Manufacturing Engineering Tripos Part 1
P3 Exam Crib
2008
Dr A Cosh

SECTION A

1(a)   This requires an introduction that rehearses the development of managerial theories starting from the seminal work of Berle and Means. It will set the answer within the field of agency theory. This explains why management and control have become separated over time and that this gives potential discretion to management to pursue their own objectives. Then, an answer should then explore managerial motivation under headings such as: salary and other forms of remuneration; security; status and prestige; and personal fulfilment. [20%]

(b)   The best way to answer this is probably to develop the Marris growth model with the demand frontier. This suggests that whilst growth, profitability and company valuation may go together up to a point, if the growth is pushed further both profitability and the valuation ratio will fall. This is intimately linked to diversification policy, but is also very dependent on the growth rate of the sector in which the firm is located. [15%]

(c)   The obvious part of the answer is the role of takeovers as a disciplinary measure if management drives down market valuation by their behaviour. A good answer will also explain why takeovers. and not the supply of finance, are the ultimate constraint. The second part of the answer concerns the way in which managers can abuse their position to carry our takeovers that are not compatible with shareholder interests. The agency problem manifests itself in growth by acquisition. An excellent answer will review the evidence from studies about merger success and about acquisitions as a disciplinary force. [25%]

(d)   The potential actions are through: voting at shareholders meetings; hiring and firing management; putting the company in play as a potential takeover target; and incentivising management to have the same objectives as the business owners. A good answer will distinguish between institutional and other shareholders. Formal shareholders meetings are rarely used as a means of controlling management action. Hiring and firing may be influenced by institutional shareholders, as will the decision to make the company available as a takeover target, possibly for acquisition by private equity firms. However, much of the answer to this part of the question may be devoted to the discussion of executive remuneration and the use of share incentive schemes and LTIPs. [40%]

Perhaps the greatness weakness in the answers was the failure to develop the full Marris model and explain the link with market valuation.

2   (a) [15%]

$Q = 12,550 - P$

$TC_1 = 4,000 + 50\,q_1 + 2.5q_1^2$

$TC_2 = 7,200 + 100\,q_2 + 0.5q_2^2$

$Q = 45\,q_1 + 50\,q_2$

$P = MC_1 = MC_2$

$MC_1 = 50 + 5\,q_1$

$MC_2 = 100 + q_2$

$q_2 = 5\,q_1 - 50$

$MC_1 = P = 12,550 - 45\,q_1 - 50\,q_2$

$50 + 5\,q_1 = 12,550 - 45\,q_1 - 50\,(5\,q_1 - 50)$

$300\,q_1 = 15,000$

$q_1 = 50$

$q_2 = 5 \times 50 - 50 = 200$

$Q = 45 \times 50 + 50 \times 200 = 12,250$

$P = 12,550 - 12,250 = 300$

(b) [15%]

Find minimum of each ATC,

$ATC_1 = 4,000/q_1 + 50 + 2.5q_1$

$ATC_2 = 7,200/q_2 + 100 + 0.5q_2$

$dATC_1\,/\,dq_1 = -4,000/q_1^2 + 2.5$

$dATC_2\,/\,dq_2 = -7,200/q_2^2 + 0.5$

$q_1^2 = 1,600$

$q_2^2 = 14,400$

$q_1 = 40$

$q_2 = 120$

$ATC_1^{min} = 4,000/40 + 50 + 2.5 \times 40 = 250$

$ATC_2^{min} = 7,200/120 + 100 + 0.5 \times 120 = 220$

Only Technology 2 firms exist and $P = 220$

$Q = 12,550 - 220 = 12,330$

$N_2 = 12,330 / 120 = 103$ approx.

