



J.K. SHAH[®]
TEST SERIES

Evaluate Learn Succeed

SUGGESTED ANSWERS

CA FINAL

Test Code – JK-SCM-22

Date –05-10-2020

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Answers

Q.1

(a) Recalculate the budget for Luxury division to the end of the current year

C\$000	Q1 (Actual)	Q2	Q3	Q4	Total
Revenue (WN 1)	10,400	12,240	11,388	7,247	41,275
Cost of Sales (WN 2)	(6,240)	(7,020)	(6,370)	(4,654)	(24,284)
Gross Profit	4,160	5,220	5,018	2,593	16,991
Distribution Costs (WN 3)	(624)	(734)	(682)	(434)	(2,474)
Administration Costs (WN 4)	(2,296)	(2,243)	(2,186)	(2,132)	(8,857)
Operating Profit	1,240	2,243	2,150	27	5,660

Recalculating Luxury division's budget for the year to reflect current conditions gives a more realistic target for the division managers. For the coming year, the effect of this is very significant and represents a much more challenging target for managers as it increases the expected total annual operating profit by 42% (5,660 / 4,000) over the original budget.

Working (C\$000):

(W1) Revenue	Q1 (Actual)	Q2	Q3	Q4	Total
Original Budget	10,400.0	12,000.0	11,000.0	7,000.0	40,400.0
2% Sales Volume		240.0	220.0	140.0	600.0
1.5% Sales Price			168.3	107.1	275.4
Total	10,400.0	12,240.0	11,388.3	7,247.1	41,275.4
(W2) Cost of Sales	Q1 (Actual)	Q2	Q3	Q4	Total
Original Budget	6,240.0	7,120.0	6,460.0	4,720.0	24,540.0
2% of Sales Volume		142.4	129.2	94.4	366.0
6.67% Exchange rate*		(242.2)	(219.7)	(160.6)	(622.5)
Total	6,240.0	7,020.2	6,369.5	4,653.8	24,283.5

*6.67% x 1 = (1.4 / 1.5), applied to 50% of COS.

(W3) Distribution Costs	Q1 (Actual)	Q2	Q3	Q4	Total
Original Budget	624.0	720.0	660.0	420.0	2,424.0
2% Sales Volume		14.4	13.2	8.4	36.0
1.31% Fuel tax increase*			8.8	5.6	14.4
Total	624.0	734.4	682.0	434.0	2,474.40

*1.31% x 70% x (3/160)

(W4) Administration Costs	Q1 (Actual)	Q2	Q3	Q4	Total
Original Budget	2,296.0	2,300.0	2,300.0	2,300.0	9,196.0
2.5% Compound Savings		(57.5)	(113.6)	(168.3)	(339.4)
Total	2,296.0	2,247.5	2,186.4	2,131.7	8,856.6

Workings for savings in administration costs:

$$\text{Q2 } 2,300.0 \times 2.5\% = 57.5$$

$$\text{Q3 } 57.5 + (2,242.5 \times 2.5\%) = 113.6$$

$$\text{Q4 } 113.6 + (2,186.40 \times 2.5\%) = 168.3$$

(10 Marks)

(b) Incremental Budgeting

Framiltone currently uses this type of budgeting, the starting point of which is usually the previous year's actual performance or budget. This is then updated for any known changes in costs, or for inflation. The budget would normally remain unchanged for the remainder of the year.

Incremental budgeting is suitable for use in organisation which are stable and not undergoing significant changes. This is the case for Dairy division, which operates in a saturated market and has little opportunity to grow.

Production volumes in Dairy division have only increased by 0.5% over a full five years, so it is a very stable business. Dairy division has stability of both revenues and costs. It has also similar fixed contracts with its suppliers of milk, the most significant raw material ingredient used in its products.

Though the third party distribution company is able to pass on some increases in fuel costs to Dairy division, these are capped at only 0.5% per year. This is significantly less than the tax increases which will increase Luxury division's fuel

costs after the start of Q 3. It appears that Dairy division has relatively little exposure to rising fuel prices.

Furthermore, these increases are agreed to the setting of the current year budget, so there is no need to update these costs on an on-going basis throughout the year. As the dairy foods market is saturated and stable, there is little opportunity for the division to incur discretionary costs such as research and development of new products.

Incremental budgeting is only suitable for business where costs are already well controlled. This is because a big disadvantage of incremental budgeting is that it perpetuates inefficient activities by often simply building inflation into previous year results or budgets. It appears that Dairy division, having been in existence for a relatively long time, does have good cost control as it has modern production plant and is recognised as having the most efficient production processes in the industry.

