## Decision Making

**Answer: 11**

1. 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.
2. 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.
3. 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 700 units @ Rs. 2.50 per unit represent opportunity cost.
4. 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 X Rs. 2
   It can also be used for E, which would cost Rs. 1,500 i.e. 300 X Rs.5.
   Since substitution is more useful, Rs.1,500 is the opportunity cost.

Summary of Relevant Costs:

| | | | Rs. |
|---|---|---|---|
| Material A | 1,000 units X Rs. 6 | | 6,000 |
| Material B | 1,000 units X Rs. 5 | | 5,000 |
| Material C | 700 units X Rs. 2.5 | | 1,750 |
| | 300 units X Rs. 4 | | 1,200 |
| Material D | 300 units X Rs. 5 | | 1,500 |
| Other expenses | | 550 | |
| Total Relevant Cost | | | 16,000 |

Contract should be accepted since offer is of Rs. 22,000 in relation to relevant Cost of Rs. 16,000.

**Answer: 12**

| | Retain Present Machine | Buy New Machine | Relative Benefit of Replacement |
|---|---|---|---|
| Variable Costs: (20,000 units @ Rs. 0.30 for 3 Years | 18,000 | 12,000 | (6,000) |
| Sale Proceeds of Old Machine | - | (4,000) | (4,000) |
| Capital Cost of New Machine | - | 7,000 | 7,000 |
| | 18,000 | 15,000 | (3,000) |

Thus, it is advantageous to replace the equipment.
Note. Depreciation charge and loss on sale of old machine should be ignored for this decision.

**Answer: 13**

**Relevant costs of producing one unit of the finished product**

| | *Rs.* |
|---|---|
| Cost of material 'M' (realisable value) | 80 |
| Cost of labour (Being sunk cost) | 0 |
| Out-of-pocket expenses | 30 |
| | 110 |

Allocated overhead is not relevant for the decision. The customer should be charged Rs. 110 per unit.

**Answer: 14**

**(i)** The down payment of Rs.2,50,000 represents a sunk cost.

The lost profit from subletting the shop of Rs.1,20,000 per annum arrived as: (18,000 × 12) – 96,000 = 1,20,000 is an example of an opportunity cost.

The salary amount is not given is also an opportunity cost lost.

**(ii)** The relevant information for running the shop is:

| | *(Rs.)* |
|---|---|
| Net Sales | 22,20,000 |
| *Less*: Costs (22,02,000 – 2,50,000) (sunk cost excluded for decision making purpose) | 19,52,000 |
| Gross Margin | 2,68,000 |
| *Less*: Opportunity cost from subletting | 1,20,000 |
| Profit | 1,48,000 |

As profit is more than opportunity cost, the most profitable decision is to carry on business in the shop.

**Answer: 15**

Calculation minimum price to be quoted for a quotation, based on relevant costs only

| | | (Rs.) |
|---|---|---|
| Opportunity cost of: | | |
| (1) Retaining materials already in the original machine | | |
| - Sale of Brass scrap | | 1,00,000 |
| - Sale of Steel scrap | | 25,000 |
| - Balance material , cost of scrapping )saved) | | (5,000) |
| (2) Conversion materials | | |
| - Department M | | 12,000 |
| - Department A | | 3,000 |
| (3) Conversion work | | |
| (a) Department M | | |
| Labour | 60,000 | |
| Variable overhead | 12,000 | |
| Contribution foregone | 1,80,000 | 2,52,000 |
| (b) Department A | | |
| Labour | Nil | |
| Variable overhead | 6,000 | |
| Off-loading cash flow foregone | 57,000 | 63,000 |
| (4) Sales proceed of design and specifications | | 60,000 |
| (5) Incremental fixed overhead-cost of supervision | | 10,000 |
| Minimum price to be quoted | | 5,20,000 |

Note: For the above minimum price of Rs.5,20,000 profit can be added. The existing overheads are committed costs and are not relevant for decision making.

**Answer: 16**

Revised Cost Estimate

| | | |
|---|---|---|
| 1. Direct Material: | | |
| - Paper | 2,500 | |
| - Ink | 3,000 | 5,500 |
| 2. Direct Labour (Skilled) | | |
| Normal (250 hrs x Rs. 4) | 1,000 | |
| Overtime (125 hrs x Rs. 1) | 125 | 1,125 |
| 3. Variable Overhead (350 hrs x Rs. 4) | | 1,400 |
| 4. Printing | | 600 |

Revised Cost Estimate 8,625

Working Notes:

1. With no alternative use, the paper would not be replaced; the alternative, therefore, being to scrap the stock receiving proceeds of Rs. 2,500.
2. The surplus ink could not be used or sold and therefore the whole cost of the ink purchased should be charged to the cost of the programme.
3. The direct employees are currently usefully employed, therefore, their wage cost is being recovered from an existing customer. Before, transferring them to the work on the programme, the ability of the programme work to bear this cost must be determined.
4. The overtime premiums are directly caused by the programme work, which should be able to bear this additional cost.
5. There is no additional cost associated with the employment of the unskilled labour.

| | | |
|---|---|---|
| Current idle time | 200 hrs | |
| Printing Work | 75 hrs | (No additional cost) |
| | 125 hrs | |
| Week-end work | 25 hrs | |
| Paid time off | 50 hrs | |

The 50 hrs of paid time off is more than covered by the 125 hrs of idle time, which is also paid for and, therefore, there is no additional cost.

6. Variable overhead is the incremental cost.
7. The variable overhead and other variable costs associated with running the printing press have been separately dealt with. The additional recovery required is, therefore, the lost contribution associated with 200 printing press hours.
8. Fixed production overheads are not associated with incremental cashflows, and therefore should be ignored.
   a) The cost of estimating time is a small cost, since it has already been incurred. It does not involve incremental cash flow. Therefore, it has been ignored.
   b) In short-term decision making, resources usage is best measured by using 'variable cost' which change in proportion to changes in output. When variable cost is matched with the sales revenue with which it is associated, the resulting difference or contribution gives a good indication of the expected benefit to the organisation of any course of action. If fixed assets are unaffected by a decision, contribution will be close approximation of cash flow and therefore, it is very real figure which may also be usefully used as a basis for ranking alternatives where limiting factors are involved.
   c) For evaluating the economic benefit derived from a product, it is necessary to match the revenue generated with he cost incurred. Opportunity cost represents the benefit forgone for taking one course of action rather than alternative. It gives a measure of sacrifice made in order to generate income. Conventional contribution approach normally extracts variable costs from the internal costing records (i.e., stock accounts, etc.). Opportunity costs may be derived from internal or external sources depending on such factors as whether there are alternative uses for internal resources consumed and whether, if used, they would be replaced.

**Answer:17:**
**Research Project**

| Particulars | Relevancy | Reason | Amount (Rs'000s) |
|---|---|---|---|
| Project cost till date | Not relevant | Sunk cost | |
| Sale price of the project | Relevant | Incremental revenue/opportunity gain | 400 |
| Cost of materials received | Not relevant | Sunk cost | |
| Cost of disposal of materials | Relevant | Avoidable/opportunity cost | 15 |
| Cost of labour | Not relevant | Common costs | |

| | | | |
|---|---|---|---|
| Contribution lost on the alternative use | Relevant | Opportunity cost [Sales – (Prime cost labour) | (125) |
| Absorbed Fixed overheads | Not relevant | Sunk cost | |
| Cost of Research Staff | Relevant | Incremental / out of pocket | (160) |
| Redundancy and severance pay | Not relevant | Common costs | |
| Share of General Building expenses | Not relevant | Sunk costs | |
| Total incremental inflow if the project is proceeded with | | | 130 |

**Decision:** Better to continue the project.

**Answer. 18**

Statement of cost of product NP (Rs.)

| Particulars | | | Total cost (100000 units) | Cost per unit |
|---|---|---|---|---|
| Direct materials | | | | |
| A | (1,00,000 X 2.50) | 2,50,000 | | |
| B | (60,000 X 1.00) | 60,000 | | |
| | (40,000 X 3.00) | 1,20,000 | | |
| C | (1,00,000 X 6.00) | 6,00,000 | 10,30,000 | 10.30 |
| Direct labour | | | | |
| Skilled | (25,000 hrs X Rs.3) | 75,000 | | |
| Unskilled | | | | |
| Opportunity loss | (25,000 X Rs.2) | 50,000 | 1,25,000 | 1.25 |
| Variable overhead | (1,00,000 X 1.50) | | 1,50,000 | 1.50 |
| Fixed Overheads: | | | | |
| Factory overheads: | | - | | |
| Addl. Overheads- Foreman | | 36,000 | | |
| Supervisor | | 24,000 | 60,000 | 0.60 |
| Depreciation: Type P | | 30,000 | | |
| Type Q | | 5,000 | 35,000 | 0.35 |
| Total Costs | | | 14,00,000 | 14.00. |
| profit | | | 4,00,000 | 4.00 |
| Sales | | | 18,00,000 | 18.00 |

Working Notes:

1. Cost of Direct Material

Material A- It is in regular use and hence replacement cost of Rs.2.50 will be charged.

Material B- Total requirement is of 1,00,000 units:

Stock available 60,000 units - opportunity cost Rs.1.00 each

40,000 units - purchase price Rs.3.00 each.

Material C- Purchase price of Rs.6.00

2. Cost of Direct Labour

Skilled Labour: (i) 1,00,000 units at Rs.0.25 per hour

(ii) Loss of contribution on existing product opportunity cost 25,000 X 2=Rs.50,000

Unskilled labour: Available in surplus and is to be paid even without work. Hence, not relevant

3. Cost of Additional Staff

| | (Rs.) |
|---|---|
| Foreman | 36,000 |
| Supervisor | 24,000 |
| Total | 60,000 |

4. Variable Overheads — Rs.1.50 per unit is relevant cost
5. Fixed Overheads — Not relevant hence excluded
6. Depreciation
   Type P: The machine is used on other product.
   Hence, replacement cost is relevant
   Depreciation =Rs.1,60,000-1,30,000 =Rs.30,000
   Type Q: Since it can be sold if not used resale value is relevant.
   Depreciation =Rs.22,000-Rs.17,000 =Rs.5,000
7. Market Survey Costs: It is a sunk cost. Hence it is not a relevant cost.

**Answer: 19**
**Working Notes**:

1. Machine manufacturing cost
   Costs of Rs.50,000 incurred to date in manufacturing the machine is irrelevant for the decision, since It is a sunk cost. The payment of Rs.15,000 received from the customer prior to the liquidation is also not relevant for decision making.
2. Material Cost.
   The purchase cost of Rs.6,000 of materials bought in the past is irrelevant for decision making. Only the scrap value of materials i.e.Rs.6,000 is relevant for decision making since it is the opportunity cost of materials bought in the past.
3. Labour Costs.
   Opportunity cost of labour when the workforce, is in short supply, and switched to another job,it could fetch the additional contribution of (Rs.30,000-Rs.8,000-Rs.12,000)=Rs.10,000.
4. Consultancy fees

| | (Rs.) |
|---|---|
| Cost of completing the work | 4,000 |
| Cost of canceling the contract | 1,500 |
| Incremental cost of completing of work | 2,500 |

5. General Overheads
   The general overheads are absorbed on allocation and therefore, these costs are not relevant for the decision.

Statement showing economics of proposition

| | | (Rs.) | |
|---|---|---|---|
| Revenue from completing work | | | 34,000 |
| Less: | | | |
| Materials (opportunity cost) | | 2,000 | |
| Labour: Actual costs | 8,000 | | |
| Opportunity costs | 10,000 | 18,000 | |
| Cost of consultancy (Incremental cost) | | 2,500 | 22,500 |
| Additional profit by accepting the offer of new customer in completion of the work. | | | 11,500 |

In view of incremental profit of Rs.11,500, the offer of new customer can be accepted.

**Answer: 20:**
For solving this question, it is necessary to take the following into consideration. SV Ltd. Has two departments A and B. Dept. A is manufacturing FLOTAP, but Dept. B is manufacturing the containers for this product. It also stores this product. This is the existing situation. Now three alternatives are given.
**Alternative 1**.- Close Dept. B and manufacturing & storing may be given to PH Ltd.
**Alternative 2** – Continue Dept. B and manufacturing may be given to PH Ltd and storing to Dept. B.
**Alternative 3** – Continue Dept. B, Manufacturing may be done by Dept. B but storing may be given to PH Ltd.
Company should either select one of the alternative or continue the existing practice.
**Working Notes**:
(i)

| | (Rs.) |
|---|---|
| Direct Materials including germicide | 4,20,000 |
| Use of germicide (1/5th of Rs. 6,00,000) | 1,20,000 |

| | |
|---|---|
| Direct materials other than germicide | 3,00,000 |

This material will be avoidable cost if Division B is to Close-down.
(ii) 10% of all materials = 10% of Rs.3, 00,000

(a) Savings: Rs.3, 00,000-Rs.30, 000=Rs.2, 70,000 if manufacture is given to PH Ltd. And storage is with SV Ltd.

(b) Savings: 3, 00,000- 90% of Rs.3, 00,000=Rs.30, 000. If manufacture is done by SV Ltd and storage given to PH Ltd.

(iii)

| | (Rs.) |
|---|---|
| Direct Labour cost | 3,00,000 |
| Less: Terminal benefit if B is closed | 45,000 |
| Avoidable cost, if Dept .B is closed (saving) | 2,55,000 |

If manufacturing is given to PH Ltd. And SV Ltd. continues to store the product, saving on account of labour retrenchment will be only Rs.15,000.(It means in this alterative 3,00,000-15,000=2,85,000 will be spent any way and avoidable cost will be only Rs.15,000).
If manufacturing is done by SV Ltd. Then Labour force will continue. It means impact of labour cost in 3rd alternative will be nil.

(iv) Supervisory staff will be transferred to another department in the lst alternative. It means cash flow will not be affected. In the second and third alternative, supervisory staff will be retained and it means no additional cash flow or relevant cost due to decision.

(v) Depreciation does not affect the cash flow. Therefore it is not relevant for these decisions.

(vi) The hire charges of warehouse is Rs.54,000 per annum. The remaining space of the warehouse is idle. It means, when department B is closed, cash outflow of Rs.54,000 will be avoided. Therefore Rs.54,000(and not Rs.27,000) is the avoidable cost for this decision. If Department B continues, this expenditure of Rs.54,000 continue. Therefore cash flow for alternatives 2 and 3 will not be isturbed on this account.

(vii) Maintenance of machine is required for manufacturing. If means Rs.21,600 will be avoidable cost for alternative 1 and 2.
In 3rd alternative this cost will continue to be there. Besides this machine will not be required in alternative 1 and 2. It will be sold at Rs.1,50,000.It will be a one time cash inflow for alternatives 1 and 2.

(viii) Miscellaneous overhead of Rs.94,500 will be avoidable cost for alternative 1. For 2nd alternative 80 % of this i.e Rs.75,600 will be avoidable cost. For 3rd alternative 20% of Rs.94,500 i.e. Rs.18,900 will be avoidable cost.

(ix) Germicide- Stock:

| | (Rs.) |
|---|---|
| Stock in 2002 | 6,00,000 |
| Used last year (1/5th) | 1,20,000 |
| Balance Stock | 4,80,000 |

It is given that original price is Rs.3,000

Therefore, Rs.4,80,000/Rs.3,000=160 tonne Germicide is there.

(x) Germicide-value

Alternative 1 : Storage is done by PH Ltd. Therefore it will be sold at Rs.2,400 per tonne. Cash inflow will be 2,400 X 160=Rs.3,84,000.
Note that original price and replacement cost are irrelevant for the decision.

Alternative 2 : 10% of all material will be used. It means 90% of 160 tonne will be sold. Cash inflow will be 160 X 0.90 X Rs.2,400= Rs.3,45,600

Alternative 3 : In this situation storage is done by PH Ltd. Therefore only 10% of whole quantity of 160 tonne will be sold in market at Rs.2,400 per tonne . Cash inflow will be 16 X Rs.2,400 Rs.38,400.

(The replacement cost is irrelevant information in the question and it will be relevant only, when germicide has competing demands.)

(xi) Machine is used for manufacturing of containers. It is not required in alternatives 1 and 2. Therefore , it will be sold and there will be one time cash inflow of Rs.1,50,000 under alternatives 1 and 2. Written down value is irrelevant for decision under consideration.

(Rs.)

| | | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|---|
| Division B | | Close | Continue | Continue |
| Manufacture of containers | | PH Ltd | PH Ltd. | SV Ltd. |
| Storage of product | | PH Ltd. | SV Ltd. | PH Ltd. |
| **Cash Inflows** | | | | |
| (Including avoidable cost) | | | | |
| Direct materials other than germicide | | 3,00,000 | 2,70,000 | 30,000 |
| Direct labour | | 2,55,000 | 15,000 | - |
| Rent of a part of warehouse | | 54,000 | - | - |
| Maintenance of machine | | 21,600 | 21,600 | - |
| Miscellaneous overhead | | 94,500 | 75,600 | 18,900 |
| Total avoidable cost p.a. | (A) | 7,25,100 | 3,82,200 | 48,900 |
| **Cash outflows** | | | | |
| Contract fee to PH Ltd. | | | | |
| For Manufacturer | | 7,50,000 | 7,50,000 | - |
| For packing and storage | | 1,50,000 | - | 1,50,000 |
| Total outflow | (B) | 9,00,000 | 7,50,000 | 1,50,000 |
| Net Cash outflow p.a. | (A-B)-( C ) | (1,74,900) | (3,67,800) | (1,01,100) |
| Total cash outflows for 4 years | ( C X 4) | (6,99,600) | (14,71,200) | (4,04,400) |
| One time income | | | | |
| Sales of germicide | | 3,84,000 | 3,45,600 | 38,400 |
| Sale of machine | | 1,50,000 | 1,50,000 | - |
| Net cash outflow | | (1,65,600) | (9,75,600) | (3,66,000) |

Recommendations: All the alternatives result in net cash outflow. Therefore it is interest of SV Ltd. To continue and to manufacture containers and store them in Division B.

**Answer: 21:**

Comparative Statement of Relevant Costs for use of own distribution division or use of Countrywide distributions. (Rs.'000)

| Particulars | Own Distribution | | | Countrywide Distribution | | |
|---|---|---|---|---|---|---|
| | 2004-05 | 2005-06 | 2006-07 | 2004-05 | 2005-06 | 2006-07 |
| Relevant Cash outflow: | | | | | | |
| Operating Costs | 2,100 | 2,100 | 2,100 | - | - | - |
| Sub-Contract costs | - | - | - | 1,950 | 1,950 | 1,950 |
| Total | 2,100 | 2,100 | 2,100 | 1,950 | 1,950 | 1,950 |
| Less: Relevant cash inflow: | | | | | | |
| Sale of delivery vehicle | | | | | | |
| On 1-4-2002 | - | - | - | 600 | - | - |
| On 31-3-2005 | - | - | 240 | - | - | - |
| Net Relevant Cash outflows: | 2,100 | +2,100 | +1,860 | 1,350 | +1,950 | +1,950 |
| Total | | | =6,060 | | =5,250 | |

Suggestion: From the above comparative statement it is observed that the net relevant cash outflow is more in case of own distribution. Hence, selection of countrywide distributors is recommended. It is based on the assumption that no portion of the common corporate cost of which Rs.3,00,000 is apportioned to distribution division which would be avoided even if, the distribution division is closed down.

(b) Reasons for reluctancy to accept countrywide distributors in distribution of Soft Drinks.

(1) Loss on Sale of Delivery Vehicles presently owned by the company: (Rs.)

| | | |
|---|---|---|
| Cost of Vehicles | (8 Vehicles on 1-4-2003) | 19,20,000 |
| Less: Depreciation for 2003-04 | | 4,20,000 |
| Book Value on 1-4-2004 | | 15,00,000 |
| Less: Sales realization | (8 Vehicles X Rs.75,000) | 6,00,000 |
| Book Loss on sale of Vehicles | | 9,00,000 |

6. Possibility of reduction in reported income as per Security Analyst's recommendation

Forecast of operating income as per Security Analyst (Rs.'000)

| Particulars | 2001-02 | 2002-03 |
|---|---|---|
| Estimated Profit when own distribution division is used | 630 | 660 |
| Net income if the offer of countrywide distributors is accepted | 630 | 330 |

Working Notes: (Rs.'000)

| | | |
|---|---|---|
| Projected Profit for 2004-05 | | 660 |
| Add; Depreciation avoided | | 420 |
| Add: Saving in operating cost | (Rs.2,100- Rs.1,950) | 150 |
| | | 1,230 |
| Less: Book loss on the disposal of delivery vehicles | | 900 |
| Net income, if Countrywide distributors selected | | 330 |

Analysis: In view of short- run benefit, countrywide distributors can be opted. But when the long-run benefits are recognized, and to focus on customer needs, the company's own distribution function is recommended.

**Answer: 22:**

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

| | | | (Rs.'000) |
|---|---|---|---|
| Material costs (for appliances covered under agreement) | | | 825 |
| [Rate to working note 1 (i)] | | | |
| Material costs (for appliances not covered under agreement) | | | 275 |
| [Refer to working note 2 (i)] | | | |
| Labor cost (for appliances covered under agreement) | | | 1,000 |
| [Refer to working note 1 (ii)] | | | |
| Labour cost (for appliances not covered under agreement) | | | 240 |
| [Refer to working note 2 (ii)] | | | |
| 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 pre 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. | |
| | $\left(\frac{Rs.60,000}{Rs.10}\right) \times Rs.137.50$ | 8,25,000 |
| (ii) | Cost of labour charged to customer by X Ltd. | |
| | $\left(\frac{Rs.1,00,000}{Rs.10}\right) \times Rs.100$ | 10,00,000 |

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

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

**Answer: 23**

**Statement of relevant cost of Mahila Griha Udyog Industries**

**If the contract is accepted/rejected**

| *Decision* | *Relevant costs (if contract is accepted) Rs.* | *Relevant costs (if contract is rejected) Rs.* |
|---|---|---|
| Cash inflows | | |
| Contract price | 18,00,000 | - |
| Sale of material Y | - | 2,10,000 |
| (Refer to working note I) | | |
| Total cash inflows: (A) | 18,00,000 | 2,10,000 |

| | | |
|---|---|---|
| Cash outflows | | |
| Material X substitute | 1,35,000 | - |
| (Refer to working note 2) | | |
| Adaptation required for the use of obsolete material X | - | 27,000 |
| Material Z | 3,00,000 | - |
| Replacement of semi-skilled labour by skilled labour | 5,70,000 | - |
| (Refer to working note 3) | | |
| Non-skilled labour cost | 3,00,000 | - |
| (Refer to working note 4) | | |
| Supervisory staff cost | 35,000 | - |
| (Refer to working note 5) | | |
| Avoidable overheads | 1,25,000 | - |
| (Refer to working note 6) | | |
| Total cash outflows: (B) | 14,65,000 | 27,000 |
| Net cash inflows: (A) – (B) | 3,35,000 | 1,83,000 |

The net benefit on accepting the contract is : Rs.3,35,000 – Rs.1,83,000 = Rs.1,52,000.

