MANUFACTURING ENGINEERING TRIPOS PART I

Friday 1 May 2009 9 to 12

PAPER P3

MANAGEMENT ECONOMICS AND ACCOUNTING

Answer not more than ***four*** *questions of which not more than* **one** *may be taken from each section* ***A, B, C*** *and* ***D***.

Answers to sections ***A, B, C*** *and* ***D*** *must appear in four separate booklets.*

All questions carry the same number of marks.

The ***approximate*** *percentage of marks allocated to each part of a question is indicated in the right margin.*

There are no attachments.

STATIONERY REQUIREMENTS
8 page answer booklet x4
Rough work pad

SPECIAL REQUIREMENTS
Engineering Data Book
CUED approved calculator allowed

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

Version 3

SECTION A

*Answer **one** question from this section.*

1 There are two sets of firms in an industry in Country A each producing an identical product, but using different technologies. The first set comprises 100 identical firms each with the following cost curve:

$$TC_1 = 10{,}000 + 10\,q_1 + 0.04\,q_1^2$$

The second set comprises 30 identical firms each with the following cost curve:

$$TC_2 = 21{,}600 + 8\,q_2 + 0.015\,q_2^2$$

The demand for this product can be expressed as:

$$P = 280 - 0.0025\,Q$$

where P is the price at which the product is sold and Q is the total annual amount that can be sold at this price.

(a) Assuming that the firms are operating under conditions of short-run perfect competition and that entry and exit cannot occur, find the profit-maximising outcome for: the price; and the outputs and profits of each type of firm. [20%]

(b) Assuming that the technology of the industry is stable and that entry and exit can occur, find the perfectly competitive, long-run equilibrium price and output in this industry in Country A. Approximately how many firms will the industry contain? [20%]

(cont.

(c) In Country B, which has prohibitively high tariff barriers against imports, the same industry has a single firm. It has the following cost and demand curves:

$$TC_m = 2{,}340{,}000 + 4\,q_m$$

$$P = 136 - 0.00132\,Q$$

Assuming the monopolist maximises short-run profits, what will be the equilibrium price, output and profits in Country B? [15%]

(d) If Country B removes all tariff barriers with Country A and that the transport cost for this product is £6 per unit, what impact would you expect this to have on Country B's price, output and profits? [20%]

(e) Discuss the assumptions you have made in your answers and the economic implications of the outcomes. In addition, discuss whether the outcome in Country A is likely to be stable. [25%]

2 (a) What factors account for the observed differences in the ratio of advertising expenditure to sales between different products and industries? [25%]

(b) How might one attempt to measure economies of scale? [25%]

(c) How might the existence of significant economies of scale affect the competitive structure and behaviour of an industry? [50%]

SECTION B

*Answer **one** question from this section.*

3 (a) In the year to 30 November 2008, Hobbs Co has recorded the following:

i. an increase of £55,000 in the market value of the head office building;
ii. the receipt of a dividend of £4,800 in respect of shares held as an investment; and
iii. an increase in the value of the shares held as an investment.

Which of the above represent unrealised gains? [5%]

(b) In the year to 31 May 2008, Grace plc acquired 75% of the share capital of Dexter Ltd for £360,000. At the date of the acquisition, Dexter had 500,000 shares of 50p each in issue and retained profits of £150,000. What is the value of goodwill arising on the acquisition? [5%]

(c) At 30 April 2008, the net book value of the fixed assets of Bradman Ltd was £80,000 greater than the tax written down value, and the balance brought forward on the deferred tax account was £24,800. The company accountant calculated that the corporation tax charge on the reported profit for the year to 30 April 2008 would be £53,960, based on the tax rate of 24%. What is the total charge for taxation in the profit and loss account for the year to 30 April 2008? [10%]

(d) You are the Financial Director of Woolley Ltd, a recently established company. The directors are due to meet to agree on the company's accounting policies. At the last meeting, the Board agreed that the key areas on which decisions will be made are:

- Research and development expenditure
- Depreciation of fixed assets
- Revaluation of fixed assets

The directors agreed that the information in the financial statements should be presented in a manner that ensures it will be useful to users and, where possible, chosen in order to maximise reported profit. For each of the three key areas on which decisions will be made discuss the choices that are available to the directors and the effect of the choices on reported profit. [40%]

(cont.

