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SUGGESTED ANSWERS

CA FINAL

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Head Office: Shraddha, 3rd Floor, Near Chinai College, Andheri E, Mumbai – 69
Tel: (022) 26836666

Answers

Q.1

(a) Fitzgerald and Moon's Building block approach

The building block model is an analysis that aims to improve the performance measurement systems of service businesses such as BLA. It suggests that the performance system should be bases on three concepts of dimensions, standard and rewards.

Dimensions fall into two categories: downstream result (Competitive and financial performance) and upstream determinants (quality of service, flexibility, resource Utilisation and innovation) of those results. These are the areas that yield specific performance metrics for a company.

Standard are the targets set for the metrics chosen from the dimensions measured. These must be such that those being measured take ownership of them, possibly by participating in the process of setting the standard. The standard must be achievable in order to motivate the employee or partner. The standards must be fairly set, bases on the environment for each business unit so that those in the lower growth areas of, say, audit do not feel prejudiced when compared to the growing work in business advisory.

Rewards are the motivators for the employees to work towards the standards set. The reward system should be clearly understood by the staff and ensure their motivation. The rewards should be related to areas of responsibility that the staff member controls in order to achieve that motivation. **(4 Marks)**

(b) Downstream results

(i) Financial performance

Summary Income statement for the year ended 31 October 20X3

	Budget ₹ 000	**Actual ₹ 000**
Fee Income (W 1)	6,075	6,300
Costs:		
Consultants' salaries (W 2)	2,025	2,025
Bonus (W 3)		90
		2,115
Other operating costs	2,550	2,805
Subcontract payments (W 4)	0	18
	4,575	4,938
Net Profit	**1,500**	**1, 362**

Working Notes:

(W1) Fee Income

Budget	40,500 chargeable consultations x ₹ 150
Actual	42,000 chargeable consultations x ₹ 150

(W2) Consultants' salaries

45 consultants ₹ 45,000

(W3) Bonus

40% of ₹ (63,00,000 – 60,75,000)

(W4) Subcontract payments

120 consultations x ₹ 150

It is clear that BLA has not performed as well as expected during the year to 31 October 20X3. Whilst client income is above budget, other operating expenses reached a level which is more than 10% higher than the budget for the year, and thus it would be extremely useful to have a more detailed breakdown of other operating expenses for the year. Consultants have earned an aggregate bonus of ₹90,000 (42,000 - 40,500) x ₹ 150 x 40% in respect of activity above budgeted levels. Payments to subcontractors amounted to ₹18,000. Actual profit amounts of ₹ 13,62,000 against a budget of ₹ 15,00,000. It would be extremely useful to see the results of the previous two years in order to assess whether there are any discernible trends in revenues and costs. The budget for the following year should be reviewed in the light of the actual performance of this year with particular reference to checking the footing of the assumptions upon which it has been prepared.

(ii) Competitiveness

Competitiveness may be measured in terms of market share or sales growth and the relative success in obtaining business from enquiries made by customers. The turnover of BLA for the year to 31 October 20X3 is above budget. Again it is desirable to see the results of recent years since it might well be the case that BLA has achieved steady growth which is indicative of a high level of competitiveness in future years.

BLA provided 1,200 consultations on a no-fee basis with a view to gaining new business. Also, during the year BLA consultants provided 405 non-chargeable 'remedial' consultations. Both of these non-chargeable activities might be viewed as initiatives to increase future levels of competitiveness.

It is useful to look at the extent to which BLA were successful in converting the enquiries received from both existing and new client enquiries into new business.

The percentages are as follows,

	Budget		**Actual**
Conversion rate from enquiries			
New Clients (24,300/67,500)	36.0%	(22,400/84,000)	26.7%
Repeat clients (16,200/32,400)	50.0%	(19, 600/28,000)	70.0%

70% of enquiries from the existing client base resulted in additional consultancy work for BLA. This is indicative of strong customer loyalty, suggesting that existing clients are satisfied with the service provided. However, the company was unable to reform as well with regard to enquiries from potential 'first time' customers, only achieving a conversion ratio of 26.7%, which is approximately 74% of the intended number of 'first time' clients that were budgeted for. This indicates that there is probably room for improvement in the ways in which B. deals with enquiries from prospective clients.

The company should review its marketing strategies with a view to improving its conversion ratio.

In absolute terms new business was approximately 7.8% below budget whereas repeat business was 21.0% above budget.

As regards the nature of the chargeable activities undertaken by the consultants, it can be seen that Exterior Design is 14. 6% below budget, whereas Interior Design and Garden Design are 6.4% and 35.1% above budget.