**Conclusion**

The contract should be accepted as it yields a net incremental cash inflow of Rs.1,52,000.

**Working notes:**

1. Material Y will have to be paid for whether or not the contract is accepted, therefore its cost is irrelevant. The relevant cost figure here is that which has an opportunity cost of Rs.2,10,000. This means that the company can resell material Y at this price.
2. Regarding material X, if the contract is accepted, alterative material will have to be purchased for the other product at a cost of Rs.1,35,000. If the contract is rejected material X will be adapted for a product not included in the list of special range of namkeens at a cost of Rs.27,000.
3. The relevant skilled labour cost of Rs.5,70,000 is the extra cost to the company because of this contract. It is the replacement cost of semi-skilled labour by skilled labour.
4. Non-skilled labour cost is the incremental cost of the contract.
5. If the company accepts the contract it will have to pay Rs.35,000 for the two position that the supervisory staff can replace.
6. Only Rs.1,25,000 of avoidable overheads are relevant to this contract.

**Answer: 24**

Working Notes:

1. The book value of Material K Rs. 40,000 is a sunk cost and is not relevant for decision making.
2. The Scrap Value of Material K Rs. 10,000 will affect the cashflow and is relevant.

Alternative I
Relevant Costs

| | | (Rs.) |
|---|---|---|
| Material A (Replacement Cost) | (600kgs. X Rs. 70) | 42,000 |
| Direct Labour – Skilled | (200 hrs X Rs. 6) | 12,000 |
| Contribution Lost (Opportunity Cost) | (2000 X Rs. 2) | 4,000 |
| Unskilled (not relevant) | | |

| | |
|---|---|
| Variable Overheads | - |
| Total Relevant Cost | 60,000 |

| | | |
|---|---|---|
| Cost per unit | = Rs. 60000 / 500 units | = Rs. 120 p.u. |
| Selling Price | | = Rs. 150 p.u. |
| Profit | = 500 units (Rs. 150 – Rs. 120) | = Rs. 15,000 |

Alternative II
1. The Cost of substitute material Rs. 8,000 is relevant.
2. The regular profit of a job Rs. 6,000 is not relevant.

Analysis: From the above analysis it is suggested to convert the materials into a specified product.

**Answer: 25**

**M/s Ranka Builder's**

**Statement of relevant costs on the**

**Acceptance of contract form Excel Ltd.**

(Figure in laksh of Rs.)

| *S.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 | | 20 | |
| | (Refer to working note 1) | | | |
| 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 | | 9 | |
| | (Refer to working note 2) | | | |
| 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 | | 7 | |

| | | | |
|---|---|---|---|
| | machine | | |
| 7. | Estimated profit foregone on other project | Opportunity foregone | 10 |
| | Total | | 93 |

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

**Working notes :**

1.

| | Rs. (Lacs) |
|---|---|
| Total cost of 3 grounds of land | 60 |
| Cost of ground 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 is Rs.10 lacs, it includes material worth Rs.2 lacs, 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 lacs, material is an incremental cost. Hence total relevant cost of others material is Rs.9 lacs. (Rs.8 lacs, incremental + Rs.1 lac, opportunity cost).
3. Since the equipment can also be used on ths contract. Its current replacement price is Rs.32 lacs, and after one year its cost will be Rs.25 lacs. Therefore the relevant opportunity cost of machine is : (Rs.32 lacs – Rs.25 lacs).

**Answer: 26**

Statement showing Revised Cost Estimates:

| | | |
|---|---|---|
| 1. | Steel Sheets (Rs. 12/kg. x 5,000kg.) | Rs.60,000 |
| 2. | Steel Rods (1,000 kg. @ Rs. 17 kg.) | 17,000 |
| 3. | Bearing, hardware items, etc. | 15,000 |
| 4. | Labour Cost | Nil |
| 5. | Overheads: | |
| | Fabrication Shop (500 hrs @ Rs. 25) | 12,500 |
| | Welding Shop (300 hrs @ Rs. 16) | 4,800 |
| | Planning engineers cost | Nil |
| | Design engineers cost | Nil |
| | Total Estimated Relevant Cost | 1,09,300 |

Relevant costs are estimated future costs pertinent to a decision.
Imputed costs do not form part of relevant costs. All costs accumulated for stock valuation purposes may not be relevant cost.

**Reasons for Variation in the Cost Elements**

1. Current rate of steel sheets is quite relevant. Past rate of Rs. 12 per kg has no impact on the decision and therefore not adopted in the cost estimates.
2. Steel rods purchased five years ago cannot be used (non- moving) and as such it represents sunk cost. This material can now be substituted for alloy steel rods (Rs. 17/kg). Alloy rods are cheaper than steel rods and therefore relevant to the decision.
3. Fixed costs are past costs, not relevant to the decision. Labour costs are fixed in nature.
4. It is assumed that Fabrication Shop is working at optimum level. Therefore rate charged from outsiders (Rs.25 per hour) is relevant.
5. It is assumed that Welding shop is not working at full capacity. Therefore variable cost of Rs. 16 per machine hour is adopted.
6. Planning and design engineers costs are fixed cost and, therefore, irrelevant.

**Answer: 27**

**Alternative 1 – (Conversion versus immediate sale)**

| | Rs. | Rs. | Rs. |
|---|---|---|---|
| Sales revenue 900 units at Rs.300 per unit (Refer to working note 1) | | | 2,70,000 |
| *Less*: Relevant costs | | | |
| Material XY opportunity cost (Refer to working note 2) | | 21,000 | |
| Material A – units @ Rs.90 per unit (Refer to working note 3 | | 54,000 | |
| Material B – 1,000 units @ Rs.45 per unit (Refer to working note 4) | | 45,000 | |
| Direct Labour : | | | |
| Unskilled – 5,000 hours @ Rs.3 per hour | 15,000 | | |
| Semi-skilled | Nil | | |
| Highly skilled – 5,000 hours @ Rs.11 (Refer to working note 5) | 55,000 | 70,000 | |
| Variable overheads 15,000 hours @ Re.1 (Refer to working note 6) | | 15,000 | |
| Extra selling and delivery expenses | 27,000 | | |
| Extra advertising | 18,000 | 45,000 | 2,50,000 |
| Fixed advertising | | 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, 6) | 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 | 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 advisable to convert material XY into a specialized product.

**Working notes :**

1. There will be a additional sales revenue of Rs.2,70,000 if Alternative 1 is chosen.
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 hours. 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 chosen 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.

**Answer: 28**

**Statement of minimum price which the company can afford to quote for the new customer (based on relevant cost)**

| | |
|---|---|
| Cost to be incurred to bring the equipment in its original condition. | 29,700 |
| Opportunity cost of the direct material | 2,250 |
| Direct wages: | |
| Dept. A : 15 man days × Rs.120 | 1,800 |
| Dept. B : 25 man days × Rs.100 | 2,500 |
| Opportunity cost of contribution lost by department B (Rs.2,500 × Rs.2.30) | 8,000 |
| Variable overheads | 1,075 |
| 25% × (Rs.1,800 + Rs.2,500) | |
| Delivery costs | 1,350 |

| | |
|---|---|
| Supervisory overtime payable for modification | 1,050 |
| Control device to be used in another job (Refer to working note 1) | (10,350) |
| Net loss on material cost savings, in the original equipment (Refer to working note) | 11,700 |
| Opportunity cost of remaining materials which can be sold as scrap | 11,400 |
| Opportunity cost of sale drawings | 1,500 |
| Total minimum price which may be quoted | 61,975 |

**Working notes:**

**1. Cost of control device to be used in another job:**

| | *Rs.* |
|---|---|
| Cost of control device | 10,500 |
| *Less*: Dismantling & removal cost of control mechanism (1 man day × Rs.120) | 120 |
| *Less*: Variable cost )25% × Rs.120) | 30 |
| Balance cost of control device | 10,350 |

**2. Net loss on material cost saving of equipment:**

| | |
|---|---|
| Loss on material cost saving of equipment | 12,000 |
| *Less*: Conversion cost (2 man days × Rs.120) | 240 |
| *Less*: Variable overheads (25% × Rs.240) | 60 |
| Net loss on material cost saving of equipment | 11,700 |

**Answer:29**

**Working Notes:**

1. Relevant cost of labour

| | | |
|---|---|---|
| Grade | : | Nil, labour cost for Grade 1 labour as it will not be affected by the decision. |
| Grade 2 | : | Rs.20 per hour |

2. Relevant cost of material

| | | |
|---|---|---|
| Material A | : | Rs.100 per unit, the replacement cost because the material is widely used. |
| Material B | : | Rs.250 per unit, the net realisable value, being the opportunity cost. |

3. Statement of loss of contribution from the reduction in the sale of product Y.

| | *Rs.* | *Rs.* |
|---|---|---|
| Sales revenue per unit: (A) | | 700 |
| Variable cost per unit | | |
| Grade 2 labour: (4 hour × Rs.20) | 80 | |
| Materials relevant variable costs | 120 | |
| Variable production overheads: (B) (4 hours × Rs.30) | 120 | 320 |

| | |
|---|---|
| Contribution per unit: [(A) – (B)] | 380 |
| Loss of contribution from the reduction in sale of 5,000 units | 19,00,000 |
| (5,000 units × Rs.380) | |
| *Less*: Avoidable fixed factory overhead cost | 5,90,000 |
| Net Loss | 13,20,000 |

Relevant costs and benefit analysis from the acceptance of the contract.

| | | *(Rs.'000)* |
|---|---|---|
| Sales revenue: (1) | | 20,000 |
| (20,000 kgs. × Rs.1,000) | | |
| Relevant costs: | | |
| Labour: | | |
| Grade 1 | NIL | |
| Grade 2 | 2,400 | |
| (20,000 kgs. × 6 hours × 20) | | |
| Material A (20,000 × 2 units × Rs.1,000) | 4,000 | |
| Material B (20,000 kgs. × 1 litre × Rs.250) | 5,000 | |
| Variable production overhead (20,000 kgs. × 8 hours × Rs.30) | 4,800 | |
| Total variable cost | 16,200 | |
| Incremental fixed costs | 2,280 | |
| | 18,480 | |
| *Add*: Loss of contribution on product Y | | |
| (Refer to working note 3) | | |
| Total relevant cost: (ii) | 19,800 | |
| Excess of relevant revenue over relevant cost: | 200 | |

Advice to A Limited: to accept the contract, as it will enhance the pre-tax operating income by Rs.2,00,000

**Answer: 30**

1. Value of Material X in stock : (which can be used as substitute for other materials)
   = Rs. 54,000 X 90 / 100 = Rs. 48,600

2. Value of Material X for which firm order has been placed
   = Rs. 76,000 X 90 / 100 = Rs. 68,400

3. Value of Material Y in stock
   = 2 times x Rs. 62,000 = Rs. 1,24,000

4. Irrelevant Costs: Following costs are irrelevant therefore, they have been ignored
   - Site manage costs – being fixed costs
   - Depreciation of plants
   - Interest on capital
   - Notional interest in estimated working capital

- Head office expense allocated to contracts.

Comparative statement of Net Benefit resulting from each contract (Rs.)

| Particulars | | Contract AX | Contract BX |
|---|---|---|---|
| Material X – in stock | | 48,600 | |
| Material X – firm orders placed | | 68,400 | |
| Material X – not yet ordered | (at current cost) | 1,50,000 | |
| Material Y - in stock | | - | 1,24,000 |
| Material Z – not yet ordered | (at replacement cost) | - | 1,78,000 |
| Labour – to be paid | | 2,15,000 | 2,75,000 |
| Travel and other expenses | (future outflow) | 17,000 | 14,000 |
| Income from the hire of plant | | (15,000) | |
| Penalty for rescinding the contract 'AX' is relevant | | - | 70,000 |
| Total Cost | | 4,84,000 | 6,61,000 |
| Contract Price | | 7,20,000 | 8,80,000 |
| Expected net benefit | | 2,36,000 | 2,19,000 |

Advice- Since the expected net benefit of contract AX, is more than Contract BX, it is suggested to continue with Contract AX.

**Answer: 31**:Relevant Cost of 'Jeet' bicycle

| | | |
|---|---|---|
| Material | | 300.00 |
| Labour | | 200.00 |
| Variable Overhead | (0.4 X 300) | 120.00 |
| Cost of Capital | (0.15 X 6,00,000) / 25,000 | 3.60 |
| | | 623.60 |

If Star Bicycle company accept the offer of making 'Jeet' for the chain stores the loss in contribution due to sale of Smart is going down by 1,00,000 units is relevant, which causes a loss of Rs. (899-300-200-120)= Rs. 279

The price of Jeet then should be Rs. 623.60 + 279 = Rs. 902.60. This is higher than the price of Rs. 800 as offered by the chain store. So, the offer cannot be accepted.

Since the chain store has decided to launch a product like 'Jeet', it will do so whether or not Star Bicycle Company accepts the proposal as there is excess capacity in the industry it will be able to do so. In that case, the loss of contribution is Rs. 279 is not relevant and Star Bicycle Company can accept the proposal of the chain store. Star Bicycle Company should have a closure look in the market condition and the chain store's ability to get a replica of 'Jeet' from other manufacturer before Star Bicycle Company reaches a final decision.

**Answer: 32:**Working Notes:

Calculation of contribution margin

The company expects that each per cent point increase in on-time performance will result in revenue increase of Rs. 18,000 p.a.

Additional revenue increase = Rs. 18,000 X 10 = Rs. 1,80,000

Contribution margin on additional revenue = Rs. 1,80,000 X 45/ 100 = Rs. 81,000

Costs incurred annually on the installation of new scheduling and tracking system (Rs.)

| | | | |
|---|---|---|---|
| Additional annual cost | | | 1,50,000 |
| Interest Foregone on Fixed deposit | (Opportunity Cost) | (10% X Rs. 2,00,000) | 20,000 |
| Total Costs | | | 1,70,000 |

Expected Savings in costs on the installation of new scheduling and tracking system (Rs.)

| | | |
|---|---|---|
| Contribution margin from additional annual revenue | (45% X Rs. 1,80,000) | 81,000 |
| Decrease in variable costs due to reduced numbers of carton lost | (3,000-1,000) X Rs. 50 | 1,00,000 |

| | | |
|---|---|---|
| Total savings in cost | | 1,81,000 |
| Net saving | (1,81,000 - 1,70,000) | 11,000 |

Suggestion: The expected savings are more than annual costs, hence it is suggested to install a new scheduling and tracking system.

**Answer 33:**
Minimum recommended price per unit of 5,000 units of a product (obsolete model) of ACE Ltd.

(i) Historical cost of Rs.11.50 per unit of 5,000 units of a product is irrelevant (as it is a sunk cost) for determining the recommended price per unit.

(ii) If at all this model is sold in the market through normal distribution channels it will entail a variable selling and distribution cost of Rs.3 per unit.

(iii) If the stock is disposed off by asking someone to take them on "as is where is basis", the company would have to spend Rs.5,000 over 5,000 units i.e. Rs.1/- per unit.

In view of (ii) and (iii) the option of selling 5,000 obsolete units of the model using regular channels will nave a differential cost of Rs.2 (Rs.3 – Re.1) per unit.

**Recommendation:**

Hence, if the company can get anything more than Rs.2/- per unit, then it is worthwhile to sell the stock of 5,000 units and earn an additional contribution.

**Answer: 34**

**Statement of Increment Cost and Incremental Revenue**

| Capacity in units | Unit cost Rs. | Total cost Rs. | Incremental cost Rs. | Unit price Rs. | Total price Rs. | Incremental revenue Rs. |
|---|---|---|---|---|---|---|
| (a) | (b) | (c)=(a)×(b) | (d) | (e) | (f)=(a)×(e) | (g) |
| 200 | 40 | 80,000 | - | 100 | 2,00,000 | - |
| 3000 | 35 | 1,05,000 (Rs.1,05,000 – Rs.80,000) | 25,000 | 95 | 2,85,000 | 85,00,000 (Rs.2,85,000 - Rs.2,00,000) |
| 4000 | 34 | 1,36,000 Rs.1,36,000 – 1,05,000) | 31,000 | 94 | 3,76,000 | 91,000 (Rs.3,76,000 – Rs.2,85,000) |
| 5,000 | 32 | 1,60,000 | 24,000 (Rs.1,60,000 – Rs.1,36,000) | - | - | - |
| 6,000 | 31 | 1,86,000 | 26,000 (Rs.1,86,000 – Rs.1,60,000) | - | - | - |

**Decision:**

At 4,000 units capacity told sales revenue is Rs.3,76,000 and the total cost is Rs.1,36,000 leaving a profit of Rs.2,40,000. The profit figure at this level clearly shows that the fixed expenses stand fully recovered. Hence,

we have to take incremental cost for further level levels of output. For an additional sales of 2,000 units incremental cost is Rs.50,000 (Rs.1,86,000 – Rs.1,36,000) and the cost per unit is Rs.25 $\left(\frac{\text{Rs.50,000}}{\text{2,000 units}}\right)$

Since the price quoted per unit is Rs.28, which is more than Rs.25, therefore, the order should be accepted.

**Answer: 35**
ABC Ltd is facing Direct material constraint and special steel plates are in short supply but the stock is available only 500 M.T.
**Alternatives available to maximize profit**
Alternative I: - Manufacture and Supply only 20,000 cylinders at the risk of reduced order in future.
Alternative II: - Make 40,00 upper halves, buy 40,000 button halves from outside and supply 40,000 cylinders.

Profitability Statement

| No. of Cylinders | Alternatives | | Differential Cost |
|---|---|---|---|
| | I<br>20,000 | II<br>40,000 | |
| Sales Realisation @ Rs.700 | 140 | 280 | 140 |
| Welding and other costs @ 30 | (6) | (12) | (6) |
| Transportation, loading etc. (at Rs.5 per half) | - | (2) | (2) |
| Net Differential Income | 134 | 266 | 132 |

The additional net income when 40,000 halves are purchased is Rs. 132 lakhs which is the maximum price that ABC Ltd. Can afford to pay keeping for itself at least the contribution it would earn by its own operation (a).

i.e. The Price = $\frac{\text{Rs. 120 Lakhs}}{40,000}$ = Rs. 330 per bottom half.

**Answer: 36**
Option 1: Profitability to continue only in season period (Rs.)

| Particulars | Gift shop | Restaurant | Lodge | Total |
|---|---|---|---|---|
| Incremental Revenue (i) | 6,000 | 8,000 | 20,000 | 34,000 |
| Differential cost: | | | | |
| Cost of Sales | 3,300 | 4,400 | - | 7,700 |
| Supplies | 300 | 800 | 1,600 | 2,700 |
| Electricity Charges | 40 | 160 | 400 | 600 |
| Total (ii) | 3,640 | 5,360 | 2,000 | 11,000 |
| Incremental revenue over differential cost (i)-(ii) | 2,360 | 2,640 | 18,000 | 23,000 |
| Less: Cost of advertisement | | | | 12,000 |
| Net incremental revenue | | | | 11,000 |

Working Notes:
(1) Incremental revenue (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.48,000 X 10/80) | 6,000 |
| Restaurant | (Rs.64,000 X 10/80) | 8,000 |
| Lodge | (Rs.1,80,000 X 10/90) | 20,000 |
| | Total | 34,000 |

(2) Differential cost of sales (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.6,000 X 55/100) | 3,300 |
| Restaurant | (Rs.8,000 X 55/100) | 4,400 |
| | Total | 7,700 |

(3) Differential cost of supplies (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.6,000 X 5/100) | 300 |
| Restaurant | (Rs.8,000 X 10/100) | 800 |
| Lodge | (Rs.20,000 X 8/100) | 1,600 |
| | Total | 2,700 |

(4) Differential cost of Electricity Charges (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.900-Rs.640) X 10/80) | 40 |
| Restaurant | (Rs.3,200 –Rs.1,920)X 10/80) | 160 |
| Lodge | (Rs.13,500-Rs.9,900) X 10/90) | 400 |
| | Total | 600 |

Option 2: Profitability to continue throughout the year including season and off season periods (Rs.)

| Particulars | | Gift shop | Restaurant | Lodge | Total |
|---|---|---|---|---|---|
| Incremental Revenue: | | | | | |
| Season Period | | - | - | - | - |
| Off Season period | | 34,200 | 45,600 | 80,000 | 1,59,800 |
| Total | (i) | 34,200 | 45,600 | 80,000 | 1,59,800 |
| Differential Cost | | | | | |
| Cost of Sales | | 19,800 | 26,400 | - | 46,200 |
| Supplies | | 1,800 | 4,800 | 12,800 | 19,400 |
| Salaries | | 9,600 | 9,600 | 40,800 | 60,000 |
| Electricity –Fixed | | 1,280 | 3,840 | 13,800 | 18,920 |
| Electricity- Variable | | 240 | 960 | 3,200 | 4,400 |
| Total | (ii) | 32,720 | 45,600 | 70,600 | 1,48,920 |
| Net incremental Revenue | (i)-(ii) | 1,480 | - | 9,400 | 10,880 |

Working Notes:

(a) Incremental Revenue in off season period (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.48,000 X 2 X 30 / 80X 95/100) | 34,200 |
| Restaurant | (Rs.64,000 X 2 X 30 / 80X 95/100 | 45,600 |
| Lodge | (Rs.1,80,000 X 2 X 40 / 90X 50/100 | 80,000 |
| | Total | 1,59,800 |

(b) Differential Cost of Sales (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.36,000 X 55/100) | 19,800 |
| Restaurant | (Rs.48,000 X 55/100) | 26,400 |
| | Total | 46,200 |

(c) Differential cost of supplies (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.36,000 X 5/100) | 1,800 |
| Restaurant | (Rs.48,000 X 10/100) | 4,800 |
| Lodge | (Rs.1,60,000 X 8/100) | 12,800 |
| | Total | 19,400 |

(d) Differential cost of Salaries (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.4,800 X 2) | 9,600 |
| Restaurant | (Rs.4,800 X 2) | 4,600 |
| Lodge | (Rs.25,200-Rs.4,800) X 2) | 40,800 |
| | Total | 60,000 |

(e) Differential cost of Electricity (Fixed Element) (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.640 X 2) | 1,280 |
| Restaurant | (Rs.1,920 X 2) | 3,840 |
| Lodge | (Rs.6,900 X 2) | 13,800 |

| | |
|---|---|
| Total | 18,920 |

(f) Differential cost of Electricity (Variable element) (Rs.)

| | | |
|---|---|---|
| Gift shop | (Rs.900-Rs.640) X 30 X2 /80) | 240 |
| Restaurant | (Rs.3,200 –Rs.1,920) X 30X 2/80) | 960 |
| Lodge | (Rs.13,500-Rs.9,900) X 40 X 2 /90) | 3,200 |
| | Total | 4,400 |

Decision : By adopting the Option 1, the net increase in incremental revenue by Rs.120 (i.e. Rs.11,000-Rs.10,880) over the Option 2.Therefore, Option 1 is suggested to adopt.
Incremental profitability by adopting strategies of both advertisement insertions and operating during off season period. (Rs.)

| | |
|---|---|
| Incremental Revenue with Advertisement | 11,000 |
| Incremental Revenue with the continue of operations during off season | 10,880 |
| Total incremental revenue | 21,880 |

Therefore, both the strategies can be implemented simultaneously for increase of profitability of the organization.

