

## AMA RTP MAY 2018

### PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING

#### QUESTIONS

##### Activity Based Costing

1. Bank of NZ operated for years under the assumption that profitability can be increased by increasing Rupee volumes. But that has not been the case. Cost analysis has revealed the following:

| Activity              | Activity Cost (₹) | Activity Driver     | Activity Capacity |
|-----------------------|-------------------|---------------------|-------------------|
| Providing ATM Service | 1,00,000          | No. of Transactions | 2,00,000          |
| Computer Processing   | 10,00,000         | No. of Transactions | 25,00,000         |
| Issuing Statements    | 8,00,000          | No. of Statements   | 5,00,000          |
| Customer Inquiries    | 3,60,000          | Telephone Minutes   | 6,00,000          |

The following annual information on three products was also made available:

| Activity Driver       | Checking Accounts | Personal Loans | Gold Visa |
|-----------------------|-------------------|----------------|-----------|
| Units of Product      | 30,000            | 5,000          | 10,000    |
| ATM Transactions      | 1,80,000          | 0              | 20,000    |
| Computer Transactions | 20,00,000         | 2,00,000       | 3,00,000  |
| Number of Statements  | 3,00,000          | 50,000         | 1,50,000  |
| Telephone Minutes     | 3,50,000          | 90,000         | 1,60,000  |

##### Required

- (i) Calculate rates for each activity.  
(ii) Using the rates computed in requirement (i), calculate the cost of each product.

##### Value Added/ Non -Value Added Activities

2. Queensland Furniture (QF) manufactures high-quality wooden doors within the forests of Queensland since 1919. Management is having emphasize on creativity, engineering, innovation and experience to provide customers with the door they desire, whether it is a standard design or a one-of-a-kind custom door. The following information pertains to operations during Jan:

|                 |           |              |           |
|-----------------|-----------|--------------|-----------|
| Processing time | 9.0 hrs.* | Waiting time | 6.0 hrs.* |
| Inspection time | 1.5 hr.*  | Move time    | 7.5 hrs.* |
| Units per batch | 60 units  |              |           |

(\*) average time per batch

**Required**

Compute the following operational measures:

- (i) Average non-value-added time per batch
- (ii) Average value added time per batch
- (iii) Manufacturing cycle efficiency
- (iv) Manufacturing cycle time

**Shut Down or Continue**

3. If AICI Limited operates its plant at normal capacity it produces 2,00,000 units from the plant 'C'. The unit cost of manufacturing at normal capacity is as under:

|                        |          |
|------------------------|----------|
|                        | ₹        |
| Direct material.....   | 65       |
| Direct labour.....     | 30       |
| Variable overhead..... | 33       |
| Fixed overhead.....    | <u>7</u> |
|                        | 135      |

Direct labour cost represents the compensation to highly-skilled workers, who are permanent employees of the company. The company cannot afford to lose them. One labour hour is required to complete one unit of the product.

The company sells its product for ₹ 200 per unit with variable selling expenses of ₹ 16 per unit. The company estimates that due to economic down turn, it will not be able to operate the plant at the normal capacity, at least during the next year. It is evaluating the feasibility of shutting down the plant temporarily for one year.

If it shuts down the plant, the fixed manufacturing overhead will be reduced to ₹ 1,25,000. The overhead costs are incurred at a uniform rate throughout the year. It is also estimated that the additional cost of shutting down will be ₹ 50,000 and the cost of re-opening will be ₹ 1,00,000.

**Requiredf**

Calculate the minimum level of production at which it will be economically beneficial to continue to operate the plant next year if 50% of the labour hours can be utilized in another activity, which is expected to contribute at the rate of ₹ 40 per labour hour. The additional activity will relate to a job which will be off-loaded by a sister company only if the company decides to shut down the plant.

(Assume that the cost structure will remain unchanged next year. Ignore income tax and time value of money)

**Labour Related Decision**

4. If DBC Ltd. is producing a component called 'DBC'. Estimated costs are:

|              | Fixed Cost per year<br>(₹ '000) | Variable Cost per 'DBC'<br>(₹) |
|--------------|---------------------------------|--------------------------------|
| Production   | 32,000                          | 3,600                          |
| Distribution | 2,000                           | 200                            |

Direct labour costs are 40% of the variable production costs. In the production department machining and assembling of 'DBC', 90 men work 8 hours per day for 300 days in a year. Each worker can machine and assemble 1 'DBC' per uninterrupted 180 minutes time frame. In each 8 hours working day, 20 minutes are allowed for coffee-break, 30 minutes on an average for training and 22 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters.

DBC Ltd. has been facing industrial relations problem as the workers of company have a very strong union. Company is faced with the possibility of a strike by direct production workers engaged on the assembly of 'DBC'. The trade union is demanding an increase of 15%, back-dated from the beginning of financial year, but the company expects that if a strike does take place, it will last 25 Days after which the union will settle for an increase of 10% similarly back-dated. The only product of the company is being sold at ₹ 6,000.

If the strike takes place, Sales of 1,300 'DBC' would be lost. The balance that would ordinarily have been produced during the strike period could, however be sold, but these 'DBC' would have to be made up in overtime working which would be at an efficiency rate of 90% of normal. This would entail additional fixed cost of ₹1,00,000 and wage payments at time and one-half.

**Required**

Give necessary advice to the management to allow the strike to go ahead or to accept the union's demand.

**Sales or Further Processing Decision**

5. If A process industry unit manufactures three joint products: L, B and G. G has no realisable value unless it undergoes further processing after the point of separation. The cost details of G are as follows:

|                          |      |
|--------------------------|------|
|                          | p.u. |
|                          | ₹    |
| Upto point of separation |      |
| Marginal cost.....       | 30   |

|                           |          |
|---------------------------|----------|
| Fixed Cost.....           | 20       |
| After point of separation |          |
| Marginal cost.....        | 15       |
| Fixed cost.....           | <u>5</u> |
|                           | 70       |

G can be sold at ₹ 37 per unit and no more.

**Required**

- (i) Would you recommend production of G?
- (ii) Would your recommendation be different if L, B and G are not joint products?

**CVP Analysis**

6. The profit for the year of Garena Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

|                         |            |
|-------------------------|------------|
| Sales.....              | ₹ 5,00,000 |
| Direct Materials.....   | ₹ 2,50,000 |
| Direct Labour.....      | ₹ 1,00,000 |
| Variable Overheads..... | ₹ 40,000   |
| Capital Employed.....   | ₹ 4,00,000 |

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

**Required**

Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

**Cost Plus/ Mark-up Pricing**

7. JTC Ltd. is specialists in the manufacture of sports goods. They manufacture croquet mallets but purchase the wooden balls, iron arches and stakes required to complete a croquet set.

Mallets consist of a head and handle. Handles use 2.5 board feet per handle at ₹ 50 per board foot. Spoilage loss is negligible for the manufacture of handles. Heads frequently split and create considerable scrap.

A head requires 0.40 board feet of high quality lumber costing ₹ 60 per board foot. Spoilage normally works out to 20% of the completed heads. 4% of the spoiled heads can be salvaged and sold as scrap at ₹ 10 per spoiled head.

In the department machining and assembling the mallets, 6 men work 8 hours per day for 25 days in a month. Each worker can machine and assemble 12 mallets per uninterrupted 40 minutes time frame. In each 8 hours working day, 15 minutes are allowed for coffee-break, 8 minutes on an average for training and 9 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters. Workers are paid at a comprehensive rate of ₹ 6 per hour.

The department is geared to produce 20,000 mallets per month and the monthly expenses of the department are as under:

|                                                  | (₹)    |
|--------------------------------------------------|--------|
| Finishing and painting of the mallets.....       | 20,000 |
| Lubricating oil for cutting machines.....        | 600    |
| Depreciation for cutting machine.....            | 1,400  |
| Repairs and maintenance.....                     | 200    |
| Power to run the machines.....                   | 400    |
| Plant Manager's salary.....                      | 9,400  |
| Other overheads allocated to the department..... | 60,000 |

### **Required**

As the mallets are machined and assembled in lots of 250, prepare a total cost sheet for one lot and advise the management on the selling price to be fixed per mallet in order to ensure a minimum 33.33% margin on the selling price.

### **Return on Investment Pricing**

8. The cost of production and sales of 80,000 units per annum of product 'I' are:

|                   |            |                |            |
|-------------------|------------|----------------|------------|
| Material          | ₹ 4,80,000 | Labour         | ₹ 1,60,000 |
| Variable Overhead | ₹ 3,20,000 | Fixed overhead | ₹ 5,00,000 |

The fixed portion of capital employed is ₹12 lacs and the varying portion is 50% of sales turnover.

### **Required**

Determine the selling price per unit to earn a return of 12% net on capital employed (net of Tax @ 40%).

### **Profit Maximisation Model**

9. APV Ltd. has developed a new product which is about to be launched into the market. The variable cost of selling the product is ₹ 17 per unit. The marketing department has

estimated that at a sale price of ₹ 25, annual demand would be 10,000 units. However, if the sale price is set above ₹ 25, sales demand would fall by 500 units for each ₹ 0.50 increase above ₹ 25. Similarly, if the price is below ₹ 25, demand would increase by 500 units for each ₹ 0.50 stepped reduction in price below ₹ 25.

**Required**

Determine the price which would maximise APV Ltd.’s profit in the next year.

**Break Even Point (Batches)**

10. BOSH India Ltd. is a leading Home Appliances manufacturer. The company uses just-in-time manufacturing process, thereby having no inventory. Manufacturing is done in batch size of 100 units which cannot be altered without significant cost implications. Although the products are manufactured in batches of 100 units, they are sold as single units at the market price. Due to fierce competition in the market, the company is forced to follow market price of each product. The following table provides the financial results of its four unique products:

|                     | B         | O          | S         | H          |            |
|---------------------|-----------|------------|-----------|------------|------------|
| Sales (units)       | 2,00,000  | 2,60,000   | 1,60,000  | 3,00,000   | Total      |
|                     | (₹)       | (₹)        | (₹)       | (₹)        | (₹)        |
| Revenue             | 26,00,000 | 45,20,000  | 42,40,000 | 32,00,000  | 145,60,000 |
| Less: Material Cost | 6,00,000  | 18,20,000  | 18,80,000 | 10,00,000  | 53,00,000  |
| Less: Labour Cost   | 8,00,000  | 20,80,000  | 12,80,000 | 12,00,000  | 53,60,000  |
| Less: Overheads     | 8,00,000  | 7,80,000   | 3,20,000  | 12,00,000  | 31,00,000  |
| Profit / (Loss)     | 4,00,000  | (1,60,000) | 7,60,000  | (2,00,000) | 8,00,000   |

Since, company is concerned about loss in manufacturing and selling of two products so, it has approached you to clear picture on its products and costs. You have conducted a detailed investigation whose findings are below:

The overhead absorption rate of ₹ 2 per machine hour has been used to allocate overheads into the above product costs. Further analysis of the overhead cost shows that some of it is caused by the number of machine hours used, some is caused by the number of batches produced and some are product specific fixed overheads that would be avoided if the product were discontinued. Other general fixed overhead costs would be avoided only by the closure of the factory. Numeric details are summarized below:

|                           |   |          |
|---------------------------|---|----------|
|                           | ₹ | ₹        |
| Machine hour related..... |   | 6,20,000 |
| Batch related .....       |   | 4,60,000 |

Product specific fixed overhead:

|                              |                 |                 |
|------------------------------|-----------------|-----------------|
| B.....                       | 10,00,000       |                 |
| O.....                       | 1,00,000        |                 |
| S.....                       | 2,00,000        |                 |
| H.....                       | <u>1,00,000</u> | 14,00,000       |
| General fixed overheads..... |                 | <u>6,20,000</u> |
|                              |                 | 31,00,000       |

The other information is as follows:

|               | B        | O        | S        | H        | Total     |
|---------------|----------|----------|----------|----------|-----------|
| Machine Hours | 4,00,000 | 3,90,000 | 1,60,000 | 6,00,000 | 15,50,000 |
| Labour Hours  | 1,00,000 | 2,60,000 | 1,60,000 | 1,50,000 | 6,70,000  |

### **Required**

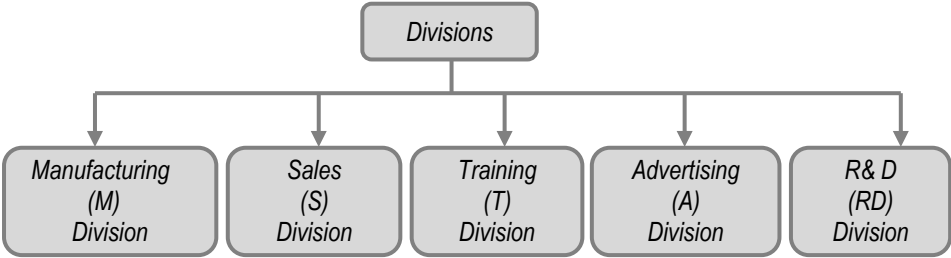
- Prepare a profitability statement that is more useful for decision making than the profit statement prepared by BOSH India Ltd.
- Calculate the break-even volume in batches and also in approximate units for Product 'B'.

### **Pricing Strategy**

- State the appropriate pricing policy in each of the following independent situations:
  - 'W' is a new product for the company and the market and meant for large scale production and long term survival in the market. Demand is expected to be elastic.
  - 'X' is a new product for the company, but not for the market. X's success is crucial for the company's survival in the long term.
  - 'Y' is a new product to the company and the market. It has an inelastic market. There needs to be an assured profit to cover high initial costs and the usual sources of capital have uncertainties blocking them.
  - 'Z' is a perishable item, with more than 80% of its shelf life over.

### **Budget – Zero Based Budgeting**

- Air Communication Limited is a state-owned large public company in the telecommunications sector. One of its main planning and control tools is the preparation and use of traditional annual budgets. Its divisional structure is as under:



Division T, A and RD incur substantial amount on discretionary expenses.

**Required**

Identify the possibilities of introducing a Zero Based Budgeting system for Division T, A and RD.

**Budget – Missing Figure**

13. Following information are extracted from monthly budgets of JIT Ltd.

|                                     | November | December |
|-------------------------------------|----------|----------|
| Beginning WIP Inventory             | 36,000   | ???      |
| Beginning Finished Goods Inventory  | 44,000   | ???      |
| Variable Cost of Goods Sold         | 1,23,000 | ???      |
| Direct Material Usage               | 50,000   | 56,000   |
| Direct Labour                       | 53,100   | 69,000   |
| Variable Overhead                   | 25,000   | 29,000   |
| Variable Cost of Goods Manufactured | 1,09,000 | 1,14,800 |
| Ending WIP Inventory                | ???      | ???      |
| Ending Finished Goods Inventory     | ???      | 45,000   |

**Required**

Find out missing figures.

**Standard Costing – Profit Reconciliation**

14. ANZ Ltd. has provided the following summarized results for two years:

|                    | Year ended<br>(₹ In lacs) |           |
|--------------------|---------------------------|-----------|
|                    | 31-03-2016                | 31-3-2017 |
| Sales              | 3,000                     | 3,277.50  |
| Material           | 2,000                     | 2,357.50  |
| Variable overheads | 500                       | 525.00    |



|                 |     |        |
|-----------------|-----|--------|
| Fixed overheads | 300 | 367.50 |
| Profit          | 200 | 27.50  |

During the year ended 31-3-2017 sale price has increased by 15% whereas material and overhead prices have increased by 15% and 5% respectively.

**Required**

- Analyse the variances of revenue and each element of cost over the year in order to bring out the reasons for the change in profit.
- Present a profit reconciliation statement starting from profits in 2015-16 showing the factors responsible for the change in profits in 2016-17.

*Note – Consider ‘Contribution Variances’ for solving this question.*

**Standard Costing**

- Natural Spices manufactures and distributes high-quality spices to gourmet food shops and top quality restaurants. Gourmet and high-end restaurants pride themselves on using the freshest, highest-quality ingredients.

Natural Spices has set up five state of the art plants for meeting the ever growing demand. The firm procures raw material directly from the centers of produce to maintain uniform taste and quality. The raw material is first cleaned, dried and tested with the help of special machines. It is then carefully grounded into the finished product passing through various stages and packaged at the firm’s ultraclean factory before being dispatched to customers.

