Answers

1   (a)   Traditional absorption costing

   (i)   Budgeted total cost per thousand metres

Product	A	B	C
		Cost per thousand metres	
	£	£	£
Direct materials	120	100	60
Direct labour	42	42	28
Prime cost	162	142	88
Overhead cost (w1)	240	240	160
Total cost	402	382	248

Working 1
Budgeted total overhead   £65,600
Budgeted total machine hours = 1,640 machine hours.

Overhead absorption rate = $\dfrac{£65,600}{1,640 \text{ machine hours}}$ = £40 per machine hour.

Cost per thousand metres
A = £40 x 6 hours = £240
B = £40 x 6 hours = £240
C = £40 x 4 hours = £160

   (ii)   Absorption costing

	A	B	C
		Per thousand metres	
	£	£	£
Total cost	402·00	382·00	248·00
Margin (w2)	100·50	95·50	62·00
Selling price	£502·50	£477·50	£310·00

Working 2: Margin = £402 ÷ 0·8 x 0·2 = £100·50.

(b)   (i)   Cost driver rates

Cost pool	£	Driver	Driver activity	Driver rate
Rates, rent, etc	26,000	Machine hours	1,640 hours	£15·85 per machine hour
Set up costs	15,000	Production runs	30	£500 per run
Goods inwards	9,600	Requisitions	120	£80 per requisition
Finished goods				
Inspection	5,250	Production runs	30	£175 per run
Dispatch	9,750	Sales orders	60	£162·50 per order

Tutorial Note. Set up and inspection cost pools could be combined to save time.

   (ii)   Total cost per fabric

Product	A	B	C
		Cost per thousand metres	
	£	£	£
Prime cost (as above)	162·00	142·00	88·00
Overhead cost (w3)	221·77	227·10	203·40
Total cost	383·77	369·10	291·40

Working 3:

	A	B	C
		Overhead per thousand metres	
Rates rent etc			
£15·85 x 6 hours etc	95·10	95·10	63·40
Set up			
£500 x $\dfrac{(120{,}000 \div 120)}{10{,}000}$	50·00	50·00	50·00
Goods inwards			
£80 x 40 ÷ 120	26·67	32·00	40·00
Inspection			
£175 x $\dfrac{(120{,}000 \div 120)}{10{,}000}$	17·50	17·50	17·50
Dispatch			
£162·50 x $\dfrac{(120{,}000 \div 120)}{5{,}000}$	32·50	32·50	32·50
Total overhead cost	221·77	227·10	203·40

(iii) Selling prices

Activity based costing

	A	B	C
		Per thousand metres	
	£	£	£
Total cost	383·77	369·10	291·40
Mark up (w4)	76·75	73·82	58·28
Selling price	460·52	442·92	349·68

Working 4: £383·77 x 20% = £76·75 etc

Comment.
The use of activity based costing has resulted in lower costs for A and B, but a higher cost for C, mainly because of the change in the basis of cost allocation. This has contributed to the fall in price of A and B and the increase in price of C. The change from a 20% margin to a 20% mark up has, everything else being equal, resulted in lower prices on all three products. (20% of cost is lower than 20% of sales price).

(c) Three advantages of activity based costing.

Activity based costing has the following advantages.
– Unit costs calculated under ABC should more accurately reflect the activities performed and resources used to make the product.
– ABC can help in distinguishing between profitable and unprofitable products and customers.
– By focussing attention on cost drivers it will help managers understand and manage overhead cost.
– An understanding of cost driver rates can help in budgeting overhead expenditure.
– ABC concerns itself with all overhead costs, and as a consequence it has proved very useful in service industries.

(only 3 advantages were required)

(d) Circumstances in which activity based costing would be an appropriate approach to product costing.

Activity based costing can be used in almost any product-costing situation. It is most useful when:
– Overheads form a high proportion of total cost.
– More than one product is made.
– Different products result in different levels of activities and resource consumption.
– Where overhead expenditure is not driven by volume of output, but by the complexity and diversity of operations.

(only two circumstances were required)

2 (a) Production Mix

	X £/litre	Y £/litre	Z £/litre
Selling price	100	120	120
Direct materials	20	16	21
Direct labour	18	24	27
Direct expenses	–	3	–
Variable overhead	12	16	18
Contribution	50	61	54
Labour hours per unit (w1)	1·50	2·00	2·25
Contribution per labour hour	£33·33	£30·50	£24·00
Rank	1	2	3

Production plan	Chemical	Litres	Contribution £	Labour hours
Minimum requirements	X	15·00	750·00	22·50
	Y	15·00	915·00	30·00
	Z	15·00	810·00	33·75
Further units	X	135·00	6,750·00	202·50
	Y	25·00	1,525·00	50·00
	Z	16·11	869·94	36·25
Total contribution			11,619·94	375·00
Fixed overheads (w2)			1,760·00	
Profit			9,859·94	

Working 1: For chemical X = £18 per litre ÷ £12 per hour, etc.
Working 2: Fixed overhead absorption rate, based on chemical X = £12 per litre ÷ 1·5 hours per litre = £4 per litre.
Total fixed overhead = 440 budgeted hours x £4 per hour = £1,760

(b) Chemical Z

Current Production		£ per month
Make current amount of Z		
31·11 litres x (£21 + £27 + £18)	=	2,053·26
Extra fixed costs	=	1,000·00
Total		3,053·26
Import current amount of Z		
31·11 litres x £100	=	(3,111·00)
Net benefit of in house production		£57·74

It is better to continue to produce product Z, rather than buy in.

