with low taxation, thus reducing the overall tax liability and increasing overall profits. If customs duties were based on the value of the goods, there would be an incentive to transfer the goods at a low transfer price to minimize customs duties. Some countries levy 'withholding taxes' on dividends paid outside the country. Here it would be possible to transfer prices for goods in or out of the country in such a manner that minimize the profits, and thus the dividends.

Most countries have tax legislation that limits the extent to which these practices can be used, but there is still considerable scope for using transfer prices to influence the incidence of profit and, through differing tax regimes, the overall amount of group profit. Where this occurs, the effectiveness of measuring divisional performance may have been substantially reduced.

(b) Calculation of Variances

(i) Material Price Variance

MPV = (Std Price – Actual Price) x Actual Quantity Purchased

		¢
L: (¢50,000 - ¢52,000) x 2,400	=	4,800,000 U
M: (¢35,000 - ¢36,000) x 1,200	=	1,200,000 U
N: (¢20,000 - ¢19,000) x 500	=	500,000 F
		5,500,000 U

(ii) Material Mix Variance

MMV = (Std Quantities of actual input – Actual Quantity Used) x Std Price

		¢
L: (1,980 - 1,920) x ¢50,000	=	3,000,000 F
M: (990 - 1,000) x ¢35,000	=	350,000 U
N: (330 - 380) x ¢20,000	=	1,000,000 U
		1,650,000 F

(iii) Material Yield Variance

MYV = (Std Input for actual Output – Actual Input Used) x Average Std Input Cost
= (¢3,850 – ¢3,300) x ¢42,500
= ¢23,375,000 F

(iv) Labour Rate Variance

LRV = (Std Rate – Actual rate) x Actual Hours Worked
= (20,000 - 20,300) x 15,100 Hours
= ¢4,530,000 U

(v) Labour Efficiency Variance

LEV = (Std Hours for Expected Output – Actual Hours Worked) x Std Rate
= (13,500 – 15,100) x ¢20,000
=¢ 32,000,000 U

NB: Std Hours for Expected Output = $\frac{3,300}{100}$ x 450 Hours
= 13,500 Hours

(vi) Labour Yeild Variance

LYV = Std Hours for Actual Output – Std Hours for Expected Output) x Std Rate
= (15,750 Hours – 13,500 Hours) x ¢20,000
= ¢45,000,000 F

NB: Std Hours for actual Output = $\frac{3,500}{100}$ x 450 Hours
= 15,750 Hours

QUESTION 3

ASEM ABA LTD

(a) Material Budget

	Asem	Beba	Total
Unit sales	6,000	4,000	
Kilos per unit	3	4	
Kilos required	18,000	16,000	34,000
Less stock reduction			2,000
Purchase requirement (kilos)			32,000
Average price (GHC) (workings 1)			2,200
Budget purchases (value) (GHC)			70,400,000

2007 Wages

	Asem	Beba	Total
Units	6,000	4,000	
Standard time per unit	24 mins	48 mins	
Total standard hours	2,400	3,200	5,600
Wage rate per hour (GHC) (workings 2)			4,200
Wages cost budget (GHC))			23,520,000

(b) Costs: Labour and related

	GHC'000
Labour (above)	23,520
Variance overheads (5,600 hours x GHC1,500)	8,400
Total labour & related cost	31,920

2007 budget recalculated at old efficiencies

	Asem	Beba	Total
Units	6,000	4,000	
Standard time per unit	30 mins	60 mins	
Total standard hours	3,000	4,000	7,000
Wage rate per hour (GHC4,200 – GHC500)			GHC3,700
Labour cost (GHC'000)			25,900
Variance overheads (7000 hours *GHC1,500) GHC'000			10,500
Total labour and related costs (GHC'000)			36,400
Total labour related under productivity scheme (GHC'000)			(31,920)
Net cost savings from productivity scheme (GHC'000)			4,480

Workings

1. Material price

2006 actual usage

Asem	4000 units x 3 kilos	=	12,000
Beba	2000 units x 4 kilos	=	8,000
			20,000 kilos