**Answer: 37**

(a) Consequences of undertaking: Nagpur & Delhi Contracts (Rs.'000)

| | Nagpur Contract | | Delhi Contract | |
|---|---|---|---|---|
| Contract revenue | | 170 | | 180 |
| Sales of materials held for the Nagpur contract (Note 1) | | | | 24 |
| Saving in material purchases by alternative use of materials of Delhi contract (Note2) | | 48 | | |
| Hire of plant | | 2 | | |
| | | 220 | | 204 |
| Incremental costs: | | | | |
| Materials to be ordered (Note 3) | 40 | | 34 | |
| Project manager's travel, lodging etc. | 4 | | 4 | |
| Local labour | 70 | | 56 | |
| Penalty for canceling the other contract | 8 | | 16 | |
| | | 122 | | 110 |
| Excess of revenue/saving over incremental costs | | 98 | | 94 |

Note:

(1) If the Delhi job is undertaken sales of materials no longer required for the Nagpur job would be (Rs.)

| | |
|---|---|
| Materials held, at cost | 20 |
| Current money value (add 60%) | 32 |
| Sales price )x90%) | 28.8 |
| Less: transportation etc. costs (16.67%) | 4.8 |
| Net sales revenue | 24.0 |

(2) If the Nagpur job is undertaken, the materials for the Delhi job might be refused on a different contract, thereby saving the purchase of additional materials: (Rs.'000)

| | |
|---|---|
| Materials held | 24 |
| Contracted for | 36 |
| Cost of unwanted materials | 60 |
| Saving in purchase on different contract (80%) | 48 |

(3) The materials contracted for to carry out the Delhi job must be paid for whatever happens. Although not yet received, they must be paid for whichever (if either) contract is undertaken. It is therefore not an incremental cost chargeable to the Delhi contract.

For similar reason, materials already held are not an incremental cost to their respective contracts. The alternative use of materials not required is , however, significant and this has been taken into account on the revenue side of the analysis.

(4) It is assumed that the project manager' salary is a fixed cost, whichever contract (if either) is undertaken. Incremental labour costs are therefore travel, lodging etc. and local labour.

(5) The penalty cost of failing to undertake one contract should be treated as a consequential cost of undertaking the other contract.

(6) The excess of revenue/ saving over incremental costs calculated for each contract shows the comparative effect on profits of undertaking each job in preference to the other. The difference between the two figures (Rs.98,000 a and Rs.94,000) shows that there is a difference between the two project of Rs.4,000 in favour of Nagpur job.

(c) The approach usef has assumed that one project or the other will be undertaken. Some costs have already been incurred (some materials , plant): other costs have been committed (project manager's salary, head office administration) and others are notional (interest on plant).

These are not relevant to any decision about future action. The only relevant consideration should be:

(i) Future revenues or cash savings as a consequence of the decision.

(ii) Future costs, incurred as an additional expense as a consequence of the decision.

In the solution in part (a), incremental revenues are the revenues from the contract undertaken , alternative uses of materials held but not required and hire of plant. Incremental costs are only those additional costs which would be incurred as a result of the decision to undertake one of the contracts.

The cost accounting profit or loss recorded for each contract might be:

Nagpur: Rs.1,70,000-Rs.1,60,000 = Rs.10,000

Delhi: Rs.1,80,000-Rs.1,82,000 =(Rs.2,000)

There figures are irrelevant to a decision because the costs include past , committed or notional costs, and other revenues and penalty costs to the company are ignored.

( c) Other factors to consider are:

(i) The constraints on working which make the contract mutually exclusive. If there is a shortage of labour, funds etc., it might be possible to overcome and carry out both projects:

(ii) The likelihood of another contract being offered for the same period of time, which is more profitable than either the Nagpur or Delhi jobs.

(iii) Loss of goodwill and future contracts by not undertaking either projects:

(iv) Reliability of the prospective customer in each contract:

(v) Reliability of costs forecasts, lobour availability etc. on both contacts. The net difference between the two jobs, Rs.4,000 is relatively small and sensitivity / risk analysis will be very important:

(vi) The preference for the Nagpur contract (by Rs.4,000) has assumed that the alternative use for the Delhi contract materials will exist. It is only a likelihood, however. Failure to obtain this saving would shift the preference strongly in favour of accepting the Delhi job.

**Answer: 38**

Working Notes:

Calculation of Balance Capacity

| Products | Units | Labour Hours (per unit) | Total Labur Hours | Capacity utilized (%) |
|---|---|---|---|---|
| 'AB' | 5,000 | 5 | 25,000 | 25 |
| 'CD' | 10,000 | 4 | 40,000 | 40 |
| Total | | | 65,000 | 65 |

At 65% Capacity = 65,000 Labour hours used

At 100% Capacity = Labour hours used would be 1,00,000

Balance Capacity = 1,00,000 hours-65,000 hours = 35,000 hours

(i) Statement of Profit for 2003-04 (Rs.)

| Products | | 'AB' | 'CD' | Total |
|---|---|---|---|---|
| Production & Sales (Units) | | 5,000 | 10,000 | |
| Sales Revenue | (i) | 4,00,000 (@Rs.80) | 10,00,000(@Rs.100) | 14,00,000 |
| Variable Costs: | | | | |
| Direct Material | | 50,000 (@Rs.10) | 300000 (@Rs.30) | 3,50,000 |
| Direct Labour | | 1,25 ,000 (@Rs.25) | 200000 (@Rs.20) | 3,25,000 |

| Products | 'AB' | 'CD' | Total |
|---|---|---|---|
| Variable overheads | 1,25,000 | 2,00,000 | 3,25,000 |

| | | | |
|---|---|---|---|
| ( 100% on Wages) | | | |
| Total (ii) | 3,00,000 | 7,00,000 | 10,00,000 |
| Contribution (i)-(ii) | 1,00,000 | 3,00,000 | 4,00,000 |
| Less: Fixed Costs | | | 2,25,000 |
| Profit | | | 1,75,000 |

Working Notes:
Proposals

(1) Utilise balance capacity to Produce 'AB'
(2) Utilise balance capacity to Produce 'CD'
(3) Utilise balance capacity to produce a new product 'EF'

Additional Units= Balance Capacity / Labour hours per unit

AB = 35,000 hrs. / 5 hrs = 7,000 units

CD = 35,000 hrs. /4 hrs. = 8,750 units
Less: Decrease in Efficiency by 16% 1,400 units
= 7,350 units

EF = 35,000 hrs. / 7 hours 5,000 units

Statement showing utilization of Balance Capacity

| Products | Proposal (a0 | Proposal (b) | Proposal ( c ) |
|---|---|---|---|
| AB - Existing | 5,000 | 5,000 | 5,000 |
| - Additional | 7,000 | - | - |
| | 12,000 | 5,000 | 5,000 |
| CD – Existing | 10,000 | 10,000 | 10,000 |
| – Additional | - | 7,350 | - |
| | 10,000 | 17,350 | 10,000 |
| EF – New Units | - | - | 5,000 |

Statement showing contribution per unit of Products 'AB' 'CD' AND 'EF'.

| Product | AB | | CD | | EF |
|---|---|---|---|---|---|
| Units | Existing 5,000 | Addl. 7,000 | Existing 10,000 | Addl. 7,350 | New 5,000 |
| Selling Price (i) | 84.00 | 80.00 | 104.00 | 104.00 | 145.00 |
| Variable Costs: | | | | | |
| Direct Material | 10.50 | 10.50 | 31.50 | 31.50 | 40.00 |
| Direct Labour | 26.25 | 26.25 | 21.00 | 25.00 | 36.75 |
| Variable Overheads (100% of Wages) | 26.25 | 26.25 | 21.00 | 25.00 | 36.75 |
| Total Variable Costs (ii) | 63.00 | 63.00 | 73.50 | 81.50 | 113.50 |
| Contribution (i) – (ii) | 21.00 | 17.00 | 30.50 | 22.50 | 31.50 |

Note:

1. The selling price of additional units of Product 'CD' is assumed to be Rs.104 as is for existing units.
2. The direct labour cost per unit of additional units of Product 'CD' is calculated as below:

Time taken for each additional unit of Product 'CD' = 35,000 hours/ 7,350 units = 4,762 hours
Direct Labour Cost per unit = 4,762 hours x Rs. 5.25 per hour = Rs. 25000

The variable cost per unit of Products 'AB' and 'CD' were Rs. 60 and Rs. 70 respectively in the year 2003-04. In the year 2003-04 it became Rs. 63 and Rs. 73.50 respectively. Then the differential cost for product 'AB' for 5,000 units comes to Rs. 3 per unit and for product 'CD' for 10,000 units comes to Rs. 3.50 per unit. The differential cost per unit for each additional unit produced during unutilised capacity is equal to its variable cost.

Profitability Statement using incremental revenue and differential cost approach (Rs.)

| Products | Units | Incremental Revenue per unit | Total Incremental revenue | Differential cost per unit | Total Differential cost | Difference |
|---|---|---|---|---|---|---|
| Proposal (a) | | | | | | |
| AB | 5,000 | 4.00 | 20,000 | 3.00 | 15,000 | 5,000 |
| | 7,000 | 80.00 | 5,60,000 | 63.00 | 4,41,000 | 1,19,000 |
| CD | 10,000 | 4.00 | 40,000 | 3.50 | 35,000 | 5,000 |
| Total | | | 6,20,000 | | 4,91,000 | 1,29,000 |
| Proposal (b) | | | | | | |
| AB | 5,000 | 4.00 | 20,000 | 3.00 | 15,000 | 5,000 |
| CD | 10,000 | 4.00 | 40,000 | 3.50 | 35,000 | 5,000 |
| | 7,350 | 104.00 | 7,64,400 | 81.50 | 5,99,025 + 50,000 (*) | 1,15,375 |
| Total | | | 8,24,400 | | 6,99,025 | 1,25,375 |
| Proposal (c) | | | | | | |
| AB | 5,000 | 4.00 | 20,000 | 3.00 | 15,000 | 5,000 |
| CD | 10,000 | 4.00 | 40,000 | 3.50 | 35,000 | 5,000 |
| EF | 5,000 | 145.00 | 7,25,000 | 113.50 | 5,67,500+ 30,000(**) | 1,27,500 |
| Total | | | 7,85,000 | | 6,47,000 | 1,37,500 |

* Selling and Distribution Expenses ** Special Advertising Expenses

The Profit as per Statement of Profit for 2003-04 is Rs. 1, 75,000. By utilising the Balance capacity 35,000 hours in manufacture of product 'EF' the said profit will increase by Rs. 1,37,500

Statement of Profit for 2004-05 with the selection of Proposal (C) to Introduce Product 'EF' (Rs.)

| | |
|---|---|
| Existing Profit on manufacture of Products 'AB' and 'CD' | 1,75,000 |
| Add: Profit from Product 'EF' by utilising to balance capacity | 1,37,500 |
| Total Profit | 3,12,500 |

**Answer: 39**

Differential Cost of the job

| | Increase Rs. | Decrease 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 job : 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:

| | Rs. |
|---|---|
| Cost as above at (a) | 1,50,000 |
| (i.e. increased costs) | |
| Depreciation | 9,000 |
| Power | 1,000 |

| | | |
|---|---|---|
| Rent | 2,500 | |
| Heat & Light | 250 | |
| Total | 1,62,750 | |

(c) Opportunity cost of taking the order:

| | Rs. | Rs. |
|---|---|---|
| Sale of Product A | | 62,500 |
| *Less*: | | |
| Material | 20,000 | |
| Labour | 20,500 | |
| Power | 1,000 | |
| Other expenses | 2,250 | 45,750 |
| Total | | 16,750 |

(d) Sunk cost of the jobs:

| | Rs. |
|---|---|
| Depreciation | 9,000 |
| Power* | 1,000 |
| Rent | 2,500 |
| Heat & Light | 250 |
| Total | 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 chase 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 costs (a) | | 1,05,250 |
| Cash disadvantage | 42,750 | |

**Ans 40:**Working Notes:

Contribution per hour in manufacturing Product B is as follows: (Rs. per unit)

| | |
|---|---|
| Selling Price | 100 |
| Less: Variable Cost | 60 |
| Contribution per unit | 40 |

Contribution per machine hour =Rs.40/5 hours =Rs.8

| | | (Rs.) |
|---|---|---|
| Relevant cost per unit | 10+(2M.H. X Rs.8) | 26 |
| Suppliers price per unit | | 25 |
| Excess of relevant cost over supplier's price. | | 1 |

Analysis-The relevant cost of production of component is higher by Re 1 over the purchase price of component part X-100.therefore buy decision is recommended.

**Ans. 41:** *Rs.*

Selling price per unit of product 'A' 50

| | |
|---|---|
| *Less*: marginal cost per unit | 35 |
| Contribution per unit | 15 |
| Contribution per hour of product 'A' | 3 |

Since one unit of product 'B' needs 2 hours, therefore if a unit of B is produced, then the contribution lost by not producing 'A' = 2 hours × Rs.3 = Rs.6

Real cost of producing one unit of product 'B'

| | *Rs.* |
|---|---|
| Marginal cost per unit | 5 |
| *Add*: Contribution lost per unit | 6 |
| Total cost of producing a unit of Product 'B' | 11 |

As the suppliers price per unit of product 'B' is Rs.10 and that of producing in the factory is Rs.11, therefore it is suggested that it is better to buy product 'B' from outside.

**Ans. 42:** Calculation of total number of hour required in department P and Q

| | Component | | | |
|---|---|---|---|---|
| Particulars | A | B | C | Total |
| Demand units | 900 | 900 | 1350 | |
| Department P: | | | | |
| Hours per unit | 2 | 2 | 1.5 | |
| Total hour required | 1800 | 1800 | 2025 | 5625 |

| | Component | | | |
|---|---|---|---|---|
| Particulars | A | B | C | Total |
| Department Q: | | | | |
| Hours per unit | 3 | 3 | 1 | |
| Total hours required | 2700 | 2700 | 1350 | 6750 |

From the above, we can observe that department Q is facing the capacity constraint of 750 hours

Statement showing the qualities of components to be purchased to maintain cost

| Particulars | A | C |
|---|---|---|
| Purchase cost | 129 | 70 |
| Less: variable cost of manufacture | 99 | 50 |
| Saving in manufacture | 30 | 20 |
| Hours required per unit in dept. Q | 3 | 1 |
| Saving in manufacture per hour | 10 | 20 |

Suggestion: since the saving in manufacture per hour is more in case of component C, component A should be purchased from outside.

No. of components of A to be purchased from outside =750 hrs/3 hrs =250 units

**Ans. 43:**

| | | |
|---|---|---|
| (a) Selling price per unit | | 600 |
| Less: Variable cost of | Rs. | |
| Component A | 32 | |
| Component B | 54 | |
| Component C | 58 | |
| Component D | 12 | |
| Component E | 4 | |
| Assembly | 40 | 200 |

| | | |
|---|---|---|
| Contribution per unit | | 400 |
| Total contribution for 132 units | Rs. | 52800 |
| Less: Fixed cost 132×316 | | 41712 |
| Net profit | | 11088 |

(b) The company may buy any one of the components. The number of units that can be produced under the three options:

| Buy component "A" | | Buy component "B" | | Buy component "C" | |
|---|---|---|---|---|---|
| Component | Machine Hrs reqd | Component | Machine Hrs reqd | Component | Machine Hrs reqd |
| A | - | A | 10 | A | 10 |
| B | 14 | B | - | B | 14 |
| C | 12 | C | 12 | C | - |
| Total machine Hrs/unit | 26 | | 22 | | 24 |
| Total machine hours available is 4752 under all options | | | | | |
| Number of units that can be manufactured, if "A" is bought = 4752/26 = 182.77 units | | Number of units that can be manufactured, if "B" is bought = 4752/22 = 216 units | | Number of units that can be manufactured, if "C" is bought = 4752/24 = 198 units | |
| Additional capacity that can be created $\frac{(182.77-132)\times 100}{132} = 38.5\%$ | | Additional capacity that can be created $\frac{(216-132)\times 100}{132} = 63.6\%$ | | Additional capacity that can be created $\frac{(198-132)\times 100}{132} = 50\%$ | |

(c) If the increase in demand during the next period is 50% it is not possible to meet it by buying Component "A" as additional capacity created is only 38.5%. Of the remaining two options, the cheaper one has to be accepted.

| | Buy "B" Rs. | Buy"C" Rs. |
|---|---|---|
| Market price | 160 | 125 |
| Less: Variable cost if made by the company | 54 | 58 |
| Additional cost to be incurred | 106 | 67 |
| Machine hours saved | 14 | 12 |
| Cost per hour | 7.57 | 5.58 |

Since it is cheaper to increase capacity by buying "C" this option has to be exercised.

(d) Profitability statement

| | | |
|---|---|---|
| Selling price per unit of equipment | | Rs. 600 |
| Less: Variable cost of: | | |
| Making A | Rs. 32 | |
| Making B | Rs. 54 | |
| Buying C | Rs. 125 | |
| Making D | Rs. 12 | |
| Making E | Rs. 4 | |
| Assembly | Rs. 40 | |
| | 267 | 267 |
| Contribution per unit | | 333 |

| | |
|---|---|
| Total contribution for 198 units (Note 1) | 65934 |
| Less: Fixed cost (as worked out above) | 41712 |
| Net profit | 27222 |
| Net increase over period for current period | 13134 |

Note: 1. Maximum capacity = 4752 machine hours.
Machine hours reqd for one unit of equipment : 36 hours.
No. of equipment that can be produced = 4752/36 = 132 Nos.

Marketing department of the company anticipates 50% increase in demand during the next period. i.e. 132 + 50% = 198 Nos.

**Ans. 44:** Working Notes:

1. **Present demand of components (in batches) from 10,800 (maximum) available machine hours and projected estimates of components demand (in batches) in the next year.**

| | | | |
|---|---|---|---|
| Maximum available machine hours | | | 10,800 |
| Machine hours needed to manufacture components. A, B and C (Per batch of ten numbers) of water purifier | | | |
| Components | | | Total |
| A | 20 | Machine hours | |
| B | 28 | Machine hours | |
| C | 24 | Machine | 72 hours |
| Present demand (in batches) of components A, B and C (10,800 hours/ 72 hours) | | | 150 |
| Projected estimate of demand of components A, B and C (add 50% increase) in the next year | | | 225 |

2. **Present and future fixed costs:**

| | | |
|---|---|---|
| Present fixed cost of 150 batches @ Rs.200/- per batch | | 30,000 |
| Add: Increase in fixed cost to meet 50% increase in demand | 10,000 | |
| Total future fixed cost for 225 batches | 40,000 | |

3. **Expected purchase cost of components**

| *View point* | *Probability* | *Component* | | |
|---|---|---|---|---|
| | | *A* | *B* | *C* |
| | | *Expected price Rs.* | *Expected Price Rs.* | *Expected Price Rs.* |
| Pessimistic | 0.25 | 30 (Rs.120×0.25) | 50 (Rs.200×0.25) | 40 (Rs.160×0.25) |
| Most likely | 0.50 | 55 (Rs.110×0.50) | 65 (Rs.130×0.50) | 70 (Rs.140×0.50) |
| Optimistic | 0.25 | 20 (Rs.80×0.25) | 35 (Rs.140×0.25) | 30 (Rs.120×0.25) |
| Total | | 105 | 150 | 140 |

4. **Present contribution (per batch)**

| | Rs. | Rs. |
|---|---|---|
| Selling price (per batch) | | 800 |
| *Less*: Variable production cost | 320 | |
| *Less*: Variable assembly cost | 50 | 370 |
| Contribution (per batch) | | 430 |
| Total Present contribution on 150 batches | | 64,500 |

**(i) Maximum number of batches that could be produced in 10,800 machine hours each of the three alternatives namely buying A or B or C is considered respectively.**

(a) Buy component A (from outside) No machine hour required

Make component B 28 Machine hours required

Make component C 24 Machine hours required

Total 52

Number of batches that could be produced internally 207.69 batches

(10,800 hours/52 hours)

(b) Buy component B (from outside) No machine hour required

Make component A 20 Machine hours required

Make component C 24 Machine hours required

Total 44

Number of batches that could be produced internally 245.45 batches

(10,800 hours/744 hours)

But in view of projected (expected) market demand of 225 batches, production would be restricted to 225 batches only.

(c) Buy component C (from outside) No machine hours required

Make component A 20 Machine hours required

Make component B 28 Machine hours required

Total 48

Number of batches that could be produced internally 225 batches

(10,800 machine hours 748 hours)

**(ii) Statement of financial implication when purchases of component A, B and C are made from outside(in view of the fact that production capacity will be limited to 50% increase)**

| *Component bought* | *A* | *B* | *C* |
|---|---|---|---|
| | *Rs.* | *Rs.* | *Rs.* |
| Total variable cost per batch (I) | 64 | 108 | 116 |
| Expected purchase cost (II) | 105 | 150 | 140 |
| (Refer to working note 3) | | | |
| Increase I variable cost per batch (III) = (II – I) | 41 | 42 | 24 |
| Present contribution per batch (IV) | 430 | 430 | 430 |
| (Refer to working note 4) | | | |

| | | | |
|---|---|---|---|
| Revised contribution per batch (V) = (IV – III) | 389 | 388 | 406 |
| Total revised contribution | 80,791 (207.69 batches × Rs.389) | 87,300 (225 batches × Rs.388) | 91,330 (225 batches × Rs.406) |

Advise: Purchase component C from outside as it gives maximum contribution on manufacturing A and B internally.