The following variances pertain to last week of operations, arose as a consequence of management’s decision to lower prices to increase volume.

|                                 |            |
|---------------------------------|------------|
| Sales Volume Variance           | 18,000 (F) |
| Sales Price Variance            | 14,000 (A) |
| Purchase Price Variance         | 10,000 (F) |
| Labour Efficiency Variance      | 11,200 (F) |
| Fixed Cost Expenditure Variance | 4,400 (F)  |

**Required**

- Identify the ‘Critical Success Factors’ for Natural Spices.
  - Evaluate the management’s decision with the ‘Overall Corporate Strategy’ and ‘Critical Success Factors’.
- Great Southern Company Ltd. has two Divisions namely Casnub Bogie Division (CBD) and Wagon Division (WD). CBD manufactures Casnub Bogies and WD manufactures BOBN type of Wagons. To manufacture a Wagon WD needs four Casnub Bogies. CBD is

the only manufacturer of the Casnub Bogies and supplies both WD and outside customers. Details of CBD and WD for the coming financial year 2017-18 are as follows:

|                            | CBD         | WD           |
|----------------------------|-------------|--------------|
| Fixed Costs (₹)            | 9,20,20,000 | 16,45,36,000 |
| Variable Cost per unit (₹) | 2,20,000    | 4,80,000*    |
| Capacity per month (units) | 320         | 12           |

\* excluding transfer costs

Market research has indicated that the demands in the market for Great Southern Company Ltd.'s products at different quotations are as follows:

For Casnub Bogies: Quotation price of ₹ 3,20,000 no tender will be awarded, but demand will increase by 30 Casnub Bogies with every ₹ 10,000 reduction in the unit quotation price below ₹ 3,20,000.

For Wagons: Quotation price of ₹ 17,10,000 no tender will be awarded, but the demand for Wagons will be increased by two Wagons with every ₹ 50,000 reduction in the unit quotation price below ₹ 17,10,000.

### Required

- Calculate the unit quotation price of the Wagon that will maximise Great Southern Company Ltd.'s profit for the financial year 2017-18.
- Calculate the unit quotation price of the Wagon that is likely to emerge if the divisional managers of CBD and WD both set quotation prices calculated to maximise divisional profit from sales to outside customers and the transfer price is set at market selling (quotation) price.

[Note: If  $P = a - bQ$  then  $MR = a - 2bQ$ ]

### Balanced Scorecard

- Classify the following measures under appropriate categories in a Balanced Scorecard for a banking company which excels in its home loan products:
  - A new product related to life insurance is being considered for a tie up with the successful housing loan disbursements.  
e.g. every housing loan applicant to be advised to take a life policy or compelled to take a fire insurance policy.
  - How different sectors of housing loans with different interest rates have been sanctioned, their volumes of growth in the past 4 quarters.
  - How many days are taken to service a loan, how many loans have taken longer, what additional loans are to be released soon, etc.

**Linear Programming – Formulation**

18. The owner of Fancy Goods Shop is interested to determine, how many advertisements to release in the selected three magazines M, N and O. His main purpose is to advertise in such a way that total exposure to principal buyers of his goods is maximized. Percentages of readers for each magazine are known. Exposure in any particular magazine is the number of advertisements released multiplied by the number of principal buyers. The following data are available:

| Particulars            | Magazines |           |           |
|------------------------|-----------|-----------|-----------|
|                        | M         | N         | O         |
| Readers                | 1.0 Lakhs | 0.6 Lakhs | 0.4 Lakhs |
| Principal buyers       | 20%       | 15%       | 8%        |
| Cost per advertisement | ₹ 8,000   | ₹ 6,000   | ₹ 5,000   |

The budgeted amount is at the most ₹1.0 lakh for the advertisements. The owner has already decided that magazine M should have no more than 15 advertisements and that N and O each gets at least 8 advertisements.

**Required**

Formulate a Linear Programming model for this problem.

**Assignment Problem – Minimisation**

19. A factory is going to modify of a plant layout to install four new machines  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$ . There are 5 vacant places P, Q, R, S and T available. Because of limited space machine  $X_2$  cannot be placed at R and  $X_3$  cannot be placed at P. The cost of locating machine to place in Rupees is shown below:

(₹)

|       | P  | Q  | R  | S  | T  |
|-------|----|----|----|----|----|
| $X_1$ | 18 | 22 | 30 | 20 | 22 |
| $X_2$ | 24 | 18 | -- | 20 | 18 |
| $X_3$ | -- | 22 | 28 | 22 | 14 |
| $X_4$ | 28 | 16 | 24 | 14 | 16 |

**Required**

Determine the optimal assignment schedule in such a manner that the total costs are kept at a minimum.

**Missing Figures & Network**

20. The number of days of total float (TF), earliest start times (EST) and duration in days are given for some of the following activities.

| Activity | TF  | EST | Duration |
|----------|-----|-----|----------|
| 1–2      | 0   | 0   | ???      |
| 1–3      | 2   | ??? | ???      |
| 1–4      | 5   | ??? | ???      |
| 2–4      | 0   | 4   | ???      |
| 2–5      | 1   | ??? | 5        |
| 3–6      | 2   | 12  | ???      |
| 4–6      | 0   | 12  | ???      |
| 5–7      | 1   | ??? | ???      |
| 6–7      | ??? | 23  | ???      |
| 6–8      | 2   | ??? | ???      |
| 7–8      | 0   | 23  | ???      |
| 8–9      | ??? | 30  | 6        |

**Required**

- (i) Find the??? Figures.
  - (ii) Draw the network.
  - (iii) List the paths with their corresponding durations and state when the project can be completed.
21. Finance Controller of Dunk Limited has drawn the following projections with probability distribution:

| Raw Material |             | Wages & Other Variable Overheads |             | Sales    |             |
|--------------|-------------|----------------------------------|-------------|----------|-------------|
| ₹ in '000    | Probability | ₹ in 000                         | Probability | ₹ in 000 | Probability |
| 08 – 10      | 0.2         | 11 – 13                          | 0.3         | 34 – 38  | 0.1         |
| 10 – 12      | 0.3         | 13 – 15                          | 0.5         | 38 – 42  | 0.3         |
| 12 – 14      | 0.3         | 15 – 17                          | 0.2         | 42 – 46  | 0.4         |
| 14 – 16      | 0.2         |                                  |             | 46 – 50  | 0.2         |

Opening cash balance is ₹ 40,000 and fixed cost is estimated at ₹ 15,000 per month.

**Required**

Simulate cash flow projection and expected cash balance at the end of the sixth month. Use the following single digit random numbers.

|                                  |             |
|----------------------------------|-------------|
| Raw Material                     | 4 3 1 0 4 6 |
| Wages & Other Variable Overheads | 2 7 9 1 8 9 |
| Sales                            | 0 6 6 0 2 8 |

**Learning Curve**

22. T Aviation Ltd, supplier of automation systems and equipment, has just invented a new part 'T'. New part has a budgeted total profit of ₹ 75,000 from the first 256 parts. The time taken to produce the first part was 112.50 hours. The labour rate is ₹ 20 per hour. A 90% learning curve is expected to apply indefinitely.

**Required**

Calculate the sensitivity of the budgeted total profit from the first 256 parts to changes in the learning rate.

**Miscellaneous**

23. Indicate 6 activity drivers in respect of each of the following activity cost pools:
- (i) Human Resources Cost
  - (ii) Accounting Costs
24. Which of the following statements are VALID in respect of flexible budgeting.
- (i) A flexible budget is one which changes from year to year.
  - (ii) It is a budget which departmental heads can change at will.
  - (iii) It is a system of budgeting which will recast the budgets because of a change in fixed expenses.
  - (iv) It is a system of budgeting under which budgets are recast quickly for changes in the volume of activity.
  - (v) It involves careful differentiation between fixed and variable expenses.
25. State whether the following statements are VALID or INVALID.
- (i) When price reductions are introduced to increase sales revenue, the revenue line will be a straight line.
  - (ii) In fixing selling prices, volume consideration should be taken into account so that fuller utilisation of plant capacity is achieved.
  - (iii) There is no price policy in perfect competition.
  - (iv) The rate of return to be earned by factory should cover the risk involved in business.
  - (v) Survival and progress of a firm depend on its ability to maintain and replace, whenever necessary, its fixed assets.

## SUGGESTED ANSWERS/HINTS

## 1. Statement Showing "Activity Rate"

| Activity              | Activity Cost [a]<br>(₹) | Activity Driver              | No. of Units of Activity Driver [b] | Activity Rate [a] / [b]<br>(₹) |
|-----------------------|--------------------------|------------------------------|-------------------------------------|--------------------------------|
| Providing ATM Service | 1,00,000                 | No. of ATM Transactions      | 2,00,000                            | 0.50                           |
| Computer Processing   | 10,00,000                | No. of Computer Transactions | 25,00,000                           | 0.40                           |
| Issuing Statements    | 8,00,000                 | No. of Statements            | 5,00,000                            | 1.60                           |
| Customer Inquiries    | 3,60,000                 | Telephone Minutes            | 6,00,000                            | 0.60                           |

## Statement Showing "Cost of Product"

| Activity                       | Checking Accounts (₹)                | Personal Loans (₹)                | Gold Visa (₹)                       |
|--------------------------------|--------------------------------------|-----------------------------------|-------------------------------------|
| Providing ATM Service          | 90,000<br>(1,80,000 tr. × ₹ 0.50)    | ---                               | 10,000<br>(20,000 tr. × ₹ 0.50)     |
| Computer Processing            | 8,00,000<br>(20,00,000 tr. × ₹ 0.40) | 80,000<br>(2,00,000 tr. × ₹ 0.40) | 1,20,000<br>(3,00,000 tr. × ₹ 0.40) |
| Issuing Statements             | 4,80,000<br>(3,00,000 st. × ₹ 1.60)  | 80,000<br>(50,000 st. × ₹ 1.60)   | 2,40,000<br>(1,50,000 st. × ₹ 1.60) |
| Customer Inquiries             | 2,10,000<br>(3,50,000 min. × ₹ 0.60) | 54,000<br>(90,000 min. × ₹ 0.60)  | 96,000<br>(1,60,000 min. × ₹ 0.60)  |
| Total Cost [a]                 | ₹ 15,80,000                          | ₹ 2,14,000                        | ₹ 4,66,000                          |
| Units of Product [b]           | 30,000                               | 5,000                             | 10,000                              |
| Cost of each Product [a] / [b] | 52.67                                | 42.80                             | 46.60                               |

2. (i) Average Non Value Added Time *per batch*

$$\begin{aligned}
 &= \text{Inspection Time} + \text{Waiting Time} + \text{Move Time} \\
 &= 1.5 \text{ hr.} + 6.0 \text{ hrs.} + 7.5 \text{ hrs.} \\
 &= 15 \text{ hrs.}
 \end{aligned}$$

(ii) Average Value Added Time *per batch*

$$\begin{aligned}
 &= \text{Processing Time} \\
 &= 9 \text{ hrs.}
 \end{aligned}$$

**(iii) Manufacturing Cycle Efficiency**

$$\begin{aligned}
 &= \frac{\text{Processing Time}}{\text{Processing Time} + \text{Inspection Time} + \text{Waiting Time} + \text{Move Time}} \\
 &= \frac{9.0 \text{ hrs.}}{9.0 \text{ hrs.} + 1.5 \text{ hr.} + 6.0 \text{ hrs.} + 7.5 \text{ hrs.}} \\
 &= 37.5\%
 \end{aligned}$$

**(iv) Manufacturing Cycle Time**

$$\begin{aligned}
 &= \frac{\text{Total Production Time}}{\text{Units per Batch}} \\
 &= \frac{24 \text{ hrs.}}{60 \text{ units}} \\
 &= 0.40 \text{ hrs. per unit}
 \end{aligned}$$

**3. Contribution per unit**

| Particulars                                                                      | (₹) |
|----------------------------------------------------------------------------------|-----|
| Selling Price                                                                    | 200 |
| Variable Cost (₹ 65 + ₹ 33 + ₹ 16)                                               | 114 |
| Contribution per unit (Excluding direct labour, considered irrelevant and fixed) | 86  |

**Savings and Earnings if the Plant is Shut Down**

| Particulars                                                       | (₹)        |
|-------------------------------------------------------------------|------------|
| Savings in Fixed Cost (₹ 14,00,000* – ₹ 1,25,000)                 | 12,75,000  |
| Contribution from Alternate Activity (₹ 40 × 50% of 2,00,000 hrs) | 40,00,000  |
| Shutting Down and Reopening Cost (₹ 50,000 + ₹ 100,000)           | (1,50,000) |
| Total                                                             | 51,25,000  |

\* [2,00,000 units × ₹ 7]

Indifference Point: ₹ 51,25,000 / ₹ 86 = 59,593 units

Minimum level of production to justify continuation = 59,594 units

**4. Alternative-1 with No Strike: (Refer W.N.-2, 3)**

Cost of Settlement is 15% Increase i.e. ₹ 216 per unit

Annual Cost of Settlement

$$\begin{aligned}
 &= 54,000 \text{ units} \times ₹ 216 \\
 &= ₹ 1,16,64,000
 \end{aligned}$$

**Alternative 2 i.e. if Strike Goes Ahead:** (Refer W.N.-1, 2, 3)

| Extra Cost                                                                                                               | (₹)         |
|--------------------------------------------------------------------------------------------------------------------------|-------------|
| Annual Incremental Labour Cost (Ex. Strike Days Production)<br>[[54,000 units – (25Days × 180 units per Day)] × ₹144.00] | 71,28,000   |
| Loss of Contribution <i>due to loss of sales</i> [1,300 units × ₹ 2,200]                                                 | 28,60,000   |
| Incremental Labour Cost for Balance 3,200 units<br>[(25 Days × 180 units per Day) – 1,300 units] × ₹144.00]              | 4,60,800    |
| Overtime Premium [3,200 units × 1,584 × 0.5]                                                                             | 25,34,400   |
| Payment for Efficiency [3,200 units × 1/9 × 1,584 × 1.5]                                                                 | 8,44,800    |
| Additional Fixed Cost                                                                                                    | 1,00,000    |
|                                                                                                                          | 1,39,28,000 |

If there is no strike, it will yield a financial benefit of ₹ 22,64,000 (₹ 1,39,28,000 – ₹ 1,16,64,000). Management should accept union's demand.

**Working Note****(1) Statement Showing Contribution *per unit* of 'DBC'**

|                                        | (₹)   |
|----------------------------------------|-------|
| Selling Price                          | 6,000 |
| Less: Variable Costs:                  |       |
| Labour Cost                            | 1,440 |
| Production Ex. Wages (₹3,600 – ₹1,440) | 2,160 |
| Distribution                           | 200   |
| Contribution                           | 2,200 |

**(2) Calculation of Labour Cost**

|                                                        |                          |
|--------------------------------------------------------|--------------------------|
| Direct Labour (40% of production costs of ₹3,600)      | = ₹1,440 <i>per unit</i> |
| With 15% Increase, Revised Labour Cost (₹1,440 + ₹216) | = ₹1,656                 |
| With 10% Increase, Revised Labour Cost (₹1,440 + ₹144) | = ₹1,584                 |

**(3) Statement Showing Budgeted Production**

|                                           |               |
|-------------------------------------------|---------------|
| Total Time in a Day: (8hrs. × 60 minutes) | = 480 minutes |
| Less: Idle Time                           | = 48 minutes  |
| Coffee Break                              | = 20 minutes  |
| Instructions                              | = 22 minutes  |



Training = 30 minutes  
 Productive Time *per day* = 360 minutes

Therefore, 'DBC' to be produced per man per day:  $(360/180 \times 1) = 2$  units

Since 'DBC' are produced at the rate of 2 'DBC' per man day, so total yearly production will be 54,000 units  $(2 \text{ units} \times 90 \text{ men} \times 300 \text{ days})$  of 'DBC'



This problem has been solved by comparing 'Existing Situation' with both 'Alternatives (Strike or Non-Strike)' *independently*. However, this problem can also be solved by comparing 'Alternatives (Strike or Non-Strike)' *only* and final answer would be the same. Students may also solve this problem by taking 'Total Approach' instead of 'Incremental Approach'.

5. (i) Cost incurred on Product 'G' *upto point of separation* is irrelevant for decision making as Product 'G' is a Joint Product. Joint Products are the result of same raw material & same process Operations.

Cost incurred *after point of separation* will be considered for decision making as *specifically* incurred for Product 'G'.

After further processing Product 'G' will *contribute* ₹17 per unit toward 'Joint Production Cost'.

Calculation is as follows

| Particulars                                 | Amount (₹) |
|---------------------------------------------|------------|
| Selling Price <i>per unit</i>               | 37.00      |
| Less: Cost after separation:                |            |
| Marginal Cost <i>per unit</i>               | 15.00      |
| Fixed Cost <i>per unit</i>                  | 5.00       |
| Contribution toward 'Joint Production Cost' |            |

Hence, *further processing* of Product 'G' is recommended.