Upstream results

(iii) Service quality

Quality of service is the totality of features and characteristics of the service Package that bear up, its ability to satisfy client needs. Flexibility and innovation in service provision may be key determinants and non-chargeable consultations associated with the remedying of those complaints is indicative

of a quality problem that must be addressed. This Problem needs investigated. BLA only provides advice to clients and only recommend contractors when asked to do so by clients. It would be interesting to see how many of the complaints related to recommendations made by BLA. Assuming consultants could have otherwise undertaken chargeable work, the revenue forgone as a consequence of the remedial consultations was ₹ 60,750. Client complaints received during the year were nearly double the budgeted level. Also the number of remedial consolations was 405 against a budgeted level of only 45, which is exactly nine time higher than budget.

Perhaps BLA should review and, if necessary, limit the amount of remedial consultancy provided to any one particular client. The business development consultations can be viewed as an innovative measure with a view to gaining additional business.

(iv) Flexibility

Flexibility may relate to the company being able to cope with flexibility of volume, delivery speed or job specification.

Hence, flexibility might be substantiated by looki6ng 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 consultancy

	Budget %	Actual %	Increase/(decrease)
Exterior Design	40.0	32.9%	(7.1%)
Interior Design	40.0	41.0%	1.0%
Garden Design	40.0	26.1%	6.1%

It is a deliberate policy of BLA to retain 45 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 on the mix of consultants which may well be a response to changing market requirements. Again, it would be useful to see recent years' statistics in order to consider trends but notably garden design looks to be a growth area hence the three new consultants recruited during the year. The mix of consultants should be such that BLA can cope with a range of job specifications. The fact that links have been retained with retired consultants will give an added dimension of flexibility in times of very heavy demand upon its consultants.

(v) Resource Utilisation

Resource Utilisation measures the ratio of output achieved from those resources input. In this scenario the mean number of consultation per consultant may be used as a guide.

Average consultations per consultant

	Budget %	Actual %	Increase/(decrease)
Exterior Design	900	922	2.4%
Interior Design	900	957	6.3%
Garden Design	900	912	1.3%

It is interesting to note that all categories of consultant are being utilised above budgeted levels. Consequently an aggregate bonus amounting to ₹ 90,000 was paid in respect of the year ended 31 October 20X3. There are potential problems if the quality of the service provision is falling. In this regard it would be useful to have more detailed analysis of the client complaints in order to ascertain whether a large proportion relate to any one category of consultancy and/or contactor. BLA has adopted an innovative approach that required consultants to undertake non-chargeable business development consultations which have at their heart intention of generating new business. Hence in the immediate sense there is a trade-off between resources Utilisation and innovation.

(vi) Innovation

Innovation should be viewed in terms of its impact on financial performance, competitiveness, service-quality, flexibility and resource Utilisation in the short, medium and long term. Certainly the non-chargeable activity in terms of 'business development' is an innovative feature within the business of BLA, as is the non-chargeable remedial consultancy provided to clients who experience problems at the commencement of building works. The acquisition of 'state of the art' business software is by its very nature innovative.

The result of its use is reflected in the significant increase of 35.1% above budget achieved in garden design consultations. This has probably enabled BLA to differentiate its services from those of its competitors and enhance its reputation. Certainly the management of BLA will be hoping for a similar increase in business as a consequence of the use of the software by its external and interior design consultants. The management should ensure the

introduction of the software has not caused the increase in the number of complaints received.

(10 Marks)

(c) Ownership

In establishing targets, the importance of individuals taking ownership of the standards has long been established: this is often facilitated by the adoption of a budgetary system based on employee participation.

This is also considered to be beneficial to the organisation since it alleviates, or at the very least reduces, many of the dysfunctional consequences associated with particular control models. In Particular, managers who participate in the Standard" setting process are more likely to accept the standards set, feel less job-related tension and have better relationships with their superiors and colleagues.

Participation does however; provide opportunities for the introduction of budgetary slack in order that any subsequent monitoring of activities presents a favorable outcome.

Achievability:

Budgets need to be realistic enough to encourage employees to perform, but not set at levels so high that they are demotivated.

The challenge to management lies in finding the balance between what the company views as achievable and what the employee views as achievable as this often prove, to be a source of organisational conflict.

Fairness:

It is important that the standards of performance measurement chosen by management facilitate a fair comparison across all similar business units and that equity is seen to prevail in measuring the performance of those units.

There may be circumstances where some business units have an inherent advantage unconnected with their own deliberate initiatives. For example, some business units will be subject to higher levels of environmental uncertainty than others. In situations where higher levels of uncertainty exist, there will be a need for greater reliance to be placed on subjective judgement in appraising performance, with consequently less reliance being placed on objective, financial data.

It would be inappropriate and inequitable to measure the performance of two completely different business contexts in an identical manner.