**(iii) Profit Statement**

**(When C is bought from outside and A, B were manufactured internally and extra production is made and sold)**

| | | *Per Batch Rs.* | *Total (for 225 batches)* *Rs.* |
|---|---|---|---|
| Sales revenue: (I) | | 800.00 | 1,80,000 (225 batches × Rs.800) |
| Less: Variable costs (Rs. (Per batch) : (II) | | | |
| Production cost of A | Rs.64 | | |
| Production cost of B | Rs.108 | | |
| Production cost of D | Rs.24 | | |
| Production cost of E | Rs.8 | | |
| Production cost of C | Rs.140 | | |
| (Refer to working note 3) | | | |
| Rs.344 | | | |
| Assembly cost | Rs.50 | 394.00 | 88.650 (225 batches × Rs.394) |
| Contribution : (III) – (-II) | | 406.00 | 91,350 |
| Less: Fixed costs | | 177.78 | 40,000 |
| (Rs.40,000 / 225 batches) | | | |
| (Refer to working note 2) | | | |
| Profit | | 228.22 | 51.350 |

**Ans. 45:**

It is given that the three components are made and assembled in own factory of M/s Priya Gadgets Ltd. And capacity utilization is full. In other words, machine hours available is the limiting factor.

The component, which results in the least extra cost per hour released may have to be bought out.

| Component | Price quoted | Variable cost | Excess of price over variable cost | Machine hours released | Extra cost per machine hour |
|---|---|---|---|---|---|
| X | Rs.66 | Rs.50 | Rs.16 | 16 | Rs.1.00 |
| Y | 78 | 56 | 22 | 24 | 0.92 |
| Z | 94 | 54 | 40 | 32 | 1.25 |

The order of preference for outside purchase is Y,X and Z.
Since only one of the components can be bought out, the machine hours released in each case has to be ensured to be sufficient to manufacture 50% or 75% more of the remaining components.
The position will emerge as follows:

| Component | Machine hrs. released when bought-out | Total machine hours required by other two components for | |
|---|---|---|---|
| | | 50% Increase * | 75% Increase @ |
| X | 16 | 28 | 42 |
| Y | 24 | 24 | 36 |
| Z | 32 | 20 | 30 |

| | * Refer to Note-1 | @ Refer to Note 2 |
|---|---|---|
| Recommendation | 50% Increase | 75% Increase |
| Buy | Y | Z |
| Make | X and Z | X and y |

Working Notes:
(1) X 50% of (24+32) = 28 hours
Y 50% of (16+32) = 24 hours
Z 50% of (16+24) = 20 hours

(2) X 75% of (24+32) = 42 hours
Y 75% of (16+32) = 36 hours
Z 75% of (16+24) = 30 hours
.
(3) Decision when 50% increase is realized
If Y is purchased, 24 hours will be released and 24 hours are required to increase production of X and Z by 50%. Therefore Y component should be purchased and X and Z should be manufactured.

(4) Decision when 75% increase is realized.
Purchase of Z from market will release 32 hours and 30 hours are required to meet the 75% increase in sale of X and Y. Therefore Z should be purchased and X and Y should be manufactured.(incase of X, hours released are 16, and hours required for 75% increase are 42. Similarly in case of Y, Hours released are 24 and hours required are 36.)

**Ans: 46:**The components are made in a machine shop using three identical machines each of which can make any of the three components.
Total machine hours required for 3 components
= 4+5+6 = 15 hours
Total capacity of 3 machines is 12,000 machine hours per month and is just sufficient to meet the current demand.
Hence, the current demand is 12,000/15 = 800 units of product z per month.
Profit made by the company for current month.

| | |
|---|---|
| Sale price | 300 |
| Less: Variable cost 48+60+80+30= | 218 |
| Contribution per unit | 82 |
| Total contribution 800 x 82= | 65,600 |
| Less: fixed cost per month | 50,000 |

Profit for current month RS. 15,600

(a) From next month onwards, the company expects the demand for z to rise by 25% i.e., 800+25% = 1,000 units per month. One component should be bought from the market. Which component ?

**Statement of extra cost of component per unit**

| Component | A | B | C |
|---|---|---|---|
| Market price<br>Less: Variable cost | 64<br>48 | 75<br>60 | 110<br>80 |
| Extra cost of buying one unit | 16 | 15 | 30 |
| Machine hours required per unit<br>Extra cost per machine hour 16/4= | 4<br>Rs.4 | 5<br>15/5=Rs.3 | 6<br>30/6=Rs.5 |
| Ranking | II | I | III |

Because of Ist rank (lowest extra cost), component b should be bought from the market.

| Manufacturing | | Hours |
|---|---|---|
| C | 1,000 units x 6 hours = | 6,000 |
| A | 1,000 units x 4 hours = | 4,000 |
| B | 400 units x 5 hours = | 2,000 (Balance) |
| | Total | 12,000 |

Balance 600 units of B should he bought from the market.

**( c) Profit made by the company**

| Component | Element of cost | Cost per unit | No. of units | Amount(Rs.) |
|---|---|---|---|---|
| A | Variable cost | 48 | 1,000 | 48,000 |
| B | Variable cost | 60 | 400 | 24,000 |
| B | Market price | 75 | 600 | 45,000 |
| C | Variable cost | 80 | 1,000 | 80,000 |
| Assembling | Variable cost | 30 | 1,000 | 30,000 |
| Total variable cost | | | | 2,27,000 |
| Add: Fixed cost | | | | 50,000 |
| Total cost | | | | 2,77,000 |
| Sales 1,000 units at Rs.300 per unit | | | | 3,00,000 |
| Profit on 1,000 units | | | | 23,000 |

**Ans. 47:i)**

**Statement showing Profit / Loss of company**

(If it accepts the order of manufacturing moulded toys)

| | |
|---|---|
| Total available machine hours: (A) | 18,000 |
| (8 machine × 7.5 hours / day × 300 days) | |
| Machine hours required for producing | |
| 4,20,000 cans: (B) | 14,000 |
| (4,20,000 cans /30 cans) | |
| Balance machine hours: {(A) – (B)] | 4,000 |
| Total number of production of moulded toys in balance hours | 60,000 |

| | |
|---|---|
| (4,000 hours × 15 toys / hour) | |
| Total contribution on 60,000 moulded toys (Rs.) | 6,00,000 |
| (60,000 × Rs.10) | |
| *Less*: Fixed expenses of mould (Rs.) | 2,25,000 |
| Net profit | (Rs.) 3,75,000 |

**Decision:** It is advisable for the company to accept the order of 60,000 moulded toys as it will increase its profit by Rs.3,75,000.

**(ii) Statement showing Profit / Loss**

(If the order of manufacture of cans increase to 5,40,000)

If 5,40,000 cans are produced, no machine hours would be available for manufacturing toys

| | *Rs. (Lacs)* |
|---|---|
| Total contribution on 5,40,000 cans | 32.40 |
| 5,40,000 cans × Rs.6) | |
| *Less*: Fixed cost | 20.00 |
| Profit | 12.40 |

Alternatively, the production would be 4,20,000 cans and 60,000 moulded toys

| | *Rs. (lacs)* |
|---|---|
| A. Profit from 4,20,000 cans: | |
| Contribution | 25.20 |
| (4,20,000 cans × Rs.6) | |
| *Less*: Fixed cost | 20.00 |
| Profit | 5.20 |
| B. Profit from 60,000 moulded toys | 3.75 |
| (Refer to (i) above) | |
| Total profit: (A + B) | 8.95 |

**Decisions:** The production of 1,20,000 additional cans instead of 60,000 moulded toys will result an additional profit of Rs.3.45 lacs (Rs.12.40 lacs – Rs.8.95 lacs). Therefore, the company is advised not to accept the order of manufacturing moulded toys.

**(iii) Let the minimum excess capacity needed to justify the manufacturing of any portion of the moulded toys order be x.**

If toys are manufactured, the profit is = (Rs.60 – Rs.50) x – Rs.2,25,000

and, if toys are sub-contracted, the profit is = (Rs.60 – Rs.57.50) x

Indifference point would be 10x – Rs.2,25,000 = 2.5x

or x = 30,000 moulded toys

Toys produced per hour =15 toys

Therefore, 2,000 (30,000 toys / 15 toys) excess machine hours are required to justify manufacturing of toys by the company, instead of sub-contracting.

**(iv) Profit under existing production plan:**

| | (Rs. Lacs) | |
|---|---|---|
| Contribution from 4,50,000 cans | 27.00 | |
| (4,50,000 × Rs.6) | | |
| Contribution from 45,000 toys | | 4.50 |
| (45,000 × Rs.10) | | |
| Total contribution | 31.50 | |
| *Less*: Fixed cost | 22.25 | |
| (20 lacs + 2.25 lacs) | | |
| Profit | 9.25 | |
| Profit from 15,000 sub-contracted toys | 0.375 | |
| (15,000 × Rs.2.50) | | |
| Total profit | 9.625 | |

If demand was accurately forecasted & 4,80,000 cans were manufactured, excess machine hour capacity available was 2,000 hrs, such excess being the pint of indifference i.e. profit from toys order would be the same by either manufacturing 30,000 toys or sub-contracting them along with the rest of 30,000 toys.

**(v) Profit under properly negotiated production plan:**

| | (Rs. Lacs) |
|---|---|
| Contribution from 4,80,000 cans | 28.80 |
| (4,80,000 × Rs.6) | |
| *Less*: Fixed cost | 20.00 |
| Profit | 8.80 |
| Profit from Toys | 1.50 |
| 60,000 Nos. sub-contracted | |
| (60,000 × Rs.2.5) | |
| Total profit | 10.30 |

Therefore, the loss for improper prediction and negotiation is Rs.10,30,000 – Rs.9,62,500 or Rs.67,500.

**Ans. 48:** Working Notes:

1. (i) Fixed manufacturing overhead per unit

   "XY 100"; Rs.3,00,000 / 5,000 units or Rs.60

   "XY 200"; Rs.3,00,000 / 12,000 units or Rs.25

   (ii) Variable manufacturing overhead per unit

   "XY 100"; (Rs.180 – Rs.60) or Rs.120

   "XY 200"; (Rs.60 – Rs.25) or Rs.35

2. Variable costs of production of "XY 100" and "XY 200"

| *Product* | *Per unit* |
|---|---|

| | 'XY 100' | 'XY 200' |
|---|---|---|
| | Rs. | Rs. |
| Direct material | 200 | 200 |
| Variable machine operating costs | 150 | 50 |
| Variable manufacturing overheads | 120 | 35 |
| Total variable costs per unit | 470 | 285 |

3. (i) machine hours for the production of one unit of each of the two products.

"XY 100"; Rs.150/-Rs.100 per hour = 1.5 hours.

"XY 200"; Rs.50/- Rs.100 per hour = 0.50 hours.

(ii) Total machine hours available

5,000 units × 1.5 hours = 7,500 hours

Ranking between manufactured "XY 100" and manufactured "XY 200"

| | Manufactured "XY 100" | Manufactured "XY 200" |
|---|---|---|
| | Rs. | Rs. |
| Variable cost of production | 470 | 285 |
| (Refer to working note 2) | | |
| Variable marketing and administrative cost | 80 | 60 |
| Total variable cost per unit: (A) | 350 | 345 |
| Selling price per unit: (B) | 900 | 600 |
| Contribution per unit: [(B) – (A)] | 350 | 255 |
| Contribution per hour | 233 | 510 |
| [Refer to working note 3(i)] | (Rs.3.50/1.5 hrs) | (Rs.255/0.5 hrs) |
| Ranking | II | I |

Ranking between manufactured "XY 100" and purchased "XY 100"

| | Manufactured "XY 100" | Purchase "XY 100" |
|---|---|---|
| | Rs. | Rs. |
| Variable cost of production | 470 | -- |
| (Refer to working note 2) | | |
| Purchase price | -- | 650 |
| Variable marketing and administrative cost | 80 | 40 |
| Total variable cost per unit: (A) | 550 | 690 |
| Selling price per unit: (B) | 900 | 900 |
| Contribution per unit: [(B) – (A)] | 350 | 310 |

| | | |
|---|---|---|
| Ranking | II | I |

"XY 200": 12,000 units × 0.50 hours or 6,000 hours

"XY 100": (7,500 – 6,000) hours = 1,500 hours

Quantity of each product that XYZ Limited should manufacture and / or purchase to maximise operating income

| | |
|---|---|
| Manufactured "XY 200" | 12,000 units |
| Manufactured "XY 100": 1,500 hours / 1.5 hours | 1,000 |
| Purchased "XY 100" | 6,000 |
| Maximum number of units | |
| Which ABC can supply. | |

**Ans. 49:** (i) Profitability as per original Budget

| | | Rs ('000s) | Rs('000s) |
|---|---|---|---|
| Sales(1,80,000 units × Rs 130) | (A) | | 23,400 |
| Direct Material (1,80,000 units × Rs 30) | | 5,400 | |
| Component 'EH' ( variable cost = Rs 7.20 per unit) | | 1,296 | |
| Direct wages (1,80,000 units × Rs 28) | | 5,040 | |
| Variable factory overheads (1,80,000 units × Rs 24 × 50% ) | | 2,160 | |
| Variable selling & distribution (1,80,000 units × Rs 24 × 50% ) | | 2,160 | |
| Total variable cost | (B) | | 16,056 |
| Contribution | (A – B) | | 7,344 |
| Fixed factory overheads | | 2,160 | |
| Fixed selling & distribution overheads | | 720 | |
| Component 'EH' @2.20 | | 396 | |
| Administrative overhead | | 900 | 4,176 |
| Profit | | | 3,168 |

**(ii) Export order**

| | Rs per Unit | Rs per Unit |
|---|---|---|
| Direct material | 56 | |
| Direct labour (10 hours × Rs 7 per hour) | 70 | |
| Variable factory overhead ( Rs 3 × 10 labour hours) | 30 | |
| Selling and distribution overheads | 14 | |
| Total variable cost | | 170 |
| Selling price (export) | | 175 |
| Contribution | | 5 |

Since the product earns contribution of Rs.5 per unit, it should be accepted.

Total units 500(per month) = 6000 units(per annum)

Therefore additional contribution (6000 units× Rs 5) = Rs.30,000

Total hours on product '43 grade' (1,80,000 units × 4) = 7,20,000 Hrs

Total hours on component 'EH' (1,80,000 units × 0.5*) = 90,000 Hrs

$$* \frac{\text{Direct Labour cost}}{\text{No of units produced} \times \text{Labour rate per hour}} = \frac{\text{Rs 52,500}}{\text{15,000 units} \times \text{Rs 7 per hour}} = 0.5 \text{ Hrs}$$

Total hours utilised at 90% capacity = 7,20,000 hours + 90,000 hours = 8,10,000 hours

$$100\% \text{ capacity hours} = \frac{8{,}10{,}000 \text{ hours} \times 100}{90} = 9{,}00{,}000 \text{ Hrs}$$

Balance hours available = 90,000 hours p.a

Hours required for export order 60,000 hours.

Both contribution per unit of export order and availability of capacity confirm its acceptance.

**(iii) Component 'EH' make or buy**

| (per 15,000 units) | Make (Rs.) | Buy (Rs.) |
|---|---|---|
| Direct material | 30,000 | |
| Direct labour | 52,500 | |
| Variable factory overhead | 25,500 | |
| Total | 1,08,000 | 1,18,500 |
| Per unit | 7.20 | 7.90 |

If the company makes the component the out of pocket cost is Rs.7.20 per unit whereas if the component is bought , the out of pocket cost is Rs.7.90.

Decision : If the capacity remains idle it is profitable to make.

**(iv) Alternative use of the spare capacity**

Units required = 1,80,000 units and hours required = 1,80,000 × 0 .5 = 90,000 Hrs

Cost of buying component 'EH' = (1,80,000 units × Rs 7.90) =Rs 14,22,000

Cost of making component 'EH' = (1,80,000 units × Rs 7.20) = Rs 12,96,000

Hence , excess cost of buying = Rs.1,26,000

Rent income (90,000 hours × Re1) = Rs.90,000

$$\text{Contribution per unit from making component 'GYP'} = \text{Rs 8} - \frac{\text{Rs 1,12,500}}{\text{15,000 Units}} =$$

Rs 0.5 per unit.

$$\text{Direct labour cost per unit of 'GYP'} = \frac{\text{Rs 31,500}}{\text{15,000 Units}} = \text{Rs. 2.10 per unit.}$$

$$\text{No. of labour hours required for one unit of 'GYP'} = \frac{\text{Rs 2.10}}{\text{Rs 7}} = 0.3 \text{ Hrs}$$

$$\text{No. of units of 'GYP' in 90,000 hours} = \frac{\text{90,000 hours}}{\text{0.3 hours}} = 3{,}00{,}000$$

Contribution from component 'GYP' = 3,00,000 × Rs 0.50 = Rs 1,50,000

Since the contribution from 'GYP' is greater than the extra variable cost of buying component 'EH' , component 'GYP' should be manufactured and component 'EH' should be purchased.

Hence, accept export order and buy the component.

**Ans. 50:**
(i) If the reliable suppliers offered to supply P44E at a guaranteed price of Rs. 50 p.u. variable manufacturing cost p.u.

| | |
|---|---|
| Direct material | 14 |
| Direct labour | 12 |
| Variable overheads | 8 |
| Total variable manufacturing cost | 34 |

| | (Rs.) |
|---|---|
| Purchase price | 50 |
| Less: variable manufacturing cost | 34 |
| Saving, if manufactured internally | 16 |

(ii) If the company incur additional inspection and testing charges of Rs. 56,000 p.a.
= Rs.56,000/Rs. 16 p.u. = 3500 units
The company can purchase, if yhe requirement of P44E, is less then 3500 units. If the requirement is more then 3500 component, it can manufacture its own requirement.

(iii) when the direct labour hours is limiting factor :
Calculation of contribution per labour hour

| Particulars | | Own manufacture of P44E | Extra sale of another existing product |
|---|---|---|---|
| Selling price | | - | 90 |
| Cost of purchase of P44E (saving) | | 50 | - |
| Less: variable cost | | 50<br>34 | 90<br>50 |
| Contribution | (i) | 16 | 40 |
| Labour hours | (ii) | 4 | 8 |
| Contribution per labour hour | (i)/(ii) | 4 | 5 |
| Rank | | II | I |

**Analysis**: since the labour hours are the limiting factor, it is suggested to opt for extra sale of another existing product then to manufacture component P44E.
(iv) The cost of the machine bought last year is a sunk cost and not relevant to the present decision of 'make or buy'.
Book value of the machine is merely an accounting treatment.

**Ans. 51:** (a)This is a make or buy decision so compare the incremental cost to make with the incremental cost buy

| **Incremental cost per unit** | **Make the Blades** |
|---|---|
| Direct material<br>(Rs. 75000 ÷ 10,000) | Rs. 7.50 |
| Direct labour<br>(Rs. 65000 ÷ 10,000) | Rs. 6.50 |
| Variable Overhead<br>(Rs. 55000 ÷ 10,000) | Rs. 5.50 |
| Supervision<br>(Rs.35,000 ÷ 10,000) | Rs.3.50 |
| Total cost | Rs.23.00 |

Compare the cost to make the blades for 10,000 motors. Rs.23.00, with the cost to buy, Rs.25.00
There is a net loss of Rs.2.00 if 'X' chooses to buy the blades.

**(b)** 'X' will be indifferent between buying and making the blades when the total costs for making and buying will be equal at the volume level where the variable costs per unit times the volume plus the fixed avoidable costs are equal to the supplier's offered cost of Rs.25.00 per unit times the volume.

(Direct materials + Direct labour + Variable overhead) × Volume + Supervision =, Cost to buy × Volume. Let volume in units = x

(7.50 + 6.50 + 5.50) × x + 35,000 = 25.00x

19.50 x + 35,000 = 25.00 x

35,000 = 25.00 × x – 19.50 × x

35,000 = 5.50 × x x = 6,364 units

of blades

As volume of production decreases, the average per unit cost of in house production increases. If the volume falls below 6,364 motors, then 'X' would prefer to buy the blades from the supplier.

**(c)** If the space presently occupied by blade production could be leased to another firm for Rs.45,000 per year, 'X' would face an opportunity cost associated with in house blade production for the 10,000 units of Rs.4.50 per unit.

New cost to make = 23.00 + 4.50 = 27.50

Now 'X' should buy because the cost to make, 27.50, is higher than the cost to buy, 25.00.

**Ans. 52:**

**(i) Deciding whether B Ltd. Should accept the offer from an outside vendor instead of manufacturing chains internally.**

| | | |
|---|---|---|
| Price of chain offered by vendor | | Rs.12 |
| Less: Variable cost of (Rs.5 + Rs.2) | | 7 |
| Excess of quoted price over variable cost | | 5 |
| Total excess of quoted price over variable cost (24,000 x Rs.5) | Rs.1,20,000 | |
| Less: Avoidable cost | | |
| Inspection, set-up, etc. | Rs.24,000 | - |
| Machine rent | 24,000 | 48,000 |
| Excess of bought –out price over variable cost and avoidable cost | | 72,000 |

Decision- B Ltd. Should not accept the offer from outside vendor, because this decision will lead to reduction in profit by Rs.72,000.

**(ii) Deciding whether the use of internal facilities for upgrading the quality of chains would be useful in comparison to purchase from outside.**

| | |
|---|---|
| Incremental revenue per unit | Rs.22 |
| Less: Differential cost per cycle | 18 |
| Contribution | 4 |
| Total Contribution (24,000 x Rs.4) | Rs.96,000 |
| Less: Tooling costs | 16,000 |
| Net contribution | 80,000 |

Decision – B Ltd. Should accept the offer of alternative use of facilities for upgrading the bicycle. It will lead to increase of Rs.80,000 in contribution. This is more than the excess of bought-out price over variable and avoidable cost [i.e.Rs.72,000 as per (i)]. Thus company will benefit by Rs.8,000 i.e.,(Rs.80,000 – Rs.72,0000)

**(iii) Deciding whether use of internal facilities for upgrading the bicycle ( chain) internally would be profitable, if batch size becomes 4,000 units in comparison to their purchases from an outside vendor.**

| | | |
|---|---|---|
| Bought- out price offered | | Rs.12 |
| Less: Variable internal cost | | 7 |
| Excess of bought – out cost over variable cost | | 5 |
| Total excess of bought – out cost over variable cost (24,000 x Rs.5) | | Rs.1,20,000 |
| Less: Inspection cost | Rs.12,000 | - |
| Machine rent | 24,000 | 36,000 |
| Excess of bought – out price over variable and avoidable costs | | 84,000 |

Decision – If inspection cost (Which varies with batch size) decreases, then excess of bought- out price over variable and avoidable costs would be Rs.84,000. In comparison to this, net contribution from using the internal facilities for upgrading quality of chains will Rs.80,000[refer to (ii).] There fore, if batch size increases and inspection cost reduces, then use of internal facilities of updation of quality of chain is advocated. If decision to update is taken in (ii), it will increase profit by Rs.4,000 (i.e..Rs.84,000 – Rs.80,000)

**Ans. 53:**

For taking a make or buy decision, it is necessary to find out the relevant cost of both the decisions, i.e. manufacturing vis-à-vis purchasing the component from outside.