Incremental budgeting may, however, build in budget slack. Managers may spend up to their budgeted amounts in one year, so that their budget is not cut the next, which may affect their appraisal and reward in the future. It is unclear whether this is occurring at Dairy division, though for many years (whole Dairy division was the only division at Framilstone), the budgets set following consultation with divisional managers have just been achieved. This may be consistent with the stability of the division, but could also indicate that budgets were not set at a challenging enough level, even though Dairy division had the best performance of the two divisions last year.

It is not therefore advisable that rolling budgets are introduced in Dairy division, as the current incremental process appears, satisfactory. This is especially so since divisional managers have little experience of setting their own budgets, and the time and cost of using rolling budgets would exceed the value of them to the division.

Rolling Budgets

Rolling budgets are continually updated to reflect current conditions and are usually extended by budgeting for an additional period after the current period, for example, a quarter, has elapsed. That way, the budget always reflects the most up to date trading conditions and best estimates of future costs and revenues, usually for the next four quarters.

Rolling budgets are suitable for business which change rapidly or where it is difficult to estimate future revenues and costs.

Luxury division was only set up two years ago, and is therefore a relatively new business. It also operates in quite a different sector of the industry to that in which Dairy division operates and where Framiltone has most experience. There is likely to be considerable uncertainty as to future costs and revenues as Framiltone has little direct experience on which to base its forecasts.

Whereas Dairy division operates in a saturated and stable market, Luxury division uses rare ingredients which are subject to variations in availability and cost, for example, as a result of poor harvests. There is no indication that Luxury division has fixed price and volume contracts with its customers or suppliers and is therefore likely to suffer from instability of supply as well as demand resulting from changes in consumer tastes.

The frequent changes in the product range are also likely to make forecasting for a year ahead difficult. The fact that a large proportion of ingredients are imported from Veeland, makes cost susceptible to changes in the C\$: V\$ exchange rates which can quickly make an annual budget out of date, though managers may be methods such as forward contracts to reduce these movements. If managers are appraised on a budget which is out of date or unrealistic, they are likely to give up trying to achieve the budget, which will negatively affect the performance Framiltone.

Rolling budgets will provide a more accurate basis on which to appraise managers at Luxury division as they incorporate the best known estimates of future costs and revenues. It can be seen by the recalculation following Q 1 results that Luxury division's revised budgeted operating profit for the year has increased significantly by 42% ($5,660 / 4,000$), most of which is due to exchange rate changes. Where costs and revenues are likely to change during the period, rolling budgets give a much more realistic basis on which to appraise divisional performance and appraise and reward divisional managers. Budgets, are likely to be achievable, which will motivate managers to try and achieve them.

Though the regular updating of the budget required in rolling budgeting is costly, time consuming and possibly a distraction for divisional managers, it does seem that rolling budgets are more suitable for Luxury division than the current incremental approach, particularly as being realistic and achievable, they will increase manager's motivation to achieve the budget and so improve the performance of the business.

(10 Marks)

Q.2

- (a) The DMAIC process is a technique used to implement six sigma to improve existing processes and its split into five purchases and is split into five phases as described below.

Define the Process

The CEO is concerned that the increase in returns from customers is increasing costs and threatens to affect the Posie brand. Six sigma focuses closely on the requirements of the customer and it is important to be clear exactly what customer's requirements are and in this case specifically why products are returned.

The objective of the project needs to be clear, in this case to reduce the number of customer returns.

Customers will expect certain minimum requirements from the manufacturing and packaging process, for example, that the furniture is able to be properly assembled and all the necessary components are included in the box. They will also expect the goods to be delivered undamaged within a reasonable time and at the time and date promised when the order was placed. Customer's perceptions of quality should correspond to the price paid, though different customers will have different expectations of this.

Beyond this basic requirement, there may be aspects of the manufacturing product which further enhance the customer's experience of the products and presumably of the Posie brand. Customers may be particularly pleased with furniture which is delivered early or at a time especially convenient to them, or which is robust, durable and 'well – made'. These perceptions are subjective and may equally relate to design or the quality of raw materials as to the manufacturing process. By identifying where the products exceed customers expectations. It may be possible to focus more on these aspects in the future. While products which significantly exceed customers expectation will enhance the Posie brand, it may also indicate a quality of manufacture which is too high and allow Posie to reduce manufacturing costs in accordance with its cost leadership strategy whilst still having mainly satisfied customers.

Measure the existing process

The current returns figures do give some data to as to why products are returned, but its usefulness is limited as it is unclear which of the categories relates to

defective manufacture, and which relate to activities of other divisions. The ambiguity of the data and category definitions will need addressing to enable the process to be measured effectively.