(c) [30%]

$$Q = q_1 + q_2$$
$$P = 12{,}550 - q_1 - q_2$$

$$Prof_1 = (12{,}550 - q_1 - q_2)\,q_1 - 4{,}000 - 50\,q_1 - 2.5q_1^2$$
$$dProf_1/dq_1 = (12{,}550 - 2q_1 - q_2) - 50 - 5q_1 = 0$$
$$q_2 = 12{,}500 - 7q_1$$

$$Prof_2 = (12{,}550 - q_1 - q_2)\,q_2 - 7{,}200 - 100\,q_2 - 0.5q_2^2$$
$$DProf_2/dq_1 = (12{,}550 - q_1 - 2q_2) - 100 - q_2 = 0$$
$$q_1 = 12{,}450 - 3q_2$$

$$7q_1 = 12{,}500 - 4{,}150 + q_1/3$$
$$q_1 = 1{,}252.5$$
$$q_2 = 12{,}500 - 7q_1 = 3{,}732.5$$

$$Q = q_1 + q_2 = 4{,}985$$
$$P = 12{,}550 - q_1 - q_2 = 7{,}565$$

$$Prof_1 = 7{,}565 \times 1{,}252.5 - 4{,}000 - 50 \times 1{,}252.5 - 2.5 \times 1{,}252.5^2$$
$$Prof_2 = 7{,}565 \times 3{,}732.5 - 7{,}200 - 100 \times 3{,}732.5 - 0.5 \times 3{,}732.5^2$$

$$Prof_1 = 9{,}475{,}162.5 - 3{,}988{,}515.6 = 5{,}486{,}647$$
$$Prof_2 = 28{,}236{,}362.5 - 7{,}346{,}228.1 = 20{,}890{,}134$$

Total profits = 26,376,781

(d) [25%]

$$TR = (12{,}550 - Q) \times Q$$
$$MR = 12{,}550 - 2(q_1 + q_2)$$
$$MR = MC_1 = MC_2$$

$$MC_1 = 50 + 5\,q_1$$
$$MC_2 = 100 + q_2$$
$$q_2 = 5\,q_1 - 50$$

$$MC_2 = 100 + q_2 = 50 + 5\,q_1 = MR = 12{,}550 - 2(6q_1 - 50)$$
$$17\,q_1 = 12{,}600 \quad \text{and} \quad q_1 = 741.2$$
$$q_2 = 3{,}655.9$$
$$Q = q_1 + q_2 = 4{,}397$$
$$P = 8{,}153$$

$$Prof_1 = 8{,}153 \times 741.2 - 4{,}000 - 50 \times 741.2 - 2.5 \times 741.2^2$$
$$Prof_2 = 8{,}153 \times 3{,}655.9 - 7{,}200 - 100 \times 3{,}655.9 - 0.5 \times 3{,}655.9^2$$
$$Prof_1 = 6{,}043{,}003.6 - 1{,}414{,}503.6 = 4{,}628{,}500$$
$$Prof_2 = 29{,}806{,}552.7 - 7{,}055{,}592.4 = 22{,}750{,}960$$

Total profits = 27,379,460

(e) [15%]

Discussion of the reasonableness of the long-run perfect competition
outcome with only about 100 firms.
Discussion of the myopia represented by the Cournot assumption.
Discussion of the sub-optimality of the Cournot outcome.
Discussion of the uneven gains from collusion to each firm.
Discussion of how collusion might be achieved through price
leadership given that explicit collusion is illegal.

*Very good answers to the mathematical parts on the whole, but
inadequate development of the discussion points noted above.*

3 (a) [5%]

Assets sold	NBV	£273,790		Assets purchased	£569,900
	Loss	£ 15,850		less asset sold	£257,940
	Cash	£257,940 inflow		**Net Cash Flow**	**£311,960**

(b) [10%]

Net book value	£2,567,900			
Tax written down value	£1,670,000			
Timing difference	£ 897,900	x 22%	£197,538	
		Deferred tax b/fwd	£104,320	
		Deferred tax increase	£ 93,218	
		To be charged to P&L		

(c) [5%]

The reduction in stock will mean that current assets are reduced, leading to a reduction in the current ratio.

The increase in long-term loan will raise the gearing ratio.

(d) (i) [30%]

Depreciation is an expense which is charged to reflect the value of economic benefits which have been consumed due to the use of a fixed asset during the accounting period. This is an application of the accruals principle, under which profit is calculated by charging expenses against profit as they are incurred.

The annual charge is normally calculated on the basis of a predetermined policy. When accounts are prepared, the total depreciation to date is deducted from the cost to arrive at the net book value. It is this value that is reported on the balance sheet.

