2

Cost Concepts in Decision Making

LEARNING OBJECTIVES :

After studying this unit you will be able to :

- Understand the meaning and prerequisites of relevant costs.
- Learn and apply the opportunity cost concept in capital expenditure decisions.
- Apply the Incremental/Differential cost techniques in managerial decisions.
- Ascertain the ways of optimising the investment plan.
- Make use of cash flow technique regarding decision relating to investment alternatives.

2.1 INTRODUCTION

We saw that the word cost has different meaning in different settings and the kind of cost concept used in a particular situation depends upon the circumstances/requirement of each case. The costs reported by financial accountants are actual costs. For the purpose of decision making and control, costs are distinguished on the basis of their relevance to the different type of decisions and control functions. For business decision making purposes, relevant costs rather than actual costs are considered. Relevant costs constitute a practical basis of decision making which is different from historical cost approach.

Relevant cost : Costs which are relevant for a particular business option, which are not historical cost but future costs to be associated with different inputs and activities related a business process. Actual, current or historical costs may be used for estimating the future costs of each alternative choice

Relevant cost in decision making process : In business operation, there may be alternative choices of doing things. The management accountant has a great role in the dicision making process of which one out of the alternatives is most profitable, keeping in mind of its technical fasibility. In the planning process of future business operation, these decisions are taken into consideration.

The contribution approach, coupled with the ability to distinguish between relevant and irrelevant costs will prove to be a boon for the managers in arriving at correct conclusions in the challenging area of decision making.

Following two conditions need to be satisfied for a cost to be called a relevant cost:-

1. **Occur in the Future** - every decision deals with selecting a course of action based on its expected future results
2. **Differ among the alternative courses of action** - costs and revenues that do not differ will not matt**er and will have no bearing on t**he decision being made.

For example, while considering a proposal for plant replacement by discarding the existing plant, the original cost and the present depreciated book value of the old plant are irrelevant as they have no impact on the decision for replacement just going to be taken place. However the expected sales value of the discarded plant is relevant, as it just goes to reduce the amount of investment to be made in the new plant and so it has an influence on the decision. Moreover, outcome of the investment is also taken into consideration for decision making.

Relevant cost analysis helps in drawing the attention of managers to those elements of cost which are relevant for the decision.

The following examples pin-point those costs which are not relevant to a decision at hand. These irrelevant costs do not play any role in the decision making:

(i) ***Historical or sunk costs are irrelevant as they do not play any role in the decision making process.*** But they are the best basis for predicting future costs. For example, if old and obsolete spare parts worth Rs.5,00,000 are to be scrapped and sold for Rs.15,000, the original cost of Rs.5,00,000 is irrelevant to the decision.

(ii) ***Even among future costs, those variable costs which will not differ under various alternatives are irrelevant.*** For example, a company proposes to re-arrange plant facilities and estimates its future costs under two alternative choices, as under:

Particulars	*Do not re-arrange*	*Re-arrange*
	Rs.	Rs.
Direct materials cost/unit	10.00	10.00
Direct labour cost/unit	5.00	4.00

In the above example, the direct material cost remains constant under both the alternatives, hence it is irrelevant to the decision “as to whether plant facilities are to be re-arranged or not”. Only direct labour cost which differs under the two alternatives is relevant. Since there is a saving of Re.1/- per unit in the second alternative, the company is advised to go in for re-arrangement of plant facilities.

(iii) ***If fixed expenses remains un-changed under different alternatives such expenses are irrelevant to the decision at hand.*** Consider, for example, the following data given for a hypothetical firm:

Expected sales	50,000 units
Variable costs	Rs.2.50 per unit
Fixed costs	Rs.1.50 per unit
Selling price	Rs.5.00 per unit

The firm expects to get a special export order for 10,000 units at a price of Rs.3.75 per unit. Advise whether the export order should be accepted or not.

In order to advise the firm, we may analyse the figures as under:

Particulars	*Sales at 50,000 units*	*Sales at 60,000 units*	*Difference*
	Rs.	Rs.	Rs.
Sales values	2,50,000	2,87,500	+37,500
Less : Variable costs	1,25,000	1,50,000	–25,000
Contribution margin	1,25,000	1,37,500	+12,500
Less : Fixed expenses	75,000	75,000	—
Net profit	50,000	62,500	+12,500

The unit total cost is Rs.4.00 (Rs.2.50 variable plus Rs.1.50 fixed). If we use this unit total cost in taking a decision to accept the sale of additional 10,000 units, our decision will be wrong because the additional unit will incur a loss of Re.0.25 (Rs.3.75 – Rs.4.00). If, however, we analyse the costs, we find that fixed expenses are irrelevant to the decision and, hence by excluding them we find that the new order is profitable.

Fixed costs should, however, be considered as relevant if they are expected to be altered by the decision at hand. Suppose, in the above example, the plant capacity is only 50,000 units and additional 10,000 units can only be manufactured by expanding capacity which entails additional fixed expenses of Rs.50,000. This increase in fixed expenses is relevant to the decision and will be compared with the incremental contribution of Rs.12,500. This will alter the earlier choice.

(iv) ***Quite often question arises whether the book value of an equipment is relevant or not.*** Three points as described below emerge in such circumstances:

(a) Book value of old equipment is irrelevant because it is a past cost.

(b) The disposal value of an equipment is relevant because it adds to the cash inflow arising from the decision.

(c) Cost of new equipment is relevant because cash outflow arises by the decision to buy the new equipment.

Consider the following example as an illustration of the principle. A firm is considering the replacement of an existing machine whose written down value is Rs.4,000 and has four years life to run. The data are analysed as under:

	For a period of four years		
Particulars	*Keep*	*Replace*	*Difference*
	Rs.	Rs.	Rs.
Sales : (A)	40,000	40,000	—
Costs	32,000	22,400	+ 9,600
Depreciation:			
Old machine	4,000		+ 4,000
New machine		6,000	– 6,000
Write off of old machine		4,000	– 4,000
Disposal of the old machine		– 400	+ 400
Total expenses : (B)	36,000	32,000	+ 4,000
Operating income : {(A) – (B)}	4,000	8,000	+ 4,000

The above analysis shows that the replacement of the machine will be advantageous by Rs.4,000.

It may be noted that in the above example, the written down value of the old machine has been written off in replacing old machine as loss because it is sunk cost. Thus it appears in both the proposals and cancels out and proves that it is irrelevant to the decision. Since the disposal value goes to reduce costs, or increases revenue and the depreciation cost of the new equipment affects such outflow, both these expenses are relevant to the decision.

In decisions involving the retention or replacement of a machine, the relevant cost concept may help in arriving at the proper decision. However, such decisions are best taken through discounted cash flow analysis.

This is because the relevant cost concept ignores the fact that under the two alternatives, cash inflows and outflows will accrue at different points of time. In the case sited above, we have taken data for four years. However, if we replace the machine, the new machine will run for more than four years. Thus, the two machines have different number of years to serve and they give rise to different cash flows. The best course is to work out the cash flows and discount them at proper rate. This will give correct result.

Illustration : Decision on acceptance of a new offer

A company has been making a machine to order for a customer, but the customer has since gone into liquidation, and there is no prospect that any money will be obtained from the winding up of the company.

Costs incurred to-date in manufacturing the machine are Rs. 50,000 and progress payments of Rs.15,000 have been received from the customer prior to the liquidation.

The sales department has found another company willing to buy the machine for Rs.34,000 once it has been completed.

To complete the work, the following costs would be incurred:

(a) Materials-these have been bought at a cost of Rs.6,000. They have no other use, and if the machine is not finished, they would be sold as scrap for Rs.2,000.

(b) Further labour costs would be Rs.8,000. Labour is in short supply, and if the machine is not finished, the work force would be switched to another job, which would earn Rs.30,000 in revenue, and incur direct costs (not including direct labour, of Rs.12,000 and absorbed (fixed) overhead of Rs.8,000).

(c) Consultancy fees, Rs.4,000. If the work is not completed, the consultant's contract would be cancelled at a cost of Rs.1,500.

(d) General overheads of Rs. 8,000 would be added to the cost of the additional work.

Should the new customer's offer be accepted? Prepare a statement showing the economics of the proposition.

Solution

Working notes: (i) Costs incurred in the past are sunk costs and revenue received in the past is also not relevant because they do not have a bearing on a decision at hand. Hence costs of Rs.50,000 incurred to date in manufacturing the machine and progress payment (revenue) of Rs.15,000 received are irrelevant and should be ignored.

(ii) The price paid in the past for the material is irrelevant. The only relevant cost of materials affecting the decision is the opportunity cost in the form of revenue from scrap which would be foregone i.e.Rs.2,000.

(iii)	*Labour costs :*	Rs.
	Contribution from the use of labour at another job	
	foregone is opportunity cost and is relevant	
	(Rs.30,000 – Rs.8,000 – Rs.12,000)	10,000
(iv)	Differential (Incremental) cost of consultancy	
	for completing the work	
	Cost of completing the work	4,000

Less : Cost of cancelling the contract	1,500
Incremental cost of completing the work	2,500

(v) Absorbed overheads and general overheads are allocated costs and should be ignored.

Statement showing the economics of the proposition

(Only relevant costs considered)		Rs.	Rs.
Revenue from completing work : (A)			34,000
Less:	Relevant cost of:		
	Material – Opportunity cost	2,000	
	Labour – Cost to be incurred	8,000	
	Opportunity cost	10,000	
Incremental cost of consultancy		2,500	
Cost of completing work : (B)			22,500
Extra profit to be earned by accepting the offer of the new customer to complete the work : {(A) – (B)}			11,500

Since the acceptance of the offer would yield an extra profit of Rs.11,500, the offer should be accepted.

Alternative solution on cash flow basis :

Statement showing economics of the proposition

	When machine is completed	*When machine is not completed*	*Incremental cash flow*
	Rs.	Rs.	Rs.
Cash inflow from sale of machine	34,000	—	34,000
Cash inflow from :			
Sale of material as scrap	—	2,000	–2,000
Use of labour at another job Rs. 30,000 – (Rs. 8,000 + Rs. 12,000)	—	10,000	–10,000
Total cash inflow : (A)	34,000	12,000	22,000
Cash outflow on :			

Labour	8,000	—	–8,000
Consultancy fees	4,000	1,500	–2,500
Total cash outflow : (B)	12,000	1,500	–10,500
Net cash inflow {(A) – (B)}	22,000	10,500	11,500

Completion of machine would result in an incremental cash inflow of Rs,.11,500, hence the machine should be completed.

Illustration : Cost Sheet of a product with relevant cost

Tiptop Textiles manufactures a wide range of fashion fabrics. The company is considering whether to add a further product the "Superb" to the range. A market research survey recently undertaken at a cost of Rs.50,000 suggests that demand for the "Superb" will last for only one year, during which 50,000 units could be sold at Rs.18 per unit. Production and sale of "Superb" would take place evenly throughout the years. The following information is available regarding the cost of manufacturing "Superb".

Raw Materials: Each "Superb" would require 3 types of raw material Posh, Flash and Splash. Quantities required, current stock levels and cost of each raw material are shown below. Posh is used regularly by the company and stocks are replaced as they are used. The current stock of Flash is the result of overbuying for an earlier contract. The material is not used regularly by Tiptop Textiles and any stock that was not used to manufacture "Superb" would be sold. The company does not carry a stock of Splash and the units required would be specially purchased.

Raw Material	*Quantity required per unit of Superb (metres)*	*Current stock level (metres)*	*Costs per metre of raw material*		
			Original cost	*Current replace-ment cost*	*Current resale value*
			Rs.	Rs.	Rs.
Posh	1.00	1,00,000	2.10	2.50	1.80
Flash	2.00	60,000	3.30	2.80	1.10
Splash	0.5	0	—	5.50	5.00

Labour : Production of each "Superb" would require a quarter of an hour of skilled labour and two hours of unskilled labour. Current wage rates are Rs.3 per hour for skilled labour and Rs.2 per hour for unskilled labour. In addition, one foreman would be required to devote all his working time for one year in supervision of the production of Superb. He is currently paid an annual salary of Rs.15,000. Tiptop Textiles is currently finding it very difficult to get skilled labour. The skilled workers needed to manufacture "Superb" would be transferred from another job on which they are earning a contribution surplus of Rs.1.50 per labour hour, comprising sales revenue of Rs.10.00 less skilled labour wages of Rs.3.00 and other variable costs of Rs.5.50. It would not be possible to employ additional skilled labour during the coming

year. Because the company intends to expand in the future, it has decided not to terminate the services of any unskilled worker in the foreseeable future. The foreman is due to retire immediately on an annual pension of Rs.6,000 payable by the company. He has been prevailed upon to stay on for a further year and to defer his pension for one year in return for his annual salary.