Total material costs = GHC44,000,000
:. cost per kilo = 44,000,000/20,000 = GHC2,200

2. Labour

	Asem	Beba
2006 standard time	½ hr	1 hr
i.e	30 mins	60 mins
2007 productivity saving (20%)	6 mins	12 mins
2007 standard time	24 mins	48 mins
2006 hours required	4000 x ½ hr = 2000 hrs	2000 x 1 hr = 2000 hrs

3. Wage rate

2006 actual wages = standard + variance

$$= \left(GHC3000 + \frac{GHC2{,}000{,}000}{4{,}000 \text{ hours}}\right)$$

= GHC3,500 per hour

Therefore, 2007 wage rate will be GHC3,500 + GHC700 = GHC4,200

4. Variable overhead rate

2006 variable overheads GHC6,000,000

2006 labour hours

Variable overhead rate is GHC1,500 per labour hour

QUESTION 4

(a) Intrapolation is the name given to estimation carried out within the range of values given for the independent variable.

Extrapolation is the name given to estimation that is based on values of the independent variable in a region that has not been considered in the calculation of the appropriate regression line.

Extrapolation is mostly commonly used for forecasting, using values of a variable described over time.

(b) (i) see graph

(ii) $\Sigma x = 237$, $n = 10$, $x = \underline{\Sigma x} = \underline{\underline{23.7}}$

$\Sigma y = 323$, $n = 10$, $y = \frac{\Sigma y}{n} = 32.3$

(x, y) (23.7, 32.3)

(iii)

x	y	xy	x^2
22	31	682	484
22	27	594	44
21	23	483	441
27	39	1053	729
22	22	484	484
17	17	289	289
30	51	1530	900
24	39	936	576
21	30	630	441
31	44	1364	961
$\Sigma x = 237$	$\Sigma y = 323$	8045	5789

$$b = \frac{n\,\Sigma xy - \Sigma\ x\,\Sigma y}{nzx^2 - (\Sigma x)^2}, \quad a = \frac{\Sigma y}{n} - b\,\frac{\Sigma x}{n}$$

$$b = \frac{10 \times 8045 - 237 \times 323}{10 \times 5789 - (237)^2} = \frac{3899}{1721} = \underline{\underline{2.27}}$$

$$a = \frac{323}{10} - 2.27\,(237) = 323 - 53.79$$
$$= -21.49$$

Regression equation is

$y = 21.49 + 2.27x$

(iv) 1. There is a position relationship between Y and X

2. The marks scored by candidates in Section A is more than double the score in Section B. A unit increase in B A will increase by 2.27

3. When a candidate scores zero in Section A (y), that candidate will score 9.4 marks in x.

4. when a candidate score zero in Section B(x) that candidate will score -21 in Section A(y) (which has no practical meaning)

(v) If a candidate scores 30 in section A

$\rightarrow$ 30 = -21.49 + 2.27x

$$x = \frac{30 = 21.49}{2.27} = 22.68$$

Score per Section B = 22.68

:. Total score per both Sections

= 30 + 22.68 = 52.68

Therefore the candidate passed

(b) Let x denote the time (minutes) to finish the exams. Given that the mean (u) time for completing the exams is (140) minutes and the standard deviation is 25 minutes and that the distribution is a normal distribution.

$u = 140$, $\sigma = 25$, $n = 400$

(i) Number of student who finished in less than two hours = prob (x < 2 hours) x n

$$\text{Prob } (x < 120) = \text{Prob} \left(\frac{x - u}{\sigma} < \frac{120 - u}{\sigma} \right)$$

$$\text{Prob} \left(\frac{x - u}{\sigma} < \frac{120 - 140)}{25} \right)$$

But $\frac{x - u}{\sigma}$ is the standard score (Ƶ score)

$$:. \text{Prob} \left(Ƶ \text{ score} < \frac{120 - 140}{25} \right)$$

= Prob (Ƶ score < -0.8)

If Ƶ score = -0.8

Ø (0.8) = 0.2881

P (Ƶ score < -0.8) = 0.5 – 0.2881 = 0.2119

:. Prob (x < 120) = 0.2119

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the paper within 2 hours = n Prob (x < 120)