Impairment is the term used when the value (effectively the market value) of a fixed asset falls below the net book value. Impairment arises for a reason other than the consumption of economic benefits, for instance damage to an asset, or a change in market conditions.

From the above it follows that the value of economic benefits consumed by using assets should be charged as an expense to the profit and loss account.

It is accepted that freehold land is not consumed by the activities of the business (unless the land is physically damaged, as would be the case in a mining company) and therefore need not be depreciated. On the assumption that the normal activities of METStars do not damage the land, the policy of not depreciating would appear to be appropriate.

The directors are required to choose the method which is used to charge depreciation. In doing so, they should seek to reflect the consumption of economic benefits which occurs. Once chosen, a method of depreciation should be consistently applied to all assets in a class.

It is often the case that companies depreciate machinery on a straight line basis and vehicles on a reducing balance basis. The straight line basis means that the depreciation charge is the same from year to year, whilst the reducing balance basis leads to reducing charges in each successive year. As vehicles tend to require increasing maintenance expenditure as they become older, the company's policies for these classes of assets would seem to be appropriate.

(d) (ii) [25%]
Depreciation:
Buildings
Cost £180,000, depreciation straight line over 30 years
Thus depreciation charge is £6,000 per annum, and the net book value at 30
November 2005 is:

Cost	£180,000
Less Depreciation to date	£72,000 (£66,000 + £6,000)
Net book value	£108,000

However, the value of the buildings is £100,000. As this is less than the net book
value, there has been impairment, and the value must be reduced to £100,000.

Plant and Machinery
Depreciation charge is £248,000 x 15% = £37,200

Vehicles

Depreciation charge is	£160,000	
less	£ 98,000	
NBV	£ 62,000	
x 20%	**£ 12,400**	

Revaluation of land:
The directors are not required to reflect the increase in the value of the land in the
financial statements, but may choose to do so. However, as the land has not been sold,
the increase is not a realised gain. As such it cannot be reported in the profit
and loss account, but instead is taken to a Revaluation Reserve.)

Increase in value of land　　＝　　£480,000 – £450,000　　= £30,000

(d) (iii) METStars Ltd Revised Draft Balance Sheet at 30 Nov 2005 £000
[25%]

Fixed assets [1]	1,636·4
Current assets	347·0
Creditors: amounts due within one year	(264·0)
	1,719·4
Creditors: amounts due in more than one year	(150·0)
Total net assets	1,569·4
Capital and reserves:	
Share capital	300·0
Retained profit	1,239·4
Revaluation reserve	30·0
	1,569·4

> 2
>
> Retained profit as given
> 1,303·0
> *less:*
> Depreciation/Impairment
> (63·6)
> ─────
> 1,239·4

[1]Fixed asset value as given	1,670·0	
add: Revaluation	30·0	
less: Depreciation/Impairment	(63·6)	(14 + 37·2 + 12·4)
	1,636·4	

*Overall, too many calculation errors and not enough discussion of depreciation and
impairment.*

4 (a) [5%]

By reporting the gains in the financial statements, the directors are recognising them. However, it should be noted that only the profit on the sale of the machine has been realised. The profit on the sale of the machine will be credited to the P&L account and the cash received reported in the Cash Flow Statement. The increase in value of the building will be matched by a credit to the Revaluation Reserve and will be shown in the Statement of Recognised Gains and Losses.

(b) [10%]

The restructuring cost is material, representing more than 25% of the reported profit. FRS 3 defines exceptional items as material items which derive from events or transactions within the ordinary activities of the business and which need to be disclosed separately if the financial statements are to give a true and fair view. The standard requires three categories of exceptional items to be reported on the face of the profit and loss account after operating profit. These are:

- cost of a fundamental reorganisation or restructuring
- profit or loss on the sale of fixed assets
- profit or loss on sale or termination of an operation.

All other exceptional items should be allocated to the appropriate heading in the profit and loss account, and disclosed by way of a note to the financial statements.

Consequently the restructuring cost should be reported on the face of the profit and loss account after operating profit. This will increase the operating profit by £85,000.