Machinery: Two machines would be required to manufacture "Superb" MT 4 and MT 7. Details of each machine are as under:

		Start of the year	*End of the year*
		Rs.	Rs.
MT 4	Replacement cost	80,000	65,000
	Resale value	60,000	47,000
MT 7	Replacement cost	13,000	9,000
	Resale value	11,000	8,000

Straight line depreciation has been charged on each machine for each year of its life. Tiptop Textiles owns a number of MT 4 machines, which are used regularly on various products. Each MT 4 is replaced as soon as it reaches the end of its useful life. MT 7 machines are no longer used and the one which would be used for "Superb" is the only one the company now has. If it was not used to produce "Superb", it would be sold immediately.

Overheads: A predetermined rate of recovery for overhead is in operation and the fixed overheads are recovered fully from the regular production at Rs.3.50 per labour hour. Variable overhead costs for "Superb" are estimated at Rs.1.20 per unit produced.

For the decision-making, incremental costs based on relevant costs and opportunity costs are usually computed.

You are required to compute such a cost sheet for "Superb" with all details of materials, labour, overhead etc., substantiating the figures with necessary explanations.

Solution

Details of relevant costs with explanations:

(i) Market Research Survey expenses of Rs.50,000 is sunk cost and hence not relevant for the decision on hand.

(ii) *Raw materials:*

(a) Posh is used regularly and stocks are replaced as they are used. Therefore, its current replacement cost of Rs.2.50 is relevant.

Posh: 50,000 metres × Rs.2.50 = Rs.1,25,000

(b) 1,00,000 metres of Flash are required for the output of "Superb". There are already 60,000 metres in stock as a result of overbuying for an earlier contract purchased @

Rs.3.30 per metre, and 40,000 metres additionally would be purchased at the current replacement cost of Rs.2.80 per metre. If "Superb" were not produced, the company would have sold 60,000 metres of Flash at Rs.1.10. This is an opportunity foregone and relevant. Hence

Flash : –

Incremental cost		Rs.
40,000 metres × Rs.2.80	=	1,12,000
Opportunity cost		
60,000 metres × Rs.1.10	=	66,000
		1,78,000

(c) 25,000 metres of splash would be specially purchased for the output

Splash 25,000 metres × Rs.5.50 = Rs.1,37,500

(iii) *Labour:*

To manufacture 50,000 units of "Superb"

Skilled labour required: 50,000 × ¼ = 12,500 hours, and

Unskilled labour required: 50,000 × 2 = 1,00,000 hours.

Wage rate for skilled labour is Rs.3 per hour. If "Superb" were not manufactured and the skilled labour were not transferred, they would have given a clean contribution of Rs.1.50 per hour. This is the cost of an opportunity foregone:

Therefore,

Cost of skilled labour:	Rs.
Cost of deployment (12,500 × Rs.3)	37,500
Add: Opportunity cost (12,500 × Rs.1.50)	18,750
	56,250

Unskilled labour:

No work has suffered and no extra cost is involved hence cost of unskilled labour: Zero

Foreman:

	Rs.
Annual salary	15,000
Less: Pension saved	6,000
Effective cost	9,000

(iv) *Machinery:*

MT 4 machines are used and replaced regularly. The difference of the replacement cost between start and end of the year is relevant.

Hence, MT 4 cost of using: Rs.15,000

MT 7 machine is not in vogue and will be sold now or in near future. The fall in its resale value represents the relevant cost.

Hence, cost of using MT 7: Rs.11,000 – Rs.8,000 = Rs. 3,000

(v) *Overheads:*

Fixed overheads have been recovered fully from existing production. So its rate of recovery is not relevant.

Variable overheads: 50,000 × Rs.1.20 = Rs.60,000

Now we can prepare the cost sheet.

Cost sheet for 50,000 units of "Superb"

		Rs.	Rs.
Raw material:			
	Posh	1,25,000	
	Flash	1,78,000	
	Splash	1,37,500	4,40,500
Labour:			
	Skilled	56,250	
	Unskilled	0	
	Foreman	9,000	65,250
Machinery costs			
	MT4	15,000	
	MT7	3,000	18,000
Variable overheads			60,000
Total cost			5,83,750
Profit (Rs.9,00,000 – Rs. 5,83,750)			3,16,250
Sales revenue (50,000 × Rs.18)			9,00,000

Illustration : Decision making on showing picture in a theatre

The Officers' Recreation Club of a large public sector undertaking has a cinema theatre for the exclusive use of themselves and their families. It is a bit difficult to get good motion pictures for show and so pictures are booked as and when available.

The theatre has been showing the picture "Blood Bath" for the past two weeks. This picture which is strictly for Adults only has been great hit and the Manager of the theatre is convinced that the attendance will continue to be above normal for another two weeks, if the show of "Blood Bath" is extended. However, another popular movie, eagerly looked forward to by both adults and children alike, - "Appu on the Airbus" is booked for the next two weeks. Even if "Blood Bath" is extended, the theatre has to pay the regular rental on "Appu on the Airbus" as well.

Normal attendance at the theatre is 2,000 patrons per week, approximately one-fourth of whom are children under the age of 12. Attendance for "Blood Bath" has been 50% greater than the normal total. The manager believes that this would taper off during a second two weeks, 25% below that of the first two weeks during the third week and 33.1/3% below that of the first two weeks during the fourth week. Attendance for "Appu on the Airbus" would be expected to be normal throughout its run, regardless of the duration.

All runs at the theatre are shown at the regular price of Rs. 2 for adults and Rs. 1.20 for children under 12. The rental charge for "Blood Bath" is Rs. 900 for one week or Rs. 1,500 for two weeks. For "Appu on the Airbus" it is Rs.750 for one week or Rs. 1,200 for two weeks. All other operating costs are fixed Rs. 4,200 per week, except for the cost of potato wafers and cakes which average 60% of their selling price. Sales of potato wafers and cakes regularly average Rs. 1.20 per patron, regardless of age.

The Manager can arrange to show "Blood Bath" for one week and "Appu on the Airbus" for the following week or he can extend the show of "Blood Bath" for two weeks; or else he can show "Appu on the Airbus" for two weeks, as originally booked.

Show by computation, the most profitable course of action he has to pursue.

Solution

THE OFFICERS' RECREATION CLUB

Comparative predicted income for two weeks

	Three decision alternatives		
	Show "Blood Bath" for two weeks	*Show "Blood Bath" for one week and "Appu on the Airbus" for the following week*	*Show "Appu on the Airbus" for two weeks*
Attendance:			
Adults:			
First week	2,250	2,250	1,500
Second week	2,000	1,500	1,500
	4,250	3,750	3,000

Children:			
First week	—	—	500
Second week	—	500	500
Total attendance	4,250	4,250	4,000
Revenue:	Rs.	Rs.	Rs.
Sale of Tickets:			
Adults @ Rs.2/-	8,500	7,500	6,000
Children @ Rs.1.20	—	600	1,200
Sale of Potato Wafers & Cakes			
@ Rs.1.20 per patron	5,100	5,100	4,800
Total revenue: (A)	13,600	13,200	12,000
Costs *(only relevant):*			
Hire charges of			
"Blood Bath"	1,500	900	—
Cost of Potato Wafers & Cakes			
(60% of their selling price)	3,060	3,060	2,880
Total relevant cost: (B)	4,560	3,960	2,880
Profit: {(A) – (B)}	9,040	9,240	9,120

It is seen from the above statement that the most profitable course of action is to show each film for one week. Hence, the manager should arrange to show "Blood Bath" for one week and "Appu on the Airbus" for the following week.

Note: The hire charges for "Appu on the Airbus" and the fixed operating costs of Rs.4,200 per week are irrelevant to this analysis as these are committed fixed costs.

Illustration : Dicision making on pricing aagainst a special order

(a) A machine which originally cost Rs.12,000 has an estimated life of 10 years and is depreciated at the rate of Rs.1,200 per year. It has been unused for sometime, however, as expected production orders did not materialise. A special order has now been received which would require the use of the machine for two months.

The current net realisable value of the machine is Rs.8,000. If it is used for the job, its value is expected to fall to Rs.7,500. The net book value of the machine is Rs.8,400. Routine maintenance of the machine currently costs Rs.40 per month. With use, the cost of maintenance and repairs would increase to Rs.60 per month.

What would be the relevant cost of using the machine for the order so that it can be charged as the minimum price for the order?

(b) X Ltd. has been approached by a customer who would like a special job to be done for him and is willing to pay Rs.22,000 for it. The job would require the following materials:

Material	*Total units required*	*Units already in stock*	*Book value of units in stock* Rs./unit	*Realisable value* Rs./unit	*Replacement cost* Rs./unit
A	1,000	0	—	—	6
B	1,000	600	2	2.5	5
C	1,000	700	3	2.5	4
D	200	200	4	6	9

(i) Material B is used regularly by X Ltd. and if stocks are required for this job, they would need to be replaced to meet other production demand.

(ii) Materials C and D are in stocks as a result of previous excess purchase and they have restricted use. No other use could be found for material C but material D could be used in another job as substitute for 300 units of material E which currently costs Rs.5 per unit (of which the company has no units in stock at the moment).

What are the relevant costs of material, in deciding whether or not to accept the contract? Assume all other expenses on this contract to be specially incurred besides the relevant cost of material is Rs.550.

Solution

(a) Relevant costs of using the machine for the order	Rs.
(i) Loss in the net realisable value of machine by using it on the order (Rs.8,000 – Rs.7,500)	500
(ii) Additional maintenance and repair for two months, i.e., (Rs. 60 – Rs.40) × 2	40
Minimum price	540

Notes (a) (i) Books value of Rs.8,400 is irrelevant for decision.

(ii) Net realisable value of the machine fall from Rs.8,000 to Rs.7,500. This loss of Rs.500 is relevant for decision, because it is influenced exclusively by the decision.

(iii) Rs.7,500 will be realised after months at least. Therefore, time value of Rs.7,500 for two months atleast. Therefore, present value of future realisable value of Rs.7,500 should be found out and this present value should be

deducted from Rs.8,000. This will be the correct relevant cost in place of Rs.500 shown above in the absence of discounting factor.

(b) (i) Material A is not yet owned. It would have to be purchased in full at the replacement cost of Rs.6.00 per unit. Relevant cost is therefore 1,000 units at the replacement Cost.

(ii) Material B is used by the company regularly. There is already existing a stock of 600 units. If these are used in the contract, a further 400 units would have to be purchased.

Relevant cost is therefore 1,000 units at the replacement Cost.

(iii) Material C: 1,000 units of material C are required. 700 units are already in stock. If it is used for the contract, a further 300 units will have to be purchased at a replacement cost of Rs.4.00 each. The existing stock of 700 units will not be replaced. If they are used for the contract, they cannot be used @ Rs. 2.50 each unit. The realisable value of these units 700 units @ Rs.2.50 per unit represent opportunity cost.

(iv) Material D is already in stock and will not be replaced. There is an opportunity cost of using D in the contract. It has following two uses:

It can be sold to fetch Rs.1,200 i.e., 600 × Rs.2

It can also be used for E, which would cost Rs.1,500 i.e., 300 × Rs.5.

Since substitution is more useful, Rs.1,500 is the opportunity cost.

(c) Summary of relevant costs:

			Rs.
Material A	1,000 units	× Rs. 6	6,000
Material B	1,000 units	× Rs. 5	5,000
Material C	700 units	× Rs. 2.5	1,750
	300 units	× Rs. 4	1,200
Material D	300 units	× Rs. 5	1,500
Other expenses			550
Total relevant cost			16,000

(d) Contract should be accepted since offer is of Rs.22,000 in relation to relevant cost of Rs.16,000.

2.1.2 Differential cost, Incremental cost and Incremental revenue: Differential cost (which may be incremental or decremental cost) is the difference in total cost that will arise from the selection of one alternative instead of another. It involves the estimation of the impact of decision alternatives on costs and revenues.. The two basic concepts which go together with

this type of cost analysis are *incremental revenue* and *incremental costs*. *Incremental revenue* is the change in the total income resulting from a decision. *Incremental costs* represent a change in the total costs resulting from a decision. Such a change in cost is not necessarily variable in nature.

Illustration : Budgeting overhead cost and pricing decision

Forward Foundry Ltd., is feeling the effects of a general recession in the industry. Its budget for the coming year is based on an output of only 500 tonnes of castings a month, which is less than half of its capacity. The prices of castings vary with the composition of the metal and the shape of the mould, but they average Rs.175 a tonne. The following details are from the monthly Production Cost Budget at the 500 tonne level:

	Core Making Rs.	*Melting and Pouring* Rs.	*Moulding* Rs.	*Cleaning and Grinding* Rs.
Labour	10,000	16,000	6,000	4,500
Variable overhead	3,000	1,000	1,000	1,000
Fixed overhead	5,000	9,000	2,000	1,000
Total	18,000	26,000	9,000	6,500
Labour and Overhead per direct labour hr.	9.00	6.50	6.00	5.20

Operating at this level has brought the company to the brink of break-even. It is feared that if the lack of work continues, the company may have to layoff some of the most highly skilled workers whom it would be difficult to get back when the volume picks up later on. No wonder, the Works Manager at his juncture, welcomes an order for 90,000 castings, each weighing about 40 lb. to be delivered on a regular schedule during the next six months. As the immediate concern of the Works Manager is to keep his work force together, occupied, he does not want to lose the order and is ready to recommend a quote on a no profit no loss basis.