- (ii) If Product 'G' is not a joint product with same cost structure. In this case there will be *negative contribution* on production of Product 'G'. The calculation is as follows—→

| Particulars                       | Amount (₹) |
|-----------------------------------|------------|
| Selling Price <i>per unit</i>     | 37.00      |
| Less: Marginal Cost (₹ 30 + ₹ 15) | 45.00      |
| Contribution                      | (8.00)     |

Hence, production of Product 'G' will not be recommended.

6. **Statement Showing “Cost and Profit for the Next Year”**

| Particulars                   | Existing<br>Volume, etc. | Volume, Costs, etc.<br>after 10% Increase | Estimated Sale,<br>Cost, Profit, etc.* |
|-------------------------------|--------------------------|-------------------------------------------|----------------------------------------|
|                               | (₹)                      | (₹)                                       | (₹)                                    |
| Sale                          | 5,00,000                 | 5,50,000                                  | 5,72,000                               |
| Less: Direct Materials        | 2,50,000                 | 2,75,000                                  | 2,69,500                               |
| Direct Labour                 | 1,00,000                 | 1,10,000                                  | 1,07,800                               |
| Variable Overheads            | 40,000                   | 44,000                                    | 43,120                                 |
| Contribution                  | 1,10,000                 | 1,21,000                                  | 1,51,580                               |
| Less: Fixed Cost <sup>#</sup> | 60,000                   | 60,000                                    | 58,800                                 |
| Profit                        | 50,000                   | 61,000                                    | 92,780                                 |

(\*) for the next year after increase in selling price @ 4% and overall cost reduction by 2%.

(#) Fixed Cost = Existing Sales – Existing Marginal Cost – 12.5% on ₹ 4,00,000  
 = ₹ 5,00,000 – ₹ 3,90,000 – ₹ 50,000  
 = ₹ 60,000

Percentage Profit on Capital Employed equals to 23.19%  $\left( \frac{₹92,780}{₹4,00,000} \times 100 \right)$

Since the Profit of ₹ 92,780 is more than 23% of capital employed, the proposal of the Sales Manager can be adopted.

7. **JTC Ltd.**

**Cost Sheet of One Lot of 250 Croquet Mallets**

| Computation of Total Cost:                                      |  | (₹)    |
|-----------------------------------------------------------------|--|--------|
| Direct Material                                                 |  |        |
| Handles (2.5 feet × 250 units × ₹ 50)                           |  | 31,250 |
| Heads (1.20 × 250 × 0.40 × ₹ 60) [W.N.-1]                       |  | 7,200  |
| Less: Scrap Recovery (4% × 50 × ₹ 10)                           |  | (20)   |
| Direct Labour (8 Hrs × ₹ 6 × 250 / 120) [W.N.-2]                |  | 100    |
| Prime Cost                                                      |  | 38,530 |
| Factory & Other Overheads                                       |  |        |
| Variable, Finishing & Painting (20,000 × 250 / 20,000) [W.N.-3] |  | 250    |
| Fixed (₹ 72,000 × 250 / 18,000) [W.N.-4]                        |  | 1,000  |
| Total Cost                                                      |  | 39,780 |

| Price Quotation: (₹)                  |        |
|---------------------------------------|--------|
| Cost per mallet (₹39,780 / 250 Units) | 159.12 |
| Add: Profit (50% on Cost)             | 79.56  |
| Selling Price                         | 238.68 |

### Working Notes

1. Since 20% of completed heads are spoiled, output of 1 unit requires input of 1.20 units ( $1 + 0.20$ ); so, total heads processed, 300 ( $1.20 \times 250$ ), of which spoiled heads are 50.

2. Total Time in a day (8 × 60) 480 minutes  
Less: Idle Time 48 minutes  
Coffee Break 15 minutes  
Instructions 9 minutes  
Training 8 minutes 80 minutes  
Productive Time per day: 400 minutes

Therefore, mallets to be produced per man per day, 120 units ( $400/40 \times 12$ ).

Since mallets are produced at the rate of 120 mallets per man day, so total monthly production will be 18,000 mallets ( $120 \text{ units} \times 6 \text{ men} \times 25 \text{ days}$ ).

3. Finishing and painting overheads are assumed to be variable for the production of 20,000 mallets.
4. All the other expenses are fixed and are to be absorbed by 18,000 ( $120 \text{ units} \times 6 \text{ men} \times 25 \text{ Days}$ ) mallets of monthly production.
8. Return of 12% Net (after tax of 40%) on Capital Employed is equivalent to 20% (Gross) [ $12\% \div (1 - 0.4)$ ] on Capital Employed.

Let Selling Price per unit to be 'K'

$$\begin{aligned}
 \text{Since Total Sales} &= \text{Total Cost} + \text{Profit} \\
 80,000 \text{ K} &= 14,60,000 + 20\% (12,00,000 + 0.5 \times 80,000\text{K}) \\
 \text{Or, } 80,000 \text{ K} &= 14,60,000 + 2,40,000 + 8,000\text{K} \\
 \text{Or, } 72,000 \text{ K} &= 17,00,000 \\
 \text{Or, 'K'} &= \frac{17,00,000}{72,000} \\
 &= ₹ 23.61
 \end{aligned}$$

Hence Selling Price per unit will be ₹ 23.61.

9. Statement of Total Contribution

| Sales Price p.u.<br>(₹) | Variable Cost p.u.<br>(₹) | Contribution p.u.<br>(₹) | Sales Volume<br>(units)<br>(₹) | Total<br>Contribution<br>(₹) |
|-------------------------|---------------------------|--------------------------|--------------------------------|------------------------------|
| (1)                     | (2)                       | (3) = (1) – (2)          | (4)                            | (5) = (3) × (4)              |
| 25.00                   | 17.00                     | 8.00                     | 10,000                         | 80,000                       |
| 24.50                   | 17.00                     | 7.50                     | 10,500                         | 78,750                       |
| 24.00                   | 17.00                     | 7.00                     | 11,000                         | 77,000                       |
| 25.50                   | 17.00                     | 8.50                     | 9,500                          | 80,750                       |
| <b>26.00</b>            | <b>17.00</b>              | <b>9.00</b>              | <b>9,000</b>                   | <b>81,000</b>                |
| 27.00                   | 17.00                     | 10.00                    | 8,000                          | 80,000                       |
| 27.50                   | 17.00                     | 10.50                    | 7,500                          | 78,750                       |

From the above statement it is quite apparent that the contribution would be maximum at a sale price of ₹ 26 per unit and sales demand of 9,000 units.



This problem can also be solve by using ‘Profit Maximisation’ model formula.

10. (i) Statement Showing “Profitability of BOSH India Ltd”

|                                  | Products (Amount in ₹) |           |           |           |             |
|----------------------------------|------------------------|-----------|-----------|-----------|-------------|
|                                  | B                      | O         | S         | H         | Total       |
| Sales                            | 26,00,000              | 45,20,000 | 42,40,000 | 32,00,000 | 1,45,60,000 |
| Direct Materials                 | 6,00,000               | 18,20,000 | 18,80,000 | 10,00,000 | 53,00,000   |
| Direct Wages                     | 8,00,000               | 20,80,000 | 12,80,000 | 12,00,000 | 53,60,000   |
| Overheads (W.N.2):               |                        |           |           |           |             |
| Machine Related                  | 1,60,000               | 1,56,000  | 64,000    | 2,40,000  | 6,20,000    |
| Batch Related                    | 1,00,000               | 1,30,000  | 80,000    | 1,50,000  | 4,60,000    |
| Contribution                     | 9,40,000               | 3,34,000  | 9,36,000  | 6,10,000  | 28,20,000   |
| Product Specific Fixed Overheads | 10,00,000              | 1,00,000  | 2,00,000  | 1,00,000  | 14,00,000   |
| Gross Profit                     | (60,000)               | 2,34,000  | 7,36,000  | 5,10,000  | 14,20,000   |
| General Fixed Overheads          |                        |           |           |           | 6,20,000    |
| Profit                           |                        |           |           |           | 8,00,000    |

**(ii) Break-even Point**

$$\begin{aligned}
 \text{Total Sale Value of Product 'B'} &= ₹ 26,00,000 \\
 \text{Total Contribution of Product 'B'} &= ₹ 9,40,000 \\
 \text{Specific Fixed Overheads (Product 'B')} &= ₹ 10,00,000 \\
 \text{Break-even Sales (₹)} &= \frac{\text{Specific Fixed Cost}}{\text{Total Contribution}} \times \text{Total Sales Value} \\
 &= \frac{₹ 10,00,000}{₹ 9,40,000} \times ₹ 26,00,000 \\
 &= ₹ 27,65,957.45 \\
 \text{Break-even Sales (units)} &= \frac{₹ 27,65,957.45}{₹ 13.00} \\
 &= 2,12,766 \text{ units}
 \end{aligned}$$

However, production must be done in batches of 100 units. Therefore, **2,128 batches** are required for break even. Due to the production in batches, 34 units (2,128 batches × 100 units – 2,12,766 units) would be produced extra. These 34 units would add extra cost ₹ 282.20 (34 units × ₹ 8.3\*). Accordingly, break-even units as calculated above will increase by 22 units  $\left( \frac{₹ 282.20}{₹ 13.00} \right)$ .

$$(*) \left( \frac{₹ 6,00,000 + ₹ 8,00,000 + ₹ 1,60,000 + ₹ 1,00,000}{2,00,000 \text{ units}} \right)$$

Break-even units of product 'B' is 2,12,788 units (2,12,766 units + 22 units).

**Workings****W.N. 1****Calculation Showing Overhead Rates**

| Overhead's Related Factors | Overhead Cost (₹)<br>[a] | Total No. of Units of Factors<br>[b] | Overhead Rate (₹)<br>[a] / [b] |
|----------------------------|--------------------------|--------------------------------------|--------------------------------|
| Machining Hours            | 6,20,000                 | 15,50,000 hrs.                       | 0.40                           |
| Batch Production           | 4,60,000                 | 9,200 batches                        | 50.00                          |

W.N.-2

Statement Showing - Overhead Costs Related to Product

| Particulars                         | B                                       | O                                       | S                                     | H                                        |
|-------------------------------------|-----------------------------------------|-----------------------------------------|---------------------------------------|------------------------------------------|
| Machining hrs.<br>related overheads | ₹ 1,60,000<br>(4,00,000 hrs<br>× ₹0.40) | ₹ 1,56,000<br>(3,90,000 hrs<br>× ₹0.40) | ₹ 64,000<br>(1,60,000 hrs<br>× ₹0.40) | ₹ 2,40,000<br>(6,00,000 hrs<br>× ₹0.40)  |
| Batch related<br>overheads          | ₹1,00,000<br>2,000 batches × ₹ 50)      | ₹1,30,000<br>(2,600 batches<br>× ₹50)   | ₹80,000<br>(1,600 batches<br>× ₹50)   | ₹1,50,000<br>(3,000<br>batches<br>× ₹50) |

11.

| Situation |                                                                                                                                                                                                                      | Appropriate Pricing Policy                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| (i)       | 'W' is a new product for the company and the market and meant for large scale production and long term survival in the market. Demand is expected to be elastic.                                                     | Penetration Pricing                           |
| (ii)      | 'X' is a new product for the company, but not for the market. X's success is crucial for the company's survival in the long term.                                                                                    | Market Price or Price Just Below Market Price |
| (iii)     | 'Y' is a new product to the company and the market. It has an inelastic market. There needs to be an assured profit to cover high initial costs and the unusual sources of capital have uncertainties blocking them. | Skimming Pricing                              |
| (iv)      | 'Z' is a perishable item, with more than 80% of its shelf life over.                                                                                                                                                 | Any Cash Realizable Value*                    |

(\*) this amount decreases every passing day.

12. Discretionary costs are those that are incurred, typically each year, in an amount that is approved as part of the normal budget process. However, there is no clear relationship between the volume of services and the amount of cost that must be incurred. Manager must decide and justify the level that is deemed to be appropriate. This justification is to be made a fresh without making reference to previous level of spending in his/her department.

Zero based budgeting is undoubtedly most effective in terms of discretionary costs. The bottom line of a zero based budgeting is that it is important to understand what types of objectives are being accomplished by discretionary cost centers and what resources being devoted to accomplishing various objectives. This will allows a prioritization, so

that organization can evaluate the likely impact of substantial increase or decrease in the resources allocated to the discretionary center.

Accordingly, ZBB has extensive potential application to the division T, A and RD.

### 13. Analysis of WIP Account

|                                           | November      | December      |
|-------------------------------------------|---------------|---------------|
| Opening WIP                               | 36,000        | <b>55,100</b> |
| Add: Direct Materials Usage               | 50,000        | 56,000        |
| Add: Direct Labor                         | 53,100        | 69,000        |
| Add: Variable Overhead                    | 25,000        | 29,000        |
| Total Inflow into WIP                     | 1,64,100      | 2,09,100      |
| Less: Variable Cost of Goods Manufactured | 1,09,000      | 1,14,800      |
| Ending WIP                                | <b>55,100</b> | <b>94,300</b> |

### Analysis of Finished Goods Inventory Account

|                                  | November      | December      |
|----------------------------------|---------------|---------------|
| Opening Finished Goods           | 44,000        | <b>30,000</b> |
| Add: Cost of Goods Manufactured  | 1,09,000      | 1,14,800      |
| Cost of Goods Available for Sale | 1,53,000      | 1,44,800      |
| Less: Cost of Goods Sold         | 1,23,000      | <b>99,800</b> |
| Ending Finished Goods Inventory  | <b>30,000</b> | 45,000        |

### 14. Statement Showing Reconciliation Between Budgeted [F.Y. 2015-16] & Actual Profit [F.Y. 2016-17]

| Particulars                   | (₹ in lacs) | (₹ in lacs) |
|-------------------------------|-------------|-------------|
| Budgeted Profit               |             | 200.00      |
| Sales Contribution Variances: |             |             |
| Price                         | 427.50 (F)  |             |
| Volume                        | 25 (A)      | 402.50 (F)  |
| Direct Material Variances:    |             |             |
| Price                         | 307.50 (A)  |             |
| Usage                         | 150.00 (A)  | 457.50 (A)  |
| Variable Overheads Variances: |             |             |
| Expenditure                   | 25.00 (A)   |             |
| Efficiency                    | 25.00 (A)   | 50.00 (A)   |

|                            |           |           |
|----------------------------|-----------|-----------|
| Fixed Overheads Variances: |           |           |
| Expenditure                | 67.50 (A) |           |
| Volume                     | N.A.      | 67.50 (A) |
| Actual Profit              |           | 27.50     |

**Computation of Variances (₹ In Lacs)**

**Sales Variances (W.N.1)**

**Price Variance** = Actual Sales – Standard Sales  
= ₹ 3,277.50 – ₹ 2,850.00  
= ₹ 427.50 (F)

**Volume Variance** = Standard Sales – Budgeted Sales  
= ₹ 2,850.00 – ₹ 3,000.00  
= ₹ 150 (A)

**Sales Contribution Variances**

**Sales Contribution** = Sales Price Variance

**Price Variance**  
= ₹ 427.50 (F)

**Sales Contribution** = Sales Volume Variance × Budgeted PV Ratio

**Volume Variance**  
= ₹ 150 (A) ×  $\left( \frac{₹ 200 + ₹ 300}{₹ 3,000} \right)$   
= ₹ 25 (A)

**Material Variances (W.N.2)**

**Material Price Variance**

= Standard Cost of Actual Quantity – Actual Cost  
= ₹ 2,050.00 – ₹ 2,357.50  
= ₹ 307.50 (A)

**Material Usage Variance**

= Standard Cost of Standard Quantity for Actual Output –  
Standard Cost of Actual Quantity  
= ₹ 1,900 – ₹ 2,050  
= ₹ 150 (A)



**Variable Overhead Variances (W.N.3)****Expenditure Variance**

$$= \text{Budgeted Variable Overheads for Actual Hours} - \text{Actual Variable Overheads}$$

Or

$$= \text{Std. Rate per unit} \times \text{Expected Output for Actual Hours Worked} - \text{Actual Variable Overheads}$$

$$= ₹ 500 - ₹ 525$$

$$= ₹ 25 \text{ (A)}$$

$$\text{Efficiency Variances} = \text{Standard Variable Overheads for Production} - \text{Budgeted Variable Overheads for Actual Hours}$$