The restatement of stock is an example of a correction of a fundamental error, which is one of two reasons for treating an item as a prior period adjustment (the other being a change in accounting policy). As the opening stock was overstated, the resulting adjustment is a charge. However the charge should be a prior period adjustment and should therefore be removed from the calculation of the current period's operating profit. This will increase the operating profit by £42,000.

Thus the correct operating profit is : £325,800 (as reported) + £85,000 (exceptional item) + £42,000 (prior period adjustment) = £452,800.

(c) [5%]

Take account of:
Profit from discontinued activities
Exceptional items
Preference dividends

But not:
Ordinary dividends

(d) (i) [55%]

Barlow Engineering Ltd

Cash Flow Statement for year ended 30 November 2007

	£	
Net cash inflow from operating activities	35,756	(Note 1)
Servicing of finance	(6,000)	(working 3)
Taxation	(25,700)	(working 4)
Capital expenditure	(11,000)	(working 5)
Equity dividends paid	(5,000)	
Net Cash Flow before financing	(11,944)	
Financing	3,000	(working 6)
Decrease in cash	(8,944)	

Note 1

Reconciliation of operating profit to net cash flow from operating activities

£

Operating profit	41,771	(working 1)
Depreciation	15,800	(per question)
Increase in stocks	(12,764)	(working 2)
Increase in debtors	(18,547)	(working 2)
Increase in creditors	9,496	(working 2)
Net cash inflow from operating activities	35,756	

Working 1 Operating Profit £

	Retained Profit 2006	345,496
	Retained profit 2007	367,267
thus	Retained profit for year	21,771
	Add Taxation charge	9,000
	Interest charge	6,000
	Dividends	5,000
		41,771

Working 2	2007	2006	movement
	£	£	£
Stock	97,593	84,829	12,764 (outflow)
Debtors	176,041	157,494	18,547 (outflow)
Creditors	147,065	137,569	9,496 (inflow)

Working 3 Interest paid £

Current liability at 30.11.06	3,000
Profit and loss charge	6,000
	9,000
Current liability at 30.11.07	3,000
Amount paid	6,000

Working 4 Taxation £

Provision at 30.11.06	25,700
Add Profit and loss charge	9,000
	34,700
Less Provision at 30.11.07	(9,000)
Amount paid	25,700

Working 5 Capital expenditure	£
NBV at 30.11.06	853,962
Less Depreciation for year	(15,800)
	838,162
NBV at 30.11.07	849,162
Difference = additions	11,000

Working 6 Financing	£
Equity Capital	11,000
Share premium	17,000
	28,000
Loan repaid	(25,000)
Amount paid	3,000

(d) (ii) [25%]

As the directors have noted, the company's cash position has deteriorated by £8,944 over the past year. This is particularly disappointing in light of the fact that an operating profit of £41,771 was earned.

Of course, we can see that there has been a significant loan repayment, but this was more than compensated for by new equity raised.

The investment of £11,000 in fixed assets was entirely funded from the cash generated by operating activities. While this may be appropriate as the amount of cash generated by operating activities (£35,756) was quite healthy and the capital expenditure was modest, if lease or hire purchase finance had been raised for the capital expenditure, the cash deficit would have been considerably removed.

By looking more closely at the detail of the cash flow statement, and in particular Note 1, the Reconciliation of operating profit to net cash flow from operating activities it can be seen that the significant increases in the level of stock and debtors have been the major reasons for the cash deficit. Financing these increases has required just over £31,000 of cash. Clearly if these increases had been avoided, the cash position would be significantly better.

Another factor is the large payment in taxation this year relating to profits of earlier periods. This was foreseeable andshould have been taken into account in cash flow forecasts.

Of course, this raises the question as to whether these increases were necessary. Given that there has also been an increase in the amounts owing to creditors, there is some evidence that the company is expanding through increased sales. It would be wise to consider the level of working capital in context, by calculating the stock holding period, and the debtors and creditors payment periods.

If the increases are due to a planned expansion, it may be that the original objective of creating cash was not realistic. This suggests that the company's

planning procedures lack integration, and that decisions in one area (e.g. increased sales activity) do not feed into other decision making processes (e.g. cash forecasting).