Materials required would cost Re.1 per casting after deducting scrap credits. The direct labour hours per casting required for each department would be:

Core making	0.09
Melting and pouring	0.15
Moulding	0.06
Cleaning and grinding	0.06

Variable overhead would bear a normal relationship to labour cost in the melting and pouring department and in the moulding department. In core making, cleaning and grinding, however, the extra labour requirements would not be accompanied by proportionate increases in

variable overhead. Variable overhead would increase by Rs.1.20 for every additional labour hour in core making and by 30 paise for every additional labour hour in cleaning and grinding. Standard wage rates are in operation in each department and no labour variances are anticipated.

To handle an order as large as this, certain increases in fixed factory overhead would be necessary amounting to Rs.1,000 a month for all departments put together. Production for this order would be spread evenly over the six months period.

You are required to:

(a) prepare a revised monthly labour and overhead cost budget, reflecting the addition of this order,

(b) determine the lowest price at which quotation can be given for 90,000 castings without incurring a loss.

Solution

(a) **FORWARD FOUNDRY LTD.**

Revised Monthly Labour and Overhead Cost Budget

(After the acceptance of an order for 90,000 castings)

	DEPARTMENTS				
	Core Making	*Melting and pouring*	*Moulding*	*Cleaning and Grinding*	*Total*
	Rs.	Rs.	Rs.	Rs.	Rs.
Labour	16,750	25,000	9,600	7,740	59,090
Variable overhead	4,620	1,563	1,600	1,270	9,053
Fixed overhead	5,000	9,000	2,000	1,000	17,000
	26,370	35,563	13,200	10,010	85,143
Incremental fixed factory overhead for all departments					1,000
Total labour and overhead cost					86,143

Working notes :

(i) Current labour hours per month in each department are obtained by dividing the total labour and overheads by the figure of labour and overheads per direct labour hour as follows:

Core Making	*Melting and Pouring*	*Moulding*	*Cleaning and Grinding*
Rs. 18,000	Rs. 26,000	Rs. 9,000	Rs. 6,500

9 hrs.	6.50 hrs.	6 hrs.	5.2 hrs.
= 2,000 hrs.	= 4,000 hrs.	= 1,500 hrs.	= 1,250 hrs.

(ii) 90,000 castings spread over 6 months give a production of 15,000 castings per month. Incremental labour hours per month are got by multiplying the 15,000 castings by direct labour hour per casting as under:

Core Making	*Melting and pouring*	*Moulding*	*Cleaning and Grinding*
15,000 × 0.09	15,000 × 0.15	15,000 × 0.06	15,000 × 0.06
= 1,350 hrs.	= 2,250 hrs.	= 900 hrs.	= 900 hrs.

(iii) *Wage rate per hour is found by dividing labour cost by direct labour hours as under*:

Core Making	*Melting and Pouring*	*Moulding*	*Cleaning and Grinding*
Rs. 10,000	Rs. 16,000	Rs. 6,000	Rs. 4,500
2,000 hrs.	4,000 hrs.	1,500 hrs.	1,250 hrs.
= Rs.5	= Rs.4	= Rs.4	= Rs.3.60

(iv) *Revised monthly labour cost:*

In Core Making	:	Rs.10,000 + (1,350 × Rs.5)	= Rs.16,750
In Melting and Pouring	:	Rs.16,000 + (2,250 × Rs.4)	= Rs.25,000
In Moulding	:	Rs.6000 + (900 × Rs.4)	= Rs.9,600
In Cleaning & Grinding	:	Rs.4,500 + (900 × Rs.3.60)	= Rs.7,740

(v) Revised monthly variable overhead cost:

In Core Making, existing charges Rs.3,000 plus Rs.1.20 × 1,350 (incremental hours)

= Rs.3,000 + Rs.1,620 = Rs.4,620

In the Melting and Pouring Department, it is 1/16 of labour cost. Hence revised variable overhead cost

= Rs.25,000 × 1/16 = Rs.1,563

In Moulding Department, it is 1/6 of labour cost. Hence revised variable overhead cost

= Rs.9,600 × 1/6 = Rs.1,600

In Cleaning and Grinding, existing charges Rs.1,000 plus Rs.0.30 × 900 (incremental hours)

= Rs.1,000 + Rs.270 = Rs.1,270

(b) Determination of the lowest price at which quotation can be given for 90,000 castings without incurring a loss:

		Rs.
		Rs.
Materials cost: 15,000 castings per month @ Re.1 each		15,000
Labour and overhead cost:		
	Rs.	
Revised budget (above)	86,143	
Less: Current budget		
(Rs.18,000 + Rs.26,000 + Rs.9,000 + Rs.6,500)	59,500	26,643
Total incremental cost for 15,000 castings		41,643

Lowest price at which quotation can be given for 90,000 castings:

$$\frac{\text{Rs.}41,643}{15,000\text{ castings}} \times 90,000\text{ castings} = \text{Rs. } 2,49,858$$

2.1.3 Opportunity cost concept: The opportunity cost of the value of opportunity foregone is taken into consideration when alternatives are compared. Opportunity Cost is the value of the next best alternative. In other words, it is the opportunity cost lost by diversion of an input factor from one use to another. It is the measure of the benefit of opportunity foregone.

The opportunity cost is helpful to managers in evaluating the various alternatives available when multiple inputs can be employed for multiple uses. These inputs may nevertheless have a cost and this is measured by the sacrifice made by the alternative action in course of choosing another alternatives..

Examples of opportunity cost:

(a) The opportunity cost of using a machine to produce a particular product is the earnings foregone that would have been possible if the machine was used to produce other products.

(b) The opportunity cost of funds invested in a business is the interest that could have been earned by investing the funds in bank deposit.

(c) The opportunity cost of one's time is the salary which he would have earned by his profession.

Illustration : Calculation of opportunity cost

Estimated direct material requirements of a business concern viz., ABC Ltd. for the year 1998-99 are 1,00,000 units. Unit cost for orders below 1,20,000 units is Rs.10. When size of order equals 1,20,000 units or more the concern received a discount of 2% on the above quoted per unit price. Keeping in view the following two alternatives:

(i) Buy 1,20,000 units at the start of the year;

(ii) Buy 10,000 units per month.

Calculate the opportunity cost, if the concern has the facility of investing surplus funds in government bonds at the rate of 10% interest.

Solution

Average investment in inventory under the given two alternatives are:

(i) (1,20,000 units × Rs.9.80)/2 = Rs. 5,88,000

(ii) (10,000 units × Rs.10)/2 = Rs. 50,000

Difference between the average investment in inventory under:

*Alternative*s (i) and (ii) is (Rs.5,88,000 – Rs.50,000) = Rs.5,38,000

The concern can invest Rs.5,38,000 at 10 percent and can earn Rs.53,800 as interest annually. The sum of Rs.53,800 is an opportunity foregone if alternative (i) is chosen. Hence Rs.53,800 is the opportunity cost of the 1,20,000 units purchase order.

Note: Rs.53,800 would not ordinarily be recorded in the accounting system as it is a foregone cost.

Illustration : Decision making on waste processing with opportunity cost in consideration

A company produces a certain waste which can be sold at a salvage price of Re. 0.90 per kg.. The company wants to process the waste product further at a labour and overhead cost of Re. 0.75 per kg. and sell it at a higher price of Rs. 1.60 per Kg. Here the sale value of processed waste has no meaning unless we take into account the opportunity cost, viz, the disposal value of waste product. While analysing the profitability of processing the waste further, the salvage value of waste should, therefore, be taken into consideration as opportunity cost as under:

	Waste sold	*Waste processed*
	Rs.	Rs.
Income per kg. : (A)	0.90	1.60
Labour & overheads	—	0.75
Opportunity cost of waste	—	0.90
Total cost : (B)	—	1.65
Net gain (loss) : {(A)–(B)}	0.90	(0.05)

Solution

It is not advisable to process the waste further since it incurs a loss of 5 paise per kg, after taking into account the opportunity cost of waste. Thus the opportunity cost represents the maximum contribution foregone by using the limited resources for a particular purpose.

Use of opportunity cost concept in capital expenditure decision

The concept of opportunity cost can be used with advantage in capital expenditure decision using time value of money. This can be illustrated as under:

An owner of a plot of land has three proposals as under:

A. Sell the plot now for a net income of Rs. 1,00,000

B. Rent out the land at an annual net rental of Rs. 8,000 for 25 years and thereafter sell it for a value of Rs. 1,50,000.

C. Spend Rs. 10,00,000 in construction of building now and thereafter rent out the building at a net annual rental of Rs. 1,10,000 for 25 years. Thereafter sell the building for Rs. 3,00,000.

Taking the rate of return at 10% advise as to which of the three alternatives is the most profitable course of action.

Taking the rate of return at 10% the result may be tabulated as under:

	A *Sell now the land* *Rs.*	*B* *Rent out building* *Rs.*	*C* *Construct (rent out)* *Rs.*
0 (Initial year)	1,00,000	Nil	–10,00,000
1 to 25 years	–	2,00,000	27,50,000
After 25 years	–	1,50,000	3,00,000
Net cash inflow	1,00,000	3,50,000	20,50,000
Net present value of cash inflow @ 10%	1,00,000	86,416	26,070

In this illustration, the opportunity costs of three alternatives are shown explicitly. The first alternative, namely, to sell now yields the highest net present value and hence it is acceptable.

Illustration : Decision making on acceptance of a job

ZED Ltd. operates two shops. Product A is manufactured in Shop - 1 and customers' jobs against specific orders are being carried out in Shop - 2. Its annual statement of income is:

	Shop - 1 *(Product -A)* *Rs.*	*Shop - 2* *(Job works)* *Rs.*	*Total* *Rs.*
Sales/Income	1,25,000	2,50,000	3,75,000
Material	40,000	50,000	90,000
Wages	45,000	1,00,000	1,45,000
Depreciation	18,000	31,500	49,500

Power	2,000	3,500	5,500
Rent	5,000	30,000	35,000
Heat and light	500	3,000	3,500
Other expenses	4,500	2,000	6,500
Total costs	1,15,000	2,20,000	3,35,000
Net Income	10,000	30,000	40,000

The depreciation charges are for machines used in the shops. The rent and heat and light are apportioned between the shops on the basis of floor area occupied. All other costs are current expenses identified with the output in a particular shop.

A valued customer has given a job to manufacture 5,000 units of X for Shop - 2. As the company is already working at its full capacity, it will have to reduce the output of product - A by 50%, to accept the said job. The customer is willing to pay Rs.25 per unit of X. The material and labour will cost Rs.10 and Rs.18 respectively per unit. Power will be consumed on the job just equal to the power saved on account of reduction of output of A. In addition the company will have to incur additional overheads of Rs.10,000.

You are required to compute the following in respect of this job:

(a) Differential cost;

(b) Full cost;

(c) Opportunity cost; and

(d) Sunk cost

Advise whether the company should accept the job

Solution

(a) Differential cost of the job :

	Increase	*Decrease*
	Rs.	Rs.
Material cost	50,000	20,000
Labour cost	90,000	22,500
Additional overheads	10,000	—
Other expenses	—	2,250
Total	1,50,000	44,750

Net differential cost of the jobs: Rs.1,05,250

(Rs.1,50,000 – Rs.44,750)

Note: Depreciation, rent, heat and light and power are not going to affect the costs.

(b) Full cost of the jobs:

Cost as above at (a)	1,50,000
(i.e. increased costs)	
Depreciation	9,000
Power	1,000
Rent	2,500
Heat & light	250
	1,62,750

(c) Opportunity cost of taking the order:

	Rs.	Rs.
Sale of product A		62,500
Less:		
Material	20,000	
Labour	22,500	
Power	1,000	
Other expenses	2,250	45,750
		16,750

(d) Sunk cost of the jobs:

	Rs.
Depreciation	9,000
Power*	1,000
Rent	2,500
Heat & light	250
	12,750

*If a student treats power as a relevant cost, in that case it would not appear here.

Advice regarding the jobs:

ZED Ltd., should not accept the job as there will be a cash disadvantage of Rs. 42,750/- as computed below:

	Rs.	Rs.
Incremental revenue		
5,000 units @ Rs.25	1,25,000	
Less: Sale of Product A	62,500	62,500
Differential cost(a)		1,05,250
Cash disadvantage		42,750

Illustration : Decision on lease

The Z company owns and operates a chain of 25 stores. Budgeted data for the Garden stores are as follows

	Rs.
Annual sales	4,25,000
Annual cost of goods sold and other operating expenses	3,82,000
Annual building ownership costs (not included above)	20,000

The company can lease the building to a large flower shop for Rs, 4,000 per month. Decide whether to continue operations of this store or to lease using :

(i) The total project (or comparative statement) approach.