Returns in Category I could be because the goods were not manufactured or packed properly in the manufacturing division, but could also be due to poor design, customers losing components or simply being unable to assemble furniture.

Damaged goods in Category 2 probably do not arise because of defective manufacturing either, though customers may wrongly categorise defective goods as damaged. For the other categories it is less clear. Though goods may become damaged by the distribution company, it seems that only a small number of returns relate directly to them.

Returns in Categories 3 and 4 could be due to defective manufacture or if the customer had simply changed their minds and no longer wanted the product. In Category 3, the identification of 'defective' items is too broad.

Returns in Category 5 which arrived late are clearly not due to manufacturing defects and as this causes only 2% of returns, is relatively insignificant.

Currently 10% of Posie's sales are of products from other manufacturers. There is no indication from the data given how many of the returns relate to these products, nor of the total number of returns relative to the number of items sold.

Therefore, the existing data are insufficient to reliably measure existing performance and take no account of inputs such as raw materials. Only items which customers value should be measured. The CEO has suggested more detailed data are required, for example, on overall customer satisfaction with the manufacturing, but this is at 93% which already seems high and there is little point in incurring costs to measure what customers are already satisfied with. In the context of the six sigma project at Posie, there is little that can be done to improve this particular area and such items should not be measured.

Improve the Process

At this stage the proposals for improving the process are implemented and availability of resources and likely costs of making the improvements need to be carefully considered. Posie may need to consider which aspects of the production or packaging process could be improved, for example, by better maintenance or calibration of machinery. Additional training of staff may also be required.

Control

This is the on – going monitoring that the reduction in customer returns due to defective manufacturing is being maintained. Reporting on the number of returns may be done by exception if they reach a particular level. In Posie, it seems likely that the data on customer returns used to manage this process will need to be redesigned to make it clearer in which responsibility centre the problems arise. The on – going monitoring may indicate that some of the earlier stages in the DMAIC process need to be revisited.

(12 Marks)

- (b) (i) The CEO wants to identify which responsibility centres are the root causes of the problem of customer returns. A responsibility centre is a part of the business where a manager has specific authority and accountability for its performance and so Posie will need information relating to aspects of performance specific to the centre. For example, performance data relating to the reasons for customer returns need to be clearly segregated between responsibility centres. Currently, the information compiled on customer returns does not do this and some categories of return may result from manufacturing defects but some will be from problems outside the manufacturing division, or even outside Posie itself, for example, from poor quality raw materials purchased externally, or because of late deliveries or damaged goods caused by the distribution company.

Once information has been analysed and responsibility has been identified, then the managers of those areas will need the information drilled down into even further, as in order to improve they need to know which specific areas they can control.

It would be unfair has been analysed and responsibility has been identified, then the managers of those areas will need the information drilled down into even further, as in order to improve they need to know which specific areas they can control.

It would be unfair to make managers responsible for aspects of performance which they are unable to control, and the board member responsible for manufacturing quality has recently resigned because of this.

Posie needs to ensure it produces performance data to an appropriate level of detail so as not to overload the users with too much data. For board level

reporting, the information in the current board reporting pack may be too detailed and it would be sufficient just to product summary data on the overall level of returns relative to sales. Responsibility centres would need much more detailed information, perhaps even down to product or production line level.

However, Posie should also consider the costs and resources required to provide more detailed performance data. Given Posier's cost leadership strategy, the cost of data collection may outweigh the benefits of doing so.

Performance data should be provided at an appropriate frequency. For the Posie main board, monthly reporting may be sufficient to alert them to any problems. Responsibility centres will need much more frequent, even daily or weekly details of the levels of customer returns so that they can react quickly to any problems identified. At the moment, the returns data are compiled every six months, possibly due to the difficulties in obtaining data from the IT systems in the overseas businesses. Even for a board level report, this seems much too infrequent.

(4 Marks)

- (ii) At the moment, the overseas subsidiaries are being designated as profit centres and managers will be held accountable for both revenues and costs. As they do not manufacture, it seems reasonable to designate them as revenue centres. As such, managers would be held accountable for just revenues as they have little or no control over costs as most goods for resale are purchased from the manufacturing division.

The performance data produced by Posie's subsidiaries. IT systems will therefore switch to focus more on revenues rather than costs. As revenue centres they may well have some freedom to change selling prices. Posie will need to ensure the subsidiaries have information to monitor the impact of different pricing strategies and will need to provide the management of these subsidiaries with information gleaned from the external environment. It will be important to evaluate competitor's pricing when making pricing decisions.