Of course, the fact that cash has been consumed will not be a major problem in the following circumstances:

– If there is sufficient working capital finance available through an existing overdraft facility.

– If the growth in stock and debtors are the result of a planned expansion in sales.

A final point to note is that the significant cash outflow in respect of the tax liability is based on last year's profits. Therefore the company's cash flow has been affected by an item which relates to the previous year's financial statements. This underlines the fact that careful planning is needed to ensure that in time of profitability, cash is not used in the short term without having regard to the need to meet the tax liability in the future.

Therefore the following action is suggested:

– consider arranging finance for future capital expenditure

– review existing overdraft and loan limits

– integrate the forecasting procedures to ensure that all decision are included

– review stock holding policy and systems for managing flow of stock

– review procedures for managing debtors

– negotiate longer credit period from main suppliers

    – ensure that the tax liability is foreseen and included in cash forecasts.

This question was tackled well with most managing the cash flow calculations. The discussion of the main issues and their potential solutions was less satisfactory.

5(a) [25%]
Target cost pricing
Target cost pricing is a response to the competitive environment in which many companies now operate. The technique seeks to ensure that market demand, competitors' strategies and profitability are included in decisions.

Essentially the approach is to consider the features and benefits which customers require from the product and to assess the likely product life cycle. The price which customers are willing to pay is then identified, as well as the desired level of profit. By deducting the desired profit from the selling price we can calculate the target cost. It is interesting to note that our proposal is to set an initial launch price and assess profitability based on this price. A more widely used approach is to consider different prices at each stage of the product life cycle. This is considered below (under 'Alternative pricing strategies').

As can be seen, this contrasts with the traditional cost plus approach, in which the cost of the product is calculated, and a profit margin added to arrive at a selling price. This approach often leads to the need for additional expenditure on product promotion if market demand is lower than anticipated.

Target cost pricing will therefore ensure that market demand and customer preferences are incorporated into the product design stage.

(b) [25%]
Initial launch price and cost saving required
Based on the market research report and the available data, the results of each of the initial launch prices can be summarized as follows (please see appendix 1 for detailed calculations):

Initial Selling Price	Profit/(Loss)
£	£m
200	(1.54)
225	3.18
230	1.54

On the basis of the above results, we should launch the product at an initial price of £225.

If this unit price is selected, the target profit is £7.83m (£52.2m x 15%). This means that the total profit must be increased by £4.65m or £20.04 per unit.

(c) [25%]
Techniques to achieve reduction in costs
In order to achieve the required cost reduction, we could adopt one or more of the following techniques:
- Reconsider the design to eliminate non value added elements
- Reduce the number of components
- Use less expensive materials
- Standardise the components used
- Employ a lower grade of staff on production
- Invest in new technology
- Outsource elements of the production or support activities
- Reduce manning levels or redesigning the work flow (e.g. by multi manning machines)

(d) [25%]
Alternative pricing strategies
As noted above, target cost pricing is normally associated with strategies which give rise to different prices at each stage of the product life cycle.
There are two main methods of applying such a strategy: Market Penetration Pricing and Market Skimming Pricing.

Market penetration
The initial price is set at a low level to encourage sales in the early stage of the product life cycle. This allows a strong market share to be built up, and helps to achieve economies of scale, which lead to improved profitability.
The strategy also tends to discourage the entry of new competitors to the market.

Market skimming
This approach entails charging high prices on entry to the market when a product is first launched. To encourage sales, there will be significant spending on sales promotion. This provides high unit profits in the early stage of the product life cycle. As a result of the high initial unit profits, it is likely that competitors will be encouraged to enter the market. As the product moves through the stages of its life cycle, prices are reduced.

It would seem that on balance, a policy of market skimming may be appropriate in this case.

Appendix 1

Price	Sales Volume	Sales Revenue	Variable Costs	Contribution	Fixed Costs	Devel. Costs	Profit/ (Loss)
£ p.u.	Units	£ m	£ m	£ m	£ m	£ m	£ m
200	259	51.8	41.44	10.36	5.5	6.4	(1.54)
225	232	52.2	37.12	15.08	5.5	6.4	3.18
230	192	44.16	30.72	13.44	5.5	6.4	1.54

The main weakness in the answers was the lack of alternative pricing strategies put forward. Penetration pricing and market skimming were rarely discussed.