= 400 x 0.2119

= 84.76

= 85 students

The number of students that will complete the exams in 2 hours is approx <u>85 students</u>

(ii) Let x denote the time to finish the exams. The number of student that finished within the Prob last half hour = np where n = 400 p = prob (x > 150)

$$\text{Prob } (x > 150) = \text{Prob} \left(\frac{x - u}{\sigma} > \frac{150 - 140}{25} \right)$$

$$= \text{Prob } (Z \text{ score} > 0.4)$$

If Z score = 0.4

Ø (0.4) = 0.1554

:. Prob (x > 150) = 0.5 - 0.1554 = 0.3446

:. The number of students that finished in the last ½ hour = np = 400 x 0.3446

= 137.84

= 138

The number of students is approx 138.

(iii) The number of students that can not finish on time means that the time (180 minutes) elapsed.

The number of students = n Prob (x > 180)

$$\text{Prob } (x > 180) = \text{Prob} \left(\frac{x - u}{\sigma} > \frac{150 - 140}{25} \right)$$

= P(Z score > 1.6)

Z score = 1.6

From tables

Ø (1.6) = 0.4452

Prob (x 7180) = 0.5 – 0.4452

= 0.0548

The number of students who can not finish the exams on time = np

= 400 x P (x > 180)

= 400 x 0.0548 = 21.92

= 22 students

The number of students that will not complete the exams is 22 students.

(iv) Let t denote the time that 87.5% of the students would have finished.

If 350 students finished, then the probability that 350 students would have finished $= \frac{350}{400} = 0.875$

Prob (x < t)

$$= P\left(\frac{x-u}{\sigma} < \frac{t-u}{\sigma} = 0.875\right)$$

$$\text{Ø}(z) = 0.875 - 0.5 = 0.375$$

From table Ƶ = 1.151

$$\therefore P\left(\frac{x-u}{\sigma} < \frac{t-140}{25}\right) = \text{Prob}\left(Ƶ \text{ score} < t - 140\right)$$

$$1.151 = \frac{t - 140}{25}$$

$$140 + 1.151 \times 25 = t$$

$$t > 168.775$$

The time at which 87.5% students would have finished the exams is 168.77 minutes or 169 minutes.

QUESTION 5

(a) The main characteristics of the distribution are:

1. It has a symmetric (frequency) curve about the mean of the distribution

2. The majority of the values tend to cluster about the mean, with the greatest frequency at the mean itself.

3. The frequencies of the values taper away (symmetrically) either side of the mean, giving the curve a characteristic "bell shape"

4. The random variable is cautious

5. The total Area under the curve is 1

QUESTION 6

a) Linear programming is a suitable method for medelling an allocation problem if the objective and the constraints on the resources can all be expressed as linear relationships of the variables.

b)

(i) Let x be number of Kings produced
Let y be number of Queens produced

Maximize contribution, Ƶ = 150x + 75y

Subject to $10x = 4y \leq 1000$

$3x + 2y \leq 360$

$2x + 5y \leq 800$

where $x, y \geq 0$

(ii) Let S_A = unused labour of Department A
S_B = unused labour of Department B
S_C = unused labour of Department C

Maximize Ƶ = 150x + 75y

Subject to $10x + 4y + S_A + OS_B + OS_C = 1000$

$3x + 2y + OS_A + OS_B + OS_C = 360$

$2x + 5y + OS_A + OS_B + S_C = 800$

Where $x, y, S_A, S_B, S_C, \geq O$

(iii)

Basic Mix		150 x	75 y	0 S_A	0 S_B	0 S_C	Solution	
0	S_A	10	4	1	0	0	1000	100
0	S_B	3	2	0	1	0	360	120
0	S_C	2	5	0	0	1	800	400
Sacrifice		0	0	0	0	0	0	
Improvement		150	75	0	0	0	-	