(6 Marks)

Q.2

(a) Budgeted and actual profits

Budget	Kitchens ₹m	Bathrooms ₹m	Total ₹m
Sales	40	14	54
Direct costs	(22)	(6)	(28)
Central services	(10)	(5)	(15)
Budgeted profit	8	3	11

Actual	Kitchens ₹m	Bathrooms ₹m	Total ₹m
Sales	33.8	15.25	49.05
Direct costs	(20.8)	(6.75)	(27.55)
Central services	(6.5)	(6.25)	(17.50)
Actual profit	6.5	2.25	4.00

(4 Marks)

(b) Sales variances

Sales price variances	Kitchens	Bathrooms	Total
	₹	₹	₹
Standard sales price	10,000	7,000	
Actual sales price	13,000	6,100	
Variance	3,000 F	900 A	
Actual sales quantity	x 2,600	x 2,500	
Sales price variances	**78,00,000**	**22,50,000 A**	**55,50,000 F**

Sales mix profit variances

	Standard Mix	Actual Mix	Variance (units)	Profit per unit (₹)	Variance (₹m)
Kitchens	3,400	2,600	800 (A)	₹ 2,000	1.60 (A)
Bathrooms	1,700	2,500	800 (F)	₹ 1,500	1.20 (F)
Total	**5,100**	**5,100**			**0.40 (F)**

Sales quantity profit variances

	Standard Mix	Budgeted Sales	Variance (units)	Profit per unit (₹)	Variance (₹m)
Kitchens	3,400	4,000	600 (A)	₹ 2,000	1.20 (A)
Bathrooms	1,700	2,000	300 (A)	₹ 1,500	0.45 (A)
Total	**5,100**	**6,000**			**1.65 (A)**

Check

Sales volume variances

Kitchens (4,000 – 2,600) x ₹ 2,000 = ₹ 2.8m A

Bathrooms (2,000 – 2,500) x ₹ 1,500 = 0.75m F

Total ₹ 2.05m

Sales volume variance = mix variance + quantity variance

= ₹ 0.4m A + ₹ 1.65m A = ₹ 2.05m

(6 Marks)

(c) Reconciliation of profits

	₹m
Budgeted profit (from part a)	11.00

	Favourable (₹m)	**Adverse (₹m)**		
Sales mix variance (from part b)				
- kitchens		1.60		
- bathrooms	1.20			
Sales quantity variance (from part b)				
- kitchens		1.20		
- bathrooms				
Sales price variances (from part b)				
- kitchens	7.80			
- bathrooms		2.25		
Direct costs (W1)				
- kitchens		6.50		
- bathrooms	0.75			
Central services (W2)		3.50		
- volume (kitchens)	1.25			
- volume (bathrooms)		2.50		
- expenditure	**11.00**	**18.00**	7	A
Actual profit Worn part a)			**4**	

Workings

(W1) Direct cost variances:

Kitchens 2,600 x (5,500 - 8,000) = ₹ 6.5m A

Bathrooms 2,500 x (3,000 - 2,700) = ₹ 0.75m F

(W2) Central services volume variances:

Kitchens (4,000 - 2,600) x ₹ 2,500 = ₹ 3,5m A

Bathrooms (2,500 - 2,000) x ₹ 2,500 = ₹ 1.25m F

Central services expenditure variance: ₹ 15m ₹ 17.5m = ₹ 2.5m

(5 Marks)

(d) Performance of the company for the year

(Actual profit at ₹4m is ₹7m below budgeted profit, a shortfall of 64%). The main causes are as follows:

- an overall fall in the total volume of sales resulting in a sales quantity variance of ₹ 1.65m A. The lower than expected volume has also resulted in central services costs being under absorbed as shown by the volume variances (net impact ₹ 2.25A).
- the sales mix has also switched from more profitable kitchens to less profitable bathrooms and this is reflected in the sales mix variance of ₹ 0.4m A.
- the impact of the lower volume of kitchen sales has been partially offset by the favourable price variance for kitchens. It is possible that a higher proportion of jobs are of the highly customised category rather than the 'off the shelf packages. This has led to higher average prices being charged but also higher direct costs being incurred. The opposite seems to have occurred with bathrooms.
- Central services costs have exceeded budget by ₹ 2.5m. This may be due to higher costs incurred designing customised jobs.

It would be worth investigating whether the extra price charged for customised designs is covering all of the additional costs incurred. Higher prices may be necessary or better control of costs.

Tutorial note: For part (a): The information given in the question suggests that an OAR of ₹ 2,500 per job is used to absorb central services costs. This means that there is under absorbed central services cost of 17.5 - 6.5 - 6.25 = ₹ 4.75m. There is no indication that this is charged to the other divisions, but total costs must be shown to arrive at total profit. **(5 Marks)**

Q.3

DMAIC technique analyses operational problems by assessing them in the following phases (1) Define; (2) Measure; (3) Analyze; (4) Improve and (5) Control.

(1) Define the problem, project goals and customer requirements: Poor quality leading to erosion of clientele.

Customer's feedback indicates that product quality requires improvement. Dis - satisfaction is reflected in the form of sale returns and warranty claims. Competitors have no sale returns on account of poor quality as well as no warranty claims on its products. Hence, in an environment where 100% quality can be achieved, ASPL is facing quality issues. This is the problem to be addressed. Failure to do so would result in loss of clientele, leading to a possibility of going out of business. The goal of the project is to identify what is the sigma level at which the company is operating and to suggest improvements to the production process it achieve 6 σ level of operations.