6 (a) [60%]

Workings	Budgeted				Actual			
	Amount	Price	Value	Unit Cost	Amount	Price	Value	Unit Cost
Materials	30,000	36.00	1,080,000	48.00	26,000	39.00	1,014,000	50.70
Wages	57,000	10.80	615,600	27.36	52,800	10.40	549,120	27.46
Variable overheads	57,000	30.00	1,710,000	76.00	52,800	28.00	1,478,400	73.92
Fixed overheads			337,500	15.00			360,000	18.00
Total Costs			**3,743,100**	166.36			**3,401,520**	170.08
Sales	22,500	192.00	**4,320,000**	192.00	20,000	188.00	**3,760,000**	188.00
Profit			576,900	25.64			358,480	17.92

Sales margin variances
Sales volume variance

Actual sales x std profit	20,000	40.64	812,800
Budgeted sales x std profit	22,500	40.64	914,400
			-101,600

Sales price variance

Actual sales x actual price	20,000	188.00	3,760,000
Actual sales x std price	20,000	192.00	3,840,000
			-80,000

Direct cost variances
Materials price variance

Actual use x std cost	26,000	36.00	936,000
Actual use x actual cost	26,000	39.00	1,014,000
			-78,000

Materials usage variance

Standard use x std cost	26,667	36.00	960,000
Actual use x std cost	26,000	36.00	936,000
			24,000

Labour wage rate variance

Actual use x std rate	52,800	10.80	570,240
Actual use x actual rate	52,800	10.40	549,120
			21,120

Labour efficiency variance

Standard use x std rate	50,667	10.80	547,200
Actual use x std rate	52,800	10.80	570,240
			-23,040

Overhead variances

Variable overhead exp variance

Actual hours x std rate	52,800	30.00	1,584,000
Actual hours x actual rate	52,800	28.00	1,478,400
			105,600

Variable overhead eff variance

Std hours x std rate	50,667	30.00	1,520,000
Actual hours x std rate	52,800	30.00	1,584,000
			-64,000

Fixed overheads

Budgeted	337,500
Actual	360,000
	-22,500

ANSWER

Budgeted profit		576,900
Sales margin variances		
Sales volume variance	-101,600	
Sales price variance	-80,000	
		-181,600
Direct cost variances		
Materials price variance	-78,000	
Materials usage variance	24,000	
Labour wage rate variance	21,120	
Labour efficiency variance	-23,040	
		-55,920
Overhead variances		
Variable overhead exp variance	105,600	
Variable overhead eff variance	-64,000	
Fixed overheads	-22,500	
		19,100
		358,480

(b) [40%]

This part of the question requires the candidate to consider the possible causes of the variances. The profit variance is 38% less than expected and so some explanation is needed and a recommendation to examine the underlying causes. A principal cause of the profit variance comes from the sales margin variances. Sales are lower than expected given a high adverse sales volume variance. If this is seasonality then perhaps the budget should be produced in a form that takes account of the seasonal factors. If it is not seasonal, then the company should examine whether the fall in demand for the product is due to increased competition from existing competitors, competition from a new product or competitor, or a general slump in demand. The actions to take would be dependent upon which of these was found to be the case and might involve a response involving a revised pricing, or marketing, strategy; or a fresh look at the product itself. The sales price margin is also adverse, suggesting some attempt to hold up demand by dropping the price – this needs further examination.

The other principal variances were materials prices and labour efficiency. The adverse materials price variance is perhaps surprising if there has been a depressed level of demand in general. It should be examined to establish whether the success of the purchasing department could be improved. If the increased price is due to some key external factor such as the oil price, then both budgeting and pricing should be re-examined to see whether they can build this key factor into the models. The adverse labour efficiency variance is not uncommon in times of depressed demand, but should lead to consideration of whether labour flexibility could be increased.

Fixed overheads were above budget, but variable overheads were substantially below budget, even allowing for the reduced production volume. This suggests that they should be re-examined to ensure that the budget is realistic.