Or

$$= \text{Std. Rate per unit} \times \text{Actual Output} - \text{Std. Rate per unit} \times \text{Expected Output for Actual Hours Worked}$$

$$= ₹ 475 - ₹ 500$$

$$= ₹ 25 \text{ (A)}$$

**Fixed Overhead Variances (W.N.4)****Expenditure Variance**

$$= \text{Budgeted Fixed Overheads} - \text{Actual Fixed Overheads.}$$

$$= ₹ 300.00 - ₹ 367.50$$

$$= ₹ 67.50 \text{ (A)}$$

**Working Notes (₹ in lacs)****Note-1:**

|                                                                          |          |
|--------------------------------------------------------------------------|----------|
| Sales in F.Y. 2016-2017                                                  | 3,277.50 |
| Less: Increase due to <i>price rise</i> [₹ 3,277.50 lacs x 15/115]       | 427.50   |
| Sales in F.Y. 2016-2017 at F.Y. 2015-2016 Prices <b>[Standard Sales]</b> | 2,850.00 |
| Sales in F.Y. 2015-2016                                                  | 3,000.00 |
| Fall in Sales in F.Y. 2016-2017 [₹ 3,000 lacs - ₹ 2,850 lacs]            | 150.00   |
| Percentage fall                                                          | 5%       |

**Note-2:**

|                                                                                                            |          |
|------------------------------------------------------------------------------------------------------------|----------|
| Material Cost in F.Y. 2015-2016                                                                            | 2,000.00 |
| Less: 5% for Decrease in Volume                                                                            | 100.00   |
| 'Standard Material Usage' at F.Y. 2015-16 Prices<br>(Standard Cost of Standard Quantity for Actual output) | 1,900.00 |
| Actual Material Cost F.Y. 2016-2017                                                                        | 2,357.50 |
| Less: 15% Increase in Prices [ $\text{₹ } 2,357.50 \text{ lakhs} \times 15/115$ ]                          | 307.50   |
| Actual Materials Used, at F.Y. 2015-2016 Prices<br>(Standard Cost of Actual Quantity)                      | 2,050.00 |

**Note-3:**

|                                                                                                        |        |
|--------------------------------------------------------------------------------------------------------|--------|
| Variable Overheads Cost in F.Y. 2015-16                                                                | 500.00 |
| Less: 5% due to fall in Volume of Sales in F.Y. 2016-17                                                | 25.00  |
| "Standard Overheads for Production" in F.Y. 2016-17                                                    | 475.00 |
| Actual Variable Overheads Incurred in F.Y. 2016-17                                                     | 525.00 |
| Less: 5% for Increase in Price [ $\text{₹ } 525 \text{ lacs} \times 5 / 105$ ]                         | 25.00  |
| Amount Spent in F.Y. 2016 -17 at F.Y. 2015-16 Prices<br>(Budgeted Variable Overheads for Actual Hours) | 500.00 |

15. (i) Gourmet and high-end restaurants recognises Natural Spices on the basis of its *high quality* of spices. Therefore, quality is most critical success factor of Natural Spices. There are other factors which cannot be ignore such as price, delivery options, attractive packing etc. But all are secondary to the quality.
- (ii) Deliberate action of cutting price to increase sales volume indicates that firm is intending to expand its market to retail market and street shops which is price sensitive.

*Purchase Price Variance* is clearly indicating that firm has purchased raw material at lower price which may be due to buying of lower quality of material. Similarly positive *Efficiency Variance* is indicating cost cutting and stretching resources.

It appears that firm is intending to expand its market to retail market and street shops by not only reducing the price but also compromising its quality which is opposing its current strategy of *high quality*.

Management should monitor the trends of variances on regular basis and take appropriate action in case of evidence of permanent decline in quality. Here, customer feedback is also very important.

## 16. (i) Assumed Quotation Price 'P', Quantity 'Q'

The Marginal Cost of a 'Wagon' is ₹ 13,60,000

(₹ 2,20,000 × 4 Casnub Bogies + ₹ 4,80,000)

*Demand Function for a 'Wagon'*

$$P = ₹ 17,10,000 - (\₹ 50,000 / 2) \times Q$$

$$\text{Revenue (R)} = Q \times [17,10,000 - 25,000 \times Q]$$

$$= 17,10,000 Q - 25,000 Q^2$$

$$\text{Marginal Revenue (MR)} = 17,10,000 - 50,000 Q$$

$$\text{Marginal Cost (MC)} = 13,60,000$$

*Profit is Maximum where Marginal Revenue (MR) equals to Marginal Cost (MC)*

$$17,10,000 - 50,000 Q = 13,60,000$$

$$Q = 7.00 \text{ units}$$

By putting the value of 'Q' in *Demand Function*, value of 'P' is obtained.

$$P = 17,10,000 - (50,000 / 2) \times Q$$

$$= 17,10,000 - 25,000 \times 7.00$$

$$= ₹ 15,35,000$$

At ₹15,35,000 unit Quotation Price of a Wagon the Great Southern Company Ltd.'s Profit will be Maximum.

(ii) At CBD the Divisional Manager would ensure that Divisional Marginal Revenue should be **equal to** Division's Marginal Cost so that Profit can be Maximum.

$$\text{MR of a Casnub Bogies} = \text{MC of Manufacturing a Casnub Bogies}$$

$$3,20,000 - 2(10,000 / 30) \times Q = 2,20,000$$

$$Q = 150 \text{ units}$$

Selling Price of a Casnub Bogie 'P' is

$$P = 3,20,000 - (10,000 / 30) \times 150$$

$$= ₹ 2,70,000$$

CBD will earn Maximum Profit when it will Quote ₹ 2,70,000 to the Outside Market.

Since, Outside Market Quotation is *Transfer Price* as well, so Transfer Price to WD will be ₹ 2,70,000 and it forms part of WD's Marginal Cost.

At WD, Division Manager would ensure that Divisional Marginal Revenue should be **equal to** Division's Marginal Cost so that Profit can be Maximum.

$$\text{MR of a Wagon} = \text{MC of Manufacturing a Wagon}$$

$$17,10,000 - 50,000 \times Q = (\text{₹ } 2,70,000 \times 4 \text{ Casnub Bogies}) + \text{₹ } 4,80,000$$

$$Q = 3.00 \text{ units}$$

Quotation Price of a Wagon 'P' should be:

$$\begin{aligned} P &= \text{₹ } 17,10,000 - 25,000 \times 3.00 \\ &= \text{₹ } 16,35,000 \end{aligned}$$

The unit Quotation Price of Wagon that emerges as a result of Market Based Transfer Pricing is ₹16,35,000.

17. (i) New Product *tie up* --- Innovation / Learning Perspective  
 (ii) Growth of Volume --- Financial Perspective  
 (iii) Time for Loan / Fresh Products --- Customer Perspective

18. Let  $x_1$ ,  $x_2$  and  $x_3$  denote the number of advertisements to be released in three magazines M, N and O respectively. Let Z denote the total exposure to the principal buyers of the goods.

Objective function:

Since the exposure in any magazine is the number of advertisements multiplied by the number of principal buyers, therefore, the value of Z is given by:

$$\begin{aligned} Z &= (0.20 \times 1,00,000) x_1 + (0.15 \times 60,000) x_2 + (0.08 \times 40,000) x_3 \\ &= 20,000x_1 + 9,000x_2 + 3,200x_3 \end{aligned}$$

Constraints:

The budgeted amount for the advertisements is at the most ₹1,00,000

$$\text{Hence, } 8,000x_1 + 6,000x_2 + 5,000x_3 \leq 1,00,000$$

Also, the magazine M should have no more than 15 advertisements, N and O each should get at least 8 advertisements.

$$\begin{aligned} \text{Hence, } x_1 &\leq 15, \\ x_2 &\geq 8 \text{ and} \\ x_3 &\geq 8 \end{aligned}$$

The linear programming model for the problem:

Maximise

$$Z = 20,000x_1 + 9,000x_2 + 3,200x_3$$

Subject to the Constraints:

$$8,000x_1 + 6,000x_2 + 5,000x_3 \leq 1,00,000$$

|       |                                    |
|-------|------------------------------------|
|       | $x_1 \leq 15$                      |
|       | $x_2 \geq 8$                       |
|       | $x_3 \geq 8$                       |
| Where | $x_1, x_2 \text{ and } x_3 \geq 0$ |

19. Dummy machine ( $X_5$ ) is inserted to make it a balanced cost matrix and assume its installation cost to be zero. Cost of install at cell  $X_3$  (P) and  $X_2$  (R) is very high marked as M.

|               | P  | Q  | R  | S  | T  |
|---------------|----|----|----|----|----|
| $X_1$         | 18 | 22 | 30 | 20 | 22 |
| $X_2$         | 24 | 18 | M  | 20 | 18 |
| $X_3$         | M  | 22 | 28 | 22 | 14 |
| $X_4$         | 28 | 16 | 24 | 14 | 16 |
| $X_5$ (Dummy) | 0  | 0  | 0  | 0  | 0  |

### Step 1

Subtract the minimum element of each row from each element of that row-

|               | P  | Q | R  | S | T |
|---------------|----|---|----|---|---|
| $X_1$         | 0  | 4 | 12 | 2 | 4 |
| $X_2$         | 6  | 0 | M  | 2 | 0 |
| $X_3$         | M  | 8 | 14 | 8 | 0 |
| $X_4$         | 14 | 2 | 10 | 0 | 2 |
| $X_5$ (Dummy) | 0  | 0 | 0  | 0 | 0 |

### Step 2

Subtract the minimum element of each column from each element of that column-

|               | P  | Q | R  | S | T |
|---------------|----|---|----|---|---|
| $X_1$         | 0  | 4 | 12 | 2 | 4 |
| $X_2$         | 6  | 0 | M  | 2 | 0 |
| $X_3$         | M  | 8 | 14 | 8 | 0 |
| $X_4$         | 14 | 2 | 10 | 0 | 2 |
| $X_5$ (Dummy) | 0  | 0 | 0  | 0 | 0 |

Step 3

Draw lines to connect the zeros as under-

|                        | P  | Q | R  | S | T |
|------------------------|----|---|----|---|---|
| X <sub>1</sub>         | 0  | 4 | 12 | 2 | 4 |
| X <sub>2</sub>         | 6  | 0 | M  | 2 | 0 |
| X <sub>3</sub>         | M  | 8 | 14 | 8 | 0 |
| X <sub>4</sub>         | 14 | 2 | 10 | 0 | 2 |
| X <sub>5</sub> (Dummy) | 0  | 0 | 0  | 0 | 0 |

There are five lines which are equal to the order of the matrix. Hence the solution is optimal. We may proceed to make the assignment as under-

|                        | P            | Q            | R  | S            | T            |
|------------------------|--------------|--------------|----|--------------|--------------|
| X <sub>1</sub>         | 0            | 4            | 12 | 2            | 4            |
| X <sub>2</sub>         | 6            | 0            | M  | 2            | <del>0</del> |
| X <sub>3</sub>         | M            | 8            | 14 | 8            | 0            |
| X <sub>4</sub>         | 14           | 2            | 10 | 0            | 2            |
| X <sub>5</sub> (Dummy) | <del>0</del> | <del>0</del> | 0  | <del>0</del> | <del>0</del> |

The following is the assignment which keeps the total cost at minimum-

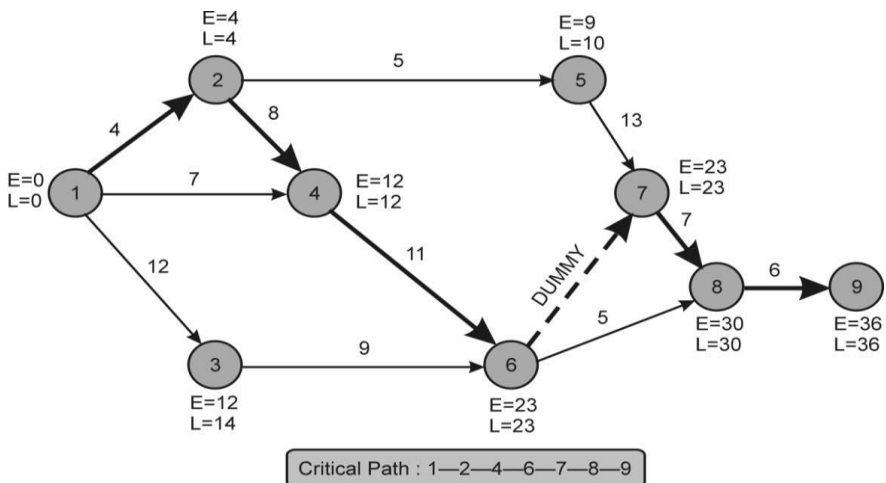
| Machines               | Location | Costs (₹) |
|------------------------|----------|-----------|
| X <sub>1</sub>         | P        | 18        |
| X <sub>2</sub>         | Q        | 18        |
| X <sub>3</sub>         | T        | 14        |
| X <sub>4</sub>         | S        | 14        |
| X <sub>5</sub> (Dummy) | R        | 0         |
| Total                  |          | 64        |

20. (i) Calculation of Missing Figures:

| Activity | Duration        | EST            | EFT                              | LST                              | LFT            | Total Float |
|----------|-----------------|----------------|----------------------------------|----------------------------------|----------------|-------------|
|          | D <sub>ij</sub> | E <sub>i</sub> | E <sub>i</sub> + D <sub>ij</sub> | L <sub>j</sub> - D <sub>ij</sub> | L <sub>j</sub> | LST - EST   |
| 1-2      | 4               | 0              | 4                                | 0                                | 4              | 0           |

|     |    |    |    |    |    |   |
|-----|----|----|----|----|----|---|
| 1-3 | 12 | 0  | 12 | 2  | 14 | 2 |
| 1-4 | 7  | 0  | 7  | 5  | 12 | 5 |
| 2-4 | 8  | 4  | 12 | 4  | 12 | 0 |
| 2-5 | 5  | 4  | 9  | 5  | 10 | 1 |
| 3-6 | 9  | 12 | 21 | 14 | 23 | 2 |
| 4-6 | 11 | 12 | 23 | 12 | 23 | 0 |
| 5-7 | 13 | 9  | 22 | 10 | 23 | 1 |
| 6-7 | 0  | 23 | 23 | 23 | 23 | 0 |
| 6-8 | 5  | 23 | 28 | 25 | 30 | 2 |
| 7-8 | 7  | 23 | 30 | 23 | 30 | 0 |
| 8-9 | 6  | 30 | 36 | 30 | 36 | 0 |

(ii) The **Network** for the given problem:



(iii) The **Various Paths** in the Network are:

1-2-4-6-7-8-9 with Duration 36 Days

1-2-5-7-8-9 with Duration 35 Days

1-3-6-7-8-9 with Duration 34 Days

1-2-4-6-8-9 with Duration 34 Days

1-3-6-8-9 with Duration 32 Days

1-4-6-7-8-9 with Duration 31 Days

1-4-6-8-9 with Duration 29 Days

(iv) The **Critical Path** is 1-2-4-6-7-8-9 with Duration 36 Days.