(2) Measure current performance: Indicators of poor quality to find out what is the sigma level of the current operations? Current performance focusing on quality can be determined based on the cost incurred in the following phases:

(a) Sale returns: Sale returns are 1% of total sales. Gross sales are 25,000 units per annum at selling price of ₹20,000 each, therefore having a value of ₹ 50, 00, 00, 000. Sales returns @1% amount to ₹50, 00, 000 that represent the return of 250 units per annum. The cost of poor quality on account of these sale returns is the variable cost of the product ₹ 12,500 per unit. This is an avoidable cost amounting to ₹ 31, 25, 000 per annum that is 0.63% of sales (₹31, 25,000 / ₹ 50, 00, 00,000).

(b) Warranty claims: Warranty is an undertaking given by the company to repair the electronic component free of cost if defect occurs within a specific period of time. Hence, when the customer files a claim that is accepted by the company, it means that there has been an issue with the quality of the product. This is a liability / cost that should ideally be kept minimum, if not nil like ASPL's competitors. Warranty for the product is for one year from the date of sale. Warranty claims this year is ₹30, 00, 000, which is given to be representative of the average yearly warranty cost. Therefore, currently this cost amount to 0.60% of sales (₹30, 00, 000/ ₹50,00,00,000). Summarizing sale returns and warranty claims alone represent 1.23% of current sales. Considering the current percentage of deficiency, the company is operating between 3σ and 4σ level. The rest of the industry is able to achieve 6 σ level of operations. At zero defective production, there are no sale returns on account of quality and no warranty claim costs. Therefore, is tremendous scope for improvement in ASPL's operations.

(3) Analyze: What is the cause of poor quality? What is the cost of resources focused on quality?

Six sigma team studied the production process in detail. Replicating the issues detailed in the given problem:

(a) Problem 1: Assembly line workers, including new hires, learnt on the job as to how to assemble the input material to produce the final electronic component. This lead to many errors due to lack of proper standardized training. Therefore, on account of these errors, the entire electronic component has to assembled again.

(b) Problem 2: Sub-standard quality of raw material is detected on inspection only at the assembly line. Inspection leads to 10% rejection of units. By this time, the defective material is already fitted into the final el electronic component. Therefore, to entire component has to be reworked upon to replace the defective raw material input.

(c) Problem 3: Machines are outdated and are not entirely suitable for the current production methodology. The above factors result in rework on products, an internal failure cost, that lead to wastage of material, resources and capacity. Two costs incurred to focus on quality are cost of inspection and cost of rework, 2,525 units are reworked upon. Time required to rework 2,525 units per year = 2,525 units / 5 units per hour = 505 hours per year. Cost of rework is given to be ₹6,250 per hour. Therefore, total cost of rework per year = ₹ 31, 56, 250. Inspection cost for 2,000 hours at the assembly line is given to be ₹10,00,000 per annum. Therefore, total cost of resources currently incurred for quality = ₹41,56,250 per annum.

(4) Improve: Reduce errors and improve quality of the product While cost of resources currently incurred for quality is only 0.83% of sales (₹41, 56, 250/₹50, 00, 00, 000), a detailed analysis brings forth many qualitative aspects that ASPL needs to be address. If its competitors are able to achieve excellence in quality, so must ASPL, in order to remain in business. Therefore, following are the proposals that can provide solutions to the problems referred to above:

(a) Solution to Problem 1: Periodic training sessions to educate new hires and update workers in the assembly line on the latest techniques in production. Standardized and informed working will lead to lower errors and thereby improving product quality. Cost per year = 5,000 hours yearly training × ₹1,000 per hour = ₹ 50, 00, 000.

(b) Solution to Problem 2: Delay in detection of poor quality input can be resolved by streamlining the work flow. New function for quality planning and improvement, at the beginning of the process helps in early detection, without wastage of resources. Cost per year for introducing this functionality = ₹1, 50, 00,000.

(c) Solution to Problem 3: Replace old machines with newer ones. Machine upgrade will align the resource with the production requirements. This reduce chances of errors in the production process Cost of procurement: ₹3, 60, 00,000 has a life of 3 years. Therefore, annual depreciation is ₹1, 20, 00, 000.

(d) Consequences of implementing these proposals, as given in the problem, can result in the following improvements:

(i) Rework of products can be entirely eliminated.

(ii) Sale returns will reduce from 1% to 0% due to better quality of products.

(iii) Yearly Warranty claims will reduce from ₹30, 00,000 to nil per annum.

(iv) With the introduction of the new facility, time required for inspection at the assembly line would reduce from 2,000 hours to 1,200 hours. Cost of inspection at the assembly line would reduce from ₹10, 00,000 per annum to ₹6, 00,000 per annum.

(v) Due to better quality, ASPL can build better reputation with the customers which can further yield additional sales of 5,000 units per year.