**Departmental Expenses Budget**

(Rs.000)

| Items | Total | Allocation ratio | Gadgets | Components |
|---|---|---|---|---|
| Production | | | 24,000 | 24,000 |
| Variable Costs | | | | |
| Direct material | 3,840 | 80 : 20 | 3,072 | 768 |
| Direct labour | 1,536 | 75 : 25 | 1,152 | 384 |
| Indirect labour | 720 | 80 : 20 | 576 | 144 |
| Inspection and testing | 480 | 75 : 25 | 360 | 120 |
| Power | 480 | 75 : 25 | 360 | 120 |
| | 7,056 | | 5,520 | 1,536 |
| Fixed Costs | | | | |
| Lighting | 40 | | | |
| Insurance | 30 | | | |
| Depreciation | 96 | | | |
| Misc. Fixed Exp. | 54 | | | |
| | 220 | | | |
| Total cost | 7,276 | | | |
| Variable cost per unit | | | Rs.230 | Rs.64 |

(i) Variable cost of component is Rs.64 per unit. The purchase price is Rs.70 per unit. For each unit net cash outflow will be Rs.6. Therefore, company should take decision to make.

(ii) Evaluation of decision to export

Inflow

(a) Additional contribution due to export

| | |
|---|---|
| 12,000 units x (Rs.245 – 230) | Rs.1,80,000 |
| (b) Saving in variable cost of components (24,000 units x Rs.64) | 15,36,000 |
| | 17,16,000 |

Less: Outflow

| | |
|---|---|
| Payment to be made to supplier (24,000 units x Rs.70) | 16,80,000 |
| Net Cash Inflow | 36,000 |

**Ans. 54**
**(a)**

| Demand | 52,000 | 48,500 | 26,500 | 30,000 |
|---|---|---|---|---|
| | A | B | C | D |
| Direct Material | 64 | 72 | 45 | 56 |
| M/c | 48 | 32 | 64 | 24 |
| Other Variable Cost | 32 | 36 | 44 | 20 |
| Total Variable Cost | 144 | 140 | 153 | 100 |
| Selling Price | 162 | 156 | 173 | 118 |
| Contribution (Rs./u) | 18 | 16 | 20 | 18 |
| M/s Hours per unit | 6 | 4 | 8 | 3 |
| Contribution (Rs./ M/c hr.) | 3 | 4 | 2.5 | 6 |
| Ranking | III | II | IV | I Sub-Contract |
| Cost Rs./u) | 146 | 126 | 155 | 108 |
| Cont (Rs./u) on (Subcontract) | 16 | 30 | 18 | 8 |

I Division: It is more profitable to sub-contract B, since contribution is higher sub- contract.

*1st Level of Operations*: 1,50,000 hours, Produce D as much as possible. Hours required = 30,000 units × 3 = 90,000 hours

Balance hours available: 60,000 hours.

Produce the next best (i.e. A, Since B is better outsourced)

$$\frac{60{,}000\text{ hrs}}{6\text{ hrs/u}} = 10{,}000 \text{ units of A.}$$

*1st Level of Operation*:

| | | *Contribution (units)* | *Contribution (Rs.)* |
|---|---|---|---|
| A | Produce 10,000 units | 18 | 1,80,000 |
| A | Outsource 42,000 units | 16 | 6,72,000 |
| B | 48,500 units | | |
| | Outsource fully | 30 | 14,55,000 |
| C | 26,500 units | | |
| | Outsource fully | 18 | |
| D | 30,000 units | | |
| | Fully produce | 18 | 5,40,000 |
| | Total Contribution: | | 33,24,000 |
| | Less: Fixed cost | | 10,00,000 |
| | Net Gain | | 23,24,000 |

2nd Level of Operation:

Both A and C increase contribution by own manufacture only by Rs.2/- per unit. 1,50,000 hrs can produce 25,000 units of A.

∴ Contribution increases by 25,000 × 2 = 50,000

(Difference in Contribution sub-contract and own manufacturing) = 2

But increase in fixed Cost = 50,000

At the 2nd level of operation, the increase in contribution by own manufacturing is exactly set up by increase in fixed costs by Rs.50,000/-. It is a point of financial indifference, but other conditions like reliability or possibility of the sub-contractor increasing his price may be considered and decision may them but towards own manufacture.

3rd Level Additional: 1,50,000 hrs available

Unit of A that are needed = [52,000 – 25,000 (2nd Level) – 10,000 (1st Level)]

= 17,000 units × 6 hrs/u = 1,02,000 hrs.

Balance 48,000 hrs are available for C to produce 6,000 units. Increase in

Contribution over Level 1st or 2nd :

| | | |
|---|---|---|
| A: | 17,000 × 2 | = Rs.34,000 |
| C: | 6,000 × 2 | = Rs.12,000 |
| | | = Rs.46,000 |
| Increase in fixed costs | | = Rs.50,000 |
| Additional Loss | | = Rs. 4,000 |

4th Level Additional 150000 hrs. can give 150000 ÷ 8 = 18,750 unit of C

| | |
|---|---|
| Increase in Contribution 18,750 × 2 | = Rs. 37,500 |
| Increase in Cost | = (Rs. 50,000) Level 3rd loss |
| c/fd | = (Rs. 4,000) Level 1st profit |
| will order by | =(Rs. 16,500) *Advice*: Do |

not expand capacities; sell maximum

No. of units by operating at 1,50,000 hrs. capacity (level 1st ) and gain Rs.23,24,000.

*Summary:*

| Product | Produce (Units) | *Sub-Contract (Units)* | *Contribution (Production)* | *Contribution (Sub-Contract)* | *Total Contribution* |
|---|---|---|---|---|---|
| A | 10,000 | 42,000 | 1,80,000 | 6,72,000 | 8,52,000 |
| B | - | 48,500 | - | 14,55,000 | 14,55,000 |
| C | - | 26,500 | - | 4,77,000 | 4,77,000 |
| D | 30,000 | - | 5,40,000 | - | 5,40,000 |
| | | | | | 33,24,000 |
| Fixed Cost | | | | 10,00,000 | |
| Profit | | | | 23,24,000 | |

**Ans. 55**

**Calculation of contribution per unit**

| **Particulars** | **EXE** | **WYE** |
|---|---|---|

| | | |
|---|---|---|
| **(a)** selling cost P.U. | 375 | 540 |
| Variable cost P.U. | | |
| Dept. 1 Direct materials | 58 | 100 |
| Direct labour | 5 hours<br>50 | 7.5 hours<br>75 |
| Variable overheads | | |
| (5 hrs*Rs. 2.40) | 12 | - |
| (7.5 hrs*Rs. 2.40) | - | 18 |
| (i) | 120 | 193 |
| Dept.2 Direct materials | 21 | 26 |
| Direct labour | 90 | 120 |
| (7.5 hrs*Rs. 3.60) | 27 | - |
| (10 hrs* Rs. 3.60) | - | 36 |
| (ii) | 138 | 182 |
| Total variable cost (i)+(ii) | 258 | 375 |
| Contribution P.U. (a)-(b) | **117** | **165** |

Calculation of contribution per unit if facilities of Dept.1 were sub-contracted but facilities of Dept.2 used internally

(Rs.)

| Particulars | EXE | WYE |
|---|---|---|
| Selling price per unit (a) | 375 | 540 |
| Cost of sub-contracting Dept.1 facilities | 138 | 212 |
| Cost of manufacture in Dept.2 internally | 138 | 182 |
| Total variable manufacturing cost per unit | 276 | 394 |
| Contribution per unit (a)-(b) | **99** | **146** |

Calculation of contribution per unit if facilities of Dept.1 and Dept.2 are sub-contracted

| Particulars | EXE | WYE |
|---|---|---|
| Selling price per unit (a) | 375 | 540 |
| Cost of sub-contracting P.U.<br>Dept.1<br>Dept.2 | <br>138<br>150 | <br>212<br>192 |
| Total variable cost P.U. (b) | 288 | 404 |
| Contribution P.U. (a)-(b) | 87 | 136 |

Statement showing number of units to be produced and sold to earn maximum profit by using own manufacturing capacity

| Particulars | EXE | WYE |
|---|---|---|
| Dept.1 (1,75,000 hrs/5 hrs)<br>(1,75,000 hrs/7.5 hrs)<br>Dept.2 (2,80,000 hrs/7.5 hrs)<br>(2,80,000 hrs/10 hrs) | 35,000<br>-<br>37,333<br>- | -<br>23,333<br>-<br>28,000 |
| Maximum unit can be produced and sold by using facilities of both departments. | 35,000 | 23,333 |
| Maximum contribution<br>(35,000 units* Rs. 117)<br>(23,333 units*Rs. 165)<br>Les: fixed cost<br>(Dept.1 Rs. 5,00,000 + Dept.2 Rs.10,00,000) | <br>40,95,000<br>-<br><br>15,00,000 | <br>-<br>38,49,945<br><br>15,00,000 |
| Maximum profit | 25,95,000 | 23,49,945 |

Suggestion: by production and sale of 35,000 units of EXE is maximum, it is suggestion to manufacture EXE internally.

**Calculation of profit from EXE** **(Rs.)**

| | |
|---|---|
| Contribution on internally produced units (35,000 units * Rs. 117)<br>Contribution when Dept.1 services were sub-contracted (2,333 units * Rs. 99)<br>Contribution when Dept.1 & Dept.2 services were sub-contracted (1,167 units * Rs.87) | 40,95,000<br>2,30,967<br>1,01,529 |
| Total contribution of EXE<br>Less: fixed cost | 44,27,496<br>15,00,000 |
| Profit | 29,27,496 |

| **Calculation of total contribution of WYE** | **(Rs.)** |
|---|---|
| Contribution on internally produced units (23,333 units * Rs. 165)<br>Contribution when Dept.1 services were sub-contracted (4,667 units * Rs. 146)<br>Contribution when Dept.1 and Dept.2 services were sub-contracted (3500 units * Rs.136) | 38,49,945<br>6,81,382<br>4,76,000 |
| Total contribution of WYE<br>Less: fixed cost | 50,07,327<br>15,00,000 |
| Profit | 35,07,327 |

Suggestion: profit is maximum for product WYE. Hence 31,500 units of WYE should be produced to yield a sum of Rs. 35,07,327 as profit.

**Ans. 56:**

**Working notes:**

1.

(a) Total normal and overtime hours available.

| | *Department* | |
|---|---|---|
| | *A* | *B* |
| Normal capacity hours | 600 | 520 |
| Overtime hours | 300 | 260 |
| (50% of normal hours in each department) | | |
| Total available hours | 900 | 780 |

(b) Total hours required to meet fully the market demand of 2,500 units of P and 2,000 units of Q.

| | *Department* | |
|---|---|---|
| | *A* | *B* |
| Hours required for manufacturing P 2,500 units of Product | 250 | 500 |
| | (2,500 Units × 0.1 hour) | (2,500 Units × 0.2 hour) |
| Hours required for manufacturing Q 2,000 units of Product | 600 | 400 |
| | (2,000 Units × 0.3 hour) | (2,000 Units × 0.2 hour) |
| Total hours required | 850 | 900 |

2. Sub-contracting should be resorted:

To meet the market demand of 2,500 units of product P and 2,000 units of product 850 and 900 hours [Refer to working note 1(b)] are required in departments A and B respectively. In department B only 780

hours are available and thus does not meet fully the requirement of 900 hours. Hence, sub-contracting should be resorted to meet the market demand fully.

3. (i) Contribution per unit;

| *Product* | *P* | | *Q* | |
|---|---|---|---|---|
| | *Normal hours* | *Overtime hours* | *Normal hours* | *Overtime hours* |
| Director material cost (Rs.) | 10.00 | 10.00 | 5.00 | 5.00 |
| Direct labour cost Dept. A (Rs.) | 1.00 | 1.50 | 3.00 | 4.50 |
| | (Rs.10 × 0.1 hr.) | (Rs.15 × 0.1 hrs.) | (Rs.10 × 0.3 hrs.) | (Rs.15 × 0.3 hrs.) |
| Dept. B: (Rs.) | 2.40 | 3.60 | 2.40 | 3.60 |
| | (Rs.12 × 0.2 hrs.) | (Rs.18 × 0.2 hrs.) | (Rs.12 × 0.2 hrs.) | (Rs.18 × 0.2 hrs.) |
| Total variable cost per unit (Rs.) : (A) | 13.40 | 15.10 | 10.40 | 13.10 |
| Sub-contract price per unit (Rs.) : (B) | 18.00 | 18.00 | 12.00 | 12.00 |
| Contribution / cost saving / (Loss per unit (Rs.) | 4.60 | 2.90 | 1.60 | (1.10) |
| (C) = [(B) – (A)] | | | | |

(ii) Contribution per hour

| | | | | |
|---|---|---|---|---|
| Hours required per unit | | | | |
| Dept. A | 0.1 | 0.1 | 0.3 | 0.3 |
| Dept. B | 0.2 | 0.2 | 0.2 | 0.2 |
| Contribution per hour | | | | |
| Dept. A (Rs.) | 46 | 29 | 5.33 | Loss |
| | (Rs.4.60/0.1 hrs.) | (Rs.2.90/0.1 hr.) | (Rs.1.60/0.3 hrs.) | -- |
| Dept. B (Rs.) | 23 | 14.50 | 8.0 | Loss |
| | (Rs.4.60/0.2 hrs.) | (Rs.2.90/0.2 hr.) | (Rs.1.60/02. Hrs.) | -- |

4. Utilization of normal and overtime available hours to meet fully monthly market demand of 2,500 units of P and 2,000 of Q.

   (i) An analysis of contribution statement (Refer to working note 3) clearly shows that 2,500 units of the product P should be manufactured by utilising the normal capacity hours of departments A and B. The manufacturing of 2,500 units of P will consume 250 normal hours of department A and 500 hours of department B (Refer to working note 1(b).

(ii) For manufacturing 2,000 units of product Q, it is beneficial to utilise the remaining normal available hours of departments A and B. The normal available hours in the department B are only 20 hours, [520 hours – 500 hours] and in department A 350 hours [600 hours – 250 hours]. 100 units of product Q can be manufactured by utilising the normal available hours of departments A and B. The manufacturing of 100 units of Q in normal available hours will utilise 30 hours in department A and 20 hours in department B.

(iii) Now for manufacturing the remaining 1,900 units of product Q, we have 320 normal hours plus 300 overtime hours in department A and 260 overtime hours in the department B. The manufacturing cost per unit of product Q comes to Rs.11.60 when normal hours of department A and overtime hours of department B are utilized.

{Rs.5 (Material Cost) + Rs.3 (Direct Labour in Department A) + Rs.3.60 (Direct Labour in Department B)}

On comparing Rs.11.60 with sub-contracting price of Rs.12 per unit, we arrive at a contribution of 0.40 per unit. Hence maximum number of units of product Q should be manufactured by using normal hours of department A and overtime hours of department B. since 0.3 and 0.2 hours are required respectively for manufacturing one unit of product Q in the two departments, therefore, utilising 320 normal hours and 213 overtime hours in departments A and B respectively, 1066.66 units (or say 1,067 units) of product Q are manufactured.

(iv) Finally, to manufacture remaining 833 units of Q, the available time is 300 overtime hours and 47 overtime hours in department A and B respectively. According to (working note 1) the available time in department B is short by 120 hours (900 required hours – 780 available hours) therefore 833 units of Q cannot be made internally. But few units can be made by utilising the available overtime hours in departments A and B. The manufacturing cost of 1 unit of Q by utilizing overtime hours in departments A and B comes to Rs.13.10 (Refer to working note 3) which on comparison with subcontract price of Rs.12 gives rise to a situation of loss of Rs.1.10 per unit {Rs.13.10 – Rs.12}. Hence it is advisable not to manufacture the remaining 833 units internally. These 833 units should be sub-contracted at a price of Rs.12/- per unit.

**(i) Statement of quantity of each product to be manufactured / or to be sub-contracted for fulfilling the market demand in most economical way.**

| | *Departments* | | | |
|---|---|---|---|---|
| | *A* | | *B* | |
| | *Normal time hours* | *Overtime hours* | *Normal time hours* | *Overtime hours* |
| Available hours (Refer to working note 1(i) | 600 | 300 | 520 | 260 |
| Production 2,500 units of P | 250 | -- | 500 | -- |
| (Refer to working note 4 (i)) | (2,500 units × 0.1 hrs.) | | (2,500 units × 0.2 hrs.) | |
| 100 units of Q | 30 | -- | 20 | -- |
| (Refer to working note 4 (ii) | (100 units × 0.3 hrs.) | | (100 units × 0.2 hrs.) | |
| 1067 units of Q | 320 | -- | -- | 213 |
| (Refer to working note 4(iii)) | (1,067 units × 0.3 hrs.) | | (1,067 units × 0.2 hrs.) | |

**(ii) Statement Showing Total Cost**

**(Based on the solution in (i) above)**

| | *Products* | | | |
|---|---|---|---|---|
| *Particulars* | *P* | *Q* | *Sub contract* | *Total* |

| | | | price | |
|---|---|---|---|---|
| | *Rs.* | *Rs.* | *Rs.* | *Rs.* |
| Direct Material Cost | 25,000 | 5,835 | - | 30,855 |
| | (2,500 units × Rs.10) | (1,167 units × Rs.5) | | |
| Direct Wages: | | | | |
| Dept. A | 2,500 | 3,500 | -- | 6,000 |
| | (250 hours × Rs.10) | (350 hours × Rs.10) | | |
| Dept. B | 6,000 | 4,074 | -- | 10,075 |
| | (500 hours × Rs.12) | (20 hours × Rs.12 + 213 hours × Rs.18 | | |
| Fixed overhead | 18,000 | 6,400 | - | 24,400 |
| Cost of 833 units @ Rs.12 per unit on sub-contracting | -- | -- | 9,996 | 9,996 |
| Total Cost | 51,500 | 19,809 | 9,996 | 81,305 |

**Ans. 57:**

**(i) Option**

**Statement of Profit (Loss)**

(if the firm discontinue all the operations during notice period of 3 months)

*(Rs. Crores)*

| *Products* | *A* | *B* | *C* | *D* | *Total* |
|---|---|---|---|---|---|
| Sales* | - | - | - | - | - |
| Costs: | | | | | |
| Material & Labour | - | - | - | - | - |
| Allocated overheads: | | | | | |
| Manufacturing | 1.5 | 1.2 | 1.8 | 1.2 | 5.7 |
| Admin. & Selling | 0.6 | 0.3 | 0.9 | 0.6 | 2.4 |
| Total allocated overheads during notice period of 3 months | 2.1 | 1.5 | 2.7 | 1.8 | 8.1 |
| Profit / (Loss) | (2.1) | (1.5) | (2.7) | (1.8) | (8.1) |

*The option (i) would not yield any revenue.

**Conclusion:** The option (i) will result in a loss of Rs.8.1 crores due to the committed costs account of 3 months notice period.

**(ii) Option**

**Working note:**

Ascertaining profitable products (if their production is continued during 3 months of notice period)

*(Rs. Crores)*

| *Products* | *A* | *B* | *C* | *D* |
|---|---|---|---|---|
| Sales (X) | 18 | 13.5 | 21 | 15 |
| Variable cost: | | | | |

| | | | | |
|---|---|---|---|---|
| Materials | 12.0 | 7.5 | 13.5 | 9.0 |
| Labour | 4.5 | 3.0 | 7.5 | 7.5 |
| Total variable costs: (Y) | 16.5 | 10.5 | 21.0 | 16.5 |
| Contribution: (X – Y) | 1.5 | 3.0 | - | (1.5) |

A review of contribution figures in the above statement of four products A, B, C and D clearly reveals that products A and B are only profitable.

**Statement of Profit (Loss)**

(If the firm continues the operations of profitable products A and B during 3 months of notice period)

*(Rs. Crores)*

| *Products* | *A* | *B* | *Total* |
|---|---|---|---|
| Contribution (Refer to above working note) | 1.5 | 3.0 | 4.5 |
| *Less*: total manufacturing administrative & selling overheads (Refer to part (i) above) | | | 8.1 |
| Profit / (Loss) | | | (3.6) |

**Conclusion:** Under this option the total loss is (Rs.3.6) crores which is less than the loss of option (i).

**(iii) Option**

**Working Note:**

Ascertaining profitable products (when notices are issued to the staff and the landlord – only in the manufacturing unit, resort to subcontracting only on profitable products)

*(Rs. Crores)*

| *Products* | *A* | *B* | *C* | *D* |
|---|---|---|---|---|
| Sales: (X) | 72.0 | 54.0 | 84.0 | 60.0 |
| Variable Cost: | | | | |
| Materials | 48.0 | 30.0 | 54.0 | 36.0 |
| Sub-contracting charges | 16.0 | 10.5 | 27.0 | 26.0 |
| | (20 lacs × Rs.80) | (15 lacs × Rs.70) | (30 lacs × Rs.90) | (20 lacs × Rs.130) |
| Total variable costs : (Y) | 64.0 | 40.5 | 81.0 | 62.0 |
| Contribution: (X – Y) | 8.0 | 13.5 | 3.0 | (2.0) |

A review of contribution figures in the above statement clearly shows that products A, Band C are only profitable.

**Statement of Profit / (Loss)**

(If the firm resorts to manufacturing of profitable products by sub-contracting)

*(Rs. Crores)*

| | *Product* | | | *Total* |
|---|---|---|---|---|
| | *A* | *B* | *C* | |
| Contribution: (X) (Refer to above working note) | 8.0 | 13.5 | 3.0 | 24.5 |
| Total manufacturing overheads of 3 months notice period : (Y) (Refer to option (i) above) | | | | 5.7 |

| | |
|---|---|
| Total administrative & Selling overheads: (Z) | 9.6 |
| Profit/(Loss): {X – (Y+Z)} | 9.2 |

**Decision:**

Out of the three options the option (iii) is the most viable one. Not only it will help the company with a turn around, but from the year 2002, the company can look forward to even higher profitability, since the manufacturing overhead would no longer be incurred thereafter.

**Ans. 58:**

Working Notes:

1. FOB price of dismantled kit:

| | |
|---|---|
| FOB price of dismantled kit (in$) | 510 |
| FOB price of dismantled kit (in Rs.) | 24,000 |
| ($510 × Rs.47.059) | |

2. Cost of a dismantled kit to Z Inc.

   If Rs.120 is the S. P. of kit to Z Inc. then its C Rs.100

   Re 1 $= \frac{Rs.100}{Rs.120}$

   If Rs.24,000 is the S. P. then C. P. is $= \frac{Rs.100}{Rs.120} \times Rs.24,000$

   $= Rs.20,000$

3. Cost of local procurements:

   140% of the supplies made by Z Inc. or 140% × Rs.10,000* = Rs.14,000

   *Being 50% of cost of a dismantled kit to Z Inc.