21. Allocation of Random Numbers

| Raw Material |            |             | Wages &<br>Other Variable Overheads |            |             | Sales     |            |             |
|--------------|------------|-------------|-------------------------------------|------------|-------------|-----------|------------|-------------|
| Mid Point    | Cum. Prob. | Random Nos. | Mid Point                           | Cum. Prob. | Random Nos. | Mid Point | Cum. Prob. | Random Nos. |
| 9            | 0.2        | 0 – 1       | 12                                  | 0.3        | 0 – 2       | 36        | 0.1        | 0           |
| 11           | 0.5        | 2 – 4       | 14                                  | 0.8        | 3 – 7       | 40        | 0.4        | 1 – 3       |
| 13           | 0.8        | 5 – 7       | 16                                  | 1.0        | 8 – 9       | 44        | 0.8        | 4 – 7       |
| 15           | 1.0        | 8 – 9       |                                     |            |             | 48        | 1.0        | 8 – 9       |

Simulation Table (₹ in 000)

| Month | Raw Material | Wages & Other V.O | Sales | Fixed Cost | Net Cash Flow | Cash Balancing<br>(Opening ₹40 thousand) |
|-------|--------------|-------------------|-------|------------|---------------|------------------------------------------|
| 1     | 11           | 12                | 36    | 15         | -2            | 38                                       |
| 2     | 11           | 14                | 44    | 15         | +4            | 42                                       |
| 3     | 9            | 16                | 44    | 15         | +4            | 46                                       |
| 4     | 9            | 12                | 36    | 15         | 0             | 46                                       |
| 5     | 11           | 16                | 40    | 15         | -2            | 44                                       |
| 6     | 13           | 16                | 48    | 15         | +4            | 48                                       |

22. (i) Cumulative Average Time for 256 parts = 48.43 hrs.\*  
[112.50 × (0.90<sup>8</sup>)]
- Total Time for 256 parts = 12,398.08 hrs.  
[48.43 hrs.× 256 parts]
- Total Labour Cost of 256 parts = ₹ 2,47,961.60  
[12,398.08 hrs.× ₹ 20]
- Revised Labour Cost for zero profit = ₹ 3,22,961.60  
[₹ 2,47,961.60 + ₹ 75,000]
- Total Time for 256 parts (Revised) = 16,148.08 hrs.  
[₹ 3,22,961.60/₹ 20]
- Cumulative Average Time for 256 parts (Rev.)= 63.08 hrs.  
[16,148.08/256]
- The usual learning curve model is
- y = ax<sup>b</sup>



Where

- y = Cumulative Average Time per part for x parts
- a = Time required for first part
- x = Cumulative number of parts
- b = Learning coefficient (log r/log 2)

Accordingly

$\Rightarrow$

$63.08$

$=$

$112.50 \times (256)^b$

$\Rightarrow$

$0.5607$

$=$

$2^{8b}$

$\Rightarrow$

$\log 0.5607$

$=$

$\log 2^{8b}$

$\Rightarrow$

$\log 0.5607$

$=$

$8 \times b \times \log 2$

$\Rightarrow$

$\log 0.5607$

$=$

$8 \times \frac{\log r}{\log 2} \times \log 2$

$\Rightarrow$

$\log 0.5607$

$=$

$8 \log r$

$\Rightarrow$

$\log 0.5607$

$=$

$\log r^8$

$\Rightarrow$

$0.5607$

$=$

$r^8$

$\Rightarrow$

$r$

$=$

$\sqrt[8]{0.5607}$

$\Rightarrow$

$r$

$=$

$0.9302$

$\text{Learning Rate (r)}$

$=$

$93.02\%$

Therefore

$\text{Sensitivity}$

$=$

$3.02/90$

$=$

$3.36\%$



Students may also take 48.38 hrs. (112.50 × 0.43)

23. (i)

|                     |                                  |
|---------------------|----------------------------------|
| Human Resource Cost | 1. Number of employee            |
|                     | 2. Number of training Hours      |
|                     | 3. Number of benefit changes     |
|                     | 4. Number of insurance claims    |
|                     | 5. Number of pension changes     |
|                     | 6. Number of recruiting contacts |

(ii)

|                 |                                     |
|-----------------|-------------------------------------|
| Accounting Cost | 1. Number of billings               |
|                 | 2. Number of cash receipts          |
|                 | 3. Number of check payments         |
|                 | 4. Number of general ledger entries |
|                 | 5. Number of reports issued         |
|                 | 6. Number of responsibility centre  |

24. (i) Invalid
- (ii) Invalid
- (iii) Invalid
- (iv) Valid
- (v) Valid
25. (i) Invalid
- (ii) Valid
- (iii) Valid
- (iv) Valid
- (v) Valid

**PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING  
QUESTIONS**

**Activity Based Costing**

1. A manufacturing company produces Ball Pens that are printed with the logos of various companies. Each Pen is priced at ₹ 5. Costs are as follows:

| Cost Driver       | Unit Variable Cost (₹) | Level of Cost Driver |
|-------------------|------------------------|----------------------|
| Units Sold        | 2.5                    | -                    |
| Setups            | 225                    | 40                   |
| Engineering hours | 10                     | 250                  |

Other Data

Total Fixed Costs (conventional) ₹ 48,000

Total Fixed Costs (ABC) ₹ 36,500

**Required**

- Compute the break-even point in units using activity-based analysis.
- Suppose that company could reduce the setup cost by ₹ 75 per setup and could reduce the number of engineering hours needed to 215. How many units must be sold to break even in this case?

**Kaizen Costing– Basic Concepts**

2. XYZ Ltd. is planning to introduce Kaizen Costing approach in its manufacturing plant. State whether and why the following are *Valid or Not* in respect of Kaizen Costing.
- VP (Finance) is of the view that company has to make a huge initial investment to bring a large scale modification in production process.
  - Head (Personnel) has made a point that introduction of Kaizen Costing does not eliminate the training requirement of employees.
  - General Manager (Manufacturing) firmly believes that only shop floor employees and workers' involvement is prerequisite of Kaizen Costing approach.
  - Manager (Operations) has concerns about creation of confusion among employees and workers regarding their roles and degradation in quality of production.

**Life Cycle Costing**

3. *t-Connections*, Taiwan based firm, has just developed ultra-thintablet t-5 with few features like the ability to open two apps at the same time. This tablet cost ₹ 5,00,000 to develop; it has undergone extensive research and is ready for production. Currently, the firm is deciding on plant capacity, which could cost either ₹ 35,00,000 or ₹ 52,00,000.

The additional outlay would allow the plant to increase capacity from 500 units to 750 units. The relevant data for the life cycle of the tablet at different capacity level are as under:

| Expected Sales         | 500 units            | 750 units            |
|------------------------|----------------------|----------------------|
| Sale Price             | ₹79,600 per unit     | ₹69,600 per unit     |
| Variable Selling Costs | 10% of Selling Price | 10% of Selling Price |
| Salvage Value - Plant  | ₹ 6,25,000           | ₹ 9,00,000           |
| Profit Volume Ratio    | 40%                  |                      |

### Required

Advise *t-Connections*, regarding the optimal plant capacity to install. The tablet's life cycle is two years.

Note: Ignore the time value of money.

### Value Chain Analysis

4. Examine the Validity of following statements along with the reasons:
  - (i) The concepts, tools and techniques of value chain analysis apply only to all those organizations which produce and sell a product.
  - (ii) Procurement activities are included in the Primary activities as classified by Porter under value chain analysis concept.
  - (iii) Value chain analysis in the strategic framework consists of single cost driver concept.

### Decision Making

5. Recently, Ministry of Health and Family Welfare along with Drug Control Department have come hard on health care centres for charging exorbitant fees from their patients. Indraprastha Health Care Ltd. (IHCL), a leading integrated healthcare delivery provider company is feeling pinch of measures taken by authorities and facing margin pressures due to this. IHCL is operating in a competitive environment so; it's difficult to increase patient numbers also. Management Consultant of the company has come out with some plan for cost control and reduction.

IHCL provides treatment under package system where fees is charged irrespective of days a patient stays in the hospital. Consultant has estimated 2.50 patient days per patient. He wants to reduce it to 2 days. By doing this, consultant has targeted the general variable cost of ₹ 500 per patient day. Annually 15,000 patients visit to the hospital for treatment.

Medical Superintendent has some concerns with that of Consultant's plan. According to him, reducing the patient stay would be detrimental to the full recovery of patient. They

would come again for admission thereby increasing current readmission rate from 3% to 5%; it means readmitting 300 additional patients per year. Company has to spend ₹ 25,00,000 more to accommodate this increase in readmission. But Consultant has found blessing in disguise in this. He said every readmission is treated as new admission so it would result in additional cash flow of ₹ 4,500 per patient in the form of admission fees.

### **Required**

Calculate the impact of Management Consultant's plan on profit of the company. Also comment on result and other factors that should be kept in mind before taking any decision.

### **Pricing Strategy**

6. 'S' is a leading IT security solutions and ISO 9001 certified company. The solutions are well integrated systems that simplify IT security management across the length and depth of devices and on multiple platforms. 'S' has recently developed an Antivirus Software and company expects to have life cycle of less than one year. It was decided that it would be appropriate to adopt a market skimming pricing policy for the launch of the product. This Software is currently in the Introduction stage of its life cycle and is generating significant unit profits.

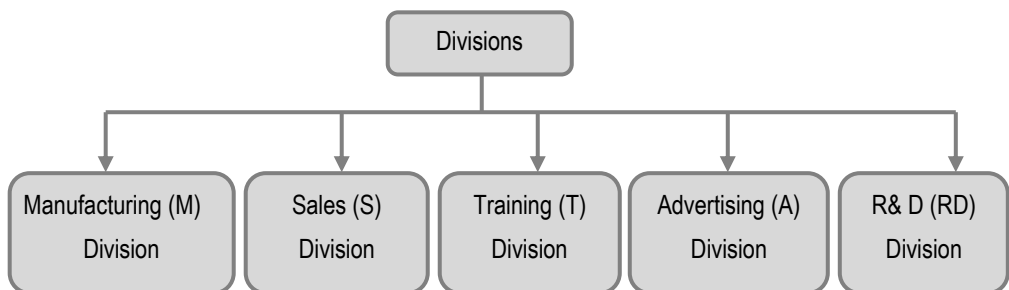
### **Required**

Explain, with reasons, the changes, if any, to the unit selling price that could occur when the Software moves from the Introduction stage to Growth stage of its life cycle.

Also suggest necessary strategies at this stage.

### **Zero Based Budgeting**

7. Capital Communication Limited is a state-owned large public company in the telecommunications sector. One of its main planning and control tools is the preparation and use of traditional annual budgets. Its divisional structure is as under:



Division T, A and RD incur substantial amount on discretionary expenses.

**Required**

Identify the possibilities of introducing a Zero Based Budgeting system for Division T, A and RD.

**Standard Costing – Missing Figures**

8. A company produces a product X, using raw materials A and B. The standard mix of A and B is 1: 1 and the standard loss is 10% of input. You are required to COMPUTE the MISSING INFORMATION indicated by “?” based on the data given below:

|                                          | A  | B  | Total    |
|------------------------------------------|----|----|----------|
| Standard price of raw material (₹ / kg.) | 24 | 30 |          |
| Actual input (kg.)                       | ?  | 70 |          |
| Actual output (kg.)                      |    |    | ?        |
| Actual price ₹ / kg.                     | 30 | ?  |          |
| Standard input quantity (kg.)            | ?  | ?  |          |
| Yield variance (sub usage)               |    |    | 270(A)   |
| Mix variance                             |    |    | ?        |
| Usage variance                           | ?  | ?  | ?        |
| Price variance                           | ?  | ?  | ?        |
| Cost variance                            | 0  | ?  | 1,300(A) |

**Transfer Pricing**

9. XWB Ltd. has two divisions Division W and Division B. Division W produces product Z, which it sells to external market and also to Division B. Divisions in the XWB Ltd. are treated as profit centres and divisions are given autonomy to set transfer prices and to choose their supplier. Performance of each division measured on the basis of target profit given for each period.

Division W can produce 1,00,000 units of product Z at full capacity. Demand for product Z in the external market is for 70,000 units only at selling price of ₹ 2,500 per unit. To produce product Z Division W incurs ₹ 1,600 as variable cost per unit and total fixed overhead of ₹ 4,00,00,000. Division W has employed ₹ 12,00,00,000 as working capital, working capital is financed by cash credit facility provided by its lender bank @ 11.50% p.a. Division W has been given a profit target of ₹ 2,50,00,000 for the year.

Division B has found two other suppliers C Ltd and H Ltd. who are agreed to supply product Z.

Division B has requested a quotation for 40,000 units of product Z from Division W.

**Required**

- (i) Calculate the transfer price per unit of product Z that Division W should quote in order to meet target profit for the year.
- (ii) Calculate the two prices Division W would have to quote to Division B, if it became XWB Ltd. policy to quote transfer prices based on opportunity costs.

**Balanced Score Card**

10. Star Telecom Ltd. is a leading cellular service provider having a global presence. It aims to be the most innovative and trusted telecom company in the world. To achieve this aim, it is constantly working on its overall functioning. It is trying to adopt best managements practices in the world. Following are some information related to the company's performance for a particular period:

| Particulars                                | Current Year | Base Year | Target                |
|--------------------------------------------|--------------|-----------|-----------------------|
| Operating Ratio                            | 60%          | 54%       | Reduce it to 50%      |
| Average Revenue <i>per user</i>            | ₹ 225        | ₹ 210     | Increase it to ₹250   |
| Unresolved Consumer Complaints             | 27,500       | 25,000    | Reduce it by 20%      |
| Customer Relationship Centres              | 280          | 200       | Take the total to 250 |
| Employee Coverage under Training Programme | 10%          | 8%        | At least 15%          |

Evaluate the performance of the company using Balance Scorecard approach.

**Linear Programming and Transportation**

11. Identify three Similarities and three Differences between Linear Programming Model and Transportation Model.

**Assignment and Transportation**

12. EXPLAIN following statement-

*“Assignment problem is special case of transportation problem; it can also be solved by transportation methods”*

**PERT and CPM**

13. State the Validity of following statements along with the reasons:
- (i) Two activities have common predecessor and successor activities. So, they can have common initial and final nodes.
  - (ii) In respect of any activity whether real or dummy, the terminal node should bear a number higher than the initial node number.

- (iii) The difference between the latest event time and the earliest event time is termed as free float.
- (iv) For every critical activity in a network, the earliest start and the earliest finish time as well as the latest finish time and the latest start time are the same.
- (v) The optimal duration of a project is the minimum time in which it can be completed.
- (vi) Resource leveling aims at smoothening of the resource usage rate without changing the project duration.

**Simulation**

14. Finance Controller of Dunk Limited has drawn the following projections with probability distribution:

| Raw Material |             | Wages & Other Variable Overheads |             | Sales    |             |
|--------------|-------------|----------------------------------|-------------|----------|-------------|
| ₹ in 000     | Probability | ₹ in 000                         | Probability | ₹ in 000 | Probability |
| 08 – 10      | 0.2         | 11 – 13                          | 0.3         | 34 – 38  | 0.1         |
| 10 – 12      | 0.3         | 13 – 15                          | 0.5         | 38 – 42  | 0.3         |
| 12 – 14      | 0.3         | 15 – 17                          | 0.2         | 42 – 46  | 0.4         |
| 14 – 16      | 0.2         |                                  |             | 46 – 50  | 0.2         |

Opening cash balance is ₹ 40,000 and fixed cost is estimated at ₹ 15,000 per month.

**Required**

Simulate cash flow projection and expected cash balance at the end of the sixth month. Use the following single digit random numbers.

|                                  |             |
|----------------------------------|-------------|
| Raw Material                     | 4 3 1 0 4 6 |
| Wages & Other Variable Overheads | 2 7 9 1 8 9 |
| Sales                            | 0 6 6 0 2 8 |

**Learning Curve – Sensitivity Analysis**

15. Z-Parts Inc., USA based firm, has just invented a new part 'Z-20'. New part has a budgeted total profit of ₹ 75,000 from the first 256 parts. The time taken to produce the first part was 112.50 hours. The labour rate is ₹ 20 per hour. A 90% learning curve is expected to apply indefinitely.

**Required**

Calculate the sensitivity of the budgeted total profit from the first 256 parts to changes in the learning rate.



## SUGGESTED ANSWERS/HINTS

## 1. Break Even Units

1. 
$$\frac{[\text{Fixed Costs} + (\text{Setup Cost} \times \text{Setups}) + (\text{Engineering Cost} \times \text{Engineering Hours})]}{(\text{Sale Price} - \text{Variable Cost})}$$

$$= \frac{[36,500 + (\text{₹ } 225 \times 40) + (\text{₹ } 10 \times 250)]}{(\text{₹ } 5 - \text{₹ } 2.5)}$$

$$= 19,200 \text{ units}$$
2. 
$$\frac{[\text{Fixed Costs} + (\text{Setup Cost} \times \text{Setups}) + (\text{Engineering Cost} \times \text{Engineering Hours})]}{(\text{Sale Price} - \text{Variable Cost})}$$

$$= \frac{[36,500 + (\text{₹ } 150 \times 40) + (\text{₹ } 10 \times 215)]}{(\text{₹ } 5 - \text{₹ } 2.5)}$$

$$= 17,860 \text{ Units}$$

2. (i) **Invalid:** Kaizen Costing is the system of cost reduction procedures which involves making small and continuous improvements to the production processes rather than innovations or large-scale investment.
- (ii) **Valid:** The training of employees is very much a long-term and ongoing process in the Kaizen costing approach. Training enhances the abilities of employees.
- (iii) **Invalid:** Kaizen costing approach involves everyone from top management level to the shop floor employees. Every employee's active participation is a must requirement.
- (iv) **Invalid:** Though the aim of Kaizen Costing is to reduce the cost but at the same time it also aims to maintain the quality. Kaizen costing also aims to bring the clarity in roles and responsibilities for all employees.