When the company is capable to achieve points (i), (ii) an d (iii) milestones, it Would have achieved 6 σ operational level. The cost of quality report Summarizes the above discussion:

Cost of Quality Report

Cost of Quality Component	**Before Improvements**		**After Improvements**	
	Current Cost ₹	**% of Sales**	**Projected Cost ₹**	**% of Sales**
Preventive Cost				
Training (5,000 hrs. × ₹1,000 per hour)	xxx	xxx	50,00,000	50,00,000
Quality Planning and Improvement	xxx	xxx	1,50,00,000	2.50%
Appraisal Cost				
Inspection Cost	10,00,000	10,00,000	6,00,000	0.10%
Internal Failure Cost				
Rework	31,56,250	0.63%	xxx	0.00%
External Failure Cost				

Sale Returns	31,25,000	0.63%	xxx	0.00%
Warranty Claims	30,00,000	0.60%	xxx	0.00%
Total Cost of Quality	1,02,81,250	2.06%	2,06,00,000	3.43%
Yearly Sales	50,00,00,000		60,00,00,000	
Total Cost of Quality / Sales (%)	2.06%		3.43%	

(e) Cost of quality is 2.06% of sales of which 1.23% alone is external failure cost. This has an impact on the customer experience and can erode customer base. By implementing the six sigma team's proposal, this external failure cost on account of sale returns and warranty costs, can completely eliminated. Internal failure cost can also be eliminated. The increase in cost of quality proposed to be made would be a preventive cost to avoid failure of quality. The company should focus on preventing the error such that it ensures that product is of good quality when it reaches the customer at the very first instance. This enhances the customer experience and therefore eliminating the scope for external failures like sales returns and warranty claims. Better quality can yield further sales of 5,000 units per year. Therefore, an increase in spending on quality measures is justified since it not only yields significant improvements to quality but also brings in more sales orders.

Improvement to the financial position of the firm is summarized below:

Particulars	**Amount ₹**
Improved Contribution Margin (Ref. note 1)	3,75,00,000
Elimination of Goods Replacement	31,25,000
Elimination of Warranty Claims	30,00,000
Elimination of Rework	31,56,250
Savings in Inspection Cost	4,00,000
Total Benefit …(A)	4,71,81,250
Additional Costs Incurred	
Training	50,00,000
Quality Planning and Improvement	1,50,00,000
Increase in Fixed Cost (Yearly Depreciation of Upgraded Machines)	1,20,00,000
Total Additional Cost …(B)	3,20,00,000
Net Benefit …(A) - (B)	1,51,81,250

Note 1: Incremental Contribution: Sales have increased by 5,000 units. Selling Price is ₹ 20,000 per unit while variable cost is ₹ 12,500 per unit. Contribution is ₹ 7,500 per unit.

Conclusion: Six Sigma team's proposals are focused on preventing the error from occurring. Consequently, quality improves, sale improves and thereby can yield a net benefit of ₹1, 51, 81,250 per year to the company.

(5) Control: Maintain quality at 6σ level and keep the production facilities updated.

(i) Training sessions with workers can serve as two way communication Platform to detect other problems that can be resolved in more timely manner. Inputs received can also be used to improve the production work flow as well.

(ii) New function of quality planning and improvement can help the company be better informed about the latest production methodologies.

(iii) Updated machines are better equipped to handled changes in the production process since they are built with the latest technology. ASPL should do a continuous assessment of the state of its machines and upgrade them when necessary.

(20 Marks)

Q.4

(a)

(a) The internal Manufacturing cost of Component Alpha is as follows:

	Component Alpha
2 hours of direct labour, at ₹8 per hour	₹16.00
1.5 kg direct Material B, at ₹5 per kg	₹7.50
Variable overhead, labour related 2 hours	₹1.25
Variable overhead, machine related, 0.5 hours	₹0.125
Total variable cost	**₹24.875**

The buying price of the component is ₹50 per unit. So, if resources are readily available, the company should manufacture the component, because it is cheaper than buying it. However, due to the scarcity of resources in the near future, the contribution earned from the component needs to be compared with the contribution that can be earned from the other products.

Using Product 1 (though any product could be used the variable overhead rates per hour can be calculated:

Labour related variable overhead per unit = ₹1.25

Direct labour hours per unit = ₹16/₹8 = 2 hours

Labour related variable overhead per hour = ₹1.25/2 hours ₹0.625 per hour

Machine related variable overhead per unit = ₹1.25

Machine related variable overhead per hour = ₹1.25/5 hours = ₹0.25 per hour

Both material A and material B are limited in supply, but calculations are required to determine whether this scarcity affects our production plans. The resources required for the maximum demand must be compared with the resources available to determine whether either of the materials is a binding constraint.