(e) A company's draft financial statements currently report an operating profit of £205,500. The operating profit also represents the company's earnings for the period, leading to a reported earnings per share (EPS) of 27.4p. The company is considering whether the expenses noted below have been correctly treated, and whether EPS can be improved by separate disclosure of these expenses.

The expenses are currently included in cost of sales. They are:

Sale of packaging machine
Following a decision to outsource the packaging of the company's products, a machine which is no longer required was sold. As there is a limited market for such machines, the sale resulted in a loss of £6,200.

Reorganisation costs
As well as outsourcing the packaging of the company's products, the production process was reorganised. Previously the production process was organised on the basis that each of the company's factories produced a single product. As part of a quality improvement programme, the production process was re-organised into a cellular configuration. The cost of this reorganisation was £35,250.

Warranty provision
During the year it had been discovered that a mathematical error had been made in the calculation of the provision for warranties at the previous year-end. The correction of this error had resulted in a charge of £28,500.

Explain the correct accounting treatment for each of the expenses noted above and give the correct figure for the company's reported EPS. [40%]

(TURN OVER

4 (a) Sutcliffe Ltd is a manufacturer of animal feed. The company accountant is preparing the 2009 financial statements, and is considering the impact of a claim for damages of £50,000 which the company received during the year. The company has admitted that it is liable for the damage, and offered the claimant £25,000 to settle the claim. This offer has not been accepted, and the claim will be settled in court. The company's legal advisors have noted that a similar claim was recently settled in court for £35,000. How should the claim be reported in the 2009 financial statements? [5%]

(b) At 30 April 2007, Hammond Ltd had provided for a revaluation gain of £30,000 in respect of one of the properties owned and used by the company. In the year to 30 April 2008, the value of another property owned by the company fell by £45,000, due to the announcement of a plan to build a new road. The second property had not previously been revalued. How are the profit and loss account for the year to 30 April 2008, and the revaluation reserve at that date, affected? [5%]

(c) Hutton Ltd has a 30 November year end. On 10 November 2008 the company bought a machine for £85,000. A cheque for £5,000 was paid to the supplier and the balance of the purchase price was financed by taking out a loan for £80,000. The loan will be repaid in 10 equal half yearly instalments, with the first instalment falling due on 10 May 2009. How will this transaction be reported on Hutton's balance sheet at 30 November 2008? [5%]

(d) The draft 2009 balance sheet of Compton Ltd reported a retained profit of £1,644,900 and net assets of £6,957,300. Following the completion of the draft 2009 balance sheet it was discovered that several items of stock had been valued at selling price at the 2008 year-end. This meant that the opening stock value for 2009 was overstated by £300,000. The closing stock had been correctly valued in the draft 2009 balance sheet. If the error is corrected before the 2009 balance sheet is finalised, what figures will be reported for retained profit and net assets? [5%]

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(e) On 1 December 2006 Graveney Ltd took control of Cowdrey Ltd by acquiring 80% of the share capital for £1.7m. At 1 December 2006, the net assets of Cowdrey had a value of £1.8m, and the retained profit was £1,187,000. Goodwill arising on the acquisition is to be amortised over five years. A recently appointed non-executive director of Graveney is unsure why Cowdrey is treated as a subsidiary, rather than an associated undertaking, or how the combined trading results of the two companies will be reported.

The profit and loss accounts and retained profits of both companies for the year to 30 November 2008 are shown below:

	Graveney	**Cowdrey**
	£,000	**£,000**
Turnover	5,126	1,543
Cost of sales	3,728	1,071
Gross profit	1,398	472
Expenses	678	231
Profit before taxation	720	241
Taxation	143	41
Profit after taxation	577	200
Retained profit brought forward	3,168	1,257
Retained profit carried forward	3,745	1,457

(i) Briefly state the difference between a subsidiary company and an associated undertaking. [15%]

(ii) Calculate:

- the goodwill arising on the acquisition;
- the annual charge for amortisation of goodwill;
- the amount of unamortised goodwill at 30 November 2008; and
- the consolidated reserves at 1 December 2007. [35%]

(iii) Prepare the consolidated profit and loss account of the Graveney Group Ltd for the year to 30 November 2008, including the consolidated reserves brought forward and carried forward. [30%]