4. Landed cost of a dismantled kit:

| | Rs. |
|---|---|
| FOB price | 12,000 |
| (50% × Rs.24,000) (Refer to working note 1) | |
| *Add:* Insurance & freight | 500 |
| CIF price | 12,500 |
| *Add*: Customs duty | 3,750 |
| (30% × Rs.12,500) | |
| Landed cost of a dismantled kit | 16,250 |

5. Cost of the standard items procured locally:

   48% of the cost of locally procured goods

   = 48% × Rs.14,000

   = Rs.6,720

6. Royalty payment per computer:

   Let x = Selling price per unit of personal computer

   y = Royalty paid per computer

   Since 20% is the margin of profit on S.P. it main a margin of 25% on C.P.

   Therefore we have

X = 1.25 (Rs. 32,250+ Rs. 150 + y)

Y = 10% {x – (Rs. 6,720 + Rs. 16,250)}

On solving the above equations we get:

X = Rs. 43,000

Y = Rs. 2003.43 or Rs. 2,000 (Approx)

| Statement showing the selling price of a personal computer in India | | Rs. |
|---|---|---|
| A. | Landed cost of a dismantled kit (Refer to working note 4) | 16,250 |
| B. | Cost of local procurement (Refer to working note 3) | 14,000 |
| C. | Cost of assembly and other overheads per computer | 2,000 |
| D. | Total cost of manufacture: (A+ B + C) | 32,250 |
| E. | Technology fee per computer (Rs. 3,00,00,000 / 2,00,000 computer) | 150 |
| F. | Royalty payment per unit (Refer to working note 6) | |
| G. | Total cost (D + E+ F) | 34,400 |
| H. | Profit (20% on selling price of 25% of total cost) | 8,600 |
| I. | Selling price (per computer) | 43,000 |

**Ans. 59:**

**Statement of Differential cost**

| Capacity | Output (units) | FOB cost per unit (Rs.) | Total cost(Rs.) | Differential cost(Rs.) | Differential cost per unit (Rs.) |
|---|---|---|---|---|---|
| 70% | 70,000 | 97 | 67,90,000 | – | – |
| 80% | 80,000 | 92 | 73,60,000 | 5,70,000 | 57 |
| 90% | 90,000 | 87 | 78,30,000 | 4,70,000 | 47 |
| 100% | 1,00,000 | 82 | 82,00,000 | 3,70,000 | 37 |

**Statement showing gain or loss for various export order**

| *Source* | *Quantity* | *Differential Cost per unit* | *Differential Cost Total* | *Sales Revenue* | *Profit / Loss* |
|---|---|---|---|---|---|
| | *(Units)* | *(Rs.)* | *(Rs.)* | *(Rs.)* | *(Rs.)* |
| A | 5,000 | 57 | 2,85,000 | 2,75,000 | –10,000 |
| B | 10,000 | 57 for 5,000<br>47 for 5,000 | 5,20,000 | 5,20,000 | – |
| C | 10,000 | 47 for 5,000<br>37 for 5,000 | 4,20,000 | 5,10,000 | +90,000 |
| **Total** | 25,000 | | 12,50,000 | 13,05,000 | +80,000 |

If proposal A is accepted the company will suffer a loss of Rs. 10,000 with an idle capacity of 5,000 units.

If proposals A and B are accepted, the company will suffer a loss of Rs. 10,000 with an idle capacity of Rs. 5,000 units.

If the company accepts all the three proposals, it will earn profit of Rs. 80,000 with an idle capacity of 5,000 units.

Therefore, the company should accept all three proposals.

**Ans. 60:**

Shut down point = $\frac{\text{Avoidable Fixed cost - Shut down cost}}{\text{P/V Ratio}}$

$= \frac{[120000-40000] - 0}{1-0.8}$ = Rs. 400000

**Ans. 61:**

**(a)** Contribution per tin = Selling Price – Variable cost

= 21 – (7.8 + 2.1+ 2.5 + 0.6)

= Rs. 8 per tin.

**Loss on operation:**

Fixed cost per annum = 2,00,000 units × 4 per unit = 8 lakhs

∴ Fixed cost for 1 quarter = 8/4 = 2 lakhs

| | *Rs.* |
|---|---|
| Fixed cost for the quarter | 2,00,000 |
| Less: Contribution on operation (8 × 10,000) | 80,000 |
| Expected loss on operation | (1,20,000) |

**Loss on shut down:**

| | *Rs.* |
|---|---|
| Unavoidable Fixed Cost | 74,000 |
| Additional shut down cost | 14,000 |
| Loss on shut-down | (88,000) |

Conclusion: Better to shut down and save Rs. 32,000.

Shut-down point (number of units) = Avoidable Fixed Cost ÷ Contribution per unit
= (2,00,000 – 88,000)/8
= 14,000 units.

**Ans. 62:**

The Directors,

XYZ Co.

New Delhi

Date…….

Dear Sir

As desired, we have analysed the cost implications of the decision of temporary closure of the trade recession. We find that if the factory is run at 50% capacity and with reduced sales revenue, the loss likely to be incurred in one full year (the estimated period of recession), would be around Rs. 200000 as detailed below:

| | Rs. In'000 |
|---|---|
| Direct materials | 300 |
| Direct labour | 400 |
| Production overhead | 240 |
| Administrative overhead | 120 |

| | |
|---|---|
| Selling & distribution overhead | 130 |
| | 1190 |
| Loss | 200 |
| Sales | 990 |

If the factory is closed, the following costs will be incurred: Rs. In '000

| | |
|---|---|
| Fixed costs | 220 |
| Settlement cost | 150 |
| Maintenance costs | 20 |
| Cost of resuming operations | 80 |
| | 470 |

It is obvious from the above, that despite the fact that running at 50% capacity would imply a loss of Rs. 200000, it is better not to close down the factory since in that case the loss would be higher.

In our views, even if running the factory entailed a somewhat bigger loss as compared to the loss incurred by closing it down temporarily, it may be better to keep the factory in operation. This is because a closure, even if temporary, results in the loss of regular and old customers, suppliers and skilled personal. This, coupled with a loss of goodwill in the market, may give rise to substantial losses at the time of restarting the factory. We trust that the above analysis would be helpful to you in reaching an appropriate decision in the matter. We shall be glad to be of any further assistance that may be required in this regard.

Yours faithfully
X and Co.

Chartered Accountants.

**Working Note:**

| | | Production overhead (Rs. Lakhs) | Admn. overhead (Rs. Lakhs) | Selling overhead (Rs. Lakhs) |
|---|---|---|---|---|
| (i) | Amount at 60% | 2.52 | 1.24 | 1.36 |
| (ii) | Amount at 80% | 2.76 | 1.32 | 1.48 |
| (iii) | Variable cost for 20% | 0.24 | 0.08 | 0.12 |
| (iv) | Variable cost for 60% | 0.72 | 0.24 | 0.36 |
| (v) | Fixed Cost | 1.80 | 1.00 | 1.00 |
| (vi) | Amount at 50% (iii×2.5+v) | 2.40 | 1.20 | 1.30 |

**Ans. 63:**

**M/s supreme Ltd.**

**(i) Comparative statement of sales and profit under marginal costing**

| Details | 2002 | 2003 |
|---|---|---|
| Sales Revenue | Rs. 6,00,000 | 5,62,500 |
| Less: variable cost | 4,50,000 | 4,50,000 |
| Contribution | 1,50,000 | 1,12,500 |
| Less: fixed cost | 1,20,000 | 78,750 |
| Profit | 30,000 | 33,750 |

(ii) **Minimum sales required, if the firm decides to shut down in units in 2003:**

Minimum sales required is the sales which should yield at least the contribution, which is sufficient to meet increase in fixed cost.

Increase in fixed costs in 2003 = Rs. 78,750 – 60,000 = Rs. 18,750

Sales required to yield contribution equal to increase in fixed cost

X* P/V retio = Rs. 18,750

Or x = Rs. 18750 / 0.20 = Rs. 93,750

**Working notes**

1. Computation of variable costs, break even point, profit and fixed cost for the year 2002:

| | |
|---|---|
| Sales revenue | Rs. 6,00,000 |
| P/V ratio | 25% |
| Margin on safety | 20% |
| So, margin of safety | = sales * 0.20 |
| | = Rs. 6,00,000 * 0.20 = 1,20,000 |

We know that margin of safety * P/V ratio = Profit

So, Profit: Rs. 1,20,000 * 0.25 = Rs. 30,000

| | |
|---|---|
| Total contribution | = sales * P/V ratio |
| | = Rs. 6, 00,000 * 0.25 = Rs. 1,50,000 |
| Variable cost | = sales – contribution |
| So, variable cost | = 6, 00,000 – 1,50,000 = 4,50,000 |
| Fixed cost | = contribution – Profit |
| | = 1,50,000 – Rs. 30, 000 = Rs. 1,20,000 |
| Break even sales * P/V ratio | = fixed cost |
| So, BES | = 1,20,000 / 0.25 = Rs. 4,80,000 |

2. Computation of sales revenue, variable cost, fixed cost and profit in 2003

Let sales revenue for the year 2003 be x. the variable cost for the year 2003 is Rs. 4,50,000 (no. change).

| | |
|---|---|
| So, contribution | = X – Rs. 4,50,000 |
| | = 20% (given) |
| We know that P/V retio | = contribution / Sales |
| Or, 20/100 | = (X – 4, 50,000) / X |
| Or, 20x | = Rs.100x – Rs. 4, 50, 00,000 |
| Or, x | = Rs. 4, 50, 00,000/80 = 5, 62,500 |
| Margin of safety | = 30% (given) |
| So, margin of safety | = sales * margin of safety ratio |
| | = Rs. 5, 62,500 * 0.30 = Rs. 1, 68,750 |

We know that sales – margin of safety = B.E. sales

| | |
|---|---|
| So, B.E. sales | = Rs. 5, 62,500 – Rs. 1, 68,750 |
| | = Rs. 3, 93,750 |

**Ans. 64 (i)**

| | *Option I*<br>*At 75% in Feb and close in March and April (Rs.)* | *Option II*<br>*At 25% each from Feb – April (Rs.)* |
|---|---|---|
| Direct Material | 5,25,000 | 5,25,000 |
| Direct Labour | 5,23,600 | 5,19,750 |
| | 10,48,600 | 10,44,750 |

| | | |
|---|---|---|
| | 8,400 | 14,700 |
| | 9,800 | |
| | 1,01,500 | 1,78,500 |
| | 65,800 | |
| | 28,000 | 84,000 |
| | 14,000 | |
| | 52,500 | 1,02,900 |
| | 53,200 | |
| Office overhead: | | |
| Staff Salaries | 1,48,400 | 2,94,000 |
| Idle 67,550 × 2 | 1,35,100 | |
| Other overheads | 28,000 | 59,850 |
| Idle | 22,400 | |
| Total overhead cost | 6,67,100 | 7,33,950 |
| Total cost | 17,15,700 | 17,78,700 |

The more economic course of action is to operate at 75% capacity for a month only, and close the plant for March and April. This option will save (Rs.17,78,700 – Rs.17,15,700) = Rs.63,000.

**Ans. 65:**

**1. Quantity analysis**

Input in process A – total capacity – given = 2, 00,000 kg
Less: loss in process A = 10% of Input = 20,000 kg (NRV at Rs. 1/ kg = 20,000)
Balance transfer to process B = 1,80,000 kg
Less: loss in process B = 5% of Input = 9,000 kg (NRV at Rs. 2 / kg = 18,000)
Balance good output available for sale = 1,71,000 kg

**2. Supplier Evaluation and Decision**

| Supplier | P | Q | R | R |
|---|---|---|---|---|
| Condition | Max. 1,20,000 kg | Max. 1,60,000 kg | Any Quantity | Qtty = 2,00,000 kg |
| Price | 10.00 | 11.20 | 11.60 | 11.00 |
| Var. Transport cost | 1.20 | 1.00 | 1.00 | 1.00 |
| Total | 11.20 | 12.20 | 12.60 | 12.00 |

The following can be planned in any of the following ways –

Total Purchase = 2, 00,000 kg

Purchase entirely from R 2,00,000 kg

Cost incurred = (2,00,000 * Rs. 12)
= 24,00,000

Purchase first kg. from P(least cost) and balance 80,000 kg from Q (Next least cost)
1,20,000 * Rs. 11.20 + 80,000 * Rs. 12.20)
= 23,20,000

Decision: hence the company should Buy 1,20,000 kg from P and 80,000 kg from Q
Fixed transport cost being constant is not relevant to the above decision.

**3. Customer evaluation and decision**

| Customer | k | **L** | **M** |
|---|---|---|---|
| Condition | Upto 80,000 kg only | Upto 1,60,000 kg only | All 1,71,000 kg |
| Selling price | 65.00 | 64.00 | 61.80 |

| | | | |
|---|---|---|---|
| Less: discount 2% | 1.30 | 1.28 | NIL |
| Net selling price | 63.70 | 62.72 | 61.80 |
| Less: var. transport cost | 2.60 | 1.44 | NIL |
| Net realization | 61.10 | 61.28 | 61.80 |

The sales can be made in any of the following way –

Total sale Quantity = 1,71,000 kg

Sold entirely to M 1, 71,000 kg

Amt realized = (1,71,000 * Rs. 61.80)
= Rs. 1,05,67,800
Less: fixed delivery cost NIL
Net amount = Rs. 1,05,67,800

sell first 1,60,000 kg to L (max. revenue)and
Balance 11,000 kg to K (next max. revenue)
(1,60,000 * Rs. 61.28 + 11,000 * Rs. 61.10)
= 1,04,76,900
= Rs. 60,000 (Rs. 5,000 * 12 months)
= 1,04,16,900

**Decision:** since revenue is higher, the company should sell the entire quantity to customer M.

**4. Statement of process costs**

| **Particular** | **Process A** | **Process B** |
|---|---|---|
| Raw materials (Rs. 23,20,000 + fixed transport 2,00,000) | 25,20,000 | 56,56,000 |
| Transport from previous process | 22,00,000 | 21,00,000 |
| Direct wages | 9,56,000 | 13,45,800 |
| Overheads | | |
| Total process costs | 56,76,000 | 91,01,800 |
| Less: scrap value of normal loss ( as in WN Above) | 20,000 | 18,000 |
| Net process costs transferred to subsequent process/FG | 56,56,000 | 90,83,800 |

**Net profit:** sales revenue – costs of production = 1,05,67,800 – 90,83,800 = **Rs. 14,84,000**

**Ans. 66:**

(i) Reorder level = Safety Stock + lead time consumption
= 100 units + (3600 units/12) = 400 units

(ii) Anticipated reduction in the value of the average stock investment

$$EOQ = \sqrt{\frac{2 \times \text{Annual consumption} \times \text{Buying cost per order}}{\text{Cost of carrying one unit of inventory for one year}}}$$

$$= \sqrt{\frac{2ab}{cs}}$$

Where a = Annual consumption
b= Buying cost per order
c= Storage and other inventory carrying cost rate

$$= \sqrt{\frac{2 \times 3600\ units \times \text{Rs. } 40}{0.2 \times Rs.100}}$$

The average stock to be held under new system:
= minimum lavel + ½Reorder quantity
= 100 + ½* 120 = 160 units

The average stock investment under new system:
= 160 units * Rs. 100 = Rs. 16,000

The average stock under old system:
= Minimum level + ½ EOQ
= 0 + ½ (1800 units) = 900 units

The average investment under old system = 900 * Rs. 100 = Rs. 90,000
Therefore, anticipated average reduction in value of average stock investment
= Rs. 90,000 – Rs. 16,000 = Rs. 74,000
(iii) The anticipated reduction in total inventory costs (in the first and subsequent years)
Under new system:

| | |
|---|---|
| Annual ordering cost ((3,600/120) * Rs. 40) = | Rs. 1,200 |
| Stock holding cost (0.20 * Rs. 16,000) = | 3,200 |
| Total inventory cost | 4,400 |

Under old system:

| | |
|---|---|
| Annual ordering cost (2 orders * Rs. 40) = | Rs. 80 |
| Stock holding cost (0.20 * Rs. 90,000) = | 18,000 |
| Total inventory cost | 18,080 |

Anticipated reduction in subsequent year:
Thus anticipated reduction in total inventory cost is Rs. 13,680 (i.e., Rs. 18,080 – 4,400) in subsequent years.
Anticipated reduction in the first year = Rs. 13,680 – Rs. 10,000 * = Rs. 3,680
* In the first year 100 units will have to be purchased.

**Ans. 67:**

| Particular | Current | Policy A | Policy B | Policy C |
|---|---|---|---|---|
| Sales | 4,50,000 | 5,00,000 | 5,40,000 | 5,65,000 |
| Less: variable cost at 70% | 3,15,000 | 3,50,000 | 3,78,000 | 3,95,500 |
| Contribution | 1,35,000 | 1,50,000 | 1,62,000 | 1,69,500 |
| Less: fixed cost (given) | 10,000 | 10,000 | 10,000 | 10,000 |
| Profit before tax | 1,25,000 | 1,40,000 | 1,52,000 | 1,59,500 |
| Less: tax at 40% | 50,000 | 56,000 | 60,800 | 63,800 |
| Profit after tax | 75,000 | 84,000 | 91,200 | 95,700 |
| Cost of good sold (VC + FC) | 3,25,000 | 3,60,000 | 3,88,000 | 4,05,500 |
| Inventory turnover ratio (given) | 10 times | 8 times | 6 times | 4 times |
| Average inventory (COGS /T/o ratio) | 32,500 | 45,000 | 64,667 | 1,01,375 |
| Carrying cost of inv. At 5% (a) | 1,625 | 2,250 | 3,233 | 5,069 |
| Opportunity cost at 20 % of capital blocked in average inventory (b) | 6,500 | 9,000 | 12,933 | 20,275 |
| Total cost of inventory holding (a + b) | 8,125 | 11,250 | 16,166 | 25,344 |
| Net benefit = total cost of inventory | 66,875 | 72,750 | 75,034 | 70,356 |

**Decision:** As net benefit is Maximum under policy B, it may be chosen (alternative assumptions exist)

**Ans. 68:**

**Working Note:**

| Fixed overheads | Rs. |
|---|---|
| Present sale value: (A) | 15,00,000 |
| (15,000 units ×Rs.100) | |
| Direct materials | 4,50,000 |
| (30% of sale value) | |
| Direct labour | 3,00,000 |
| (20% of the value) | |
| Variable overheads | 3,00,000 |
| (Rs.20 per unit) | .. |
| Total variable costs (B) | 10,50,000 |

| | | |
|---|---|---|
| Contribution: (C) = (A) – (B) | | 4,50,000 |
| Profit : (D) | | 2,25,000 |
| (15,000 units × Rs.15) | | . |
| Fixed overheads: | (C) – (D) | 2,25,000 |
| (current level) | | |
| Add: Additional fixed overheads due to price escalation | | 50,000 |
| Total fixed overheads: | | 2,75,000 |

**Statement of profitability for various alternatives**

| *Alternatives* | *I* | *II* | *III* | *IV* |
|---|---|---|---|---|
| | Rejecting the proposal for the purchase of 10,000 units and continuing with present level of sales only | Rejecting the proposal for the purchase of 10,000 units from a party and attaining the maximum capacity by incurring additional selling expenditure | Accepting the proposal of the party to take 10,000 units @ Rs.90 per units by installing a balancing equipment and continuing with present level of sales | Accepting the proposal of the party to take 10,000 units @ Rs.90 per cent by installing a balancing equipment and attaining sale of maximum available capacity by incurring additional selling expenditure |
| Sale (units) | 15,000 | 20,000 | 25,000 | 30,000 |
| | Rs. | Rs. | Rs. | Rs. |
| Sales Value: (A) | 15,00,000 (15,000 × Rs.100) | 20,00,000 (20,000 × Rs.100) | 24,00,000 (15,000 × Rs.100+10,000 × Rs.90 | 29,00,000 (20,00,000 × Rs.100 + 10,000 × Rs.90) |
| Variable costs | | | | |
| Direct material | 4,95,000 | 6,60,000 | 8,25,000* | 9,90,000* |
| (33% of sales value) | | | | |
| Direct Labour | 3,75,000 | 5,00,000 | 6,25,000* | 9,90,000* |
| Variable overheads | 3,00,000 | 4,00,000 | 5,00,000 | 6,00,000 |
| (@Rs.20 per unit) | | | | |
| Total variable costs: (B) | 11,70,000 | 15,60,000 | 19,50,000 | 23,40,000 |
| Fixed costs | | | | |
| Fixed overheads | 2,75,000 | 2,75,000 | 2,75,000 | 2,75,000 |
| (Refer to working note) | | | | |
| Additional selling expenditure | - | 50,000 | - | 50,000 |
| Depreciation | - | - | 1,00,000 | 1,00,000 |

| | | | | |
|---|---|---|---|---|
| for balancing equipment | | | | |
| Additional administrative expenses | - | - | 50,000 | 50,000 |
| Total fixed cost : (C) | 2,75,000 | 3,25,000 | 4,25,000 | 4,75,000 |
| Total cost D: [(B)+(C)] | 14,45,000 | 18,85,000 | 23,75,000 | 28,15,000 |
| Profit: (A)-(D) | 55,000 | 1,15,000 | 25,000 | 85,000 |

*Note:* For computing the material and labour cost under alternative III & IV the notional sale price of Rs.100 is taken for additional 10,000 units.

*Recommendation:* Alternative II is the best as it gives maximum profit.

**Ans. 69:**

Comparative profit Statement (based on Revised Cost Structure)

| | *Proposal 1* | *Proposal 2* | *Proposal 3* |
|---|---|---|---|
| | Sell 20,000 units only | Secure orders for 5,000 additional units (unused capacity) and sell 25,000 units | Accept the new order for 10,000 additional units and sell 30,000 units |
| | Rs. | Rs. | Rs. |
| Total sales revenue (A) | 20,00,000 | 25,00,000 | 29,00,000 |
| | (Rs.20,000 units × Rs.100) | 25,000 units × Rs.100) | (30,000 units + Rs.33) |
| Director Labour | 5,00,000 | 6,25,000 | 7,50,000 |
| | (20,000 units × Rs.25) | (Rs.25,000 units × Rs.10) | (30,000 units + Rs.10) |
| Variable overhead | 2,00,000 | 2,50,000 | 3,00,000 |
| | (20,000 units × Rs.10) | (25,000 units × Rs.10) | (30,000 units + Rs.10) |
| Fixed overheads | 4,40,000 | 4,40,000 | 4,40,000 |
| | (Rs.4,00,000 + Rs.40,000) | | |
| *Add*: Administrative charges | - | - | 60,000 |
| *Add*: Sales promotion expenses | - | 50,000 | - |
| Depreciation (New equipment) | | | 1,50,000 |
| Total cots (B) | 18,00,000 | 21,90,000 | 26,90,000 |

| | | | |
|---|---|---|---|
| Profit (C) = [(A) – (B)] | 2,00,000 | 3,10,000 | 2,10,000 |

**Analysis**

An analysis of the profit figures of M/s Unique products under three proposals clearly shows that it is maximum under proposal 2. Therefore, it is advisable for the concern to produce and sell 25,000 units @ Rs.100/- per unit and utilise its full production capacity.