## 3. Workings

## Statement Showing Variable Manufacturing Cost per unit

| Particulars of Costs                         | ₹ / unit |
|----------------------------------------------|----------|
| Sales                                        | 79,600   |
| Less: Contribution (40%)                     | 31,840   |
| Variable Cost                                | 47,760   |
| Less: Variable Selling Costs (₹79,600 × 0.1) | 7,960    |
| Variable Manufacturing Cost                  | 39,800   |

## Statement Showing Expected Profit

| Particulars of Costs | ('000) ₹ / unit |           |
|----------------------|-----------------|-----------|
|                      | 500 units       | 750 units |
| Sales                | 39,800          | 52,200    |

|                             |                           |                           |
|-----------------------------|---------------------------|---------------------------|
|                             | (₹79,600 × 500)           | (₹69,600 × 750)           |
| Less: Variable Mfg. Cost    | 19,900<br>(₹39,800 × 500) | 29,850<br>(₹39,800 × 750) |
| Less: Variable Selling Cost | 3,980<br>(₹39,800 × 0.1)  | 5,220<br>(₹52,200 × 0.1)  |
| Add: Salvage Value          | 625                       | 900                       |
| Less: Cost of Plant         | 3,500                     | 5,200                     |
| Net Profit                  | 13,045                    | 12,830                    |

Development cost is sunk and is not relevant.

Advice---

Based on the above 'Expected Profit' statement which is purely based on *financial considerations* firm may go for high price – low volume i.e. 500 units level. However, *non-financial considerations* are also given due importance as they account for actions that may not contribute directly to profits in the short run but may contribute significantly to profits in long run. Here, it is important to note that life cycle of product is two years and there is no significant difference between the profits at both levels. In this scenario firm may opt the plant having high capacity not only to increase its market share but also to establish a long term brand image.

4. (i) **Invalid:** The concepts, tools and techniques of value chain analysis apply to organizations which produce and sell a product and also to organizations which provide a service.
  - (ii) **Invalid:** Procurement activities are included in the support activities rather than primary activities.
  - (iii) **Invalid:** Value chain analysis in the strategic framework consists of multiple cost drivers concept. In value chain analysis, a set of unique cost drivers is identified for each value activity instead of single cost driver application at the overall firm level. Multiple cost drivers may be classified into Structural drivers and Executional drivers.
5. (i) **Impact of Management Consultant's Plan on Profit of the IHCL**

**Indraprastha Health Care Ltd.  
Statement Showing Cost Benefit Analysis**

| Particulars                                                                                                                 | ₹         |
|-----------------------------------------------------------------------------------------------------------------------------|-----------|
| Cost:                                                                                                                       |           |
| Incremental Cost <i>due to</i> Increased Readmission                                                                        | 25,00,000 |
| Benefit:                                                                                                                    |           |
| Saving in General Variable Cost <i>due to</i> Reduction in Patient Days<br>[15,000 Patients × (2.5 Days – 2.0 Days) × ₹500] | 37,50,000 |

|                                                            |           |
|------------------------------------------------------------|-----------|
| Revenue from Increased Readmission (300 Patients × ₹4,500) | 13,50,000 |
| Incremental Benefit                                        | 26,00,000 |

**(ii) Comment**

Primary goal of investor-owned firms is shareholder wealth maximization, which translates to stock price maximization. Management consultant's plan is looking good for the IHCL as there is a positive impact on the profitability of the company (refer Cost Benefit Analysis).

Also IHCL operates in a competitive environment so for its survival, it has to work on plans like above.

But there is also the second side of a coin that cannot also be ignored i.e. Indraprastha values and business ethics. Discharging patients before their full recovery will add discomfort and disruption in their lives which cannot be quantified into money. There could be other severe consequences as well because of this practice. For gaining extra benefits, IHCL cannot play with the life of patients. It would put a question mark on the business ethics of the IHCL.

May be IHCL would be able to earn incremental profit due to this practice in *short run* but it will tarnish the image of the IHCL which would hurt profitability in the *long run*.

So, before taking any decision on this plan, IHCL should analyze both *quantitative as well as qualitative factors*.

6. Following acceptance by early innovators, conventional consumers start following their lead. New competitors are likely to now enter the market attracted by the opportunities for large scale production and profit. 'S' may wish to discourage competitors from entering the market by lowering the price and thereby lowering the unit profitability. The price needs to be lowered so that the product becomes attractive to different market segments thus increasing demand to achieve the growth in sales volume. Strategies at this stage may include the following
  - (i) Improving quality and adding new features such as Data Theft Protection, Parental Control, Web Protection, Improved Scan Engine, Anti Spyware, Anti Malware etc.
  - (ii) Sourcing new market segments/ distribution channels.
  - (iii) Changing marketing strategy to increase demand.
  - (iv) Lowering price to attract price-sensitive buyers.
7. Discretionary costs are those that are incurred, typically each year, in an amount that is approved as part of the normal budget process. However, there is no clear relationship between the volume of services and the amount of cost that must be incurred. Manager must decide and justify the level that is deemed to be appropriate. This justification is to be made afresh without making reference to previous level of spending in his/her department.

Zero based budgeting is undoubtedly most effective in terms of discretionary costs. The bottom line of a zero based budgeting is that it is important to understand what types of objectives are being accomplished by discretionary cost centers and what resources being devoted to accomplishing various objectives. This will allow a prioritization, so that organization can evaluate the likely impact of substantial increase or decrease in the resources allocated to the discretionary center.

Accordingly, ZBB has extensive potential application to the division T, A and RD.

## 8. Working for Finding – Missing Figures

$$\begin{aligned}\text{Cost Variance}_A &= 0 \\ \text{Cost Variance}_{(A+B)} &= ₹ 1,300 \text{ (A)} \\ \text{Yield Variance}_{(A+B)} &= ₹ 270 \text{ (A)}\end{aligned}$$

### Standard Cost and Actual Cost (Incomplete Information)

| Raw Material | Standard Data   |                |                      | Actual Data     |                |                      |
|--------------|-----------------|----------------|----------------------|-----------------|----------------|----------------------|
|              | Qty. (Kg.) [SQ] | Price (₹) [SP] | Amount (₹) [SQ x SP] | Qty. (Kg.) [AQ] | Price (₹) [AP] | Amount (₹) [AQ x AP] |
| A            | ???             | 24             | ???                  | ???             | 30             | ???                  |
| B            | ???             | 30             | ???                  | 70              | ???            | ???                  |
| Total        | ???             |                | ???                  | ???             |                | ???                  |

$$\text{Material Cost Variance}_A = \text{Standard Cost} - \text{Actual Cost}$$

$$\Rightarrow 0 = (SQ_A \times ₹ 24 - AQ_A \times ₹ 30)$$

$$\Rightarrow SQ_A = 1.25 AQ_A$$

$$\text{Material Yield Variance}_{(A+B)} = \text{Average Standard Price per unit of Standard Mix} \times [\text{Total Standard Quantity (units)} - \text{Total Actual Quantity (units)}]$$

$$\Rightarrow ₹ 270 \text{ (A)} = \left( \frac{₹ 24 \times SQ_A + ₹ 30 \times SQ_B}{SQ_A + SQ_B} \right) \times [(SQ_A + SQ_B) - (AQ_A + 70)]$$

$$SQ_A = SQ_B \text{ as Standard Mix is in ratio } 1:1$$

$$\Rightarrow ₹ 270 \text{ (A)} = \left( \frac{₹ 24 \times SQ_A + ₹ 30 \times SQ_A}{SQ_A + SQ_A} \right) \times [(SQ_A + SQ_A) - (AQ_A + 70)]$$

$$\Rightarrow ₹ 270 \text{ (A)} = 27 \times [2 \times SQ_A - (AQ_A + 70)]$$

$$\Rightarrow ₹ 270 \text{ (A)} = 27 \times [2 \times 1.25 AQ_A - (AQ_A + 70)]$$

$$\Rightarrow AQ_A = 40 \text{ Kg.}$$

$$\text{As } SQ_A = 1.25 AQ_A$$

$$\begin{aligned}
 &= 1.25 \times 40 \text{ Kg.} \\
 &= 50 \text{ Kg.} \\
 \text{As } SQ_B &= SQ_A \\
 &= 50 \text{ Kg.} \\
 \text{Cost Variance } (A+B) &= \text{Standard Cost} - \text{Actual Cost} \\
 \Rightarrow 1,300 \text{ (A)} &= (50 \text{ Kg.} \times ₹ 24 + 50 \text{ Kg.} \times ₹ 30) - (40 \text{ Kg.} \times ₹ 30 + 70 \text{ Kg.} \times AP_B) \\
 \Rightarrow AP_B &= ₹ 40
 \end{aligned}$$

### Standard Cost and Actual Cost (Complete Information)

| Raw Material | Standard Data      |                   |                         | Actual Data        |                   |                         | Std. Cost of Actual Qty. (₹)<br>[AQ x SP] |
|--------------|--------------------|-------------------|-------------------------|--------------------|-------------------|-------------------------|-------------------------------------------|
|              | Qty. (Kg.)<br>[SQ] | Price (₹)<br>[SP] | Amount (₹)<br>[SQ x SP] | Qty. (Kg.)<br>[AQ] | Price (₹)<br>[AP] | Amount (₹)<br>[AQ x AP] |                                           |
| A            | 50                 | 24                | 1,200                   | 40                 | 30                | 1,200                   | 960                                       |
| B            | 50                 | 30                | 1,500                   | 70                 | 40                | 2,800                   | 2,100                                     |
| Total        | 100                |                   | 2,700                   | 110                |                   | 4,000                   | 3,060                                     |

### Computation of Variances

**Material Cost Variance** = Standard Cost – Actual Cost

$$= SQ \times SP - AQ \times AP$$

$$(A) = ₹ 1,200 - ₹ 1,200$$

$$= ₹ 0$$

$$(B) = ₹ 1,500 - ₹ 2,800$$

$$= ₹ 1,300 \text{ (A)}$$

$$\text{Total} = ₹ 0 + ₹ 1,300 \text{ (A)}$$

$$= ₹ 1,300 \text{ (A)}$$

**Material Price Variance** = Standard Cost of Actual Quantity – Actual Cost

$$= AQ \times SP - AQ \times AP$$

Or

$$= AQ \times (SP - AP)$$

$$(A) = 40 \text{ Kg.} \times (₹ 24.00 - ₹ 30.00)$$

$$= ₹ 240 \text{ (A)}$$

|                                |       |   |                                                                                                                                         |         |
|--------------------------------|-------|---|-----------------------------------------------------------------------------------------------------------------------------------------|---------|
|                                | (B)   | = | 70 Kg. × (₹ 30.00 – ₹ 40.00)                                                                                                            |         |
|                                |       | = | ₹ 700 (A)                                                                                                                               |         |
|                                | Total | = | ₹ 240 (A) + ₹ 700 (A)                                                                                                                   |         |
|                                |       | = | ₹ 940 (A)                                                                                                                               |         |
| <b>Material Usage Variance</b> |       | = | Standard Cost of Standard Quantity for Actual Output –<br>Standard Cost of Actual Quantity                                              |         |
|                                |       | = | SQ × SP – AQ × SP                                                                                                                       |         |
|                                |       |   | Or                                                                                                                                      |         |
|                                |       | = | SP × (SQ – AQ)                                                                                                                          |         |
|                                | (A)   | = | ₹ 24 × (50 Kg. – 40 Kg.)                                                                                                                |         |
|                                |       | = | ₹ 240 (F)                                                                                                                               |         |
|                                | (B)   | = | ₹ 30 × (50 Kg. – 70 Kg.)                                                                                                                |         |
|                                |       | = | ₹ 600 (A)                                                                                                                               |         |
|                                | Total | = | ₹ 240 (F) + ₹ 600 (A)                                                                                                                   |         |
|                                |       | = | ₹ 360 (A)                                                                                                                               |         |
| <b>Material Mix Variance</b>   |       | = | Total Actual Quantity (units) × (Average Standard Price<br>Per unit of Standard Mix – Average Standard Price per<br>unit of Actual Mix) |         |
|                                |       | = | 110 Kg. × $\left( \frac{₹ 2,700}{100 \text{ Kg.}} - \frac{₹ 3,060}{110 \text{ Kg.}} \right)$                                            |         |
|                                |       | = | ₹ 90 (A)                                                                                                                                |         |
| <b>Material Yield Variance</b> |       | = | Average Standard Price per unit of Standard Mix ×<br>[Total Standard Quantity (units) – Total Actual Quantity<br>(units)]               |         |
|                                |       | = | $\left( \frac{₹ 2,700}{100 \text{ Kg.}} \right) \times (100 \text{ Kg.} - 110 \text{ Kg.})$                                             |         |
|                                |       | = | ₹ 270 (A)                                                                                                                               | (Given) |
| Standard Output                |       | = | Standard Input – Standard Loss                                                                                                          |         |
|                                |       | = | 100 Kg. – 10 Kg.                                                                                                                        |         |
|                                |       | = | 90 Kg.                                                                                                                                  |         |
| Actual Output                  |       | = | 90 Kg.                                                                                                                                  |         |

(Actual Output and Standard Output are always equal numerically in any Material Variance Analysis)

9. (i) **Transfer Price per unit of Product Z that Division W Should Quote in order to meet Target Profit**

Quotation for the 40,000 units of product Z should be such that meet Division W's target profit and interest cost on working capital. Therefore the minimum quote for product Z will be calculated as follows:

| Particulars                                                                                   | Amount (₹)  |
|-----------------------------------------------------------------------------------------------|-------------|
| Target Profit (given for the year)                                                            | 2,50,00,000 |
| Add: Interest Cost on Working Capital (₹12,00,00,000 @11.5%)                                  | 1,38,00,000 |
| Required Profit                                                                               | 3,88,00,000 |
| Add: Fixed Overhead                                                                           | 4,00,00,000 |
| Target Contribution                                                                           | 7,88,00,000 |
| Less: Contribution Earned --- External Sales<br>{60,000 units × (₹2,500 – ₹1,600)}            | 5,40,00,000 |
| Contribution Required – Internal Sales                                                        | 2,48,00,000 |
| Contribution per unit of Product Z (₹2,48,00,000 ÷ 40,000 units)                              | 620         |
| Transfer Price of Product Z to Division B<br>(Variable Cost per unit + Contribution per unit) | 2,220       |

(ii) **The Two Transfer Prices Based on Opportunity Costs**

For the 30,000 units (i.e. maximum capacity – maximum external market demand) at variable cost of production i.e. ₹1,600 per unit.

For the next 10,000 units (i.e. external market demand – maximum possible sale) at market selling price i.e. ₹2,500 per unit.

10. The balanced scorecard is a method which displays organisation's performance into four dimensions namely financial, customer, internal and innovation. The four dimensions acknowledge the interest of shareholders, customers and employees taking into account of both long-term and short-term goals. The detailed analysis of performance of the company using Balance Scorecard approach as follows:

(i) **Financial Perspective:** Operating ratio and average revenue will be covered in this prospective.

Company is unable to achieve its target of reducing operating ratio to 50% instead it has increased to 60%. Company is required to take appropriate steps to control and manage its operating expenses. Average revenue per user has increased from ₹ 210 to ₹ 225 but remains short of targeted ₹ 250. This is also one of the reasons

of swelled operating ratio. Company can boost up its average revenue per user either by increasing the price of its services or by providing more paid value added services.

- (ii) **Customer Perspective:** Service complaints will be covered under this perspective. The company had set a target of reducing unresolved complaints by 20% instead unresolved complaints have risen by 10%  $[(27,500-25,000)/(25,000) \times 100]$ . It shows dissatisfaction is increasing among the consumers which would adversely impact the consumer's general perception about the company and company may lose its consumers in long run.
- (iii) **Internal Business Perspective:** Establishing customer relationship centres will be covered under this perspective. Company has established 80 relationship centres in the current period exceeding its target of 50 (250-200) to cater to the needs of existing consumers as well as soliciting new consumers. This shows the seriousness of the company towards the consumer satisfaction and would help them in the long run.
- (iv) **Learning and Growth Perspective:** Employee training programmes are covered under this perspective.

Company had set a target to cover at least 15% employee under its training programmes but covered only 10%. This could hurt capabilities of the employees which are needed for long term growth of the organisation necessary to achieve the objectives set in the previous three perspectives. People or the Indraprastha resource of the company is one of the three principle sources where organisational learning and growth comes.

## 11. Similarities

- (i) Both the models have an objective function.
- (ii) Both models' objective functions are linear.
- (iii) Both the models require non-negativity constraints.

## Differences

- (i) The general linear programming problem may be of *maximization* or *minimization* type, whereas, transportation problem predominately deals with *minimization* problem.
- (ii) A general linear programming problem is solved by using *simplex algorithm*; whereas transportation problem is solved by using *transportation algorithm* (as simplex method is less appropriate to solve).
- (iii) The resources, for which the structural constraints are built up is *homogeneous* in transportation model; whereas in Linear Programming model they are *heterogeneous*.