(TURN OVER

SECTION C

*Answer **one** question from this section.*

5 (a) In the four week production period just completed, Edrich Ltd produced 570 units. The standard labour cost for each unit was £13.50, based on budgeted production of 550 units. The actual labour cost for the period was £8,238. What was the labour rate variance for the period? [5%]

(b) In the year 30 April 2008 Boycott Ltd acquired, under an operating lease, the use of a machine that would have cost £340,000 to purchase outright. The lease rentals during the year were £120,000. The company's operating profit for the year was £2,854,800. At the year end the balance sheet reported net assets of £11,600,000. The directors estimate that there is no significant difference between the book value and economic value of the net assets. The company's cost of capital is estimated to be 14%. What is Boycott's Economic Value Added (EVA) for the year to 30 April 2008? [5%]

(c) Richards Ltd provides an advertising design and production service to clients. The production section is the only customer of the design section, with all design work being transferred at full cost plus 40%. The production section charges clients £90 per hour. In the forthcoming three months, Richards has budgeted that 7,000 hours will be charged to clients. The budgeted costs are:

	Design	**Production**
Variable costs	£29 per hour	£35 per hour
Fixed costs	£56,160	£172,000
Hours	2,400	7,000

What is the budgeted profit for each of the two sections for this three month period? [10%]

(d) You are the Product Development Manager for Gooch Ltd. The company produces a range of products and you have to consider the following information.

(i) Gooch's product range includes three products, each of which requires the use of a specialised machine. The machine was bought 14 months ago at a cost of £457,200 and has a useful life of 10,000 machine hours. The cost of the machine is charged to production on the basis of the number of machine hours used. To date 2,200 machine hours have been used.

(cont.

When the machine was bought, six employees were provided with specialised training, making them the only staff qualified to operate the machine. The training cost a total of £12,500 and this is being charged to production on a straight line basis over five years. As a result of their specialised training, the staff are paid a premium of £3.70 per labour hour which brings the total machining labour cost to £27.50 per hour.

In the forthcoming 13 week period to 31 July 2009, 2,989 machining labour hours are available. Budgeted data for the period to 31 July 2009 is shown below:

Product	**Xon**	**Supon**	**Megon**
Selling price (£ per unit)	360.00	450.00	550.00
Variable costs (£ per unit)			
Materials	111.40	114.50	116.30
Labour: machining	82.50	123.75	151.25
assembly	13.10	14.70	15.40
Variable overheads*	33.60	50.40	61.60
Fixed costs*	42.00	63.00	77.00
Demand (units)	450	340	280
Machine hours per unit	0.50	0.75	1.00

* NB The amounts for variable overheads and fixed costs do not include the cost of the machine or the associated training.

Calculate the volume of each product which should be manufactured in the period to 31 July 2009 to maximise Gooch's profit. [55%]

(ii) Gooch's purchasing department has identified a company which produces a component that eliminates the need for the specialised machining. If Gooch decides to purchase the component, the specialised machine will be scrapped and the machining staff will be offered voluntary redundancy. The production manager expects two of the staff to accept this offer.

The company accountant has calculated that using the component will reduce the unit cost of each product. Explain what other factors Gooch should take into account before deciding whether, or not, to purchase the component. [25%]

(TURN OVER

6 (a) Pridenray Co is about to launch a new product. The planned selling price is £28.75 per unit and the total cost is £19.50 per unit, including a fixed cost per unit of £4.20. The potential sales volume in the first year of sale will be affected by whether, or not, a competitor is successful in bringing a similar product to market. Pridenray estimates that there is a 30% probability that the competitor will succeed. In that case the sales volume will be 230,000 units. If the competitor is unsuccessful, the sales volume will be 60% higher. Using the expected value criterion, what is the expected contribution of the product? [5%]

(b) A division of Pele Co has reported a profit before tax of £478,000 and total assets of £2,756,000. The company's cost of capital is 11% and the economic value of net assets is £3,150,000. The net operating profit after tax is £447,000. What is the division's residual income and Economic Value Added (EVA)? [5%]

(c) Best Ltd is developing a number of new products. New legislation means that one of these products will not be viable unless additional expenditure, estimated at £450,000, is undertaken. This figure excludes £200,000 which is the estimate of the contribution which will be lost through the delay to another project due to the transfer of resources. To date £4.7 million has been spent on the project. It is estimated that before the change in legislation, £2.1 million was required to bring the product to the launch stage. What is the sunk cost of the project? [5%]

(d) A statement of variances shows an adverse labour rate variance and a favourable materials price variance. What are the possible explanations for the variances? [5%]

(e) (i) You have recently been appointed to the post of general manager with a new company, Puskas Ltd. The company has been established by three investors to manufacture new products which they have developed. A budget which includes the data below has been prepared for the first year of operation along with information about overheads.