(ii) The incremental (or relevant cost) approach.

(iii) The opportunity cost approach.

Solution

(i) Comparative statement showing the profitability of two alternatives

	Continue operation	*Lease the building*	
	Rs.	Rs.	
Annual sales	4,25,000	48,000	(@4,000 p.m.)
Less: Cost of goods sold (excluding ownership costs)	3,82,000	—	
Building ownership costs	20,000	20,000	
Net income	23,000	28,000	

Net income is Rs. 28,000 if the building is leased out and thus leasing is a profitable proposition.

(ii) Incremental or relevant cost approach

Building ownership costs are not relevant as there is no change in these costs under both the alternatives. Therefore, the correct approach will be to consider the incremental cash inflows from the continuing operation.

	Rs.
Net cash flow from continuing the operation (Rs. 4,25,000 – Rs. 3,82,000)	43,000
Less: Income from leasing	48,000
Incremental loss from continuing operations	5,000

Therefore, company should not continue the operation

(iii) The opportunity cost approach

	Rs.
Total sale revenue	4,25,000
Less: Cost of goods sold	(3,82,000)
Opportunity cost of leasing	(48,000)
Loss due to continuing operation	5,000

Therefore, the company should lease out the building.

Illustration : Contract Cost

The Aylett and Co., Ltd has been offered a contract, if accepted would significantly increase next year's activity levels. The contract requires the production of 20,000 kg. of product X and specifies a contract price of Rs.100 per kg. The resources used in the production of each kg. of X include the following:

Resources per kg. of Product X		
Labour Grade	1	2 hours
Grade	2	6 hours
Materials	A	2 units
	B	1 litre

Grade 1 labour is highly skilled and although it is currently under utilised in the firm it is Aylett's policy to continue to pay grade 1 labour in full. Acceptance of the contract would reduce the idletime of grade 1 labour. Idle time payments are treated as non-production overheads.

Grade 2 is unskilled labour with a high turnover and may be considered a variable cost.

The costs to Aylett of each type of labour are:

Grade 1 Rs.4 per hour

Grade 2 Rs.2 per hour

The materials required to fulfil the contract would be drawn from those materials already in stock. Materials A is widely used within the firm and any usage for this contract will necessiate replacement. Materials B was purchased to fulfil an expected order that was not received, if material B is not used for the contract, it will be sold. For accounting purposes FIFO is used. The various values and costs for A and B are:

	A Per Unit Rs.	B Per Litre Rs.
Book value	8	30
Replacement cost	10	32
Net realisable value	9	25

A single recovery rate for fixed factory overheads is used throughout the firm even though some fixed production overheads could be attributed to single products or Departments. The overhead is recovered per productive labour hour and initial estimates of next year's activity, which excludes the current contract, show fixed production overheads of Rs.6,00,000 and productive labour hours of 3,00,000. Acceptance of the contract would increase fixed production overheads by Rs.2,28,000. Variable production overheads are accurately estimated at Rs.3/- per productive hour.

Acceptance of the contract would be expected to encroach on the sale and production of another product, Y which is also made by Aylett Ltd. It is estimated that sales of Y, would then decreases by 5,000 units in the next year only. However this forecast reduction in sales of Y would enable attributable fixed factory overheads of Rs.58,000 to be avoided. Information on Y is as follows:

	Per unit
Sales price	Rs.70
Labour - Grade 2	4 hours
Materials -relevant variable costs	Rs.12

All activity undertaken by Aylett is job costed using full, absorption, costing in order to derive a profit figure for each contract if the contract for X is accepted it will be treated as a separate job for routine costing purposes. The decision to accept or reject the contract will be taken in sufficient time to enable its estimated, effects to be incorporated in the next year's budgets and also in the calculations carried out to derive the overhead recovery rate to be used in the forthcoming year.

Required:

(a) Advise Aylett on the desirability of the contract

(b) Show how the contract, if accepted, will be reported on by the routine job costing system used by Aylett.

(c) Briefly explain the reasons for any differences between the figures used in (a) and (b) above.

Solution

(a) **Statement of profit on the basis of historical costing system**

		Rs.	Rs.
Sales: 20,000 kg @ Rs.100 : (A)			20,00,000
Less: Costs			
Material A:	20,000 kg × 2 units @ Rs.8		3,20,000
Material B:	20,000 kg × 1 litre @ Rs.30		6,00,000
Labour grade 1 :	20,000 kg × 2 hrs. @ Rs.4		1,60,000

Labour grade 2 :	20,000 kg × 6 hrs. @ Rs.2	2,40,000	
Variable overheads:	20,000 kg × 8 hrs. @ Rs.3	4,80,000	
Fixed overheads:	20,000 kg × 8 hrs. @ Rs.1.75	2,80,000	
Total cost : (B)			20,80,000
Loss : {(A) – (B)}			80,000

Working note:

The fixed overhead rate\hr is computed as below:	(Rs.)
Total fixed overheads for 3,00,000 hrs	6,00,000
Add: Additional fixed overheads for 1,60,000 hrs.	2,28,000
Less: Fixed costs saved due to the reduction of production of Y for 20,000 hrs. (5,000 units × 4 hours)	58,000
Total fixed overheads	7,70,000

Total number of hours:

3,00,000 hrs. + 1,60,000 hrs. – 20,000 hrs. = 4,40,000 hrs.

Therefore: Fixed overhead rate\hr

$$\frac{\text{(Total fixed overheads}}{\text{Total number of hours)}} = \frac{\text{Rs.7,70,000}}{\text{4,40,000 hrs}}$$

Conclusion: On the basis of Historical Costing approach (similar to cost sheet workings) the offer should be rejected as it incurs loss

(b) Statement of profit under relevant costing system

	Rs.	*Rs.*
Sales: 20,000 kg @ Rs.100 : (A)		20,00,000
Less : Costs		
Material A: 20,000 kg × 2 units × Rs.10	4,00,000	
(Refer to working note: A)		
Material B: 20,000 kg × 1 litre × Rs.25	5,00,000	
(Refer to working note: B)		
Labour grade 1	Sunk cost	
(Refer to working note: C)		
Labour grade 2 : 20,000 kg × 6 hrs × Rs.2	2,40,000	
(Refer to working note: D)		
Variable overheads: 20,000 kg × 8 hrs. × Rs.3	4,80,000	

(Refer to working note: E)		
Fixed costs	2,28,000	
(Refer to working note: F)		
Loss of profit due to Y (opportunity cost)	1,32,000	
(Refer to working note: (G)		
Total costs : (B)		19,80,000
Profit : {(A) – (B)}		20,000

Working notes :

A: Material A & B required for this contract are already available in stores. Therefore, the original purchase price is considered as sunk cost. Since A is a regularly used item the present stock is not meant for this job. Therefore the requirement will have to be purchased therefore, the replacement cost is considered as relevant.

B: Material B will be sold if not used for this contract. Therefore, the resale value should be considered. (Loss of cash inflow is treated as cash outflow).

C: Grade 1 labour is at present under utilised. Acceptance of the contract will only reduce the idle time, the wages will be paid on time basis. Therefore the cost should be treated as sunk cost and is not relevant for decision making.

D: Grade 2 labour is considered as a variable cost, i.e. out of pocket cost and hence relevant for decision making.

E: Variable overheads are out of pocket costs are therefore relevant for decision making.

F. Fixed cost already incurred is a sunk cost whereas fixed costs to be incurred is relevant. Hence, only the additional fixed costs are considered.

G: Because of accepting of this contract, production and sale of Y to the extent of 5,000 units (which is included in the original budget) is affected resulting in a loss of cash flow of Rs.1,32,000, which should be treated as an opportunity cost.

Computation of opportunity cost:	Rs.	Rs.
Sales: 5,000 units @ Rs.70		3,50,000
Material: 5,000 units × Rs.12	60,000	
Labour: 5,000 units × 4 hours × Rs.2	40,000	
Variable overhead: 5,000 units × 4 hours × Rs.3	60,000	
Fixed overheads	58,000	2,18,000
Opportunity costs		1,32,000

(c) Reasons: Under the relevant cost approach only the out of pocket costs have been considered. The adjustment A to G can be classified into either actual cash outflows or loss of cash inflows which are also treated as cash outflows.

Conclusion: We should accept the contract as it will improve the overall profitability.

Illustration : Decision making on different options of services

A Ltd. produces and markets a range of consumer durable appliances. It ensures after-sales service through X Ltd. The big appliances are serviced at customer's residence while small appliances are serviced at workshop of X Ltd.

The material supplied to X Ltd. is charged at cost at 10%. X Ltd. charges customers at 25% over the above price. For labour, the company receives 10% of the rate fixed for work done under the after-sales service agreement and 15% of the rate fixed in case of jobs not covered under the agreement from X Ltd. 60% by value of the total work undertaken by X Ltd. was for big appliances and rest accounted for small appliances during the previous year.

The company decides to carry out all or some of the work itself and has chosen one area in the first instance. During the previous year the company earned a profit of Rs.2,16,000 as detailed below from X Ltd. for the area chosen :

	Material Rs)	*Labour(Rs)*
Under after-sales service agreement	60,000	1,00,000
For jobs not covered under the agreement	20,000	36,000

The company forecasts same volume of work in that area for the ensuing period. The following three options are under consideration of the management:

(1) To set up a local service centre to provide service for small appliances only. The existing system is to continue for big appliances.

(2) To set up a local service centre to provide service for big appliances only. The existing system is to continue for small appliances.

(3) To set up a local service centre to provide service to all appliances. The existing system then stands withdrawn.

The relevant costs for carrying out jobs under the above options are as under:

			(Rs. '000)
	Option -1	*Option-2*	*Option-3*
Heat, rent, light etc.	125	50	150
Management costs	108	83	150
Service staff costs	230	440	750
Transport costs	25	220	230

You are required to find out the most profitable option.

Solution

Statement showing value of total work undertaken by X Ltd. at customer's price

			(Rs. '000)
Material cost (for appliances covered under agreement) *[Refer to working note 1(i)]*			825
Material cost (for appliances not covered under agreement) *[(Refer to working note 2(i)]*			275
Labour cost (for appliances covered under agreement) *[Refer to working note 1(ii)]*			1,000
Labour cost (for appliances not covered under agreement) *[Refer to working note 2(ii)]*			240
Total receipts			2,340
Break up of receipts :			
Big appliances	60%	1,404	
Small appliances	40%	936	

Profitability Statement

(Rs. '000)

	Option 1	*Option 2*	*Option 3*
Income:			
Big appliances	129.6 (60% × Rs.216)	1,404	1,404
Small appliances	936	86.4 (40% × Rs.216)	936
Total receipts : (A)	1,065.6	1,490.4	2,340
Costs :			
Material	320	480	800
	40% × (825 + 275)	60% × (825 + 275)	(825 + 275)
	137.5%	137.5%	137.5%
Heat, rent, light etc.,	125	50	150
Management costs	108	83	150
Service staff costs	230	440	750
Transport costs	25	220	230
Total costs : (B)	808	1,273	2,080
Profit : [(A) – ((B)]	257.6	217.4	260

Recommendation :

Option 3 is most profitable one.

Working Notes :

1. *Material and labour cost (for appliances under after sales agreement) :*

		Rs.
(i)	Cost of material per unit charged to customer's by X Ltd. (Rs.100 + 10% (Rs.100+ 25% × Rs.110)	137.50
	Cost of material charged to customer's by X Ltd. $\left(\frac{\text{Rs. } 60,000}{\text{Rs. } 10} \times \text{Rs. } 137.50\right)$	8,25,000
(ii)	Cost of labour charged to customers by X Ltd. $\left(\frac{\text{Rs. } 1,00,000}{\text{Rs. } 10}\right)$ × 100	10,00,000

2. *Material and Labour cost (for appliances not covered under sales agreement) :*

		Rs.
(i)	Cost of material charged to customers by X Ltd. $\left(\frac{\text{Rs. } 20,000}{\text{Rs. } 10} \times \text{Rs. } 137.50\right)$	2,75,000
(ii)	Cost of labourer charged to customers by X Ltd. $\left(\frac{\text{Rs. } 36,000}{\text{Rs. } 15}\right)$ × 100	2,40,000

Illustration : Decision on Acceptance of a contract

Ranka Builders has been offered a contract by Excel Ltd. to build for it five special Guest Houses for use by top management. Each Guest House will be an independent one. The contract will be for a period of one year and the offer price is Rs. One crore. In addition, Excel Ltd. will also provide 2 grounds of land, free of cost for the purpose of construction. The Chief Accountant of Ranka Builders has prepared an estimate on the basis of which he has advised that the contract should not be accepted at the price offered. His estimate was as follows:

		Rs. in Lacs
Land (3 Grounds at Rs. 20 lakhs each)		60
Drawings and Design		7
Registration		10
Materials :	Cement and Sand	6
	Bricks and Tiles	4
	Steel	10
	Others (including interior decoration)	10

Labour	– Skilled	12
	– Unskilled	8
	– Supervisor's Salary	5
Overheads	General	12
	Depreciation	6
	Total Cost	150

The Accountant also provides the following information:

Land : The total requirement of land is 3 grounds costing Rs. 20 lakhs per ground. Excel Ltd. will provide 2 grounds free of cost.