Demand shortfall
As selling price exceeds the buy in cost it is worthwhile to buy in the extra litres required in month 4.
Extra contribution (60 – 31·11) x (£120 – £100) = £577·80

Conclusion
Shilton Ltd should buy in 28·89 litres of chemical Z in month 4.

Tutorial note
Importing all of product Z would only become the best alternative if demand for Z was below 29·41 litres (extra fixed cost ÷ extra variable cost per litre: £1,000 ÷ £34 per litre = 29·41 litres). In later months when labour is in free supply, all Z will be made in house.

(c) Two other factors.
Before subcontracting the production of Z, Shilton Ltd should consider the following points:
– Is the quality of imported Z up to requirement?
– Will delivery be as required?
– Will its customers be happy if they find out that an overseas supplier is producing Z for sale under Shilton's brand?
– By importing Z, Shilton Ltd is effectively exporting pollution to the overseas country. There is an ethical consideration to be made.
– Will the overseas supplier eventually turn into a competitor?
– How long will the contract be for, the supplier may not be required once the labour shortage ends?

Note: only two factors were required.

3 **(a)** Flexed Budget

Demand	724,000	units
	£	
Warehouse rental (W1)	280,000	
Stock picking costs (W2)	579,200	
Fork-lift costs (W3)	1,548,000	
	£2,407,200	

Working 1: To cope with demand 124,000 units in excess of capacity a further 160,000 units of capacity will be required.
Total cost £160,000 + £120,000 = £280,000

Working 2: Stock picking costs are a variable cost.

The variable cost per unit $= \dfrac{\text{Change in total cost}}{\text{Change in volume}} = \dfrac{(£400,000 - £160,000)}{(500,000 - 200,000)} = £0.8$ per unit

(Alternatively Standard rate £16·00 per hour ÷ standard rate of 20 units per hour = £0·8 per unit)
Stock picking cost at 724,000 units = 724,000 x £0·80 per unit = £579,200

Working 3 Fork-lift costs are semi variable

The variable cost per unit $= \dfrac{\text{Change in total cost}}{\text{Change in volume}} = \dfrac{(£1,100,000 - £500,000)}{(500,000 - 200,000)} = £2.0$ per unit

The fixed element, by substitution:
Total cost = fixed cost + variable cost
At 200,000 units
£500,000 = fixed cost + 200,000 x £2·0
Fixed cost = £100,000.
At 724,000 units total cost = £100,000 + (724,000 x £2·0) = £1,548,000.

(b) Variances
Direct picking labour

Actual hours at actual rate	=	£622,640	
		Rate	> £42,640 Adv
Actual hours at standard rate 36,250 hrs x £16·00	=	£580,000	
		Efficiency	> £800 Adv
Flexed budget cost	=	£579,200	

Fork-lift costs

Actual cost	=	£1,528,822	
		Total variance	> £19,178 Fav
Flexed budget cost	=	£1,548,000	

(c) Cost centres, Profit centres and Investment centres

Cost Centres
Cost centres are areas of the organisation to which costs may be traced. They can be a machine, a department, a product, a project or a manager's area of responsibility. The manager of a cost centre is held accountable for costs.

The performance of cost centre managers is usually measured by comparing actual costs against budgeted costs, often by the calculation of variances.

The major problem of cost based measures is that they often ignore the quality of the service provided by the cost centre.

Profit centres
A profit centre is any unit of an organisation to which costs and revenues can be traced so that the profitability of the unit may be measured. The manager of a cost centre is held accountable for both costs and revenues. Profit centres can be departments, divisions, products or regions.

Their performance is usually measured by traceable profit, whilst the performance of profit centre managers is usually measured by controllable profit.

A common difficulty is deciding which costs are traceable to the profit centre or controllable by the profit centre manager. This is particularly true when different profit centres share facilities and common costs.

Investment centres
An investment centre is a unit of the organisation to which costs and revenues can be traced but which also has some control over investment decisions. The manager of an investment centre is held accountable for profit in relation to funds invested in the investment centre. Investment centres are usually large divisions or subsidiaries of the parent company.

Their performance is traditionally measured by return on capital employed or residual income.

Similar difficulties exist to those of a profit centre and deciding which costs and revenues are traceable and controllable can be problematic. In addition defining and valuing traceable or controllable investment can prove difficult.