It has been agreed that overheads will be applied to products using Activity Based Costing (ABC). Calculate the cost per unit of each product using ABC. [35%]

(cont.

Product	STA	RPA	MNA
Selling price (per unit)	£320	£360	£450
Direct material (per unit)	£95	£108	£125
Direct labour (per unit)	£85	£98	£106
Production volume (000s units)	65	55	45
Machine hours (per unit)	0.4	0.8	1.4
Number of production runs (p.a.)	42	33	25
Number of orders (p.a.)	385	274	147

Annual overheads are estimated to be:

Machine running costs	£4,655,000
Production set up costs	£460,000
Order processing costs	£443,300
Total	£5,558,300

(ii) When the budget was prepared, the forecast sales volumes were:

Product	STA	RPA	MNA
Sales volume (,000 units)	60	50	45

There has been some concern about the environmental impact of one of the raw materials common to all three products, leading to a fall in consumer confidence. The directors are confident that this will affect only next year, as three research projects will be published soon that will clearly demonstrate that there are no grounds for concern. If no action is taken, actual sales volumes in the next year will be less than forecast, and have produced the following estimates:

Anticipated actual sales Units (,000)			Probability of occurrence %
STA	RPA	MNA	
48	40	36	15
51	42	38	45
56	46	42	40

The directors believe that sales volumes could be maintained at 95% of the original forecast if a substitute material was used and an advertising campaign was undertaken. The substitute material would add £5 to the unit cost of each product, while the advertising campaign would cost £120,000. In view of the short term impact, production volumes will be unaffected.

Calculate the expected value of the contribution which will be earned in the next year if no action is taken and assess whether it is beneficial to use the substitute material and undertake the advertising campaign. [45%]

(TURN OVER

SECTION D

*Answer **one** question from this section.*

7 (a) Edwards plc has twenty million 50 pence ordinary shares and irredeemable loan capital with a nominal value of £40 million in issue. The ordinary shares have a current market value of £2.40 per share and the loan capital is quoted at £80 per £100 nominal value. The cost of ordinary shares is estimated at 11% and the cost of loan capital is calculated to be 8%. The rate of corporation tax is 25%. What is the weighted average cost of capital (WACC) for the company? [5%]

(b) An investor has a call option on 1,000 ordinary shares in a company. The option premium was 40 pence per share and the strike price is 650 pence per share. At the expiry date of the option the share price was 680 pence. Should the option be exercised and what is the net gain (loss) for the investor? [5%]

(c) Taylor plc has a £50 million fixed-rate loan on which it pays interest at the rate of 7.8% per year. The company would like to undertake a swap agreement with a bank to exchange the fixed-rate commitment for a floating-rate commitment. A swap bank is prepared to pay a fixed rate of interest of 7.5% per year and to receive LIBOR in return. LIBOR during the first year was 7.1% per year. What is the effective interest rate for the company for the first year of the swap agreement? [5%]

(d) The cost of equity capital for an ungeared company is 10%. A similar but geared company in the same risk class is financed by 60% equity and 40% loan capital. The rate of corporation tax is 20%. Using Modigliani and Miller (including taxation), what is the weighted average cost of capital (WACC) of the geared company? [5%]

(e) Morgan Ltd is a manufacturer of high-quality tools for those working in the engineering industry. The mission statement of the company declares that it is dedicated to maximising the wealth of its shareholders and, since it was formed in 1992, the company has grown rapidly. Recently, the company has developed a new type of drill and the directors of the company are now considering whether this drill should be manufactured and sold.

(cont.

The following information is available to help evaluate the viability of the new product.