Drawing and Design : These have already been prepared and 50% of the cost has already been incurred.

Materials :

(i) Cement and sand are already in stock and are in regular use. If used for this contract, they have to be replaced at a cost of Rs. 8 lacs.

(ii) Bricks and tiles represent purchases made several months before for a different contract. They could be sold readily for a net Rs.5 lakhs after meeting all further expenses.

(iii) Others: Materials worth Rs. 2 lakhs relating to interior decoration are in stock for which no alternative use is expected in the near future. However they can be sold for Rs. 1 lac.

Labour :

(i) Skilled workers will be transferred to this project from another project. The Project Manager claimed that if the men were returned to him, he could have earned the company an additional Rs. 2 lakhs in terms of profits.

(ii) The supervisor undertakes various tasks in the sites and his pay and continuity of employment will not be affected by the new contract. If the contract is taken, he will devote half of his time.

Overheads :

(i) The equipment that would be used on the contract was bought one year before for Rs. 30 lakhs and is expected to last for five years. It can also be used on other contracts and the current replacement price will be Rs. 32 lakhs and in a year's time it will be Rs. 25 lacs.

(ii) The general overheads includes both specific and absorbed overheads. If the contract is not undertaken, Rs. 4 lakhs of the same can be avoided.

Ranka Builders has also on hand another project, which would not be executed if the contract from Excel Ltd. were to be accepted. The estimated profit on that project is Rs. 10 lacs.

In the light of information given above, you are required to indicate with reasons whether the contract from Excel Ltd. should be accepted or not.

Solution

M/s. Ranka Builder's

Statement of relevant costs on the

Acceptance of contract from Excel Ltd.

(Figures in lakhs of Rs.)

Sl. No.	*Particulars*	*Basis for the cost to be relevant*	*Relevant cost if contract is accepted Rs.*	*Irrelevant cost if the contract is accepted Rs.*
1.	Land cost *(Refer to working note 1)*		20	
2.	Drawings and design		–	7 (Sunk cost)
3.	Registration	Incremental	10	–
4.	*Materials:*			
	Cement and sand	Replacement	8	
	Bricks and tiles	Opportunity	5	
	Steel	Incremental	10	
	Others *(Refer to working note 2)*		9	
5.	*Labour:*			
	Skilled	Opportunity	2	
	Unskilled	Incremental	8	
	Supervisor's salary			5 (Sunk cost)
6.	*Overheads:*			
	General	Relevant (avoidable)	4	
	Depreciation			6 (Sunk cost)
	Replacement cost of machine *(Refer to working note 3)*	7		
7.	Estimated profit foregone on other project	Opportunity foregone	10	
	Total cost		93	

Decision: Since the offer price of contract is Rs. 1 crore and its total relevant cost is Rs. 93 lacs; these figures clearly show that the offer should be accepted.

Working notes :

		(Rs.in lakhs)
1.	Total cost of 3 grounds of land	60
	Cost of 2 grounds of land will be borne by Excel Ltd.	40
	Cost of 1 ground of land will be borne by M/s. Ranka Builders	20

2. Others material cost of Rs. 10 lakhs includes material worth Rs. 2 lakhs relating to interior decoration, which is a sunk cost, this material can be sold for Rs 1 lac (which is a relevant opportunity cost) and Rs. 8 lakhs material is an incremental cost. Hence total relevant cost of others material is Rs. 9 lakhs (Rs. 8 lakhs incremental + Rs. 1 lac opportunity cost).

3. Since the equipment can also be used on this contract its current replacement price is Rs. 32 lakhs and after one year its cost will be Rs. 25 lacs. Therefore the relevant opportunity cost of machine is : Rs. 7 lakhs {Rs. 32 lakhs Rs. 25 lacs}.

Illustration : decision on acceptance of a contract

Intervero Ltd., a small engineering company, operates a job order costing system. It has been invited to tender for a comparatively large job which is outside the range of its normal activities and, since there is surplus capacity, the management are keen to quote as low a price as possible. It is decided that the opportunity should be treated in isolation without any regard to the possibility of its leading to further work of a similar nature (although such a possibility does exist). A low price will not have repercussions on Intervero's regular work.

The estimating department has spent 100 hours on work in connection with the quotation and they have incurred travelling expense of Rs.550 in connection with a visit to the prospective customers' factory. The following cost estimates has been prepared on the basis of their study.

	Inquiry 205 H 81 Cost Estimate	
	(Rs.)	*(Rs.)*
Direct material and components:		
2,000 units of A at Rs.25 per unit	50,000	
200 units of B at Rs.10 per unit	2,000	
Other material and components to be bought is (specified)	12,500	
		64,500

Direct labour:	
700 hrs. of skilled labour at Rs.3.50 per hour	2,450
1,500 hrs. of unskilled labour at Rs.2 per hour	3,000
Overhead:	
Department P- 200 hrs. at Rs.25 per hour	5,000
Department Q- 400 hrs. at Rs.20 per hour	8,000
Estimating Department:	
100 hours at Rs.5 per hour	500
Travelling expenses	550
Planning Department:	
300 hours at Rs.5 per hour	1,500
	85,500

The following information has been brought together:

Material A: This is a regular stock item. The stock holding is more than sufficient for this job. The material currently held has an average cost of Rs.25 per unit but the current replacement cost is Rs.20 per unit.

Material B: A stock of 4,000 units of B is currently held in the stores. This material is slow moving and the stock is the residue of a batch bought seven years ago at a cost of Rs.10 per unit. B currently costs Rs.24 per unit but the resale value is only Rs.18 per unit. A foreman has pointed out that B could be used as a substitute for another type of regularly used raw material which costs Rs.20 per unit.

Direct Labour: The work force is paid on a time basis. The company has adopted no redundancy policies which mean that skilled workers are frequently moved to jobs which do not make proper use of their skills. The wages included in the cost estimate are for the mix of labour which the job ideally requires. It seems likely, if the job is obtained, that most of the 2,200 hours of direct labour will be performed by skilled staff receiving Rs.3.50 per hour.

Overhead: Department P : It is a department of Intervero Ltd., that is working at full capacity. The department is treated as a profit centre and it uses a transfer price of Rs.25 per hour for charging out its processing time to other departments. This charge is calculated as follows:

	Rs.
Estimated variable cost per machine hour	10
Fixed departmental overhead	8
Departmental profit	7
	25

Department P's facilities are frequently hired out to other firms and a charge of Rs.30 per hour is made. There is a steady demand from outside customers for the use of these facilities.

Overhead :Department Q : Department Q uses a transfer price of Rs.20 for charging out machine processing time to other Departments. This charge is calculated as follows :

	Rs.
Estimated variable cost per machine hour	8
Fixed departmental overhead	9
Departmental profit	3
	20

Estimating department : This department charges out its time to specific jobs using a rate of Rs.5/- per hour. The average wage rate within the department is Rs.2.50 per hour but the higher rate is justified as being necessary to cover departmental overheads and the work done on unsuccessful quotations.

Planning department: This department also uses a charging out rate which is intended to cover all departmental costs.

The offer received for the above contract is Rs.70,000.

You are required to restate the cost estimate by using an opportunity cost approach. Make any assumptions that you deem to be necessary and briefly justify each of the figures that you give.

Solution

Statement of cost of Intevero Ltd.

	Rs.
Direct material :	
A: 2,000 units @ Rs.20	40,000
(Refer to working note 1)	
B: 200 units @ Rs.20	4,000
(Refer to working note 2)	
Direct labour (skilled)	12,500
Direct labour (Unskilled)	sunk
(Refer to working note 3)	
Overheads:	
Dept. P: 200 hrs. @ Rs.30	6,000
(Refer to working note 4)	
Dept. Q: 400 hrs. @ Rs.8	3,200
Estimating department	sunk
Planning department	sunk
Total cost	65,700

Working notes:

1. Material A is a regularly used item. Therefore, the present stock is not meant for this contract. Hence, the replacement cost is considered.
2. Material B will be sold if not used for this contract. Therefore, the resale value (Rs.20 or Rs. 18 whichever is more should be considered).
3. The entire job will be performed by skilled workers (unskilled jobs also). This implies skilled workers are idle at present and since the company follows no redundancy policy and their wages will be paid on time basis whether the contract is accepted or not. Hence, they are treated as a sunk cost.
4. Department P is a profit centre and is working at full capacity at present and has a steady demand from outside for its facilities at Rs.30 per hour. Therefore, we should consider this Rs.30\hr. as relevant (out of pocket cost Rs.10 + opportunity cost of Rs.20).
5. Department Q : Only the out of pocket costs being the variable overheads of Rs.8\ hr. should be considered.
6. All other costs mentioned are sunk costs.

   Conclusion: We should accept this offer.

Illustration : Decision on use of alternative resources

B Ltd. is a company that has in stock, materials of type XY that cost Rs. 75,000, but that are now obsolete and have a scrap value of only Rs. 21,000. Other than selling the material for scrap, there are only two alternative uses for them.

Alternative 1 – Converting the obsolete materials into a specialised product, which would require the following additional work and materials –

Material A	600 units
Material B	1,000 units
Direct Labour	
5,000 hours unskilled	
5,000 hours semi-skilled	
5,000 hours highly skilled	
Extra selling and delivery expenses	Rs. 27,000
Extra advertising	Rs. 18,000

The conversion would produce 900 units of saleable product and these could be sold for Rs. 300 per unit.

Material A is already in stock and is widely used within the firm. Although present stocks, together with orders already planned, will be sufficient to facilitate normal activity and extra material used by adopting this alternative will necessitate such materials being replaced

immediately. Material B is also in stock, but it is unlikely that any additional supplies can be obtained for some considerable time because of an industrial dispute. At the present time material B is normally used in the production of product Z, which sells at Rs. 390 per unit and incurs total variable (cost excluding Material B) of Rs. 210 per unit. Each unit of product Z uses four unis of Material B. The details of Materials A and B are as follows :

	Material A	*Material B*
	(Rs.)	(Rs.)
Acquisition cost at the time of purchase	100 per unit	Rs. 10 per unit
Net realizable value	85 per unit	Rs. 18 per unit
Replacement cost	90 per unit	—

Alternative 2 – Adopting the obsolete materials for use as a substitute for a sub-assembly that is regularly used within the firm. Details of the extra work and materials required are as follows:

Material C 1,000 units

Direct Labour

4,000 hours unskilled

1,000 hours semi-skilled

4,000 hours highly skilled

1,200 units of the sub-assembly are regularly used per quarter at a cost of Rs. 900 per unit. The adaptation of material XY would reduce the quantity of the sub-assembly purchased from outside the firm to 900 units for the next quarter only. However, since the volume purchased would be reduced, some discount would be lost and the price of those purchased from outside would increase to Rs. 1,050 per unit for that quarter.

Material C is not available externally though 1,000 units required would be available from stocks, it would be produced as extra production. The standard cost per unit of Material C would be as follows :

	Rs.
Direct labour 6 hours unskilled labour	18
Raw materials	13
Variable overhead : 6 hours at Re. 1	6
Fixed overhead : 6 hours at Rs. 3	18
	55

The wage rates and overhead recovery rates for B Ltd are :

Variable overhead	Re 1 per direct labour hour
Fixed overhead	Rs 3 per direct labour hour
Unskilled labour	Rs 3 per direct labour hour

Semi-skilled labour	Rs 4 per direct labour hour
Highly skilled labour	Rs 5 per direct labour hour

The unskilled labour is employed on a casual basis and sufficient labour can be acquired to exactly meet the production requirements. Semi-skilled labour is part of the permanent labour force, but the company has temporary excess supply of this type of labour at the present time. Highly skilled labour is in short supply and cannot be increased significantly in the short-term, this labour is presently engaged in meeting the demand for product L, which requires 4 hours of highly skilled labour. The contribution from the sale of one unit of product L is Rs. 24.

Given the above information, you are required to present cost information advising whether the stocks of Material XY should be sold, converted into a specialised product (Alternative 1) or adopted for use as a substitute for a sub-assembly (Alternative 2).