A potential problem with providing only performance data relating to revenue is that managers could focus too much on achieving revenue targets rather than maintaining or improving profitability. As they are autonomous

subsidiaries, there will be aspects of their own costs, such as staffing costs and other overheads, which they will be able to have some control over. It is important that Posie ensures the management still has sight of this information to ensure that such costs are still controlled effectively.

Furthermore, if the overseas managers are only held responsible for sales, this may mean they do not focus sufficiently on addressing reasons why goods are refunded, and so levels of returns may increase. This means that once Posie undertakes the exercise to identify the root causes of the returns from customers, this information is shared and monitored.

Posie needs to be aware of these issues when determining information requirements if the reclassification of the subsidiaries goes ahead. It will not be as simple as assuming that they will now only need information on revenues.

(4 Marks)

Q.3

(a) (i) EAJ

Financial performance and competitiveness

Summary Income Statement for the year ended 31st May 20X6

	Budget ₹000s	Actual ₹000s
Fee income :		
New	2,940	3,150
Existing	<u>6,930</u>	<u>8,085</u>
	<u>9,870</u>	<u>11,235</u>
Costs :		
Consultants Salaries	5,000	5,000
Bonus		294
Other operating costs	<u>3,600</u>	<u>4,500</u>
Total Costs	<u>8,600</u>	<u>9,794</u>
Net Profit	<u>1,270</u>	<u>1,441</u>

It is clear that EAJ performed well during the year ended 31st May 20X6. Fee income was 13.8% above budget, in spite of the fact that other operating costs were 25% higher than budget.

The management of EAJ should investigate what caused this significant overspend and therefore it would be extremely useful to have a more detailed breakdown of other operating costs.

Consultants earned an aggregate bonus of (₹12,35,000 - ₹9,870,000) – (450 x 2 x ₹700) x 40% = ₹294,000 in respect of activity above budgeted levels. Actual net profit was ₹14,41,000 against a budgeted net profit of ₹12,70,000. In spite of the overspend on other operating costs. EAJ is achieving repaid growth in levels of net profit. In 20X5 (its second year of trading) net profit was 50% higher than in its first year. In 20X6 net profit has increased by 60.1% over 20X5 net profit.

EAJ could increase its competitiveness in terms of sales growth and the relative success of obtaining business from enquiries made by customers.

In assessing sales growth it needs to be borne to mind that this is that ‘start up’ phase of EAJ. However, EAJ increased sales revenue from ₹40,00,000 in its first year to ₹1,12,35,000 in its third year of operation, which is very impressive. EAJ;s success in obtaining business from enquiries made by customers for the year ended 31st May 20X6 is shown in the following table.

Conversion rate from enquiries:	Budget	Actual
New Delhi	35.0%	30.0%
Repeat Clients	50.0%	60.0%

60% of enquiries from existing clients, resulted in additional chargeable consultancy days for EAJ. This may well indicate that EAJ is starting to building customer loyalty despite the fact that the organization has only been in existence for three years. With regard to enquiries from potential ‘first time’ clients. EAJ achieved a conversion ratio of 30.0%, against a budgeted conversion ratio of 35% that was budgeted. However, in absolute terms new business was approximately 7.1% above budget whilst existing business was 16.7% business above budget.

As regards the nature of the chargeable activities undertaken by the consultants it can be seen that Distribution software implementation was 20.6% below budget, whereas Accounting and Manufacturing Implementation were 26.2% and 33.3% respectively above budget.

EAJ provided 300 consultations on a no fee basis with a view to gaining new business. Also, during the year EAJ consultants provided non – chargeable

‘remedial’ consultations. Both of these non – chargeable activities might be viewed as initiatives aimed at increasing future levels of competitiveness. However, each remedial consultation could be viewed as inefficiency.

External Effectiveness

In order to achieve ‘external effectiveness’ EAJ has to satisfy its customers. Customer satisfaction may be defined as meeting customer expectations. The quality of service provision and delivery are operational criteria that can be used to monitor levels of customer satisfaction. To some extent, the increase in the number of complaints is indicate of a quality problem that must be investigated and addressed. In particular the number of chargeable days for implementation of distribution applications is significantly below budget and it might will be the case that poor service ‘delivery’ is giving rise to the need for remedial consultations.

Assuming consultants could otherwise have undertaken chargeable work at a rate of ₹700, revenue amounting to ₹630,000 was lost as a consequence of having to undertake remedial consultations. It would appear that EAJ does not budget for complaints :

A summary of client complaints received by EAJ is shown in the following table:

Year ended 31st May	20X4	20X5	20X6
Number of Complaints	160	225	2802
Number of Clients	320	500	700
Complaint : Client Ratio (%)	50%	45%	40%

Whilst it can be seen that the complaint : client ratio is improving it should be recognized that this may be due to the fact that the size of the client base is increasing very rapidly. Such a trend might be expected during the first few years of operation, especially in a business such as EAJ.