There were some excellent answers, but several candidates failed to complete the variance analysis successfully. The discussions were good on the whole.

7 (a) [5%]
Using CAPM, the expected return for the equity shareholders is:

$$5\% + [1.4(12\% - 5\%)] = 14.8\%$$

The predicted market value of a share is:

$$Po = D1/Ko$$

Where:

Po = the value of an ordinary share
D1 = the dividend received at the end of period 1
Ko = the required rate of return on the share
$$= 50p / 0.148$$
$$= £3.38$$

(b) [5%]
Beta should be rejected as it offers higher risk than Alpha for a lower return. Delta should be rejected as it offers a lower return than Alpha for the same level of risk.

(c) [5%]
The US company needs to buy £s to make the payment. It should therefore buy sterling futures now and then close its position in three months' time by selling sterling futures. The US company needs to buy £s to pay the supplier and so a sterling call option is required.

(d) [5%]
The overall cost is calculated as follows:

	%
Fixed rate	6.0
- Net receipts (5.5 – 5.1)	(0.4)
Total cost	5.6

(e) (i) [60%]

The sales for the new devices will be as follows:

	Year 1	Year 2	Year 3	Year 4
Sales (000's units)	450	650	300	200
Selling price	£35	£35	£30	£25
Total sales (£000's)	15,750	22,750	9,000	5,000

Option (i) The incremental cash flows will be as follows:

	Year 0 £000's	Year 1 £000's	Year 2 £000's	Year 3 £000's	Year 4 £000's
Total sales		15,750	22,750	9,000	5,000
Plant	(8,500)				2,000
Working capital	(1,200)				1,200
Variable costs		(2,700)	(3,900)	(1,800)	(1,200)
Fixed costs		(7,600)	(7,600)	(7,600)	(7,600)
Cash flows	(9,700)	5,450	11,250	- 400	-600
Discount rate 12%	1.00	0.89	0.80	0.71	0.64
Present value	(9,700)	4,866	8,968	-285	-381

NPV £3.468m

An alternative version of Option (i) would assume that the manufacturing fixed costs included the fixed asset depreciation (This would be £1.625m per year i.e. [(8.5-2.0)/4].
In this case the incremental cash flows will be as follows:

	Year 0 £000's	Year 1 £000's	Year 2 £000's	Year 3 £000's	Year 4 £000's
Total sales		15,750	22,750	9,000	5,000
Plant	(8,500)				2,000
Working capital	(1,200)				1,200
Variable costs		(2,700)	(3,900)	(1,800)	(1,200)
Fixed costs		(5,975)	(5,975)	(5,975)	(5,975)
Cash flows	(9,700)	7,075	12,875	1,225	1,025
Discount rate 12%	1.00	0.89	0.80	0.71	0.64
Present value	(9,700)	6,317	10,264	872	651

NPV £8.404m

Option (ii) The incremental cash flows will be as follows:

	Year 0 £000's	Year 1 £000's	Year 2 £000's	Year 3 £000's	Year 4 £000's	Year 5 £000's
Total sales		18,900	27,300	10,800	6,000	
Loan	(3,000)			3,000		
Payments to supplier		(16,200)	(23,400)	(10,800)	(7,200)	
Fixed costs		(2,800)	(2,800)	(2,800)	(2,800)	
Cash flows	(3,000)	16,100	8,300	(12,400)	(7,600)	(7,200)
Discount rate 12%	1.00	0.89	0.80	0.71	0.64	0.57
Present value	(3,000)	14,375	6,617	(8,826)	(4,830)	(4,085)

NPV £0.251m

Option (iii)
NPV = £7·5 m

(e) (ii) [20%]

The calculations show that options (i) and (iii) provide the highest NPV and, therefore, provides the greatest benefit to shareholders. Which of these is the bigger depends on the choice made over the treatment of fixed costs.
However, there is not a large difference between the NPVs of options (i) and (iii). A careful review of the underlying estimates and assumptions relating to option (i) should be carried out before a final decision is made.
Option (i) assumes that the business has, or can quickly acquire, the expertise to produce the new devices. As the company is a medical research business, there may be difficulties setting up a manufacturing operation that have not been fully taken into account. In addition, the proposed move into manufacturing may not fit with the strategic objectives of the company.