150	x	1	0.4	0.1	0	0	100
0	S_B	0	0.8	-0.3	1	0	60
0	S_C	0	4.2	-0.2	0	1	600
Sacrifice		150	60	15	0	0	15000
Improvement		0	15	-15	0	0	-

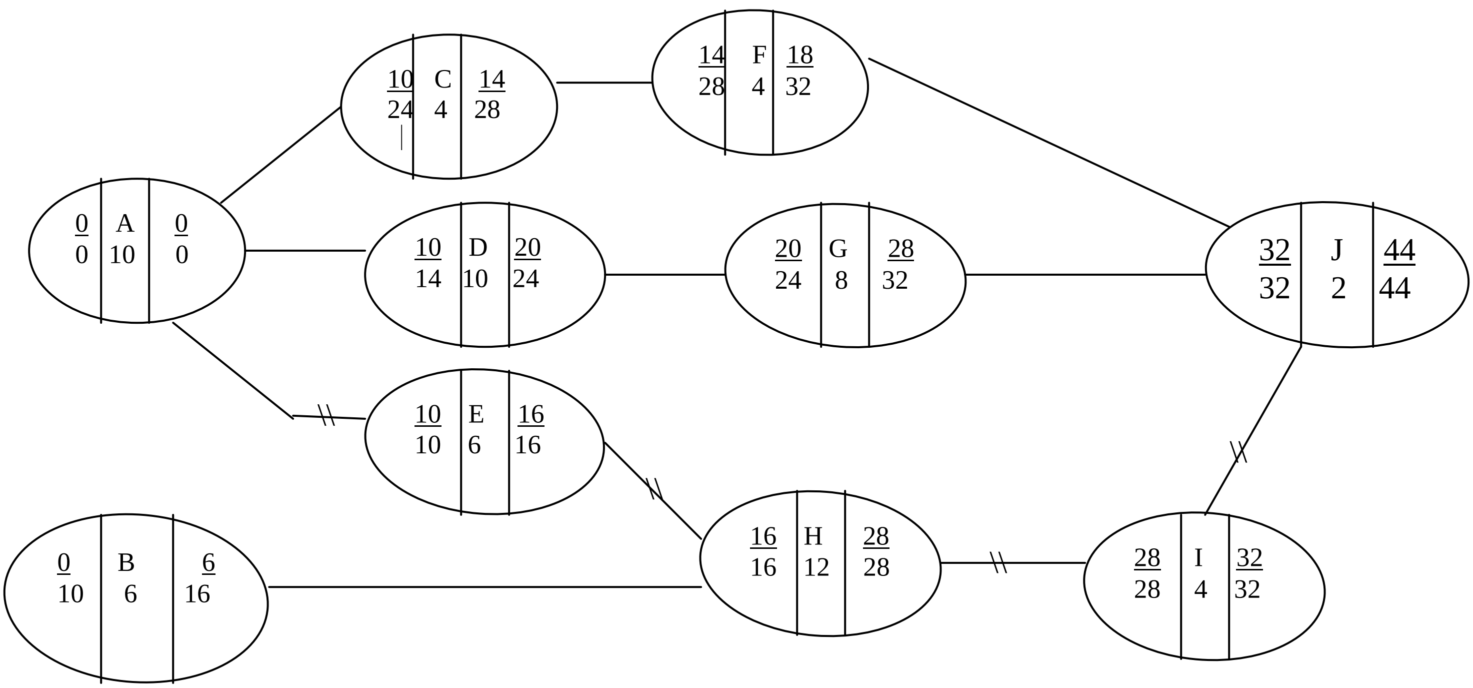
Interpretation of Final Simplex Tableau

GCGCL must produce 70 units of the Kings and 75 units of the Queens, and have 285 hours in department C unused. This plan yields an optimum or maximum contribution of ¢16,125.

At the optimum, an extra one hour in Department A will come at calcium ¢9 and similarily in Department B it will increase calculation by ¢18.75. These are also the shadow prices f these resources.

QUESTION 7

a) A float is the spare time available in a network.



Duration of project from the diagram is 44 weeks, and the critical path is A – E – H – I – J

(iii) See graph

c) The activities are C, S, F, G