The harsh fact is that the number of complaints is increasing in absolute terms. In order to be able to better assess customer satisfaction, complaints need to be analysed since the nature of complaints may well be of far more relevance than the number of complaints.

The number of customer support desk queries resolved is improving. i.e. 20X4 (85%); 20X5 (95%) and 20X6 (99%). This will further enhance the level of customer satisfaction. The fact that the number of accounts in

dispute is falling whilst the number of clients is increasing significant on a year on year basis may also be an indication of improved customer satisfaction. The increase in the number of new customers and the increased revenues generated per customer are probably indicator's of increasing levels of customer satisfaction.

Internal Efficiency

Internal efficiency may be assessed by reference to flexibility and productivity. Flexibility relates to the business operating system as a whole whilst productivity relates to the management of resources such as, in the case of EAJ, consultants time.

Flexibility might be substantiated by looking at the mix of work undertaken by the consultants during the year. The following table gives a comparison of actual and budgeted consultations by category of consultant.

Consultations by category of consultant:

	Budget %	Actual %	Increase (Decrease)
Accounting	40.0	44.2	4.2%
Distribution	30.0	20.8	(9.2%)
Manufacturing	30.0	35.0	16.7%

It is a deliberate policy of EAJ to retain 100 Consultants thereby maintaining flexibility to meet increasing demand. The delivery speed will be increased as a consequence of the retention of consultants. It would appear that a change has occurred in the mix of consultants which may well be a response to changing market requirements. Again, it would be useful to see recent year's statistics in order to consider trends.

Productivity can be measured by the ratio of output achieved from those resources input. In this scenario the average number of chargeable days per consultant may be used as a guide.

Average number of chargeable days per consultant			
	Budget	Actual	Increase / (decrease)
Accounting	168	212	26.2%
Distribution	168	160	(4.8%)
Manufacturing	168	192	14.3%

The implementation of distribution application software was more than 20% below budget. Chargeable distribution consultancy days based on the original budget of 168 days per consultant would produce a total of 4,200 chargeable days which is 200 more than the actual levels. Again this might be indicative of a quality problem.

‘Cycle time’ would appear to be improving as evidenced by the increasing number of on – time implementation as well as the reduction in the implementation time of each application. In this respect EAJ needs to be certain that the reduction in implementation time has not caused a diminution in the quality of service delivery. Consequently, an aggregate bonus amounting to ₹294,000 was paid in respect of the year ended 31st May, 2006. EAJ needs to ensure that the incentive provided by the bonus is not causing a loss of “Internal Efficiency”.

With regard to the bonus paid to consultations then it is questionable whether the bonus should be shared equally by consultants since chargeable activity levels clearly between categorized of consultant.

- (b) Particularly at higher levels of management, non – financial information is often not numerical terms, but qualitative, or soft, than quantitative. Qualitative information often represents opinion of individuals and user groups. Decisions often appear to have been made on the basis of quantitative information; however, qualitative consideration often influence the final choice, even if this is not explicit. In both decision making and control, managers should be aware that an information system may provide a limited or distorted picture of what is actually happening. In many situations, sensitivity has to be used in interpreting the output of an information system. Conventional information systems are usually designed to carry quantitative information and are sometimes less able to Convey qualitative issues. However the impact of decreased output requirement on staff morale is something that may be critical but it is not something that may be critical but it is not something that an information system would automatically report. The following difficulties in measurement and interpretation mean that qualitative factors are often ignored:

- * Information in the form of opinions is difficult to measure and interpret. It also requires more analysis.

- * Qualitative information may be incomplete.
- * Qualitative aspects are often interdependent and it can be difficult to separate the impact of different factors.
- * Evaluating qualitative information is subjective, as it is not in terms of numbers – there are no objective formulae as there are with financial measures.
- * The cost of collecting and improving qualitative information may be very high.

Despite the challenges it presents, there may be ways of improving the use of qualitative information. Where it is important to make use of qualitative information, it is essential to ensure that users are aware of any assumptions made in analysis and of the difficulties involved in measuring and counting. It is sometimes possible to when looking at impact. For example, when looking at service quality it is possible to consider the cost of obtaining the same quality of service elsewhere. Even if it is not possible to quantify issues precisely, attempting to do so is likely to improve decision making as the issues are likely to have been sought through more thoroughly.