Solution

Alternative 1 – (Conversion versus immediate sale)

	Rs.	Rs.	Rs.
Sales revenue 900 units at Rs. 300 per unit			2,70,000
(*Refer to working note 1*)			
Less : Relevant costs			
Material XY opportunity cost		21,000	
(*Refer to working note 2*)			
Material A – 600 units @ Rs. 90 per unit		54,000	
(*Refer to working note 3*)			
Material B – 1,000 units @ Rs. 45 per unit		45,000	
(*Refer to working note 4*)			
Direct Labour :			
Unskilled - 5,000 hours @ Rs. 3 per hour	15,000		
Semi-skilled NIL			
Highly skilled - 5,000 hours @ Rs. 11	55,000	70,000	
(*Refer to working note 5*)			
Variable overheads 15,000 hours @ Rs. 1		15,000	
(*Refer to working note 6*)			
Extra selling and delivery expenses	27,000		
Extra advertising	18,000	45,000	2,50,000
Fixed overheads		NIL	
(To remain same, not relevant)			
Excess of relevant revenues			20,000

Alternative 2 – (Adaptation versus immediate sale)

Saving on purchase of sub-assembly :			
Normal spending - 1,200 units @ Rs. 900 per unit		10,80,000	
Less : Revised spending - 900 units @ Rs. 1,050 per unit (*Refer to working note 7*)	9,45,000	1,35,000	
Less : Relevant costs			
Material XY opportunity cost (*Refer to working note 2*)		21,000	
Material C - 1,000 units @ Rs. 37 (*Refer to working note 8*)		37,000	
Direct labour			
Unskilled – 4,000 hours @ Rs. 3 per hour	12,000		
Semi-skilled NIL			
Highly skilled – 4,000 hours @ Rs. 11 per hour (*Refer to working note 5*)	44,000	56,000	
Variable overheads – 9,000 hours @ Re. 1/- per hour (*Refer to working note 6*)		9,000	1,23,000
Fixed overheads (*To remain same not relevant*)		NIL	
Net relevant savings			12,000

Evaluation :

The evaluation of two alternatives clearly shows that Alternative 1, yields higher net revenue of Rs. 8,000 (Rs. 20,000 – Rs. 12,000). Hence because of higher net revenue of Alternative 1, it is adviseable to convert material XY into a specialised product.

Working notes :

1. There will be an additional sales revenue of Rs. 2,70,000 if Alternative 1 is choosen.
2. Acceptance of either Alternative 1 or 2 will mean a loss of revenue of Rs. 21,000 from the sale of the obsolete material XY and hence it is an opportunity cost for both of the alternatives. The original purchase cost of Rs. 75,000 is a sunk cost and thus not relevant.
3. Acceptance of Alternative 1 will mean that material A must be replaced at an additional cost of Rs. 54,000.

4. Acceptance of Alternative 1 will mean diversion of material B from the production of product Z. The excess of relevant revenues over relevant cost for product Z is Rs. 180 (Rs. 390 – Rs. 210) and each unit of product Z uses four units of material B. The lost contribution (excluding the cost of material B which is incurred for both alternatives) will therefore be Rs. 45 for each unit of material B, that is used for converting the obsolete materials into a specialised product.
5. Unskilled labour can be matched exactly to the company's production requirements. Hence acceptance of either alternative 1 or 2 will cause the company to incur additional unskilled labour cost at Rs. 3 for each hour. It is assumed that the semi-skilled labour will be able to meet the extra requirements of either alternatives at no extra cost to the company. Hence, cost of semi–skilled labour will not be relevant. Skilled labour is in short supply and can only be obtained by reducing the production of product L, resulting in a loss of contribution of Rs. 24 (given) or Rs. 6 per hour of skilled labour. Hence the relevant labour cost will be Rs. 6 (contribution lost per hour) + Rs. 5 (hourly rate of skilled labour) i.e. Rs. 11 per hour.
6. It is assumed that for each direct labour of input, variable overhead will increase by Re. 1, hence for each alternative using additional direct labour hours, variable overheads will increase.
7. The cost of purchasing the sub-assembly will be reduced by Rs. 1,35,000 if the second alternative is choosen and so these savings are relevant to the decision.
8. The company will incur additional variable costs of Rs. 37 for each unit of material C that is manufactured, so the fixed overheads for material C viz. Rs. 18/- per unit is not a relevant cost.

2.1.4 Sunk costs: Costs which do not change under given circumstance and do not play any role in decision making process are known as sunk costs. They are historical costs incurred in the past. In other words, these are the costs which have been incurred by a decision made in past and cannot be changed by any decision made in the future.

Out of pocket costs: This is that portion of costs which involves payments to outsiders i.e., it gives rise to cash expenditure as opposed to such costs as depreciation, which do not involve any cash expenditure. Such costs are relevant for price fixation during recession or when make or buy decisions are to be made. These costs include cost incurred under some heads for which separate cost accounting records are not maintained and they are sometimes termed as miscllenеous cost.

2.2 APPLICATION OF INCREMENTAL/DIFFERENTIAL COST TECHNIQUES IN MANAGERIAL DECISIONS:

It is a technique used for arriving at managerial decisions in which only cost and income differences between alternative courses of action are taken into consideration. This technique is applicable to situations where fixed costs alter. This technique emphasizes on comparing the incremental costs with incremental revenues for taking a managerial decision. So long as

the incremental revenue is greater than incremental costs, the decision should be in favour of the proposal.

The areas in which the above techniques of cost analysis can be used for making managerial decisions are:

(i) Whether to process a product further or not.

(ii) Dropping or adding a product line.

(iii) Making the best use of the investment made.

(iv) Acceptance of an additional order from a special customer at lower than existing price.

(v) Opening of new sales territory and branch.

(vii) Make or Buy decisions.

(viii) Submitting tenders

(ix) Lease or buy decisions

(x) Equipment replacement decision.

2.2.1 Whether to process a product further or not : Many companies manufacture products which can be sold or subjected to further processing. It is also possible that waste emanating from one operation of a factory can be sold as such or sold after further processing in the company's plant.

Examples of such companies are: meat processing, manufacture of copper or aluminium, etc. In such cases, the matter for consideration is whether the incremental revenue arising from the processing of the product further is sufficient to cover the incremental cost involved in such additional processing and still leave a contribution towards profit.

Illustration : Decision on further processing of a product

A company produces product 'A' which is at present being sold at Rs.7 each; the monthly production is 25,000 units. The company can, as an alternative make product 'F', by using one unit of 'A', as raw material, in each unit of 'F'. Product 'F' can be sold at Rs.10/- each. The company pays sales commission at 10 percent on sales value. Capacity to manufacture 'F' is available to the extent of 12,500 units per month without additional capital cost. Taking the following additional information advise whether or not the company should go in for the manufacture of product 'F'.

Product	'A'	'F'
	Rs.	Rs.
Raw material cost	1.50	0.50
Labour & overheads	2.10	1.40

The figures given for 'F' represent expenses incurred in addition to those incurred for the manufacture of 'A'. The supervision charges for manufacturing 'F' will be Rs.4,000 per month extra.

Solution

Particulars	*Product 'A' 12,500 units*		*Product 'F' 12,500 units*		*Incremental Revenue/Cost*
	Per unit	*Total*	*Per unit*	*Total*	
	Rs.	Rs.	Rs.	Rs.	Rs.
Sales revenue	7.00	87,500	10.00	1,25,000	37,500
Less: Commission @ 10%	0.70	8,750	1.00	12,500	3,750
Net revenue : (i)	6.30	78,750	9.00	1,12,500	33,750
Raw materials	1.50	18,750	2.00	25,000	6,250
Labour & overheads	2.10	26,250	3.50	43,750	17,500
Additional fixed expenses			0.32	4,000	4,000
Total cost : (ii)	3.60	45,000	5.82	72,750	27,750
Profit : (i) – (ii)	2.70	33,750	3.18	39,750	6,000

The above table shows that by resorting to further processing of 12,500 units the company can earn an additional profit of Rs.6,000 per month and hence the proposal is recommended.

Note: In the above problem it is likely that the company, instead of utilising its capacity to make product 'F' may go in for a further increase in production of product 'A' to the extent possible. In such circumstances, the incremental profit of the second alternative should be compared with the incremental profit as obtained above.

Illustration : Decision making on further processing of some products out of joint products

X Ltd. is in the Food Processing Industry. In one of its processes, three joint products are manufactured. Traditionally, the company has apportioned costs incurred up to the Joint Products' pre-separation point on the basis of weight of outputs of the product.

You have been recently appointed Cost Accountant, and have been investigating process cost and accounting procedure.

You are required to prepare statements for management to show:

(a) The profit or loss of each product as ascertained using weight basis of apportioning pre-separation joint costs.

(b) The optimal contribution which could be obtained from the manufacture of these products.

The following process data for December are given. Cost incurred up to separation point are Rs.96,000 :

	Product A	*Product B*	*Product C*
Cost incurred after separation point (Rs.)	20,000	12,000	8,000
Selling price per Ton of completed product (Rs.)	500	800	600
Estimated, if sold at separation point (Rs.)	250	700	450
Output (Tons)	100	60	80

The cost of any unused capacity after the separation point should be ignored.

Solution

(a) Statement showing profit or loss of each product using weights as the basis of apportioning pre-separation joint costs

	Total	*Product A*	*Product B*	*Product C*
	Rs.	*Rs.*	*Rs.*	*Rs.*
Cost upto the point of separation in the ratio of (100: 60: 80) or (5:3:4)	96,000	40,000	24,000	32,000
Cost after separation point	40,000	20,000	12,000	8,000
Total costs	1,36,000	60,000	36,000	40,000
Sales revenue	1,46,000	50,000	48,000	48,000
Profit/(Loss)	10,000	(10,000)	12,000	8,000

(b) To ascertain optimal contribution, first, the incremental profit or loss from each product, if products are further processed after separation point is to be computed. The statement below shows the incremental profit or loss after further processing:

	Product A	*Product B*	*Product C*
	Rs.	Rs.	Rs.
Output (Tons)	100	60	80
Incremental revenue from further processing	25,000	6,000	12,000
	(Rs.500–Rs.250)×100	(Rs.800–Rs.700)×60	(Rs.600–Rs.450)×80
Less: Incremental cost	20,000	12,000	8,000
Incremental profit (loss)	5,000	(6,000)	4,000

It will be seen from the above statement that there will be a loss of Rs.6,000 if further processing of product B is done after the separation point. It is, therefore, recommended that Product B should be sold at separation point. The optimal contribution based on this recommendation will be as follows:

Statement showing optimal contribution

	Product A	*Product B*	*Product C*	*Total*
Output (Tons)	100	60	80	
	Rs.	Rs.	Rs.	Rs.
Sales revenue	50,000	42,000	48,000	1,40,000
	(100×Rs.500)	(60×Rs.700)	(80×Rs.600)	
Less: Post separation cost	20,000	—	8,000	28,000
Contribution	30,000	42,000	40,000	1,12,000

2.2.2 Dropping or adding a product line: Often firms manufacturing a number of products may find that one or more of its products are not worthwhile for producing from the profitability point of view. Since the objective of any business organisation is to maximise its profits, the firm can in such cases consider the economies of dropping such unprofitable products, and adding a more profitable product(s). In such cases, the firm may have two alternatives as under:

(a) To drop the unprofitable product and to leave the capacity unutilised.

(b) To drop the unprofitable product and to utilise the capacity for the manufacture of a more remunerative product.

If we consider alternative (a) above, what is more important is the amount of fixed expenses apportioned to the product which is going to be discontinued. If the capacity relating to the product in question is going to be left unutilised, the contribution which the product is making towards recovery of fixed expenses will not be forthcoming. Thus continuance of a product line which is adjudged asunprofitable, on the basis of absorption costing may make matters worse. The use of contribution approach will help the firm to take a sound decision on such occasions. As some of the fixed expenses can be reduced by dropping a product line, such fixed costs become relevant while making a decision about the discontinuance of product line.

If we take alternative (b) the fixed expenses apportioned to the product line discontinued will remain the same for being absorbed by the new product. The comparison is now between discontinuance of the product line and introduction of another remunerative product line. Since the fixed expenses are not going to be reduced in this alternative, the product which yields the highest contribution is preferred because it will maximise the overall profitability of the firm.

Illustration : Adding a new product lines

A firm produces three products, the details of sales, contribution margin and the fixed costs apportioned to the products are as under:

	Products		
	A	B	C
Sales values (Rs.)	10,00,000	8,00,000	2,00,000
Contribution (Rs.)	40%	30%	25%
Fixed expenses (Rs.)	3,40,000	1,80,000	90,000

Fixed expenses attributable to product 'C' are Rs.40,000.

Product C incurs a loss and hence the management wishes to consider two alternatives:

(i) Discontinue product 'C' to save the loss.

(ii) Discontinue product 'C' and utilise the capacity to manufacture product 'D'. In this case the sales value of product D is Rs.2,00,000 and the contribution is 35%.