	Product 1	**Product 2**	**Product 3**	**Product 4**	**Total**
Existing Contract	100 units	100 units	100 units	100 units	
Direct Material A	150 litres	100 litres	0 litres	100 litres	**350 litres**
Direct Material B	100 kgs	0 kgs	300 kgs	200 kgs	**600 kgs**

We can now determine whether Material A or Material B is a limiting factor:

	Maximum Availability	**Post-contract availability**	**Needed for total production**
Direct Material A	5,000 litres	4,650 litres	3,200 litres
Direct Material B	6,000 kgs	5,400 kgs	5,550 kgs

The security of **material B** is a binding constraint and therefore the contributions of each product and the component per kg of material B must be compared. (At this point, Product 2 can be ignored because it does not use material B):

	Product 1	**Product 3**	**Product 4**	**Component Alpha**
Contribution	₹32	₹51.325	₹58.75	
Direct Material B	1 kg	3 kgs	2 kgs	
Contribution per kg of Material B	₹32.00	₹17.10	₹29.38	₹16.75 (W1)
Rank	1	3	2	4

Since component Alpha is the lowest ranked usage of material B. **the company should continue to purchase the component** so that the available resources can be used to manufacture Product 1, Product 4 and Product 3.

We can now determine whether Material A or Material B is a limiting factor.

W1 - Component Alpha - Contribution per kg of B	
Buying cost of component Alpha	₹ 50.00
2 hours of direct labour, at ₹8 per hour	(₹ 16.00)
1.5 kg direct Materiel B. at ₹5 per kg	(₹ 7.50)
Variable overhead. labour related 2 hours	(₹ 1.250)
Variable overhead, machine related, 0.5 hours	(₹ 0.125)
Contribution per component	**₹ 25.125**

Contribution per kg of Material B = ₹ 25.125/1.5 kgs of B = ₹ 16.75

(4 Marks)

(b) Direct material B at ₹ 5/kg available: 5,400 kgs

First, we make Product 1: 900 units @ 1 kgs per unit = 900 kgs.

This leaves 4,500 kgs available for the next best-ranking product, Product 4. That is enough for (4,500 kgs/2 kgs per unit) = 2,250 units of Product 4. We only need 900 units of Product 4 though i.e. 1,800 kgs, which leaves (4,500 – 1,800 kgs = 2,700 kgs) available for the next product, Product 3.

Each unit of Product 3 uses 3 kgs of Material B, we can therefore make 900 units of Product 3.

Summary

	Product 1	**Product 2**	**Product 3**	**Product 4**
Contractual units	100 units	100 units	100 units	100 units
Non- contractual units	900 units	950 units	900 units	900 units
Total	**1,000 units**	**1,050 units**	**1,000 units**	**1,000 units**

(6 Marks)

(c) The decision concerning the purchase of the component would change if the contribution from its manufacture were equal to the least best contribution from the products using material B. Apart from the minimum demand constraint the

least best usage is derived from product 3 which has a contribution per kg of ₹17.10 which is ₹ 0.35 per kg higher than that from component Alpha.

Since each unit of Alpha requires 1.5 kgs of B then the buying price would have to be 1.5 × ₹ 0.35 = ₹ 0.525 per component higher than at present before it would have the same rank as product 3. Thus the buying price at which the decision would change = ₹ 50 + ₹ 0.525 = ₹ 50.525.

(2 Marks)

(b)

(a) Initial order

	₹
Material (10 × ₹30)	300
Labour and variable overhead (100 × ₹3)	300
Setting-up cost (see note)	1,000
Total	₹1,600
Minimum price each (₹1,600 ÷ 10)	₹160

Note: If there is no guarantee of a follow-up order, the setup costs must be recovered on the initial order.

(b) Follow-on order

- b = log 0,8/log 2 = – 0.321928
- If production increases to 20 watches (2 batches) then the cumulative average time per batch is:
  $y = ax^b$
  $y = 100 \times 2^{-0.321928}$
  y = 80.00 hours
- i.e. cumulative time for 20 watches (2 batches) = 160 hours
- Therefore, the time taken for the second batch of ten watches 160 – 100 = 60 hours.

Costs are therefore:

	₹
Material (10 x ₹30)	300
Labour and variable overhead (60 × ₹3)	180
Total	480
Minimum price each	48

Note: The set up and costs have been recovered on the initial order can therefore be ignored.

(c) Both order together

Total costs are:

	₹
Material (20 × ₹ 30)	600
Labour (160 hours × ₹ 3)	480
Setting-up cost	1,000
Total	2,080
Minimum price each	104

Note: This is the mean of the two previous prices.

(d) Mass production

- Total production = 20 watches for the special order + 140 watches for mass production = 160 watches or 16 batches.
- $y = ax^b$
  Average time/batch for first 2 batches (i.e. first 20 watches)
  $= 100 \times 2^{-0.3219} = 80$ hours
  Total time for first 2 batches = 80 x 2 = 160 hours (as before).
- Average time per batch for first 16 batches (i.e. first 160 watches)
  $= 100 \times 16^{-0.321928} = 40.96$ hours
- Total time for first 16 batches = 40.96 x 16 = 655.36 hours.
  Hence total time for batches 3 to 16 (i.e. the 140 mass produced units)
  = (655.36 – 160) hours = 495.36 hours.