(20 Marks)

Q.4

(a)

	Quantity	Rate	Total Costs	% of Sales
Prevention Costs:		₹	₹'000	
Design Engineering	48,000	96	4,608	1.28
Process Engineering	54,000	70	3,780	1.05
Training			180	0.05
Total Prevention Costs			8,568	2.38
Appraisal Costs:				
Inspection (Manufacturing)	2,88,000	50	14,400	4.00
Product Testing			72	0.02
Total appraisal costs			14,472	4.02

Internal Failure Costs:				
Rework (Manufacturing)	2,100	4,800	10,080	2.80
Total Internal failure costs			10,080	2.80
External Failure Costs:				
Customer Support (Marketing)	2,700	240	648	0.18
Transportation costs (Distribution)	2,700	280	756	0.21
Warranty repair (Customer Service)	2,700	4,600	12,420	3.45
Total external failure costs			13,824	3.84
Total Costs (P, A, IF and EF)			46,944	13.04
Opportunity Costs	1,800	7,200	12,960	3.60
Total quality costs			59,904	16.64

% of Total Quality:			
Prevention	2.38%	16.64%	14.30%
Appraisal	4.02%	16.64%	24.16%
Internal Failure	2.80%	16.64%	16.83%
External Failure	3.84%	16.64%	23.08%
Lost Sales	3.60%	16.64%	21.63%
			100.00%

The total of prevention, appraisal, internal failure, and external failure costs should not be assumed to represent the total costs of quality for TAW or any other organisation. Quality cost statements frequently exclude opportunity costs such as foregone contribution margins and profit from lost sales, lost production or lower prices that are consequences of poor quality. This is because opportunity costs are difficult to estimate and are often not recorded by accounting systems. It should be recognised that opportunity costs can be substantial and provide much impetus to quality – improvement programmes.

(10 Marks)

Q.4**(b)**

The following method could be adopted in this example:-

- (1) The saving per unit of each product is calculated. Saving = Purchases Price – VC to make.
- (2) Divide this by the amount of scarce resource (a.k.a limiting factor) each product uses. This gives the saving per unit of limiting factor (LF).
- (3) Rank. The higher the saving per unit of LF the greater the priority to make that should be given to the product.
- (4) Once the priorities have been decided, the scarce resource is allocated to the products in the order of the priorities until it is fully used up.
- (5) Any products with unsatisfied demand can be satisfied by buying from have external source

(1) Calculate saving = Purchases Price – VC to make:

Production Cost	L	M	N	P
External purchase price	₹ 57	₹ 55	₹ 54	₹ 50
Variable Costs to make	₹ 45	₹ 40	₹ 30	₹ 20
Saving	₹ 12	₹ 15	₹ 24	₹ 30

(2) Calculate the saving per unit of limiting

Production Cost	L	M	N	P
Saving	₹ 12	₹ 15	₹ 24	₹ 30
Scarce resource (machine hours) per unit	3 hours	5 hours	4 hours	6 hours
Saving per unit of the scarce resource	₹ 4	₹ 3	₹ 6	₹ 5

(3) Rank

Production Cost	L	M	N	P
Saving per unit of the scarce resource	₹ 4	₹ 3	₹ 6	₹ 5
Rank: product to make in priority	3	4	1	2

- (4) Allocate scarce resource of 24,000 machine hours to production Make all Ns (1,500 units). This will use up 1,500 x 4 hours = ₹ 6,000 hours.

Then, make all Ps (1,500 units). This will use up $1,500 \times 6$ hours = 9,000 hours.

The cumulative total is $6,000 + 9,000 = 15,000$ hours.

Then, make all Ls (1,500 units). This will use up $1,500 \times 6$ hours = 9,000 hours.

The cumulative total is $15,000 + 4,500 = 19,500$ hours.

This leaves $(24,000 - 19,500) = 4,500$ hours, in which to make $\frac{4,500}{5} = 900$ units of product M.

- (5) Unsatisfied demand = $1,500$ Ms - 900 Ms = 600 Ms. These will have to be bought externally.

Production Cost	L	M	N	P
	₹	₹	₹	₹
Variable Production cost	₹ 45	₹ 40	₹ 30	₹ 20
External Cost	₹ 57	₹ 55	₹ 54	₹ 50
Incremental Cost	₹ 12	₹ 15	₹ 24	₹ 30
Hours per unit	÷ 3	÷ 5	÷ 4	÷ 6
Incremental Cost per hour	₹ 4	₹ 3	₹ 6	₹ 5
Cheapest per hour	2 nd	1 st	4 th	3 rd

The analysis shows that it is actually cheaper to try and make ALL the components within the factory.