**Ans. 70** **(a) Statement of Profitability for the year 1993-94 (as originally envisaged by the company)**

| Products | Ethylene | EDC | VCL | Total |
|---|---|---|---|---|
| Annual Production Capacity (MT) | 25,000 | 30,000 | 30,000 | |
| Annual Planned Productions (MT) (Refer to Note -1) | 25,000 | 25,000 | 15,000 | |
| Cost of production of annual planned production | Rs. | Rs. | Rs. | Rs. |
| Variable costs (Refer to Note 2) | 5,00,000 | 7,50,000 | 6,00,000 | |
| Fixed cost (Refer to Note 3) | 5,00,000 | 9,00,000 | 12,00,000 | |
| Common cost (Refer to Note 4) | 2,50,000 | 4,50,000 | 6,00,000 | |
| Cost of Ethylene | 12,50,000 | | | |
| Cost of Ethylene (Used for EDC) | | 12,50,000 | | |
| Cost of EDC (25,000 MT) | | 33,50,000 | | |
| Cost of 10,000 MT of EDC (Refer to Note 5) | | 13,40,000 | | |
| Cost of 15,000 MT of EDC for (VCL) | | | 20,10,000 | |
| Cost of Sale (A) | | 13,40,000 | 44,10,000 | 57,50,000 |
| Sales Revenue (B) | | 15,00,000 | 45,00,000 | 60,00,000 |
| Profit (B-A) | | 1,60,000 | 90,000 | 2,50,000 |

Note: Only 25,000 metric tonne of ethylene is available and as such 25,000 metric tonne of EDC could be produced. Out of this 15,000 metric tonne of EDC is consumed for VCL production and the balance of 10,000 metric tonne of EDC is sold.

**Working Note:**

**Note: 1 annual planned production**

| | Ethylene | EDC | VCL |
|---|---|---|---|
| Proposed Sale | - | 10,000 | 15,000 |
| Production: | - | 10,000 | 15,000 |
| For EDC | 10,000 | | |
| For VCL | 15,000 | 15,000 | - |
| Total | 25,000 | 25,000 | 15,000 |

**2. Variable Costs**

| Ethylene | EDC | VCL |
|---|---|---|
| 25,000 MT x Rs.20 =Rs.5,00,000 | 25,000 MT x Rs.30 =Rs.7,50,000 | 15,000 MT x Rs.40 =Rs.6,00,000 |

**3. Fixed Cost**

| | | | |
|---|---|---|---|
| (This will be based on Production capacity) | 25,000 MT x 20 =Rs.5,00,000 | 30,000 MT x 30 =Rs.9,00,000 | 30,000 MT x40 =Rs.12,00,000 |

**4. Common Cost**

| | | | |
|---|---|---|---|
| (This will also be based | 25,000 MT x 10 | 30,000 MT x 15 | 30,000 MT x 20 |

On production capacity =Rs.2,50,000 =Rs.4,50,000 =Rs.6,00,000

**5**. Cost of 25,000 metric tones of EDC = Rs.33,50,000
Cost of one metric ton of EDC = Rs.33,50,000 * 25,000 = Rs.134
Cost of 10,000 metric tones of EDC = 10,000 x Rs.134 = Rs.13,40,000
Cost of 15,000 metric tones of EDC = 15,000 x Rs.134 = Rs.20,10,000

6. Sales Revenue

| | |
|---|---|
| EDC = 10,000 MT x Rs.150 | =Rs.15,00,000 |
| VCL = 15,000 MT x Rs,300 | =Rs.45,00,000 |
| Total | 60,00,000 |

(b) Revised Statement of Profitability
(When the company decides to accept offer of X)

| Products | Ethylene | EDC | VCL | Total |
|---|---|---|---|---|
| Annual planned productions (MT) | 25,000 | 25,000 | 30,000 | |
| | Rs. | Rs. | Rs. | |
| Cost of production Refer (a) | 12,50,000 | 33,50,000 | | |
| Variable cost (30,000 MT x Rs.40) | | | 12,00,000 | |
| Production Fixed cost (30,000 MT x Rs.40) | | | 12,00,000 | |
| Common Fixed cost (30,000 MT x Rs.20) | | | 6,00,000 | |
| Purchases cost of 5,000 MT of EDC @ Rs.125 per MT | | 6,25,000 | | |
| Total of EDC used in VCL | | 39,75,000 | 39,75,000 | |
| Total cost (A) | | | 69,75,000 | |
| Total Sales (Refer to note 1 below (B) | | | 80,00,000 | |
| Profit (B-A) | | | 10,25,000 | |

Comment – Since the profit has increased the proposal of X should be accepted.
Note 1: Total Sales :

| | |
|---|---|
| 20,000 MT of VCL to X @ Rs.250 per MT | =Rs.50,00,000 |
| 10,000 MT of VCL X Rs.300 (in open Market) | =Rs.30,00,000 |

| | Hours |
|---|---|
| Available capacity | 20,000 |
| First product D should be produced (2,800 x 6) | 16,800 |
| Balance hours | 3,200 |
| Second product A should be produced (2,000 x 1) | 2,000 |
| Balance hours | 1,200 |
| Third product B should be produced (600 x 2) | 1,200 |

Thus, if 20,000 hours is the limiting factor, all requirements of D and A can be manufactured and only 600 units of product B can be manufactured. The balance requirement of product B. i.e.,3,500-600 =2,900 units will have to be bought – out or manufactured in the second shift.
(b) Because purchase price of component c is Rs.52 and cost of manufacturing is Rs.57, it will not be profitable to manufacture C even in second shift. It should be purchased form outside, purchased from outside. The relative position is as follows:

**Cost of producing 2,900 units of product B in second shift**

**Ans. 71:**

Solution (a) Working Notes

(i) **Press hours required**

| Components | A | B | C | D |
|---|---|---|---|---|
| Direct expenses | Rs.10 | Rs.20 | Rs.10 | Rs.60 |
| Direct hours per unit | 1 | 2 | 1 | 6 |

**(ii) Marginal cost per unit vs. bought-out prices per unit**

| | | | | |
|---|---|---|---|---|
| Marginal costs: | | | | |
| Direct Materials | Rs.37 | Rs.27 | Rs.25 | Rs.44 |
| Direct wages | 10 | 8 | 22 | 40 |
| Direct expenses | 10 | 20 | 10 | 60 |
| Marginal costs | 57 | 55 | 57 | 144 |
| Bought – out price | 60 | 59 | 52 | 168 |
| Excess of bought out price over marginal cost | 3 | 4 | (5) | 24 |
| Process hours per unit | 1 | 2 | 1 | 6 |
| Excess of bought – out price per unit of limiting factor | 3 | 2 | (5) | 4 |
| Ranking | 11 | 111 | - | 1 |

The bought – out price of component C is lower than the marginal cost by Rs.5 and for this reason it should be purchased from outside. For the remaining products. Ranking is based on utilization of limiting factor. Optimal product mix has been, calculated as follows:

**Calculation of optimal product mix**

| | |
|---|---|
| Variable Cost | Rs.55 |
| Increase in direct wages | 2 |
| | 57 |
| Total variable cost (2,900 x 57) | Rs.1,65,300 |
| Additional fixed cost | |
| Hours required = 2,900 x 2=5,800 hours | |
| Extra fixed cost of 5,800 hours at Rs.500 for each 1,000 hours or part thereof | 3,000 |
| Total cost for producing 2,900 units of product B in second shift | 1,68,300 |
| Bought- out price for 2,900 units of product B will be 2,900 x Rs.59 | 1,71,100 |
| Disadvantage in buying B | 2,800 |

For the above-mentioned reasons, it is in the interest of company to manufacture product B in the Second shift instead of buying it from outside market .The disadvantage of the decision to buy product B from outside will be Rs.2,800 .

80,00,000

**Ans. 72:**

**Components**

| | P | Q | R | S |
|---|---|---|---|---|
| i. Direct wages | Rs.17.50 | Rs.35.00 | Rs.17.50 | Rs.105.00 |
| ii. D.L.H. @ Rs.8.75 p.h | 2 | 4 | 2 | 12 |
| iii. Variable Mfg. cost | Rs.99.75 | Rs.96.25 | Rs.99.75 | Rs.252.00 |
| iv. Purchase Price | 105.00 | 103.00 | 91.00 | 294.00 |

| | | | | |
|---|---|---|---|---|
| v. Saving if components are manufactured | 5.25 | 6.75 | - | 42.00 |
| vi. Saving per hour (5 * 2) | 2.625 | 1.6875 | - | 3.50 |
| Ranking | 2 | 3 | | 1 |

**(i) Statement showing product-mix of the components to be manufactured**
**(Available hrs. = 40,000)**

| Component | Qty. reqd. | Hrs. / unit | Production | Hrs. Used | Balance hrs. |
|---|---|---|---|---|---|
| S | 2,400 | 12 | 2,400 | 28,800 | 11,200 |
| P | 2,400 | 2 | 2,400 | 4,800 | 6,400 |
| Q | 4,800 | 4 | 1,600 | 6,400 | - |

Components to be manufactured= S = 2,400
P = 2,400
Components to be purchased = Q = 1,600
Q = 3,200
R = 1,200

*6,400 hrs * 4 = 1,600

**(ii) Statement showing impact of second shift working**

Additional quantity of Q required = 3,200
Hours required to manufacture (3,200 x 4) = 12,800
Say = 13,000
Fixed cost (Rs.875 * 1,0000 ) x 13,000 = Rs.11,375

| | |
|---|---|
| Fixed cost per component Q (11,375 * 3,200) | =Rs.3.55 |
| Increase in labour cost (Rs.35 x 25%) | 8.75 |
| Total | 12.30 |
| Saving in cost | 6.75 |
| Loss if component Q is manufactured | 5.55 |

Hence, second shift operation is not recommended

- Fixed cost given per 1,000 hours

**Ans. 73:**

Since S and Y are produced simultaneously from an input of raw material Z, therefore when additional 60,000 kgs. of Y will be produced then 30,000 of S will also be produced simultaneously. The input of material Z required for these additional 60,000 kgs. of Y and 30,000 kgs. of S will be 90,000 kgs. of material Z. Hence the cost of processing 90,000 kgs. of material will be as follows:

| | *Rs.* |
|---|---|
| Cost of Raw material Z (90,000 kgs. × Rs.3) | 2,70,000 |
| Variable processing cost (90,000 kgs. × Rs.2) | 1,80,000 |
| Total cost of processing | 4,50,000 |
| *Less*: Sales revenue from 60,000 kgs. of Y | 2,40,000 |

| | |
|---|---|
| (60,000 kgs. × Rs.8) | |
| Balance cost to be recovered | 2,10,000 |
| Current sales revenue from the sale of 3,00,000 kgs. of S | 24,00,000 |
| (3,00,000 kgs. × Rs.8) | |
| Total sales revenue to be earned from the Sale of S | 26,10,000 |
| (3,00,000 kgs. + 30,000 kgs.) | |
| Hence minimum reduced price per kg. of S to recover Rs.26.10,000 from the sale of 3,30,000 kgs. of S | 7.91 |
| (Rs.26,10,000 / 3,30,000 kgs.) | |

**Ans. 74:**

**Working notes:**

1. Statement of total available, utilized and surplus capacity hours when 9,000 units of product 'X' are produced.

| *Departments* | *Available Capacity hours* | *Capacity utilized* | | *Surplus Capacity hours* |
|---|---|---|---|---|
| | | *(in %* | *(in hours)* | |
| (1) | (2) | (3) | (4) = (2)×(3) | (5)=(2)-(4) |
| A | 2,400 (300 days × 8 hours) | 75 | 1,800 | 600 |
| B | 2,400 | 100 | 2,400 | NIL |
| C | 2,400 | 70 | 1,680 | 720 |
| D | 2,400 | 50 | 1,200 | 1,200 |

2. Statement of total available, utilized and surplus capacity hours when 12,000 units of product 'X' are produced.

| *Production Department* | *Available capacity hours* | *Capacity utilization on 9,000 units Hours* | | *Balance capacity hours* | *Unit per hour* | *Hours required for 3,000 additional units* | *Surplus capacity hours* |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4)=(2)×(3) | (5) | (6) | (7) | (8)=(5)-(7) |
| A | 2,400 | 75 | 1,800 | 600 | 5 $\left(\frac{9,000\text{ units}}{1,800\text{ hrs.}}\right)$ | 600 | Nil |
| B | 2,400 | 100 | 2,400 | Nil | 3.75 $\left(\frac{9,000\text{ units}}{2,400\text{ hrs.}}\right)$ | 800 | Nil |
| C | 2,400 | 70 | 1,680 | 720 | 5.36 $\left(\frac{9,000\text{ units}}{1,680\text{ hrs.}}\right)$ | 560 | 160 |
| D | 2,400 | 50 | 1,200 | 1,200 | 7.5 | 400 | 800 |

$$\left(\frac{9{,}000\text{ units}}{1{,}200\text{ hrs.}}\right)$$

**Alternative I**

**Statement of net Revenue (Under Alternative I)**

| *Production* | *Surplus capacity hours (Refer to W.N.-1* | *Hire charges per hour* | *Total revenue in (Rs. Lacs)* | *Incremental costs per hour Rs.* | *Total cost in (Rs. Lacs)* | *Net revenue in (Rs.)* |
|---|---|---|---|---|---|---|
| | (a) | (b) | (c)=(a)×(b) | (d) | (e)=(a)×(d) | (f)=(c)-(e) |
| A | 600 | 2,500 | 15.00 | 2,000 | 12.00 | 3.00 |
| B | 720 | 1,800 | 12.96 | 1,500 | 10.80 | 2.16 |
| D | 1,200 | 1,600 | 19.20 | 1,200 | 14.40 | 4.90 |
| Total | | | 47.16 | | 37.20 | 9.96 |

| | | |
|---|---|---|
| *Add*: present income (10% of Rs.1,800 lacs) | | 180.00 |
| Total return | 189.96 | |

Return on investment

$$= \frac{\text{Total return}}{\text{Total investment}} \times 100 = \frac{189.96}{1{,}800} \times 100 = 10.553\%$$

**Alternative II**

Statement of Net Revenue when 12,000 units of product 'X' are produced and surplus plant capacity (hours) in departments C and D hired out.

| *Production* | *Surplus capacity hours (Refer to W.N.-2)* | *Hire charges per hour* | *Total revenue in (Rs.Lacs)* | *Incremental costs per hour Rs.* | *Total cost in (Rs. Lacs)* | *Net revenue in (Rs. Lacs)* |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3)=(1)×(2) | (4) | (5)=(1)×(4) | (6)=(3)-(5) |
| C | 160 | 1,800 | 2.88 | 1,500 | 2.40 | 0.48 |
| D | 800 | 1,600 | 12.80 | 1,200 | 9.60 | 3.20 |
| Total | | | 15.68 | | 12.00 | 3.68 |

| | |
|---|---|
| *Add*: Revenue (in lacs) earned on 3,000 additional units sale (3,000 units is × Rs.1,600) | 48.00 |
| *Add*: Present income on investment (10% × Rs.1,800 lacs) | 180.00 |
| Total Return (in lacs) | 231.69 |

$$\text{Return on investment} = \frac{231.68\text{ lacs}}{2{,}200\text{ lacs}} \times 100 = 10.53\%$$

Evaluation of two alternative proposals :

Since the return on investment under alternative I is more than that under alternative II; therefore it should be accepted.

**Ans. 75:**

**(i) Statement of Profitability of three Joint Products resulting from the joint production process of a popular line of colognes.**

| | *Evergreen* | *Morning Flower* | *Evening Flower* | *Total* |
|---|---|---|---|---|
| | *Rs.* | *Rs.* | *Rs.* | *Rs.* |
| Sales revenue | 4,00,000 | 6,00,000 | 6,00,000 | 16,00,000 |
| | (10,000 units × Rs.40) | (6,000 units × Rs.100) | (4,000 units × Rs.150) | -- |
| Less: cost after point of split off | 2,00,000 (10,000 units × Rs.20) | 2,40,000 (6,000 units × Rs.40) | 2,00,000 (4,000 units × Rs.50) | 6,40,000 -- |
| Net realization value at the point of spilt off | 2,00,000 | 3,60,000 | 4,00,000 | 9,60,000 |
| Less: Joint cost apportioned (Refer to working note) | 1,16,667 | 2,10,000 | 2,33,333 | 5,60,000 |
| Profit | 83,333 | 1,50,000 | 1,66,667 | 4,00,000 |

Response to the President's question. Review of the above profitability statement clearly shows that the concern is not selling its largest-volume product viz. evergreen at a loss. It yields a profit of Rs.83,333. In fact the figure of joint cost data given in the statement of the question is misleading. The total joint cost viz. Rs.5,60,000 should have been apportioned ever the three joint products by using net realisable value method. The use of net realisable value method would give joint cost per-unit of three respective joint products as Rs.11,666; Rs.35 and Rs.58.33. (Refer to working note)

**Working note:**

Statement of Joint cost apportionment over three products obtained under a joint production process.

| | *Evergreen* | *Morning Flower* | *Evening Flower* | *Total* |
|---|---|---|---|---|
| | *Rs.* | *Rs.* | *Rs.* | *Rs.* |
| Total Joint cost | 2,80,000 | 1,68,000 | 1,12,000 | 5,60,000 |
| | (10,000 units × Rs.28) | (6,000 units × Rs.28) | (4,000 units × Rs.28) | -- |
| Joint cost apportionment (One the basis of net realization value i.e. (Rs.2,00,000 : Rs.3,60,000 : Rs.4,00,000 or (5:9:10) | 1,16,667 | 2,10,000 | 2,33,333 | 5,60,000 -- |
| Joint cost per unit | 11,666 (Rs.1,16,667 / 10,000 units) | 35 (Rs.2,10,000 / 6,000 units) | 58.33 (Rs.2,33,333 / 4,000 units) | |

**(ii) Should the company sell Morning Flower Cologne below cost:** To compete successfully with the other company's product, if the price of Morning Flower Cologne is reduced to Rs.60, it will still contribute Rs.20 per unit (Rs.60 – Rs.40) towards joint cost and profit. On a volume of 6,000 units it will contribute Rs.1,20,000 in total. Hence the company should do so and go ahead to sell Morning Flower below cost.

**(iii) Response to price reduction:** (Refer to working note) A reduction in sales price of Morning Flower fails to maintain a gross margin of 20% on sales of three products obtained from the joint production process of a popular line of colognes. Hence the company cannot reduce the sales price of Morning Flower to Rs.60. A reduction in sale price would result in a loss of revenue of Rs.1,40,000.

**Working note:**

| | Rs. |
|---|---|
| Total joint cost (20,000 units × Rs.28) | 5,60,000 |
| Total cost after split off (10,000 × Rs.20 + 6,000 units × Rs.40 + 4,000 units × Rs.50) | 6,40,000 |
| Total cost | 12,00,000 |
| *Add:* Profit margin (20% on ales or 25% on total cost | 3,00,000 |
| Expected desired sales revenue | 15,00,000 |
| *Less*: Sales revenue of Evergreen and Evening Flower (10,000 units × Rs.40) + (4,000 × Rs.150) | 10,00,000 |
| Expected sales revenue from Morning Flower | 5,00,000 |
| By reducing sales price of morning flower to Rs.60/- total sale revenue received will be | 3,60,000 |
| Loss of revenue resulting from the sale of Morning Flower | 1,40,000 |

**(iv) Minimum price for Morning Flower**

| | |
|---|---|
| Expected Sales revenue from Morning Flower to maintain a gross margin of 20% of sales: (Rs.) | 5,00,000 |
| (Refer to (ii) part | |
| Quantity (in units) | 6,000 |
| Hence minimum price per unit (Rs.) | 83.33 |
| (Rs.5,00,000 / 6,600 units) | |

## Ans. 76:

(i) (a) **Statement showing apportionment of joint costs sales value at split-off**

| Products | Sales in tones (a) | Selling price per ton (Rs.) (b) | Sales value (Rs.) (c) = (a) * (b) | Apportioned joint cost (Rs.) |
|---|---|---|---|---|
| Caustic soda | 2,400 | 100 | 2,40,000 | 1,00,000 |
| Chlorine | 1,600 | 150 | 2,40,000 | 1,00,000 |
| Total | | | 4,80,000 | 2,00,000 |

*Apportioned joint cost = $\frac{\text{Total joint cost}}{\text{Total sale value}}$ * sale revenue of each product.

Apportioned joint cost to caustic soda = $\frac{\text{Rs. 2,00,000}}{\text{Rs. 4,80,000}}$ * Rs. 2,40,000 = 1,00,000

Apportioned joint cost to chlorine = $\frac{\text{Rs. 2,00,000}}{\text{Rs. 4,80,000}}$ * Rs. 2,40,000 = Rs. 1,00,000

(b) Statement showing apportionment of joint costs on physical measure (tons)

| Products | Sales in (tons) | Apportioned ** joint costs (Rs.) |
|---|---|---|
| Caustic soda | 2,400 | 1,20,000 |
| Chlorine | 1,600 | 80,000 |
| Total | 4,000 | 2,00,000 |

**Apportioned joint cost = $\frac{\text{Total joint cost}}{}$ * sales of each product (tons)

Total sales (tons)

Joint cost apportioned to caustic soda = $\frac{\text{Rs. 2,00,000}}{\text{Rs. 4000 tons}}$ * 2,400 tons = Rs. 1,20,000

Joint cost apportioned to chorine = $\frac{\text{Rs. 2,00,000}}{\text{Rs. 4,000 tons}}$ * 1,600 tons = Rs. 80,000

**(c) Statement showing apportionment of joint costs by using estimated net realizable value method**

| Products | Sales revenue (Rs.) | Further pro-cessing cost (Rs.) | Net realizable value (Rs.) | Apportioned ** joint cost (Rs.) |
|---|---|---|---|---|
| Caustic soda (2,400 tons * Rs. 100) | 2,40,000 | - | 2,40,000 | 80,000 |
| PVC (1,000 tons of PVC * Rs. 400) | 4,00,000 | 40,000 | 3,60,000 | 1,20,000 |
| Total | | | 6,00,000 | 2,00,000 |

***Apportioned joint cost = $\frac{\text{Total joint cost}}{\text{Total net realizable value}}$ * Net realizable value of each product.