Which alternative should be adopted?

Solution

(i) Let us tabulate the results of the firm as under:

Profitability of the firm:

	Products			
	A	B	C	Total
Sales value (Rs.)	10,00,000	8,00,000	2,00,000	20,00,000
Contribution (%)	40%	30%	25%	34.5%*
Contribution (Rs.)	4,00,000	2,40,000	50,000	6,90,000
Fixed costs (Rs.)	3,40,000	1,80,000	90,000	6,10,000
Net profit (loss) (Rs.)	60,000	60,000	(40,000)	80,000

*$\frac{\text{Rs. } 6,90,000}{\text{Rs. } 20,00,000} \times 100 = 34.5\%$ Average

Under alternative (i), a comparison between the total profitability and the profitability without product 'C' is relevant, shown as under:

Particulars	*Products*	*Products*	*Difference*
		A,B &C	*A&B only*
Sales value	(Rs.)	20,00,000	18,00,000	2,00,000
Contribution	(Rs.)	6,90,000	6,40,000	50,000
Fixed expenses	(Rs.)	6,10,000	5,70,000	40,000
Net profit	(Rs.)	80,000	70,000	10,000

It may be observed from the above table that discontinuance of product 'C' reduced the total profit from Rs.80,000 to Rs.70,000. In other words, product 'C' was yielding a contribution sufficient to cover more than the incremental fixed costs of Rs.40,000 attributable to its manufacture.

(ii) Under alternative (ii), comparison between the profitability of product 'C' and product 'D' is relevant as under:

Particulars		*Product'C'*	*Product'D'*	*Difference*
Sales value	(Rs.)	2,00,000	2,00,000	_
Contribution	(%)	25%	35%	
Contribution	(Rs.)	50,000	70,000	20,000

Since product D yields a higher contribution, the total profitability will increase by Rs.20,000. The fixed expenses remain constant. This is illustrated below:

Product		*A*	*B*	*D*	*Total*
Sales value	(Rs.)	10,00,000	8,00,000	2,00,000	20,00,000
	(%)	40%	30%	35%	35.5%*
Contribution	(Rs.)	4,00,000	2,40,000	70,000	7,10,000
Fixed expenses	(Rs.)	3,40,000	1,80,000	90,000	6,10,000
Net profit (loss)	(Rs.)	60,000	60,000	(20,000)	1,00,000

$$\frac{*\text{Rs.}7,10,000}{\text{Rs.}20,00,000} \times 100 = 35.5\% \text{ Average}$$

Illustration : Optimization of profit under a limiting factor condition

Something More Ltd. is considering adding products to its product line. After a lot of deliberations between the sales and production personnel, it is decided that Products P, Q and R would be the most desirable additions to the company's product range on account of the technical competency, marketing potential and production flexibility as regards these products. In fact P, Q and R can all be made on the same kind of plant as that already in use and therefore as regards production, all products can be readily interchanged. However, it is considered necessary to build further plant facilities to cater for this additional production.

Solution

Something More Ltd.

Statement showing the production of R, Q and P in order of priority determined on the basis of contribution per machine hour, to maximise the profit at various levels of activity

Product Levels of Activity (Machine Hours)	*P* (Max. demand = 200 units Machine hours for max. demand = 3,000 hours)		*Q* (Max. demand = 125 units Machine hours For max. demand = 62.5 hours)		*R* (Max. demand = 750 units Machine hours For max demand = 2,250 hours)		*Total Contribution*	*Fixed Cost*	*Net Profit*
	Units	Contribution	Units	Contribution	Units	Contribution			
		Rs.		Rs.		Rs.	Rs.	Rs.	Rs.
1,800	–	–	–	–	600	54,000	54,000	15,000	39,000
2,300	–	–	10	1,000	750	67,500	68,500	20,000	48,500
2,800	–	–	110	11,000	750	67,500	78,500	26,000	**52,500**
3,300	28*	4,200	125	12,500	750	67,500	84,200	33,000	51,200
3,800	61*	9,150	125	12,500	750	67,500	89,150	39,000	50,150

* 28 and 61 units of product P consumes 420 and 915 machine hours respectively whereas actually 425 and 925 machine hours are available. As incomplete units can be sold only in the next period after they are completed, for these computations only complete units have been considered.

The most desirable level of activity to be pursued is at 2,800 machine hours to produce and sell 750 units of R and 110 units of Q. At this activity level profit is maximum, i.e. Rs. **52,500.**

In this connection the following data are relevant:

Products	*P*	*Q*	*R*
	Rs.	Rs.	Rs.
Direct materials per unit	100	120	90
Direct labour per unit	50	70	90
Variable overheads per unit	50	130	100
Selling price per unit	350	420	370
Demand in units per cost period	200	125	750
(on the basis of the above selling price)			
Machine hours required per unit of production	15	5	3

It is felt that initially extra plant facilities can be built to operate at the following five different levels of activity viz. 1,800, 2,300, 2,800, 3,300 and 3,800 machines hours per cost period. The fixed overhead costs for a cost period relevant to these five different levels of activity are estimated at Rs.15,000, Rs.20,000, Rs.26,000, Rs.33,000 and Rs.39,000 respectively.

You are required to advise, with supporting figures, the product or products to be manufactured and in what quantities at each of the five contemplated levels of activity that would seem most desirable to be pursued for maximisation of profits.

Working note

Computation of contribution per unit of product and per machine hour

	Products		
	P	*Q*	*R*
	Rs.	*Rs.*	*Rs.*
Selling price: (A)	350	420	370
Less : Variable costs			
Direct materials	100	120	90
Direct labour	50	70	90
Variable overheads	50	130	100
Total variable costs: (B)	200	320	280
Contribution per unit: (A–B)	150	100	90
Machine hours required per unit	15	5	3
Contribution per machine hour	10	20	30

For maximizing profits, the products giving the maximum contribution per machine hour should be concentrated upon as machine hours available are the foremost constraint.

Hence the order of priority for producing the product should be R, Q, and P.

2.2.3 Optimising Investment plan

The investment decisions, also termed as capital budgeting decisions involve current outlays in return for a stream of benefits in future year. When multiple alternatives of investment opportunities having similar risks are available, we can use incremental cost and revenue approach to find out the optimum investment plan. In this case we increase the total investment by increment till such time the incremental rate of return falls below the cut off rate given. The cut off rate is defined as the minimum rate of return expected from the investment.

Illustration : optimization of Investment plan

A company has Rs.2,00,000 to invest and it can earn 14% by investing the sum in company deposits. It also has got an opportunity to invest this sum in five projects as under :

	Projects				
	A	B	C	D	E
	Rs.	Rs.	Rs.	Rs.	Rs.
Total investment	20,000	60,000	1,00,000	1,60,000	2,00,000
Annual net profit	1,000	8,400	15,600	24,240	28,640
Rate of return	5%	14%	15.6%	15.15%	14.3%

Find the optimum investment plan.

Solution

The optimum investment plan by using the incremental approach is as under:

	Projects			
	B	C	D	E
	Rs.	Rs.	Rs.	Rs.
Incremental investment	40,000	40,000	60,000	40,000
Incremental net profit	7,400	7,200	8,640	4,400
Rate of return on incremental investment	18.5%	18%	14.4%	11.0%

Looking at the figures above, we find that project D is the most profitable one because if we take project E, the rate of return on the incremental investment will fall below the cut off rate of 14% and hence not acceptable. The following table will prove the facts. It may be observed here that the total income is the highest figure if the funds are invested in project D and the balance available in other company deposits at 14%.

	Project				
	A	B	C	D	E
	Rs.	Rs.	Rs.	Rs.	Rs.
Total funds available	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Funds invested in project	20,000	60,000	1,00,000	1,60,000	2,00,000
Balance invested in deposits	1,80,000	1,40.000	1,00,000	40,000	—
Income from project	1,000	8,400	15,600	24,240	28,640
Income from deposits @ 14%	25,200	19,600	14,000	5,600	—
Total income	26,200	28,000	29,600	29,840	28,640

Cash flow technique : This technique is useful in making decision regarding investment alternatives.

In this technique of decision making only differential cash flows are considered. Cash flow refers to the actual movement of cash in and out of an organisation. When cash is received it is called 'cash inflows' or positive cash flow, and when cash is paid out, it is called 'cash outflows' or negative cash flow. The difference between the two flows is termed as the **net cash flow'**. This technique of decision making can be applied in those circumstances in which the prime differences can be measured in terms of the future cash flows of the various alternatives under consideration. An alternative which gives most favourable net cash flow is selected. The application of the cash flow technique involves the following steps:

(i) Compute the future cash inflows and the future cash outflows of each alternative under consideration.

(ii) Ascertain the overall net cash flow.

(iii) Select the alternative that has the most favourable net cash flow i.e. the highest net cash flow.

Illustration : Make or Buy decision

A firm needs component in an assembly operation. If it wants to do the manufacturing itself, it would need to buy a machine for Rs. 4 lakhs which will last for 4 years with no salvage value. Manufacturing costs in each of the 4 years would be Rs. 6 lakhs, Rs. 7 lakhs, Rs. 8 lakhs, and Rs. 10 lakhs respectively. If the firm had to buy the components from a supplier, the cost would be Rs. 9 lakhs, Rs. 10 lakhs, Rs. 11 lakhs and Rs. 14 lakhs respectively in each of the four years. However, the machine would occupy floor space which would have been used for another machine. This latter machine would be hired at no cost to manufacture an item, the sale of which would produce net cash flows in each of the four years of Rs. 2 lakhs. It is impossible to find room for both the machines and there are no other external effects. The cost of capital is 10% and the present value factor for each of the four years is 0.909, 0.826, 0.751 and 0.683 respectively.

Should the firm make the components or buy from outside?

Solution

Evaluation of Make or Buy proposal

(All figures are in lakhs of rupees)

Year	*P.V. factors at 10%*	*When the component is manufactured*		*When the component is bought from an outside supplier*	
		Cash outflow (Capital cost + manufacturing cost + opportunity cost)	*Present value*	*Cash outflow (Buying cost)*	*Present value*
		Rs.	*Rs.*	*Rs.*	*Rs*
(a)	(b)	(c)	(d) = (b) × (c)	(e)	(f) = (b) × (e)
0	1.000	4	4.000	—	—
1	0.909	6+2	7.272	9	8.181
2	0.826	7+2	7.434	10	8.260
3	0.751	8+2	7.510	11	8.261
4	0.683	10+2	8.196	14	9.562
Total			34.412		34.264

Saving in cash outflow *(when bought from outside)* = [Total present value of cash outflow, when the component is manufactured internally] — [Total present value of cash outflow, when the component is bought from outside]

= Rs. 34.412 – Rs. 34.264

= Rs. 0.148 (lakhs)

Conclusion : Since there is a saving of Rs. 0.148 (lakhs) in buying the component from outside, therefore, we should stick to this decision.

Note: The loss of Rs. 2 lakhs cash inflow for each of the four years due to the inability of the firm to operate another machine if it manufactures the component has been treated as an opportunity cost.

Illustration : decision on alternative channel of sales

An item of finished goods inventory that cost Rs.200 per unit to make is facing the danger of becoming obsolete. There are two following alternative ways of disposing it of:

Sell the stock to P for Rs.200; or to Q for Rs.216. Q's place is twice as far away as that of P though due to favourable transport conditions the delivery time will be the same. The cost accountant has prescribed the following cost estimates for delivery:

P - Petrol and oil Rs.10, wages Rs.12, share of licence, insurance and depreciation (based on mileage) Rs.14.

Q - Petrol and oil Rs.20, wages Rs.12, share of licence, insurance and depreciation Rs.28.

You are required to recommend whether the stock should be sold to P or Q.

Solution

	P	Q
	Rs.	Rs.
Cash inflow (Sales)	200	216
Cash outflow (Petrol, oil and wages)	22	32
Net cash flow	178	184

Since the most favourable net cash flow occurs in the case of sale to Q, hence it is recommended that the item be sold to Q.

Notes: 1. In the above analysis Rs.14 and Rs.28 the share of licence, insurance and depreciation have not been included because there is no actual cash outflow in respect of these costs. Otherwise also these costs are not going to affect the cashflow whether sale is made to P or Q or even to neither of them.

2. It may be noted that the net cashflow does not measure the profits of the projects. It only indicates which project is more profitable.

Note: *Students should note that the discounted cash flow technique has been discussed in detail in the book of Management Accounting and Financial Analysis. Students should refer to the aforesaid book to refresh their knowledge.*

Illustration : Decision making on the basis of relevant osts

CARCARE CORPORATION has just today paid for and installed a special machine for polishing cars at one of its prestigious outlets. It is the first day of company's fiscal year. The machine costs Rs. 20,000. Its annual operating costs total Rs. 15,000 exclusive of depreciation. The machine will have a four year useful life and a zero terminal disposal value.