Note: Credit will be given for any appropriate performance measure and a discussion of its limitations

4 (i) Balanced Scorecard

The balanced scorecard is an approach to performance measurement, developed by Kaplan and Norton in 1996. Rather than assessing organisational performance from a purely financial point of view, it employs a variety of financial and non-financial indicators. The four perspectives on performance originally suggested by Kaplan and Norton are:

Financial: This considers how the organisation can create value for its stakeholders. Performance measures are likely to include traditional financial measures of profitability, cash flow and sales growth.

Customer: This looks at how existing and potential customers see the organisation. Performance measures could include number of customer complaints, new customers acquired, on-time deliveries, etc.

Process efficiency: This considers the processes at which an organisation must excel if it is to achieve customer satisfaction and financial success. Measures might include the speed of innovation, the quality of after sales service or manufacturing time.

Learning and growth: This looks at the organisation's capacity to maintain its competitive position through the acquisition of new skills and the development of new products and services.

Kaplan and Norton view the balanced scorecard as a management system rather than just a performance measurement device. It can be used as a method of implementing and controlling the delivery of an organisation's chosen strategy.

(ii) Total Quality Management

Total quality management (TQM) is the continuous improvement in quality, productivity and effectiveness obtained by establishing management responsibility for processes as well as outputs. In this, every process has an identified owner and every person in an entity operates within a process and contributes to its improvement.

One of the basic principles of TQM is that the cost of preventing mistakes is deemed to be less than the cost of correcting them once they occur. The aim should be therefore to get things right first time.

The costs of quality can be categorised under four headings:

Prevention costs: These represent the cost of any action taken to investigate, prevent or reduce defects or failures. Examples include training of staff, investment in more reliable machinery, development of quality control systems, etc.

Appraisal costs: These are the costs of assessing the quality achieved. Examples include quality inspection, performance testing, etc.

Internal failure costs: These are costs arising within the organisation relating to a failure to achieve the specified level of quality. Examples include the cost of rectification, the cost of wasted materials and labour, etc.

External failure costs: These are costs arising when the failure to achieve the specified level of quality is detected outside the organisation. Examples would include costs of additional deliveries to the customer, cost of replacement items, lost goodwill, etc.

(iii) Benchmarking

Benchmarking involves the establishment, through data gathering, of targets and comparators, through whose use relative levels of performance (and particularly areas of underperformance) can be identified. By the adoption of identified best practices the performance of the organisation should be improved.

Four types of benchmarking are commonly recognised.

Internal benchmarking. This involves the comparison of different departments or divisions within an organisation. Data for this is easy to obtain and conditions are often comparable. Learning may be limited as comparisons are only being made within the same company.

Competitive benchmarking. This involves comparing performance with that of direct competitors. The potential for learning is improved but data may be difficult to obtain. For commercial reasons firms are often unwilling to divulge information to direct competitors. The growth of benchmarking clubs and trade associations has reduced the problems of competitive benchmarking

Functional benchmarking. Various functions in the business are compared with those recognised as the best external practitioners of the function. A manufacturing company could compare its invoice preparation time with that of a credit card company, its delivery time with a firm of couriers etc. The potential for learning how to improve performance is very high, but comparability problems sometimes exist. (This is sometimes referred to as operational or generic benchmarking)

Strategic benchmarking: This involves comparison of performance with competitors at the strategic level. Areas such as market share and return on capital employed could be considered. Such comparisons are important in designing competitive strategy.

1	**(a)**	**(i)**	Overhead absorption rate	2	
			Total cost per unit	3	
					5
		(ii)	One per price	3	
					8
	(b)	**(i)**	One per rate	5	
		(ii)	0·5 per overhead per product	7·5	
			Total costs	3	
				Max	10
		(iii)	1 per price	3	
			ABC change	2	
			Pricing change	2	
					7
					22
	(c)		2 marks per explained point		6
	(d)		2 marks per explained point		4
					40

2	**(a)**	Production mix		
		Unit contributions	3	
		Contribution per		
		Unit of limiting factor	3	
		Amounts of X, Y and Z	3	
		Total contribution	1	
		Fixed costs	2	
				12
	(b)	Make or buy		
		Make cost	1	
		Buy in cost	1	
		Demand shortfall		
		Decision	1	
		Buy in units	1	
				4
	(c)	Other considerations		
		2 per sensible factor, max		4
				20

3 (a) Warehouse costs   2
       Picking costs   1
       Fork lift trucks   2
                                                                        ___
                                                                          5

(b) 2 marks per variance   6

(c) Definitions   3
       Measures   3
       Problems   3
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                                                                          9
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                                                                         20
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4 Balanced Scorecard
     Concept explained   2
     Per perspective explained, 2 each, max   8
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                                                                         10

     TQM
     Concept explained   2
     Per cost explained, 2 each, max   8
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                                                                         10

     Benchmarking
     Concept explained   2
     Per type explained, 2 each, max   8
                                                                        ___
                                                                         10

     Max   20
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