Apportioned joint cost for caustic soda = $\frac{\text{Rs. 2,00,000}}{\text{Rs. 6, 00,000}}$ * Rs. 2,40,000 = Rs. 80,000

Apportioned joint cost for chlorine = $\frac{\text{Rs. 2, 00,000}}{\text{Rs. 6, 00,000}}$ * Rs. 3, 60,000 = Rs. 1, 20,000

(ii) Statement of gross margin percentage of caustic soda and PVC under sales value at split off: physical measure (tons) and estimated net realizable value method

| | Sale value at split off (Rs.) | Physical measure (tons) (Rs.) | Estimated net realizable value (Rs.) |
|---|---|---|---|
| Caustic soda | | | |
| Sale revenue : (A) | 2,40,000 | 2,40,000 | 2,40,000 |
| Joint cost allocated : (B) | 1,00,000 | 1,20,000 | 80,000 |
| Gross margin (C) : (A)-(B) | 1,40,000 | 1,20,000 | 1,60,000 |
| Gross margin (%) $\frac{(C)}{(A)}$ * 100 | 58.33% | 50% | 66.67% |
| (b) PVC: | | | |
| Sales revenue (A) | 4,00,000 | 4,00,000 | 4,00,000 |
| Joint cost allocated | 1,00,000 | 80,000 | 1,20,000 |
| Further processing cost | 40,000 | 40,000 | 40,000 |
| Total cost | 1,40,000 | 1,20,000 | 1,60,000 |
| Gross margin (c) : (A)-(B) | 2,60,000 | 2,80,000 | 2,40,000 |
| Gross margin (%) $\frac{(C)}{(A)}$ *100 | 65% | 70% | 60% |

(iii) Consequence of the operating income of inorganic chemicals for November, 1998 by accepting the offer of daily swimming pools Ltd. to purchase, 1,600 tons of chlorine

| | |
|---|---|
| Incremental revenue (loss) due to processing of chlorine to PVC (1,600 tons * Rs. 150) – (1,000 tons * Rs. 400 tons) | (Rs. 1, 60,000) |
| Saving on further processing cost of chlorine into PVC | 40,000 |
| Incremental operating income | (Rs. 1, 20,000) |

The operating income of inorganic chemicals will be reduced by Rs. 1,20,000 in the month of November, 1998 if it accepts the offer of daily swimming pools Ltd., to purchase 1,600 tons of chlorine in November, 1998 at Rs. 150 per ton.

**Ans. 77:**

(i) Statement showing the product to be manufactured and sold and the result contribution

| | | | Aristocrat | deluxe |
|---|---|---|---|---|
| Maximum possible production in unit (Note1) | | | | |
| S. P. per unit | | | Rs. 90.00 | Rs. 80.00 |
| Less: variable costs: | Aristocrat | deluxe | | |
| Direct material | Rs. 10.00 | Rs. 10.00 | | |
| Variable costs: | | | | |
| Deptt. A (0.5*Rs. 50; 0.3 * Rs. 50) | 25.00 | 15 | | |
| Deptt. B (0.4 * Rs. 60; 0.45 * Rs. 60) | 24.00 | 27.00 | | |
| Total variable cost per unit | 59.00 | 52.00 | 59.00 | 52.00 |
| Contribution per unit | | | 31.00 | 28.00 |
| Total contribution per unit 6,800 * Rs. 31; 8,500 * Rs. 28 | | | Rs. 2,10,800 | Rs. 2,38000 |

Form the above, it is apparent that sale of Rs. 8,500 units of deluxe model produces the maximum contribution of Rs. 2,38000 within the capacity and material constraints. Therefore, 8,500 units of deluxe model should be produced.

(ii) statement showing the maximum contribution on the sale of aristocrat or deluxe models and hiring out the surplus capacity in departments A and B

| | Aristocrat | deluxe |
|---|---|---|
| Total contribution on sale of maximum possible production as per (i) above | Rs. 2,10,800 | Rs.2,38,000 |

Contribution on hiring capacity (Note 2):

| | Aristocrat | Deluxe | | |
|---|---|---|---|---|
| Deptt. A | Nil | 850 * Rs. 40 | - | 34,000 |
| Deptt. B | 1,120 * Rs. 60 | 15 * Rs. 60 | 67,200 | 900 |
| Total contribution | | | 2,78,000 | 2,72,900 |

It is noticed that total contribution of the company would be maximum i.e. Rs. 2,78,000 on the sale of 6,800 units of aristocrat model and hiring out the surplus capacity of the two departments.

(iii) Statement showing total contribution of company when 4,250 units of each product are manufactured and surplus capacity of Deptt. A and/or Deptt. B hired out

| | Aristocrat | Deluxe | Total |
|---|---|---|---|
| (a) Production (units) | 4,250 | 4,250 | |
| (b) Contribution per unit as at (i) above | Rs. 31 | Rs. 28 | |
| Total contribution (a) * (b) | Rs. 1,31,750 | Rs. 1,19,000 | Rs. 2,50,750 |
| Contribution earned on hiring the surplus capacity of Deptt. B (Note 3) | | | 13,650* |
| | | | 2, 64,400 |

This proposal is less profitable then proposal at (ii) above

Working Note:
Maximum capacity or production is given in hours. But part (i) required production to be stated in units. The same has been worked out as under:

| | | Deptt. A | | Deptt. B |
|---|---|---|---|---|
| Maximum capacity in hours | | 3,400 | | 3,840 |
| | | Aristocrat | | Deluxe |
| Maximum hour per unit - Deptt. A | | 0.50 | | 0.30 |
| Deptt. B | | 0.40 | | 0.45 |
| Maximum possible production (in unit) – constant | | | | |
| Maximum capacity | | | | |
| Deptt. A: | 3,400/0.5; | 3,400/0.30 | 6,800 | 11,333 |
| Deptt. B | 3,840/0.40; | 3,840/0.45 | 9,600 | 8,533 |
| Maximum possible production (in unit) – constant | | | | |
| Available material | 17,000 kgs/2 kgs | 17,000/2 kgs | 8,500 | 8,500 |
| Maximum possible production considering both | | | | |

| | | |
|---|---|---|
| Capacity and material constants | 6,800 | 8,500 |

2. Surplus capacities

| | Deptt.A | Deptt. B |
|---|---|---|
| (a) Maximum possible hours | 3,400 | 3.840 |
| (b) Capacity used when 6,800 units of aristocrat model are produced (0.50 * 6,800; 0.40 * 6,800) | 3,400 | 3,840 |
| (c) surplus capacity with aristocrat model | NIL | 1,120 |
| (d) Capacity used when 8,500 units of deluxe model are produced (0.3 * 8,500; 0.45 * 8,500) | 2,550 | 3,825 |
| (e) Surplus capacity with deluxe model (a)-(d) | 850 | 15 |

| | Deptt. A | Deptt. B |
|---|---|---|
| 3. Maximum possible hour as in unit Note 1 | 3,400 | 3,840 |
| Hour utilized aristocrat 4,250 * 0.50; 4,250 * 0.45 | (-) 2,125 | (-) 1,700 |
| Deluxe | (-) 1,275 | (-) 1912.5 |
| Surplus capacity (hours) | NIL | NIL |

**Ans. 78:**

## Brightly

| Unit price Rs. | Contribution per unit Rs. | Volume Units | Total contribution (Rs. in 000) | Incremental contribution (Rs. 000) | Labour hours | Incremental labour hours | Incremental contribution per labour hour Rs. | Rank |
|---|---|---|---|---|---|---|---|---|
| 276 | 176 | 12000 | 2112 | 2112 | 24000 | 24000 | 88 | 2 |
| 272 | 172 | 14000 | 2408 | 296 | 28000 | 4000 | 74 | 6 |
| 268 | 168 | 16000 | 2688 | 280 | 32000 | 4000 | 70 | 7 |
| 264 | 164 | 18000 | 2952 | 264 | 36000 | 4000 | 66 | 8 |
| 260 | 160 | 20000 | 3200 | 248 | 40000 | 4000 | 62 | 9 |
| 254 | 154 | 22000 | 3388 | 188 | 44000 | 4000 | 47 | 10 |

## Lightly

| Unit price | Contribution per unit | Volume | Total contribution (Rs. in 000) | Incremental contribution (Rs. 000) | Labour hours | Incremental labour hours | Incremental contribution per labour hour | Rank |
|---|---|---|---|---|---|---|---|---|
| 163 | 103 | 40,000 | 4120 | 4,120 | 40,000 | 40,000 | 103 | 1 |
| 162 | 102 | 42,000 | 4284 | 164 | 42,000 | 2,000 | 82 | 3 |
| 161 | 101 | 44,000 | 4444 | 160 | 44,000 | 2,000 | 80 | 4 |
| 160 | 100 | 46,000 | 4600 | 156 | 46,000 | 2,000 | 78 | 5 |
| 156 | 96 | 48,000 | 4608 | 8 | 48,000 | 2,000 | 4 | 11 |
| 152 | 92 | 50,000 | 4600 | (8) | 50,000 | 2,000 | (4) | Loss |

As the labour time is scarce source (time available 78,000 hours), the decision has to be taken on the basis of ranks based upon incremental contribution per labour hour.

| Product | Price | Incremental volume | Incremental labour | Balance hours | Incremental Contribution |
|---|---|---|---|---|---|

| | | | hours | | (in 000 Rs.) |
|---|---|---|---|---|---|
| Lightly | 163 | 40,000 | 40,000 | 38,000 | 4120 |
| Brightly | 276 | 12,000 | 24,000 | 14,000 | 2112 |
| Lightly | 162 | 2,000 | 2,000 | 12,000 | 164 |
| Lightly | 161 | 2,000 | 2,000 | 10,000 | 160 |
| Lightly | 160 | 2,000 | 2,000 | 8,000 | 156 |
| Brightly | 272 | 2,000 | 4,000 | 4,000 | 296 |
| Brightly | 268 | 2,000 | 4,000 | | 280 |
| Total | | | | | 7,288 |

Hence product mix is Brightly – 16,000 units and Lightly 46,000 units

| | |
|---|---|
| Optimal contribution per month | Rs. 72,88,000 |
| Fixed costs per month | Rs. 60,00,000 |
| Optimal profit per month | Rs. 12,88,000 |

**Working Notes:**

| | Brightly | Lightly |
|---|---|---|
| Variable cost (p.u.) | $\frac{(38,00,000-34,00,000)}{(16,000-12,000)}=\text{Rs.}100$ | $\frac{(66,80,000-62,00,000)}{(48,000-40,000)}=\text{Rs.}60$ |
| Fixed cost (Rs.) | 22,00,000 | 38,00,000 |

Contribution = Unit selling price less variable cost per unit.

**Ans. 79:**

Statement showing computation of selling price per unit

| Months | 1-3 | 4-9 | 10-12 | Total |
|---|---|---|---|---|
| Total number of unit Produced (Note 4) | Rs. 28,125 | Rs. 60,000 | Rs. 33,750 | 1,21,875 |
| Variable cost | Rs. 2,81,250 | Rs. 6,00,000 | Rs. 3,37,500 | Rs. 12,18,750 |
| Labour cost (Note 2) | 3,00,000 | 6,00,000 | 3,37,500 | 12,18,750 |
| Overheads | 1,12,500@ | 2,40,000@ | 1,35,000@ | 4,87,500 |
| Total sami variable overheads (Note 3) | | | | 72,000# |
| Fixed overheads | | | | 1, 92,300 |
| Total costs | | | | 32, 08,050 |
| Add: profit: (20% on selling price or 25% on cost) | | | | 8, 02,013 |
| Sales revenue | | | | 40, 10,063 |
| Selling price per unit ( Rs. 40,10,063/1,21,875 on cost) | | | | 32.90 |

**Working notes**

1. Average installed capacity per month (in units):
   = Total annual installed capacity/12 month (in units):
   = 1, 50,000 units/ 12 months = 12,500 units per month.
2. Total labour cost at different capacity utilization:

| Capacity utilization | 75% | 80% | 90% |
|---|---|---|---|
| Expected production per month ( in units) | 9,375 | 10,000 | 11,250 |
| Labour cost of expected production (Rs.) | 93,750 | 1, 00,000 | 1, 12,500 |
| Minimum lqbour cost per month (Rs.) | 1, 00,000 | 1, 00,000 | 1, 12,500 |
| Capacity utilization (in months) | 3 | 6 | 3 |
| Total labour cost at different capacity levels | Rs. 3, 00,000 | Rs. 6, 00,000 | Rs. 3, 37,500 |

@28125 × Rs. 4; 60000 × Rs. 4; 33750 × Rs. 4

#This can also be taken based on average capacity utilization i.e. ( 121875÷150000) × 100 = 81.25%. Therefore, semi-variable overheads can also be taken as 68000 (refer note 3). In that case, selling price will be Rs. 32.87.

**Ans. 80:**

**Contribution analysis:**

| | ***Product X*** | ***Product Y*** |
|---|---|---|
| | *Rs.* | *Rs.* |
| Selling price | 288 | 432 |
| Variable costs: | | |
| Direct materials | 40 | 80 |
| Direct Labour: | 48 | 72 |
| | 24 | 48 |
| | 72 | – |
| | – | 96 |
| Variable overheads | 32 | 28 |
| Total variable costs | 216 | 324 |
| Contribution per unit | 72 | 108 |

The direct labour hours required to manufacture the two products in each of the four departments at the wage rate of Rs. 8 per hour are as under:

| **Department** | **Product X** | | **Product Y** | |
|---|---|---|---|---|
| | *Wage cost* | *Hours/unit* | *Wage cost* | *Hours/unit* |
| 1 | 48 | 6 | 72 | 9 |
| 2 | 24 | 3 | 48 | 6 |
| 3 | 72 | 9 | – | – |
| 4 | – | – | 96 | 12 |

Department 3 is used only for product X and department 4 is used only for product Y. Hence, these two departments will determine the maximum production of these two products as under:

*Department 3 : Maximum available hours:*

| Workers | × | Hours/day | × | Days/year | | |
|---|---|---|---|---|---|---|
| 27 | × | 8 | × | 300 | = | 64,800 hours |

Maximum possible production of product X: $\frac{64,800}{9 \text{ hrs per unit}}$ = 7,200 units

*Department 4 : Maximum available hours:*

| Workers | × | Hours/day | × | Days/year | | |
|---|---|---|---|---|---|---|
| *36* | × | 8 | × | 300 | = | 86,400 hours |

Maximum possible production of product Y: $\frac{86,400}{12 \text{ hrs per unit}}$ = 7,200 units

The company can produce 7,200 units each of products X and Y provided departments 1 and 2 have capacity to process this quantity of output.

We can check the capacity of departments 1and 2 as under:

*Department 1: Maximum available hours:*

| | | | | | | |
|---|---|---|---|---|---|---|
| Workers | × | Hours/day | × | days/year | | |
| *45* | × | 8 | × | 300 | = | 1,08,000 hours |

Hours required to produce 7,200 units each of X and Y:

| | | | |
|---|---|---|---|
| Product X | 7,200 × 6 hours | = | 43,200 hours |
| Product Y | 7,200 × 9 hours | = | 64,800 hours |
| Total | | = | 1,08,000 hours |

Department 1 has capacity to produce 7,200 units each of products X and Y.
Department 2 : Maximum available hours:

| | | | | | | |
|---|---|---|---|---|---|---|
| Workers | × | Hours/day | × | days/year | | |
| *24* | × | 8 | × | 300 | = | 57,600 hours |

Hours required to produce 7,200 units each of X and Y:

| | | | |
|---|---|---|---|
| Product X | 7,200 ×3 hours | = | 21,600 hours |
| Product Y | 7,200 × 6 hours | = | 43,200 hours |
| Total | | = | 64,800 hours |

Department 2 has scarce capacity.
Since department 2 capacity is scarce, link the contribution to the key factor of department 2 hours as under:

| | | **Product X** | **Product Y** |
|---|---|---|---|
| Contribution per unit | | 72 | 108 |
| Department 2 hours per unit Hours | | 3 | 6 |
| Contribution per hour of Department 2 | Rs. | 24 | 18 |
| Rank | | 1 | 2 |

Optimal product mix:

| Product | Max. units | Lab. Hours/unit | Prod. units | Hours used | Balance hours | Cont./unit | Total cont. |
|---|---|---|---|---|---|---|---|
| | | | | | | *Rs.* | *Rs.* |
| X | 7,200 | 3 | 7,200 | 21,600 | 36,000 | 72 | 5,18,400 |
| Y | 7,200 | 6 | 6,000 | 36,000 | – | 108 | 6,48,000 |
| Total optimal contribution | | | | | | | 11,66,400 |
| Fixed costs | | | | | | | 5,00,000 |
| Optimal profit | | | | | | | 6,66,400 |

*Alternative Solution:*

The maximum possible production of product X is 7,200 units and that of product Y is 7,200 units. The following two methods shall be used to determine the optimal profit:

(a) Produce 7,200 units of product X and use the balance capacity to produce product Y.

(b) Produce 7,200 units of product Y and use the balance capacity to produce product X.

Profitability based on (a):

Direct labour hours are scarce in Department 2.

| | |
|---|---|
| Maximum available hours in Department 2 | 57,600 |
| Product X requires 7,200×3= | 21,600 hours |
| Balance hours on Y | 36,000 |
| Production of Y 36,000 ÷ 6= | 6,000 units |

*Contribution:* X 7,200 units Rs. 5,18,400
@ Rs. 72

| | | |
|---|---|---|
| @ Rs. 108 | Y 6,000 units | Rs. 6,48,000 |
| | Total | Rs. 11,66,400 |
| | Fixed costs | Rs. 5,00,000 |
| | Profit | Rs. 6,66,400 |

Profitability based on (b):

| | | |
|---|---|---|
| Maximum available hours in Department 2 | 57,600 | |
| Product Y requires 7,200×6= | 43,200 hours | |
| Balance hours on X | 14,400 | |
| Production of X 14,400 ÷ 3= | 4,800 units | |
| *Contribution:* | X 4,800 × 72 | Rs. 3,45,600 |
| | Y 7,200 × 108 | Rs. 7,77,600 |
| | Total | Rs. 11,23,200 |
| | Fixed costs | Rs. 5,00,000 |
| | Profit | Rs. 6,23,200 |

Profitability of (a) is better.

**Ans. 81:**

(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 | |
| Self 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.

| *Alternatives* | *Keep old machine* | | *Buy new machine* | | | |
|---|---|---|---|---|---|---|
| | *1st, 2nd 3rd & 4th year each* | *All years* | *Year 1* | *2nd 3rd & 4th year each* | *All 4 years* | *Cumulative difference operating income* |
| 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 sale revenue Rs.1.50,000 and other cash costs of Rs.1,10,000 as irrelevant items for the presentation in requirements (a) and (b) above. These items are irrelevant because their amounts 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 eh replacement of machine the book value of the machine is irrelevant because it is a past (historical) cost. All past costs are down the drains. 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 | Zero | Zero |
| (iii) Useful life | 4 | 4 |
| Depreciation $\left(\frac{(i)-(ii)}{(iii)}\right)$ Rs. | 5,000 | 5,000 |

2. Loss on the disposal of old machine:

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

**Ans. 82:**

Evaluation of Make or Buy proposal

(All figures are in lakhs in 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 | | 24.264 |

$$\text{Saving in cash outflow (when brought from outside)} = \begin{bmatrix}\text{total present value of cash outflow, when the component is manufactured internally}\end{bmatrix} - \begin{bmatrix}\text{Total present value of cash outflow, when the component is bought from outside.}\end{bmatrix}$$

= Rs.24.412 – 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.

**Ans. 83:**

**Proposal I**

Statement of sales revenue of mild

| Year (a) | Quantity of mild in metric tonnes (b) | Price per metric tonne (c) | Total amt of sales in (Rs. Lacs) (d) = (b) * (c) | Discount factor @ 12% (e) | NPV of sales (Rs. In lacs) (f) = (d) * (e) |
|---|---|---|---|---|---|
| 1 | 15,000 | 950 | 142. 5 | 0.89 | 126.825 |
| 2 | 15,000 | 900 | 135.0 | 0.79 | 106.65 |
| 3 | 15,000 | 850 | 127. 5 | 0.71 | 90. 525 |

| | | | | | |
|---|---|---|---|---|---|
| 4<br>5 | 15,000<br>15,000 | 800<br>750 | 120.0<br>112. 5 | 0.64<br>0. 57 | 76.800<br>64.125 |
| | | | | | 464. 925 |

**Proposal II**

| Year (a) | Quantity of medium in metric tones (b) | Price per metric tone (c) | Variable cost per metric tone (Rs.) (d) | Net price per metric tone (Rs.) (e) =(c)–(d) | Net sales revenue in (Rs. Lacs.) (f) = (b) * (e) | Discount factor @ 12% (g) | PV of net sales revenue (Rs. Lacs.) (h) = (f) * (g) |
|---|---|---|---|---|---|---|---|
| 1 | 1,000 | 1,200 | 200 | 1,000 | 10 | 0.89 | 8.90 |
| 2 | 2,000 | 1,300 | 200 | 1,100 | 22 | 0.79 | 17.38 |
| 3 | 3,000 | 1,400 | 200 | 1,200 | 36 | 0.71 | 25.56 |
| 4 | 4,000 | 1,500 | 200 | 1,300 | 52 | 0.64 | 33.28 |
| 5 | 5,000 | 1,600 | 200 | 1,400 | 70 | 0.57 | 39.90 |
| | Total | | | | | | 125.02 |

**Note:** since the selling price of medium is not given after second year, therefore an individual is free to talk any selling price after second year. In view of this assumption the answer of each case may differ.

| Year (a) | Quantity of mild in metric tones (b) | Price per metric tone (Rs.) (c) | Sales revenue in (Rs. Lacs) (d) = (b) * (c) | Discount factor @ 12% (e) | PV of sales revenue in (Rs. Lacs) (f) = (d) * (e) |
|---|---|---|---|---|---|
| 1 | 14,000 | 950 | 133 | 0.89 | 118.37 |
| 2 | 13,000 | 900 | 177 | 0.79 | 92.43 |
| 3 | 12,000 | 850 | 102 | 0.71 | 72.42 |
| 4 | 11,000 | 800 | 88 | 0.64 | 56.32 |
| 5 | 10,000 | 750 | 75 | 0.57 | 42.75 |
| | Total | | | | 382.29 |

Total present value of sales of medium and mild under proposal II (Rs. Lacs) 507.31
(Rs. 125.02 lacs – Rs. 382.29 lacs)
Total net present value under proposal II
(Rs. 507.31 lacs – Rs. 30 lacs)
The net present value under proposal I is Rs. 464.925 lacs, and that under proposal II is Rs. 477.31 lacs. A comparison of the net present value under two proposal clearly shows that the proposal II is better as it yield a higher net present value of revenue, therefore it should be accepted.