After the machine has been used for one day, a machine salesman walks in. He offers a different machine that promises to do the same job at a yearly operating cost of Rs. 9,000, exclusive of depreciation. The new machine will cost Rs. 24,000 in cash, duly installed. The "old" machine is unique and can be sold outright for only Rs. 10,000 minus Rs. 2,000 removal cost. The new machine, like the old one, will have a four-year useful life and zero terminal disposal velue.

Sales, all in cash, will be Rs. 1,50,000 annually and other cash costs will be Rs. 1,10,000 annually, regardless of this decision.

For simplicity, ignore income taxes, interest and present value considerations.

Required :

(a) Prepare a statement of cash receipts and disbursements for each of the four years under both alternatives. What is the cumulative difference in cash flows for the four years taken together ?

(b) Prepare Income Statements for each of the four years under both alternatives. Assume straight-line depreciation. What is the cumulative difference in operating income for the four years taken together ?

(c) What are the irrelevant items in your presentations in requirements (a) and (b) ? Why are they irrelevant ?

(d) Suppose the cost of the "old" machine was Rs. 10,00,000 rather than Rs. 20,000. Nevertheless, the old machine can be sold outright for only Rs. 10,000 minus Rs. 2,000 removal cost. Would the net differences in requirements (a) and (b) change ? Explain.

(e) "To avoid a loss, we should keep the old machine." What is the role of book value in decisions about replacement of machines ?

Solution

(a) Statement of Cash Receipts, Disbursements and cumulative difference in Cash flows for four years taken together under both alternatives.

(Rs. in thousands)

Alternatives	Keep old machine			Buy new machine			
	Year 1	2nd, 3rd & 4th year each	All 4 years	Year 1	2nd, 3rd & 4th year each	All 4 years	Cumulative difference in cash flows for four years taken together
Receipts :							
Sales revenue	150	150	600	150	150	600	
Sales of old equipment	—	—	—	8	—	8	
Total receipts : (A)	150	150	600	158	150	608	
Disbursements :							
Annual operating cost	15	15	60	9	9	36	
Other cash costs	110	110	440	110	110	440	

Purchase cost of "old" machine	20	—	20	20	—	20	
Purchase of "new" machine	—	—	—	24	—	24	
Total disbursements : (B)	145	125	520	163	119	520	
Net cash in-flows : (A) – (B)	5	25	80	(5)	31	88	08

(b) Statement of income for each of the four years and cumulative difference in operating income

(Rs. in thousands)

Alternatives	Keep old machine		Buy new machine			
	Ist, 2nd 3rd & 4th year each	All 4 years	Year 1	2nd, 3rd & 4th year each	All 4 years	Cumulative difference in operating income
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*	
Income :						
Sales revenue	150	600	150	150	600	
Total revenue : (A)	150	600	150	150	600	
Costs :						
Annual operating cost	15	60	9	9	36	
Other cash costs	110	440	110	110	440	
Depreciation	5	20	6	6	24	
(*Refer to working note 1*)						
Loss on the disposal of old machine	—	—	12	—	12	
(*Refer to working note 2*)						
Total costs : (B)	130	520	137	125	512	
Operating income : (A) – (B)	20	80	13	25	88	08

(c) The purchase of cost old machine Rs. 20,000; the sales revenue Rs. 1,50,000 and other cash costs of Rs. 1,10,000 are irrelevant items for the presentation in requirements (a) and (b) above. These items are irrelevant because their amount are common to both the alternatives.

(d) The net difference in requirements under (a) and (b) will not change if the cost of 'old' machine becomes Rs. 10,00,000 instead of Rs. 20,000. This is so because the cost of old machine is common for both the alternatives.

(e) In the decision about the replacement of machine the book value of the machine is irrelevant because it is a past (historical) cost. All past costs are down the drain. Nothing can change

what has already happened. As apparent from (a) and (b) above; we can completely ignore the cost of old machine i.e. Rs. 20,000 and still have a correct analysis.

Working Note :

1. *Depreciation (according to straight line method) :*

		Old machine	*New machine*
(i)	Cost of machine (Rs.)	20,000	24,000
(ii)	Terminal disposal value (Rs.)	Zero	Zero
(iii)	Useful life	4	4
	Depreciation $\left[\frac{(i)-(ii)}{(iii)}\right]$ Rs.	5,000	6,000

2. *Loss on the disposal of old mahcine :*

	Rs.	*Rs.*
Purchase price of old machine		20,000
Disposal value	10,000	
Less : Removal cost	2,000	8,000
Loss		12,000

SUMMARY

- For the purpose of decision making and control, costs are distinguished on the basis of their relevance to the different type of decisions.
- ***Relevant Costs.*** **:** These are the estimated future costs that are different under alternative courses of action for a specific problem and hence are appropriate to a specific management decision.
- **Conditions to be satisfied for relevant costs :-**
  - ✓ **Occur in the Future**-every decision deals with selecting a course of action based on its expected future results.
  - ✓ **Differ among the alternative courses of action-** costs and revenues that do not differ will not matter and will have no bearing on the decision being made.
- ***Differential cost:*** Difference in total cost that will arise from the selection of one alternative instead of another.
- ***Opportunity Cost:*** Value of the next best alternative.
- ***Sunk Cost:*** Cost which do not change under given circumstance and do not play any role in decision making process.
- ***Out Of Pocket Costs :*** Portion of costs which involves payments to outsiders i.e., it gives rise to cash expenditure as opposed to other costs such as depreciation, which do not involve any cash expenditure.
- The investment decisions involve current outlays in return for a stream of benefits in future year.
- The cut off rate is defined as the minimum rate of return expected from the investment.

SELF-EXAMINATION QUESTIONS

1. State whether the following statements are *true* or *false*:
   (a) The essence of management process is decision making.
   (b) Decision making is one man's job.
   (c) While making decision, only relevant cost are considered.
   (d) Past costs are relevant to the decision at hand.
   (e) Book value of an old equipment is not relevant to the proposal of equipment replacement.
2. Fill in the blanks:
   (a) The aim of the decision maker is to choose the best out of————courses of action _____.
   (b) Historical costs are ——to decision making.
   (c) Fixed expenses are relevant to decision at hand only if they are expected to be —— — by the decision.
   (d) In a proposal of equipment replacement ——value of old equipment and ——value of new equipment are relevant.
3. Fill in the blanks:
   (a) Incremental revenue is the -———— in the total income resulting from a decision.
   (b) The minimum rate of return expected from an investment is known as —— rate.
   (c) The opportunity cost of utilising a machine to produce a new product is the ———— that would have been possible by other existing products.
   (d) The time adjusted rate of return is that rate of discount at which the sum of the —— — present value is equal to the sum of the ——— present values.
4. State which of the following statements are *true or false :*
   (a) Incremental cost concept can be used for finding an optimum investment plan.
   (b) Net present value method cannot be used for selecting a capital project.
   (c) The opportunity cost of a firm's funds is the interest rate at which banks accept deposits from the firms.
5. Given the following data which of the answer is correct?
   (a) A company's scrap can be sold at Rs.2/- per kg. After processing at a cost of Rs.1.50, it can be sold at Rs.4/- per kg.
   Answers : (i) Sell the scrap and do not process further and sell
   (ii) Process the scrap further and sell.
   (b) The net present value of Rs.1,000 received after 3 years at an interest rate of 20% is:
   Answers : (i) Rs.712/- (ii) Rs.769/-

6. Following are two types of statements one having questions and the other giving the answers. Connect up the questions with their correct answers:

Questions		Answers	
(a)	What is differential cost?	(i)	It is minimum rate of return expected from an investment.
(b)	What is a cut off rate?	(ii)	It is the rate of discount at which discounted cash inflows equal discounted cash outflows.
(c)	What is the internal rate of return?	(iii)	Excess of discounted cash inflows over discounted cash outflows.
(d)	What is net present value	(iv)	Prospective change in cost following the adoption of an alternative machine or process.

7. "Costs may be classified in a variety of ways according to their nature and the information needs of the management.."

8. What is cost analysis? How it is useful in decision making?

9. What is meant by incremental revenue?

10. Indicate the major areas of decision in which differential cost analysis is useful.

11. Write short notes on:
    (i) Relevant cost
    (ii) Opportunity cost
    (iii) Incremental cost
    (iv) Sunk cost

12. Gemini Enterprises currently makes as many units of part No. X - 248 as it needs. Sen, General Manager of Gemini Enterprises, has received a quotation from another company for making part no.X-248. Zedco will supply 1,000 units of part No.X-248 per year at Rs.50 per unit. Zedco can begin supply on 1st July, 1998 and continue for 5 years, after which Gemini will not need the part. Zedco can accommodate any change in Gemini's demand for the part and will supply it for Rs.50 regardless of quantity. Shah, the Controller of Gemini Enterprises, reports the following costs for manufacturing 1,000 units of part No.X-248.

	Rs.
Direct materials	22,000
Direct labour	11,000
Variable manufacturing overhead	7,000
Depreciation on machine	10,000
Product and process engineering	4,000

Rent	2,000
Allocation of general plant overhead costs	5,000
Total costs	61,000

The following additional information is available:

(a) Part X-248 is made on a machine used exclusively for its manufacture. The machine was acquired on 1st July, 1997 at a cost of Rs.60,000. The machine has a useful life of six years and a zero terminal disposal price. Depreciation is calculated on straight-line basis.

(b) The machine could be sold today for Rs.15,000.

(c) Product and process engineering costs are incurred to ensure that the manufacturing process for part No.X-248 works smoothly. Although these costs are fixed in the short run, with respect to units of part No. X-248, they can be saved in the long run if part no.X-248 is no longer produced. If part no. X-248 is outsourced, product and process engineering costs of Rs.4,000 will be incurred for 1997-98 but not thereafter.

(d) Rent costs of Rs.2,000 are allocated to products on the basis of the floor space used for manufacturing the product. If part number X-248 is discontinued, the space currently used to manufacture it would become available. The company could then use the space for storage purposes and saves Rs.1,000 currently paid for outside storage.

(e) General plant overhead costs are allocated to each department on the basis of direct manufacturing labour costs. The costs will not change in total. But no general plant overhead will be allocated to part number X-248 if the part is outsourced.

Assume that Gemini requires a 12% rate of return for this project. The following information may be useful:

Year	Present Value Factor at 12%
0	1.000
1	0.893
2	0.797
3	0.712
4	0.636
5	0.567

Required :

(i) Should part number X-248 be outsourced ? Prepare a quantitative analysis.

(ii) State any sensitivity analysis that seems to be advisable. Do not perform any sensitivity calculations.

(iii) Sen is particularly concerned about his bonus for 1997-98. The bonus is based on the accounting income of Gemini Enterprises. What decision will Sen make if he wants to maximise his bonus for 1997-98?

13. Mahila Griha Udyog Industries is considering to supply its products - a special range of namkeens-to a departmental store. The contract will last for 50 weeks, and the details are given below:

	Rs.
Material :	
X (in stock - at original cost)	1,50,000
Y (on order - on contract)	1,80,000
Z (to be ordered)	3,00,000
Labour :	
Skilled	5,40,000
Non-skilled	3,00,000
Supervisory	1,00,000
General overheads	10,80,000
Total cost	26,50,000
Price offered by department store	18,00,000
Net Loss	8,50,000

Should the contract be accepted if the following additional information is considered?

(i) Material X is an obsolete material. It can only be used on another product, the material for which is available at Rs.1,35,000 (Material X requires some adaptation to be used and costs Rs.27,000).

(ii) Material Y is ordered for some other product which is no longer required. It now has a residual value of Rs.2,10,000.

(iii) Skilled labour can work on other contracts which are presently operated by semi-skilled labour at a cost of Rs.5,70,000.

(iv) Non-skilled labour are specifically employed for this contract.

(v) Supervisory staff will remain whether or not the contract is accepted. Only two of them can replace other positions where the salary is Rs.35,000.

(vi) Overheads are charged at 200% of skilled labour. Only Rs.1,25,000 would be avoidable, if the contract is not accepted.

ANSWERS TO SELF EXAMINATION QUESTIONS

1.	(a) True	(b) False	(c) True	(d) False	(e) True
2.	(a) alternative,	(b) irrelevant,	(c) altered,	(d) disposal, book.	
3.	(a) Change,	(b) cut off,	(c) earnings foregone,	(d) positive, negative.	

4. (a) True, (b) False, (c) Not true in all cases.

5. (a) Process the scrap further and sell; (b) Rs.712

6. (a) with (iv); (b) with (i); (c) with (ii); (d) with (iii)

12. (i) Since the outsourcing has negative NPV, therefore part should continue to be made internally.

    (ii) As the outsourcing will start from July 1998, the bonus which Mr. Sen expect will remain the same.

13. The net benefit on accepting the contract is Rs. 1,52,000 therefore the contact should be accepted.