Hours required to make 1,500 units of each component:

$$(1,500 \times 3) + (1,500 \times 5) + (1,500 \times 4) + (1,500 \times 6) = 27,000 \text{ hours.}$$

The company only has 24,000 hours available. So 3,000 hours of work must be sub-contracted. The CHEAPEST component per hour must be bought externally.

This is component M.

3,000 hours of time on M equates to $3,000 \div 5 = 600$ units of M.

(10 Marks)

Q.5**(a)****(a) Environmental Cost Categories**

PLX will need to identify existing and new cost information that is relevant to understanding its environmental impact.

There are conventional costs such as raw material costs and energy costs which should be broadened to include the cost of waste through inefficiency. These and other conventional costs (such as regulatory fines) are often hidden within overheads and therefore will not be a high priority for management control unless they are separately reported.

There are contingent costs such as the cost of cleaning industrial sites when these are decommissioned. These are often large sums that can have significant impact on the shareholder value generated by a project. As these costs often occur at the end of the project life, they can be given low priority by a management that is driven by short-term financial measures (e.g. annual profit) and make large cash demands that must be planned at the outset of the project.

There are relational costs such as the production of environmental information for public reporting. This reporting will be used by environmental pressure groups and the regulator and it will demonstrate to the public at large the importance that PLX attaches to environmental issues.

Finally, there are reputational costs associated with failing to address environmental issues when consumer boycotts and adverse publicity lose sales revenue.

(7 Marks)**(b) Explanation and evaluation of techniques**

A lifecycle view consists of considering the costs and revenues of a product over the whole life of the product rather than one accounting period. For an oil refinery, this might be taken to be the useful life of the refinery. A lifecycle view may take profit or discounted cash flow as the principal measure of performance. This is particularly relevant for PLX given the planned redevelopment programme at the refinery which will highlight the decommissioning costs of such plant. This will aid future long-term investment planning at PLX.

Activity-based costing (ABC) is a method of detailed cost allocation that when applied to environmental costs distinguishes between environment-related costs

and environmental-driven costs. At PLX, related costs would include those specifically attributed to an environmental costs centre such as waste filtration plant while driven costs are those that are generally hidden in overheads but relate to environmental drivers such as additional staff costs or the shorter working life of equipment (in order to avoid excess pollution in the later years of its working life). This will assist PLX in identifying and controlling environmental costs.

Input/output analysis (sometimes called mass balance) considers the physical quantities input into a business process and compares these with the output quantities with the difference being identified as either stored or wasted in the process. These physical quantities can be translated into monetary quantities at the end of the tracking process. Flow cost accounting is associated with this analysis as it reflects the movement of physical quantities through a process and will highlight priorities for efficiency improvements.

These techniques are not mutually exclusive and all can assist PLX in improving performance. However, cost/benefit analysis will need to be undertaken for each of the systems. This will be difficult, as benefit estimates will prove vague given the unknown nature of the possible improvements that may accrue from using the techniques. The non-financial benefits will include a better public image and reduced chance of protest by environmental groups and an improved relationship with the government who is likely to be a key supplier of crude oil to the business. Additionally, ABC and flow cost accounting will require significant increases in the information that the management accounting systems collect and so incur increased costs. As a result, the decision to use these techniques is likely to be based on the balance between known costs and estimated benefits of non-financial factors.

(7 Marks)

(c) **Lifecycle costing**

A traditional analysis of the costs of Kayplas might yield the product profit given in the original data. However, this ignores capital costs, environmental costs and the cost of decommissioning. A lifecycle analysis aims to capture the costs over the whole lifecycle of the product and it would show

Q.5**(b)****(a)** Sales price variance

$$= 220,000 \text{ a } (\text{₹}14 - \text{₹}12.50) = \text{₹}330,000 \text{ A}$$

Sales volume variance

$$= (250,000 - 220,000) \text{ a } \text{₹}4 = \text{₹}120,000 \text{ A}$$

(b) Budgeted market share = $250,000/10,00,000 = 25\%$

The company would have expected to achieve sales of $25\% \times 11,00,000 = 275,000$ in the actual market conditions.

The market size variance

$$= (275,000 - 250,000) \times \text{₹}4 = \text{₹}100,000 \text{ F}$$

The market share variance

$$= (275,000 - 220,000) \text{ a } \text{₹}4 = \text{₹}2,20,000 \text{ A}$$

The increased market size is favourable as the company should sell more if market share can be maintained. The market share variance was adverse as market share fell from 25% to $2,20,000/11,00,000 = 20\%$.