Cost of first 140 mass-production models:

	₹
Material (140 x ₹ 30)	4,200
Labour and variable overhead (495.36 x ₹3)	1,486
Marketing	250
Total Cost	**5,936**
Revenue (140 x ₹45)	6,300
Profit	364

- Average time per batch for first 16 batches (i.e. first 160 watches) = 100 x $16^{-0.321928}$ = 40.96 hours

Total time for first 16 batches = 40.96 x 16 = 655.36 hours.

Hence total time for batches 3 to 16 (i.e. the 140 mass produced units) = (655.36 -160) hours = 495.36 hours.

Cost of first 140 mass-production models:

	₹
Material (140 x ₹ 30)	4,200
Labour and variable overhead (495.36 x ₹ 3)	1,486
Marketing	250
Total Cost	5,936
Revenue (140 x ₹ 45)	6,300
Profit	364

(8 Marks)

Q.5

(a)

(a)

	Division A (₹)	Division B (₹)	Total (₹)
Sales:			
- internal	10,000 x ₹ 17.60 (W1) = 176,000	n/a	1,76,000
- external	n/a	10,000 x ₹ 35 = 3,50,000	3,50,000
Costs:			
- transfer costs	n/a	(1,76,000) (as above)	(176,000)
- variable costs	10,000 x ₹ 10 = (1,00,000)	10,000 x ₹ 5 = (50,000)	(150,000)
- fixed costs	(60,000)	(30,000)	(90,000)
Profit	**16,000**	**94,000**	**1,10,000**

(3 Marks)

(b)

	Division A (₹)	Division B (₹)	Total (₹)
Sales:			
- internal	10,000 x ₹ 11 (W2) = 1,10,000	n/a	176,000
- external	n/a	10,000 x ₹ 35 = 3,50,000	3,50,000
Costs:			
- transfer costs	n/a	(1,76,000) (as above)	(1,10,000)
- variable costs	10,000 x ₹10 = (1,00,000)	10,000 x ₹ 5 = (50,000)	(1,50,000)
- fixed costs	(60,000)	(30,000)	(90,000)
Profit	(50,000)	1,60,000	1,10,000

Working 1

	₹
Material cost per unit	8
Other variable costs per unit	2
Fixed cost per unit (S60,000 + 10,000)	6
Full cost	16
Plus 10% profit	1.60
Transfer price = full cost + 10%	17.60

Working 2

	₹
Material cost per unit	8
Other variable costs per unit	2
Total variable cost	10
Plus 10% profit	1
Transfer price = marginal cost + 10%	11

(3 Marks)

(c)

- Division A would prefer the transfer price to be set at full cost plus 10%. This would give them a budgeted profit of ₹ 16,000, compared to a loss of ₹ 50,000 when the marginal cost transfer price is used.

- Division B would prefer the transfer price to be set at variable cost + 10%. This gives them a profit of ₹ 1,60,000 compared with a profit of ₹ 94,000 if the full cost transfer price is used.
- There is a natural conflict between the divisions and the transfer price would have to be negotiated to ensure that each division views it as being fair.
- The company as a whole will be indifferent to the transfer price. There is no external market for Division A's goods and the profit will be ₹ 1,10,000 regardless of the transfer price set.

(4 Marks)

(b)

(1) C

The full cost per unit includes all productio6n costs, including a share of fixed overheads.

$$\text{OAR} = \frac{\text{Budgeted production overhead (₹10,44,000, per question}}{\text{Activity level (Total number of labour hours)}}$$

$$\text{OAR} = \frac{₹\,10,44,000}{2,32,000 \text{ labour hours (W1)}}$$

OAR = ₹ 4.50 per labour hour

	Product W	**Product X**	**Product Y**
Material costs per unit, as per question	₹ 35	₹ 45	₹ 30
Labour costs per unit, as per question	₹ 40	₹ 30	₹ 50
Fixed overhead cost per unit	₹ 4.50 x 4 hours = ₹ 18	₹ 4.50 x 3 hours = ₹ 18.50	₹ 4.50 x 5 hours = ₹ 22.50
Total = full cost per unit	**₹ 93**	**₹ 88.50**	**₹ 102.50**

(2 Marks)

(2) C

	Product W	**Product X**	**Product Y**
Material costs per unit, as per question	₹ 35	₹ 45	₹ 30
Labour costs per unit, as per question	₹ 40	₹ 30	₹ 50
Material ordering costs per unit (W 2)	₹ 4.40	₹ 4.125	₹ 2.75
General running costs per unit (W 3)	₹ 14.21	₹ 10. 655	₹ 17.759
Total costs per unit using ABC	**₹ 93. 61**	**₹ 89.79**	**₹ 100.51**

(2 Marks)

(3) B

Statement (4) is not correct. The mark-up percentage does not have to be fixed: it may vary and be adjusted to reflect market conditions.