12. The assignment problem is special case of transportation problem; it can also be solved by transportation method. But the solution obtained by applying this method would be severely degenerate. This is because the optimality test in the transportation method requires that there must be  $m+n-1$  allocations/assignments. But due to the special structure of assignment problem of order  $n \times n$ , any solution cannot have more than  $n$  assignments. Thus, the assignment problem is naturally degenerate. In order to remove degeneracy,  $n-1$  number of dummy allocations will be required in order to proceed with the transportation method. Thus, the problem of degeneracy at each solution makes the transportation method computationally inefficient for solving an assignment problem.



$$(*) \quad \underline{m+n-1} - n \Rightarrow \underline{n+n-1} - n \Rightarrow \underline{2n-1} - n \Rightarrow \underline{n-1}$$

13. (i) **Invalid**

Reason: As per the rules of network construction, parallel activities between two events, without intervening events, are prohibited. Dummy activities are needed when two or more activities have same initial and terminal events. Dummy activities do not consume time or resources.

(ii) **Valid**

Reason: As per the conventions adopted in drawing networks, the head event or terminal node always has a number higher than that of initial node or tail event.

(iii) **Invalid**

Reason: The difference between the latest event time and the earliest event time is termed as slack of an event. Free float is determined by subtracting head event slack from the total float of an activity.

(iv) **Invalid**

Reason: For every critical activity in a network, the earliest start time and the latest start time is same and also the earliest finish time and the latest finish time is same.

(v) **Invalid**

Reason: The optimum duration is the time period in which the total cost of the project is minimum.

(vi) **Valid**

Reason: Resource leveling is a network technique used for reducing the requirement of a particular resource due to its paucity or insufficiency within a constraint on the project duration. The process of resource leveling utilizes the large floats available on non-critical activities of the project and cuts down the demand of the resource.

## 14. Allocation of Random Numbers

| Raw Material |            |             | Wages &<br>Other Variable Overheads |            |             | Sales     |            |             |
|--------------|------------|-------------|-------------------------------------|------------|-------------|-----------|------------|-------------|
| Mid Point    | Cum. Prob. | Random Nos. | Mid Point                           | Cum. Prob. | Random Nos. | Mid Point | Cum. Prob. | Random Nos. |
| 9            | 0.2        | 0 – 1       | 12                                  | 0.3        | 0 – 2       | 36        | 0.1        | 0           |
| 11           | 0.5        | 2 – 4       | 14                                  | 0.8        | 3 – 7       | 40        | 0.4        | 1 – 3       |
| 13           | 0.8        | 5 – 7       | 16                                  | 1.0        | 8 – 9       | 44        | 0.8        | 4 – 7       |
| 15           | 1.0        | 8 – 9       |                                     |            |             | 48        | 1.0        | 8 – 9       |

## Simulation Table

(₹ in 000)

| Month | Raw Material | Wages &<br>Other V.O | Sales | Fixed Cost | Net Cash Flow | Cash Balancing<br>(Opening ₹ 40 thousand) |
|-------|--------------|----------------------|-------|------------|---------------|-------------------------------------------|
| 1     | 11           | 12                   | 36    | 15         | -2            | 38                                        |
| 2     | 11           | 14                   | 44    | 15         | +4            | 42                                        |
| 3     | 9            | 16                   | 44    | 15         | +4            | 46                                        |
| 4     | 9            | 12                   | 36    | 15         | 0             | 46                                        |
| 5     | 11           | 16                   | 40    | 15         | -2            | 44                                        |
| 6     | 13           | 16                   | 48    | 15         | +4            | <b>48</b>                                 |

15. Cumulative Average Time for 256 parts = 48.43 hrs.\*  
 $[112.50 \times (0.90^8)]$
- Total Time for 256 parts = 12,398.08 hrs.  
 $[48.43 \text{ hrs.} \times 256 \text{ parts}]$
- Total Labour Cost of 256 parts = ₹ 2,47,961.60  
 $[12,398.08 \text{ hrs.} \times ₹ 20]$
- Revised Labour Cost for zero profit = ₹ 3,22,961.60  
 $[₹ 2,47,961.60 + ₹ 75,000]$
- Total Time for 256 parts (Revised) = 16,148.08 hrs.  
 $[₹ 3,22,961.60 / ₹ 20]$
- Cumulative Average Time for 256 parts (Rev.) = 63.08 hrs.  
 $[16,148.08 / 256]$

The usual learning curve model is

$$y = ax^b$$

Where

- $y$  = Cumulative Average Time per part for  $x$  parts  
 $a$  = Time required for first part  
 $x$  = Cumulative number of parts  
 $b$  = Learning coefficient ( $\log r / \log 2$ )

Accordingly

$$\begin{aligned}
 \Rightarrow 63.08 &= 112.50 \times (256)^b \\
 \Rightarrow 0.5607 &= 2^{8b} \\
 \Rightarrow \log 0.5607 &= \log 2^{8b} \\
 \Rightarrow \log 0.5607 &= 8 \times b \times \log 2 \\
 \Rightarrow \log 0.5607 &= 8 \times \frac{\log r}{\log 2} \times \log 2 \\
 \Rightarrow \log 0.5607 &= 8 \log r \\
 \Rightarrow \log 0.5607 &= \log r^8 \\
 \Rightarrow 0.5607 &= r^8 \\
 \Rightarrow r &= \sqrt[8]{0.5607} \\
 \Rightarrow r &= 0.9302 \\
 \text{Learning Rate (r)} &= 93.02\%.
 \end{aligned}$$

Therefore

$$\begin{aligned}
 \text{Sensitivity} &= 3.02/90 \\
 &= 3.36\%
 \end{aligned}$$



Students may also take 48.38 hrs. ( $112.50 \times 0.43$ )

**PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING**  
**QUESTIONS**

**Shut Down or Continue**

1. If AICI Limited operates its plant at normal capacity it produces 2,00,000 units from the plant 'C'. The unit cost of manufacturing at normal capacity is as under:

|                        | ₹        |
|------------------------|----------|
| Direct material.....   | 65       |
| Direct labour.....     | 30       |
| Variable overhead..... | 33       |
| Fixed overhead.....    | <u>7</u> |
|                        | 135      |

Direct labour cost represents the compensation to highly-skilled workers, who are permanent employees of the company. The company cannot afford to lose them. One labour hour is required to complete one unit of the product.

The company sells its product for ₹ 200 per unit with variable selling expenses of ₹ 16 per unit. The company estimates that due to economic down turn, it will not be able to operate the plant at the normal capacity, at least during the next year. It is evaluating the feasibility of shutting down the plant temporarily for one year.

If it shuts down the plant, the fixed manufacturing overhead will be reduced to ₹ 1,25,000. The overhead costs are incurred at a uniform rate throughout the year. It is also estimated that the additional cost of shutting down will be ₹ 50,000 and the cost of re-opening will be ₹ 1,00,000.

**Required**

Calculate the minimum level of production at which it will be economically beneficial to continue to operate the plant next year if 50% of the labour hours can be utilized in another activity, which is expected to contribute at the rate of ₹ 40 per labour hour. The additional activity will relate to a job which will be off-loaded by a sister company only if the company decides to shut down the plant.

(Assume that the cost structure will remain unchanged next year. Ignore income tax and time value of money)

Labour Related Decision

2. If DBC Ltd. is producing a component called 'DBC'. Estimated costs are:

|              | Fixed Cost per year<br>(₹ '000) | Variable Cost per 'DBC'<br>(₹) |
|--------------|---------------------------------|--------------------------------|
| Production   | 32,000                          | 3,600                          |
| Distribution | 2,000                           | 200                            |

Direct labour costs are 40% of the variable production costs. In the production department machining and assembling of 'DBC', 90 men work 8 hours per day for 300 days in a year. Each worker can machine and assemble 1 'DBC' per uninterrupted 180 minutes time frame. In each 8 hours working day, 20 minutes are allowed for coffee-break, 30 minutes on an average for training and 22 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters.

DBC Ltd. has been facing industrial relations problem as the workers of company have a very strong union. Company is faced with the possibility of a strike by direct production workers engaged on the assembly of 'DBC'. The trade union is demanding an increase of 15%, back-dated from the beginning of financial year, but the company expects that if a strike does take place, it will last 25 Days after which the union will settle for an increase of 10% similarly back-dated. The only product of the company is being sold at ₹6,000.

If the strike takes place, Sales of 1,300 'DBC' would be lost. The balance that would ordinarily have been produced during the strike period could, however be sold, but these 'DBC' would have to be made up in overtime working which would be at an efficiency rate of 90% of normal. This would entail additional fixed cost of ₹1,00,000 and wage payments at time and one-half.

Required

Give necessary advice to the management to allow the strike to go ahead or to accept the union's demand.

Sales or Further Processing Decision

3. If A process industry unit manufactures three joint products: L, B and G. G has no realisable value unless it undergoes further processing after the point of separation. The cost details of G are as follows:

|                          |      |
|--------------------------|------|
|                          | p.u. |
|                          | ₹    |
| Upto point of separation |      |
| Marginal cost.....       | 30   |
| Fixed Cost.....          | 20   |

After point of separation

|                    |          |
|--------------------|----------|
| Marginal cost..... | 15       |
| Fixed cost.....    | <u>5</u> |
|                    | 70       |

G can be sold at ₹ 37 per unit and no more.

**Required**

- Would you recommend production of G?
- Would your recommendation be different if L, B and G are not joint products?

**CVP Analysis**

- The profit for the year of Garena Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

|                         |           |
|-------------------------|-----------|
| Sales.....              | ₹5,00,000 |
| Direct Materials.....   | ₹2,50,000 |
| Direct Labour.....      | ₹1,00,000 |
| Variable Overheads..... | ₹40,000   |
| Capital Employed.....   | ₹4,00,000 |

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

**Required**

Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

**Cost Plus/ Mark-up Pricing**

- JTC Ltd. is specialists in the manufacture of sports goods. They manufacture croquet mallets but purchase the wooden balls, iron arches and stakes required to complete a croquet set.

Mallets consist of a head and handle. Handles use 2.5 board feet per handle at ₹ 50 per board foot. Spoilage loss is negligible for the manufacture of handles. Heads frequently split and create considerable scrap.

A head requires 0.40 board feet of high quality lumber costing ₹ 60 per board foot. Spoilage normally works out to 20% of the completed heads. 4% of the spoiled heads can be salvaged and sold as scrap at ₹ 10 per spoiled head.

In the department machining and assembling the mallets, 6 men work 8 hours per day for 25 days in a month. Each worker can machine and assemble 12 mallets per uninterrupted 40 minutes time frame. In each 8 hours working day, 15 minutes are allowed for coffee-break, 8 minutes on an average for training and 9 minutes for supervisory instructions. Besides 10% of each day is booked as idle time to cover checking in and checking out changing operations, getting materials and other miscellaneous matters. Workers are paid at a comprehensive rate of ₹ 6 per hour.

The department is geared to produce 20,000 mallets per month and the monthly expenses of the department are as under:

|                                                  | (₹)    |
|--------------------------------------------------|--------|
| Finishing and painting of the mallets.....       | 20,000 |
| Lubricating oil for cutting machines.....        | 600    |
| Depreciation for cutting machine.....            | 1,400  |
| Repairs and maintenance.....                     | 200    |
| Power to run the machines.....                   | 400    |
| Plant Manager's salary.....                      | 9,400  |
| Other overheads allocated to the department..... | 60,000 |

### **Required**

As the mallets are machined and assembled in lots of 250, prepare a total cost sheet for one lot and advise the management on the selling price to be fixed per mallet in order to ensure a minimum 33.33% margin on the selling price.

### **Return on Investment Pricing**

6. The cost of production and sales of 80,000 units per annum of product 'I' are:

|                        |            |                     |            |
|------------------------|------------|---------------------|------------|
| Material.....          | ₹ 4,80,000 | Labour.....         | ₹ 1,60,000 |
| Variable Overhead..... | ₹ 3,20,000 | Fixed overhead..... | ₹ 5,00,000 |

The fixed portion of capital employed is ₹12 lacs and the varying portion is 50% of sales turnover.

### **Required**

Determine the selling price per unit to earn a return of 12% net on capital employed (net of Tax @ 40%).

### **Profit Maximisation Model**

7. APV Ltd. has developed a new product which is about to be launched into the market. The variable cost of selling the product is ₹ 17 per unit. The marketing department has estimated that at a sale price of ₹ 25, annual demand would be 10,000 units. However, if

the sale price is set above ₹ 25, sales demand would fall by 500 units for each ₹ 0.50 increase above ₹ 25. Similarly, if the price is below ₹ 25, demand would increase by 500 units for each ₹ 0.50 stepped reduction in price below ₹ 25.

### Required

Determine the price which would maximise APV Ltd.'s profit in the next year.

### Pricing Strategy

8. State the appropriate pricing policy in each of the following independent situations:
  - (i) 'W' is a new product for the company and the market and meant for large scale production and long term survival in the market. Demand is expected to be elastic.
  - (ii) 'X' is a new product for the company, but not for the market. B's success is crucial for the company's survival in the long term.
  - (iii) 'Y' is a new product to the company and the market. It has an inelastic market. There needs to be an assured profit to cover high initial costs and the usual sources of capital have uncertainties blocking them.
  - (iv) 'Z' is a perishable item, with more than 80% of its shelf life over.

### Budget – Ratio

9. Calculate from the following figures:
  - (i) Efficiency ratio,
  - (ii) Activity, Ratio and
  - (iii) Capacity Ratio:

Budgeted Production..... 528 units  
 Standard Hours per unit.....10  
 Actual Production.....450 units  
 Actual Working Hours..... 6,000

### Budget – Missing Figure

10. Following information are extracted from monthly budgets of JIT Ltd.

|                                    | November | December |
|------------------------------------|----------|----------|
| Beginning WIP Inventory            | 36,000   | ???      |
| Beginning Finished Goods Inventory | 44,000   | ???      |
| Variable Cost of Goods Sold        | 1,23,000 | ???      |
| Direct Material Usage              | 50,000   | 56,000   |
| Direct Labour                      | 53,100   | 69,000   |



|                                     |          |          |
|-------------------------------------|----------|----------|
| Variable Overhead                   | 25,000   | 29,000   |
| Variable Cost of Goods Manufactured | 1,07,500 | 1,15,900 |
| Ending WIP Inventory                | ???      | ???      |
| Ending Finished Goods Inventory     | ???      | 45,000   |

**Required**

Find out missing figures.

**Standard Costing – Profit Reconciliation**

11. HKT Ltd. has provided the following summarized results for two years:

|                    | Year ended<br>(₹ In lacs) |           |
|--------------------|---------------------------|-----------|
|                    | 31-03-2015                | 31-3-2016 |
| Sales              | 3,000                     | 3,277.50  |
| Material           | 2,000                     | 2,357.50  |
| Variable overheads | 500                       | 525.00    |
| Fixed overheads    | 300                       | 367.50    |
| Profit             | 200                       | 27.50     |

During the year ended 31-3-2016 sale price has increased by 15% whereas material and overhead prices have increased by 15% and 5% respectively.

**Required**

- Analyse the variances of revenue and each element of cost over the year in order to bring out the reasons for the change in profit.
- Present a profit reconciliation statement starting from profits in 2014-15 showing the factors responsible for the change in profits in 2015-16.

*Note – Consider ‘Contribution Variances’ for solving this question.*

**Balanced Scorecard**

12. Classify the following measures under appropriate categories in a Balanced Scorecard for a banking company which excels in its home loan products:

- A new product related to life insurance is being considered for a tie up with the successful housing loan disbursements.  
e.g. every housing loan applicant to be advised to take a life policy or compelled to take a fire insurance policy.

- (ii) How different sectors of housing loans with different interest rates have been sanctioned, their volumes of growth in the past 4 quarters.
- (iii) How many days are taken to service a loan, how many loans have taken longer, what additional loans are to be released soon, etc.

### Linear Programming – Formulation

13. The owner of Fancy Goods Shop is interested to determine, how many advertisements to release in the selected three magazines A, B and C. His main purpose is to advertise in such a way that total exposure to principal buyers of his goods is maximized. Percentages of readers for each magazine are known. Exposure in any particular magazine is the number of advertisements released multiplied by the number of principal buyers. The following data are available:

| Particulars            | Magazines |        |        |
|------------------------|-----------|--------|--------|
|                        | A         | B      | C      |
| Readers                | 50,000    | 30,000 | 20,000 |
| Principal buyers       | 40%       | 30%    | 16%    |
| Cost per advertisement | ₹12,000   | ₹9,000 | ₹7,500 |

The budgeted amount is at the most ₹ 1.5 lakh for the advertisements. The owner has already decided that magazine A should have no more than 8 advertisements and that B and C each gets at least 4 advertisements.