(c) It could be argued that the increased competition in the market was not foreseen when the budget was set and the variance is thus a planning variance. However, this line of reasoning would suggest that any unforeseen issues give rise just to planning variances.

Perhaps sales managers should have identified potential threats sooner? Also, once extra competition was experienced, managers had to decide how to respond. This could have involved additional advertising rather than price cuts, e.g. it could be argued that price cuts were made to try (unsuccessfully) to protect market share, in which case managers should be held (at least partly) responsible for such a decision.

(6 Marks)

Q.6

(a)

(a) Standard contribution = ₹ 6 - ₹ 4.30 = ₹ 1.70 per cylinder

Sales Variances:		₹	₹
AQ AP		63,000	
Price Variance			} 600 (A)
AQ SP = 10,600 units x ₹ 6 per unit		63,600	
AQ SM = 10,600 units x ₹ 1.70 per unit		18,020	
Volume Variance			} 1,020 (F)
BQ SM = 10,000 units x ₹ 1.70 per unit		17,000	
Material Variances:		₹	₹
AQ AP		42,500	
Price Variance			} 60 (F)
AQ SP = 53,200 kg x ₹ 0.80 =		42,560	
Usage Variance			}
SQ SP = 10,600 units x 5 kg) x ₹ 0.80 =			160 (A)
		42,400	
Labour Variances:		₹	₹
AQ AP		3,100	
Rate Variance			} 40 (A)
AH SR = 2,040 hours x ₹ 1.50 =		3,060	
Efficiency Variance			} 120 (F)
SH SR = 10,600 units x 0.2 hours) x ₹ 1.50 =		3,180	
Operating Statements			
Budgeted Contribution (10,000 x ₹ 1.70)			17,000
Sales Volume Contribution Variance			1,020 F
Standard Contribution on actual Sales (10,600 x 1.70)			18,020
Sales Price Variance			(600 A)
Variable Cost Variances:	F	A	

	₹	₹	₹
Material Price	60		
Wages Rate		40	
Materials Usage		160	
Labour Efficiency	120		
	180	200	(20 A)
Actual Contribution			17,400
Budgeted Fixed Overhead			2,000
Fixed Overhead Expenditure Variance			(200 A)
Actual Profit			15,200

(8 Marks)

Q.6**(b)**

Lifecycle Costs		₹ million
Total R & D Costs		20.0
Total Marketing Costs	(5 + 4 + 3 + 0.9)	12.9
Total Production Costs	(1 x 1 + 5 x 0.9 + 10 x 0.8 + 4 x 0.5)	15.5
		48.4
Total Production (Units)	(1 + 5 + 10 + 4)	20 million
Cost per unit	(48.4 ÷ 20)	₹ 2.42

Comment

- The cost was calculated at ₹ 11 per unit during the launch phase. Based on this cost, the accountant was right to be concerned about the launch price being set at ₹ 8 per units.
- However, looking at the whole life-cycle the marketing manager's proposal seems more reasonable.
- The average cost per unit over the entire life of the product only ₹ 2.42 per unit. Therefore, starting price of ₹ 8 per unit would seem reasonable and would result in a profit ₹ 5.58 per unit.

(6 Marks)

Q.6**(c)****(a) Step 1: Find the gradient, b**

The question provides us with two selling prices and the respective level of demand at these selling prices. Therefore, we can begin by finding the gradient of the straight line, b.

$$b \text{ (gradient)} = \text{change in price/change in quantity} \\ = (220 - 200)/(950 - 1000) = -0.4$$

Step 2: Calculate the intercept, a

Once the gradient is known the intercept can be found using either of the selling prices and demand levels given in the question.

For example, price (P) = 200 when 1000 units (Q) are sold and substituting -0.4 for b

$$200 = a - (0.4 \times 1,000)$$

$$200 = a - 400$$

$$a = 200 + 400 = 600$$

Step 3: Straight-line demand equation

So the equation is: $P = 600 - 0.4Q$.

Step 4: Forecast the demand at a given selling price

At a price of ₹300

$$300 = 600 - 0.4Q$$

$$0.4Q = 300$$

$$Q = 300/0.4$$

Quantity demanded (Q) = 750 units per month

(b) $MR = 600 - 0.8Q$ $MC = VC$ so equating $MR = MC$: $100 = 600 - 0.8Q$

$$\text{So } Q = 625$$

And substituting Q into Price function, $P = ₹350$

(c) Contribution per unit = ₹350 — ₹100 = ₹250

$$\text{Total contribution} = ₹250 \times 625 \text{ units} = ₹156,250$$

(6 Marks)