(2 Marks)

(4) D

All statements are correct, apart from statement (1), which should refer to the minimum (not the maximum) price. The use of marginal costing identifies the variable cost of the item produced and thus provides a clear indication of the minimum price that should be charged so as to avoid a negative contribution.

(2 Marks)

(5) C

Statement 2 is not correct. Investing in new machines would hopefully reduce the number of labour hours.

Working (W1)	**Product W**	**Product X**	**Product Y**
Direct labour hours per unit	4 Hours	3 Hours	5 Hours
Total number of units	15,000 Units	24,000 Units	20,000 units
Total number of hours: 2,32,000 hours (W)	60,000 hours	72,000 Hours	1,00,000 hours

The ‘material ordering costs’ activity will be associated with the number of supplier order. There are (120 + 180 + 100) = 400 supplier orders in total.

$$\text{Cost per supplier order} = \frac{₹\,2,20,000}{400\text{ orders}} = ₹550 \text{ per supplier order}$$

	Product W	Product X	Product Y
Material ordering costs per unit	(₹ 550 per order x 120)/15,000 = ₹ 4.40 per unit	(₹ 550 per order x 180)/24,000 = ₹ 4.125 per unit	(₹ 550 per order x 100)/20,000 = ₹ 2.75 per unit

(W3)

The 'General running costs' activity will be associated with the number of labour hours.

$$\text{Cost per order} = \frac{₹\,8,24,000}{2,32,000\text{ lab hours}} = ₹\,3.551 \text{ per labour hour}$$

	Product W	Product X	Product Y
General running costs per unit @ ₹ 3.551 per labour hour	₹ 14.21	₹ 10. 655	₹ 17.759

(2 Marks)

Q.6

(a)

		₹	₹
Material A (note 1)	11000 kgs ₹ 2 – ₹ 300	1,700	
	1,000 kgs ₹10	10,000	
			11,700
Material B (note 2)	1,000 kgs @ ₹15		15,000
Material C (note 3)	500 kgs - opportunity cost		8,000
Material D (note 4)	50 litres @ ₹ 50		(2,500)
Skilled labour (note 5)	1,000 hrs ₹ 25		25,000
Semi-skilled labour (note 6)	500 hrs ₹ 22.50		11,250
Unskilled labour (note 7)	500 hrs ₹12 (opportunity cost)		6,000
Minimum tender price = total of relevant cash flows			**74,450**

Notes

(1) There are 1,000 kgs in stock and these will not be replaced. These would otherwise be sold at a net gain of ₹1,700. This gain is therefore foregone as a

result of using this material in the contract. The other 1,000 kgs are out of stock and therefore the relevant cost is the current purchase price of ₹10 per kg.

(2) The material is in stock but will be replaced and therefore the relevant cost is the current purchase price of ₹15 per kg.

(3) The material is in stock and there are two options if this material is not used for the contract:

Option 1 - Sell it for ₹ 6,000.

Option 2 - Use it as a substitute and save ₹ 8,000.

Option 2 is preferable. This is therefore the opportunity cost of using it in the contract.

(4) The material is in stock, and will not be replaced. The cost of disposing of 50 litres will be saved (@ ₹50/litre, i.e. ₹ 2,500). Saving this cost is a relevant benefit.

(5) The incremental cost of paying for the labour needed.

(6) 1,500 spare hours have already been paid for as the workforce are on annual contracts. The additional cash flow is therefore the extra 500 hours that are needed at time-and-a-half.

(7) For each hour diverted from their normal jobs contribution of ₹ 2 will be foregone. This together with the cost of paying the workers to do the project amounts to a relevant cost of ₹ 12 per kg. They would not be hired at ₹ 20 per hour as this is more expensive.

(8) Fixed overheads can be ignored as they are not incremental.

(9) Costs of preparing the tender are all sunk costs and hence must be ignored.

(10) Profit element should be ignored since a minimum contract price is being calculated.

(12 Marks)

(b)

Proposal (a) will increase the sales revenue but the increase in costs will be greater:

	₹'000
Sales (1,50,000 @ ₹7)	1,050
Variable costs (1,50,000 @ ₹ 5)	750
Contribution (₹3 per unit)	300
Fixed costs plus advertising	164
Net Profit	138

This is lower than current forecast

Proposal (b)

- Reduces variable costs by ₹ 60,000 (₹ 3,00,000 x 20%)
- But increases fixed costs by ₹ 72,000 and is therefore not to be recommended unless the total volume increases as a result of the policy (e.g. if the supply of the components were previously a limiting factor).

Conclusion:

Neither proposal should be accepted.

(4 Marks)

(c)

(1) Skimming and the penetration-pricing strategies.

(2) Penetration and volume discounting rely substantially on relatively low-price offers; this is also true to a lesser extent of complementary and product line pricing strategies.

(3) Complementary and product-line pricing strategies.

(4) Volume discounting.

(4 Marks)