1. Costs incurred in designing and developing the new drill, which have all been paid, were £220,000. These costs are to be written off in equal instalments against profits generated over the new product's expected life of four years.
2. Sales are expected to be 18,000 drills per year over the next four years. The selling price of each drill will be £40 in the first three years and £30 in the final year.
3. Variable costs are estimated to be £15 for each drill.
4. Additional fixed costs are expected to be £295,000 per year. This includes a charge for depreciation of equipment used in the manufacture of the drills of £80,000 per year.
5. Equipment that originally cost £800,000 and which has a written down value of £450,000 will be used to produce the new product. If the new drill is not manufactured, the equipment will be sold immediately for £420,000 as it cannot be used for any other purpose. If, however, the drill is manufactured, the equipment will be sold at the end of four years for £86,000.
6. Additional working capital of £120,000 will be required immediately to support the manufacture of the new product. This will be released at the end of the life of the new product.

The company uses the net present value method and the discounted payback method to evaluate new investment opportunities. When applying these methods, the company uses a cost of capital of 10% and adopts a maximum discounted payback of two years. Ignoring taxation:

(i) Calculate the incremental cash flows arising from a decision to produce the new drill. [40%]

(ii) Calculate the net present value (NPV) and the discounted payback period of the new drill. [20%]

(iii) Evaluate the investment criteria adopted by the business and state, with reasons, whether the new drill should be produced. [20%]

(TURN OVER

8 (a) A few years ago, Guha Ltd issued bonds that pay interest on an annual basis at the rate of 8.0%. Interest has just been paid on the bonds, which are due for repayment in exactly two years' time. The bonds will be redeemed at £110 per £100 nominal value. A yield of 10% per year is required by investors for such bonds. What is the likely current market value of the bonds? (Ignore taxation) [5%]

(b) Colvin plc has 10 million shares in issue and has a market capitalisation of £60 million. The company has recently announced a one-for-four rights issue at a discount of 40% on the current market value. What is the theoretical value of the rights attached to each original share? [5%]

(c) A UK business expects to receive euros in five months' time. If the business wishes to hedge against exchange rate risk, which of the following methods could be employed to achieve this? [5%]

i. Take out a forward contract to sell euros in five months' time.
ii. Take out a forward contract to buy euros in five months' time.
iii. Buy euros now at the prevailing spot rate.
iv. Take out a call option on euros.

(d) Gunn plc pays a constant annual dividend of 40 pence per ordinary share and the ordinary shares of the company have a beta of 1.5. The risk-free rate of return is 6% and the current market rate of return is 10%. What is the predicted market value of an ordinary share of the company? [5%]

(e) Flint plc is an established high street retailer. Over the years, it has developed considerable expertise in developing software solutions for retail problems and recently decided to exploit this expertise by offering software solutions to other high street retailers. This resulted in software sales that far exceeded expectations. The company's success in this area provoked a strategic review, which, in turn, led to a decision to sell off the retail outlets and to re-focus the company towards providing software solutions. The sell-off is due to take place in one month's time.

The company employs net present value analysis (NPV) for the appraisal of all its investment projects and the board of directors believes that the proposed change of direction requires a review of the company's weighted average cost of capital (WACC), which is used as the appropriate discount rate.

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The following extracts have been taken from the balance sheet of the company for the year that has just ended:

	£m
Equity	
£1 ordinary shares	500
Retained profits	2,000
	2,500
Loan capital	
Debentures	1,000
Term loan	300
	1,300

The existing capital structure will remain the preferred capital structure of the business following its change of strategic direction.

The ordinary shares have a current market value of £4.80 per share and the equity beta is 1.1. Returns on the market are 6.8% and the risk-free rate is 3.5%. The debentures are irredeemable and currently trading at £120 per £100 nominal value. It can be assumed that all of the company's loan capital is risk free.

At present, only one listed company, Amos plc, specialises in providing software solutions to the retail trade. The company is financed 60% by equity and 40% by loan capital, based on market values, and it has an equity beta of 1.8.

The effective corporation tax rate is 20%.

(i) Explain why Flint plc may wish to review its cost of capital. [10%]

(ii) Using Modigliani and Miller, calculate the weighted average cost of capital (WACC) for Flint plc that should be used as the appropriate discount rate when evaluating new investment proposals. [40%]

(iii) Identify and discuss any weaknesses in the approach used in (ii) above to derive the WACC of Flint plc. [30%]

END OF PAPER