Option (ii) avoids the problems just mentioned but relies on a supplier producing the devices at the required time and to the required standard. Furthermore, the NPV from this option is very low compared to the other options available. This is because the cost of purchasing the devices from the supplier is high and in the fourth year, is higher than their selling price.

Option (iii) provides a sum that is certain and so avoids the risk that future sales and costs will be worse than expected, although there may be a risk that the sale of the patent will damage the future prospects of Gregorius plc. However, the upside potential of sales being greater than forecast is lost.

Subject to a review of the forecast information, option (i) appears to be the best choice.

The question was answered well on the whole.

8 (a) [5%]
Let X = risk-free return
CAPM model gives, $5.0 = X + 0.4 (8 - X)$
Therefore,   X = 3.0
Expected return for Company B, $Y = 3.0 + 1.5 (8.0 - 3.0)$
Therefore,   **Y = 10.5%**

(b) [5%]
Share price   = P/E ratio x EPS
                  = 20 x £0.50
                  = £10.00
Dividend   = 2% x £10.00
                  = £0.20
Dividend cover ratio
                  = £0.50/£0.20 = **2.5 times**

(c) [5%]
i   FALSE
An interest rate cap is a series of borrowers' options on a notional loan.
ii   TRUE
An American-style option may be exercised before the expiry date.

(d) [5%]
i   The investor can buy the shares at 860p compared to a market price of 880p.
         The option should therefore be exercised.
ii   The investor can sell the £600,000 for €900,000 compared to €870,000 on the
         spot market. The option should therefore be exercised.

(e) (i) [15%]

A company may divest itself of part of its business operations for a variety of reasons including:

Strategic review Following a review of its operations, a company may decide that certain operations no longer align with the strategic direction of the business. These operations may be sold in order to enable the company to focus on its core activities.
Poor performance A particular business operation may not meet the profitability requirements that are expected. If there is reason to believe that better returns can be achieved elsewhere, the company may decide to sell the operation and to re-invest the proceeds.
Financial problems A company may be experiencing financial problems. In order to overcome these problems, it may be necessary to raise additional finance by selling off certain business operations.
Risk reduction A business operation that is considered to be high risk may be sold in order to lower the risk profile of the company as a whole.

(e) (ii) [50%]

a.   Net assets (book value method)

Po = Net assets at balance sheet values/No. of ordinary shares

= £762/200

= **£3.81**

b.   Net assets liquidation method

Po = Net assets at realisable values/No. of ordinary shares

= [(876 + 24 + 52 + 408 + 330) − 590]/200

= **£5.50**

c.   Dividend growth method

Po = Do(1 + g)/(r − g)

Where:

Do = current dividend

g = expected annual growth in dividends

r = required rate of return

= £0.30 (1 + 0.03)/(0.07 − 0.03)

= **£7.73**

d.   Price earnings ratio method

Po = P/E ratio x Earnings per share (EPS)

= 9 x £1.08*

= **£9.72**

*EPS is calculated as follows:

EPS = £216/200

= £1.08

(e) (iii) [15%]

The net asset (book value) method often provides a conservative share value. The use of historic cost and the omission of certain valuable resources of the business (e.g. brand names and goodwill) from the balance sheet conspire to produce total asset values that are well below current market values. The net asset (realisation) method will also usually produce a conservative figure for the value of a share. The value of a business as a going concern is usually higher than the value of its net assets. This may be due to the fact that certain valuable resources are again omitted from the calculations or may be because the value in use of certain assets is higher than their realisable values. The dividend growth model has theoretical appeal but depends on the accuracy of the assumption made concerning future dividends. In practice, it is often very difficult to predict future dividend policy.

The P/E ratio method may be the most reliable of the four methods. It uses similar companies in the same industry as a benchmark for the valuation process and may provide a useful indicator to the current market value of a share. However, the method assumes that Wolfson Ltd has the same risk and growth characteristics as the average for the industry. It may also be necessary to apply a discount to the share value figure derived to take account of the lack of marketability associated with the shares of a non-listed company.