#### Required

Formulate a Linear Programming model for this problem.

### Assignment Problem – Minimisation

14. A factory is going to modify of a plant layout to install four new machines  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$ . There are 5 vacant places P, Q, R, S and T available. Because of limited space machine  $X_2$  cannot be placed at R and  $X_3$  cannot be placed at P. The cost of locating machine to place in Rupees is shown below:

(₹)

|       | P  | Q  | R  | S  | T  |
|-------|----|----|----|----|----|
| $X_1$ | 9  | 11 | 15 | 10 | 11 |
| $X_2$ | 12 | 9  | -- | 10 | 9  |
| $X_3$ | -- | 11 | 14 | 11 | 7  |
| $X_4$ | 14 | 8  | 12 | 7  | 8  |

**Required**

Determine the optimal assignment schedule in such a manner that the total costs are kept at a minimum.

**PERT/ CPM**

15. The following table gives the activities in a construction project and the time duration of each activity:

| Activity | Predecessors | Normal Time (Days) |
|----------|--------------|--------------------|
| A        | ---          | 16                 |
| B        | ---          | 20                 |
| C        | A            | 8                  |
| D        | A            | 10                 |
| E        | B,C          | 6                  |
| F        | D,E          | 12                 |

**Required**

- Draw the activity network of the project.
- Find critical path.
- Find the total float and free-float for each activity.

**Learning Curve**

16. The Crocodile Ltd. makes mementos for offering chief guests and other dignitaries at functions. A customer wants 4 identical pieces of hand-crafted gifts for 4 dignitaries invited to its function.

For this product, Company estimates the following costs for the 1st unit of the product.

| Particulars of Costs                     | ₹ / unit |
|------------------------------------------|----------|
| Direct Variable Costs (excluding labour) | 1,000    |
| Direct Labour (20 hours @ ₹ 25 hour)     | 500      |

90 % learning curve ratio is applicable and one labourer works for one customer's order.

**Required**

- What is the price per piece to be quoted for this customer if the targeted contribution is ₹ 750 per unit?
- If 4 different labourers made the 4 products simultaneously to ensure faster delivery to the customer, can the price at (i) above be quoted? Why?

**Miscellaneous**

17. Indicate 6 activity drivers in respect of each of the following activity cost pools:
- Human Resources Cost
  - Accounting Costs
18. Which of the following statements are VALID in respect of flexible budgeting.
- A flexible budget is one which changes from year to year.
  - It is a budget which departmental heads can change at will.
  - It is a system of budgeting which will recast the budgets because of a change in fixed expenses.
  - It is a system of budgeting under which budgets are recast quickly for changes in the volume of activity.
  - It involves careful differentiation between fixed and variable expenses.
19. State whether the following statements are VALID or INVALID.
- When price reductions are introduced to increase sales revenue, the revenue line will be a straight line.
  - In fixing selling prices, volume consideration should be taken into account so that fuller utilisation of plant capacity is achieved.
  - There is no price policy in perfect competition.
  - The rate of return to be earned by factory should cover the risk involved in business.
  - Survival and progress of a firm depend on its ability to maintain and replace, whenever necessary, its fixed assets.

**SUGGESTED ANSWERS****1. Contribution *per unit***

| Particulars                                                                      | (₹) |
|----------------------------------------------------------------------------------|-----|
| Selling Price                                                                    | 200 |
| Variable Cost (₹ 65 + ₹ 33 + ₹ 16)                                               | 114 |
| Contribution per unit (Excluding direct labour, considered irrelevant and fixed) | 86  |

**Savings and Earnings if the Plant is Shut Down**

| Particulars                                       | (₹)       |
|---------------------------------------------------|-----------|
| Savings in Fixed Cost (₹ 14,00,000* – ₹ 1,25,000) | 12,75,000 |

|                                                                   |            |
|-------------------------------------------------------------------|------------|
| Contribution from Alternate Activity (₹ 40 × 50% of 2,00,000 hrs) | 40,00,000  |
| Shutting Down and Reopening Cost (₹ 50,000 + ₹100,000)            | (1,50,000) |
| Total                                                             | 51,25,000  |

\* [2,00,000 units × ₹ 7]

Indifference Point: ₹51,25,000 / ₹86 = 59,593 units

Minimum level of production to justify continuation = 59,594 units

**2. Alternative-1 with No Strike:** (Refer W.N.-2, 3)

Cost of Settlement is 15% Increase i.e. ₹216 per unit

Annual Cost of Settlement

$$= 54,000 \text{ units} \times ₹216$$

$$= ₹1,16,64,000$$

**Alternative 2 i.e. if Strike Goes Ahead:** (Refer W.N.-1, 2, 3)

| Extra Cost                                                                                                               | (₹)         |
|--------------------------------------------------------------------------------------------------------------------------|-------------|
| Annual Incremental Labour Cost (Ex. Strike Days Production)<br>[[54,000 units – (25Days × 180 units per Day)] × ₹144.00] | 71,28,000   |
| Loss of Contribution <i>due to loss of sales</i> [1,300 units × ₹ 2,200]                                                 | 28,60,000   |
| Incremental Labour Cost for Balance 3,200 units<br>[(25 Days × 180 units per Day) – 1,300 units] × ₹144.00]              | 4,60,800    |
| Overtime Premium [3,200 units × 1,584 × 0.5]                                                                             | 25,34,400   |
| Payment for Efficiency [3,200 units × 1/9 × 1,584 × 1.5]                                                                 | 8,44,800    |
| Additional Fixed Cost                                                                                                    | 1,00,000    |
|                                                                                                                          | 1,39,28,000 |

If there is no strike, it will yield a financial benefit of ₹ 22,64,000 (₹1,39,28,000 – ₹ 1,16,64,000). Management should accept union's demand.

**Working Note**

**(1) Statement Showing Contribution per unit of 'DBC'**

|                                        | (₹)   |
|----------------------------------------|-------|
| Selling Price                          | 6,000 |
| Less: Variable Costs:                  |       |
| Labour Cost                            | 1,440 |
| Production Ex. Wages (₹3,600 – ₹1,440) | 2,160 |

|              |       |
|--------------|-------|
| Distribution | 200   |
| Contribution | 2,200 |

**(2) Calculation of Labour Cost**

|                                                        |                          |
|--------------------------------------------------------|--------------------------|
| Direct Labour (40% of production costs of ₹3,600)      | = ₹1,440 <i>per unit</i> |
| With 15% Increase, Revised Labour Cost (₹1,440 + ₹216) | = ₹1,656                 |
| With 10% Increase, Revised Labour Cost (₹1,440 + ₹144) | = ₹1,584                 |

**(3) Statement Showing Budgeted Production**

|                                                                |               |
|----------------------------------------------------------------|---------------|
| Total Time in a Day: (8hrs. × 60 minutes)                      | = 480 minutes |
| Less: Idle Time                                                | = 48 minutes  |
| Coffee Break                                                   | = 20 minutes  |
| Instructions                                                   | = 22 minutes  |
| Training                                                       | = 30 minutes  |
| Productive Time <i>per day</i>                                 | = 360 minutes |
| Therefore, 'DBC' to be produced per man per day: (360/180 × 1) | = 2 units     |

Since 'DBC' are produced at the rate of 2 'DBC' per man day, so total yearly production will be 54,000 units (2 units × 90 men × 300 days) of 'DBC'



This problem has been solved by comparing 'Existing Situation' with both 'Alternatives (Strike or Non-Strike)' *independently*. However this problem can also be solved by comparing 'Alternatives (Strike or Non-Strike)' *only* and final answer would be the same. Students may also solve this problem by taking 'Total Approach' instead of 'Incremental Approach'.

3. (i) Cost incurred on Product 'G' *upto point of separation* is irrelevant for decision making as Product 'G' is a Joint Product. Joint Products are the result of same raw material & same process Operations.

Cost incurred *after point of separation* will be considered for decision making as *specifically* incurred for Product 'G'.

After further processing Product 'G' will *contribute* ₹17 per unit toward 'Joint Production Cost'.

Calculation is as follows

| Particulars                                 | Amount (₹) |
|---------------------------------------------|------------|
| Selling Price <i>per unit</i>               | 37.00      |
| Less: Cost after separation:                |            |
| Marginal Cost <i>per unit</i>               | 15.00      |
| Fixed Cost <i>per unit</i>                  | 5.00       |
| Contribution toward 'Joint Production Cost' | 17.00      |

Hence, *further processing* of Product 'G' is recommended.

- (ii) If Product 'G' is not a joint product with same cost structure. In this case there will be *negative contribution* on production of Product 'G'. The calculation is as follows→

| Particulars                     | Amount (₹) |
|---------------------------------|------------|
| Selling Price <i>per unit</i>   | 37.00      |
| Less: Marginal Cost (₹30 + ₹15) | 45.00      |
| Contribution                    | (8.00)     |

Hence, production of Product 'G' will not be recommended.

4.

**Statement Showing "Cost and Profit for the Next Year"**

| Particulars                   | Existing<br>Volume, etc. | Volume, Costs, etc.<br>after 10% Increase | Estimated Sale,<br>Cost, Profit, etc.* |
|-------------------------------|--------------------------|-------------------------------------------|----------------------------------------|
|                               | (₹)                      | (₹)                                       | (₹)                                    |
| Sale                          | 5,00,000                 | 5,50,000                                  | 5,72,000                               |
| Less: Direct Materials        | 2,50,000                 | 2,75,000                                  | 2,69,500                               |
| Direct Labour                 | 1,00,000                 | 1,10,000                                  | 1,07,800                               |
| Variable Overheads            | 40,000                   | 44,000                                    | 43,120                                 |
| Contribution                  | 1,10,000                 | 1,21,000                                  | 1,51,580                               |
| Less: Fixed Cost <sup>#</sup> | 60,000                   | 60,000                                    | 58,800                                 |
| Profit                        | 50,000                   | 61,000                                    | 92,780                                 |

(\*) for the next year after increase in selling price @ 4% and overall cost reduction by 2%.

(#) Fixed Cost       = Existing Sales – Existing Marginal Cost – 12.5% on ₹4,00,000  
                           = ₹5,00,000 – ₹3,90,000 – ₹50,000  
                           = ₹60,000

Percentage Profit on Capital Employed equals to 23.19%  $\left( \frac{₹92,780}{₹4,00,000} \times 100 \right)$

Since the Profit of ₹92,780 is more than 23% of capital employed, the proposal of the Sales Manager can be adopted.

5.

**JTC Ltd.**

**Cost Sheet of One Lot of 250 Croquet Mallets**

| <b>Computation of Total Cost:</b>                               |  | <b>(₹)</b> |
|-----------------------------------------------------------------|--|------------|
| Direct Material                                                 |  |            |
| Handles (2.5 feet × 250 units × ₹50)                            |  | 31,250     |
| Heads (1.20 × 250 × 0.40 × ₹60) [W.N.-1]                        |  | 7,200      |
| Less: Scrap Recovery (4% × 50 × ₹10)                            |  | (20)       |
| Direct Labour (8Hrs × ₹6 × 250 / 120) [W.N.-2]                  |  | 100        |
| Prime Cost                                                      |  | 38,530     |
| Factory & Other Overheads                                       |  |            |
| Variable, Finishing & Painting (20,000 × 250 / 20,000) [W.N.-3] |  | 250        |
| Fixed (₹72,000 × 250 / 18,000) [W.N.-4]                         |  | 1,000      |
| Total Cost                                                      |  | 39,780     |
| <b>Price Quotation:</b>                                         |  | <b>(₹)</b> |
| Cost per mallet (₹39,780 / 250 Units)                           |  | 159.12     |
| Add: Profit (50% on Cost)                                       |  | 79.56      |
| Selling Price                                                   |  | 238.68     |

**Working Notes**

- Since 20% of completed heads are spoiled, output of 1 unit requires input of 1.20 units (1 + 0.20); so, total heads processed, 300 (1.20 × 250), of which spoiled heads are 50.
- |                          |            |                    |
|--------------------------|------------|--------------------|
| Total Time in a day      | (8 × 60)   | 480 minutes        |
| Less: Idle Time          | 48 minutes |                    |
| Coffee Break             | 15 minutes |                    |
| Instructions             | 9 minutes  |                    |
| Training                 | 8 minutes  | <u>80 minutes</u>  |
| Productive Time per day: |            | <u>400 minutes</u> |



Therefore, mallets to be produced per man per day, 120 units ( $400/40 \times 12$ ).

Since mallets are produced at the rate of 120 mallets per man day, so total monthly production will be 18,000 mallets ( $120 \text{ units} \times 6 \text{ men} \times 25 \text{ days}$ ).

3. Finishing and painting overheads are assumed to be variable for the production of 20,000 mallets.
4. All the other expenses are fixed and are to be absorbed by 18,000 ( $120 \text{ units} \times 6 \text{ men} \times 25 \text{ Days}$ ) mallets of monthly production.
6. Return of 12% Net (after tax of 40%) on Capital Employed is equivalent to 20% (Gross) [ $12\% \div (1 - 0.4)$ ] on Capital Employed.

Let Selling Price per unit to be 'K'

Since Total Sales = Total Cost + Profit

$$80,000 K = 14,60,000 + 20\% (12,00,000 + 0.5 \times 80,000K)$$

$$\text{Or, } 80,000 K = 14,60,000 + 2,40,000 + 8,000K$$

$$\text{Or, } 72,000 K = 17,00,000$$

$$\text{Or, 'K' = } \frac{17,00,000}{72,000}$$

$$= ₹23.61$$

Hence Selling Price per unit will be ₹23.61.

#### 7. Statement of Total Contribution

| Sales Price<br>p.u.<br>(₹) | Variable<br>Cost p.u.<br>(₹) | Contribution<br>p.u.<br>(₹) | Sales Volume<br>(units)<br>(₹) | Total<br>Contribution<br>(₹) |
|----------------------------|------------------------------|-----------------------------|--------------------------------|------------------------------|
| (1)                        | (2)                          | (3) = (1) – (2)             | (4)                            | (5) = (3) × (4)              |
| 25.00                      | 17.00                        | 8.00                        | 10,000                         | 80,000                       |
| 24.50                      | 17.00                        | 7.50                        | 10,500                         | 78,750                       |
| 24.00                      | 17.00                        | 7.00                        | 11,000                         | 77,000                       |
| 25.50                      | 17.00                        | 8.50                        | 9,500                          | 80,750                       |
| <b>26.00</b>               | <b>17.00</b>                 | <b>9.00</b>                 | <b>9,000</b>                   | <b>81,000</b>                |
| 26.50                      | 17.00                        | 9.50                        | 8,500                          | 80,750                       |
| 27.00                      | 17.00                        | 10.00                       | 8,000                          | 80,000                       |
| 27.50                      | 17.00                        | 10.50                       | 7,500                          | 78,750                       |

From the above statement it is quite apparent that the contribution would be maximum at a sale price of ₹26 per unit and sales demand of 9,000 units.



This problem can also be solve by using '**Profit Maximisation**' model formula.

8.

| Situation |                                                                                                                                                                                                                      | Appropriate Pricing Policy                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| (i)       | 'W' is a new product for the company and the market and meant for large scale production and long term survival in the market. Demand is expected to be elastic.                                                     | Penetration Pricing                           |
| (ii)      | 'X' is a new product for the company, but not for the market. X's success is crucial for the company's survival in the long term.                                                                                    | Market Price or Price Just Below Market Price |
| (iii)     | 'Y' is a new product to the company and the market. It has an inelastic market. There needs to be an assured profit to cover high initial costs and the unusual sources of capital have uncertainties blocking them. | Skimming Pricing                              |
| (iv)      | 'Z' is a perishable item, with more than 80% of its shelf life over.                                                                                                                                                 | Any Cash Realizable Value*                    |

(\*) *this amount decreases every passing day.*

9. (i) Efficiency Ratio =  $\frac{\text{Standard Hours (for actual production)}}{\text{Actual Hours (worked)}} \times 100$
- $$= \frac{450 \text{ units} \times 10 \text{ hrs.}}{6,000 \text{ hrs.}} \times 100$$
- $$= 75\%$$
- (ii) Activity Ratio =  $\frac{\text{Standard Hours (for actual production)}}{\text{Budgeted Hours}} \times 100$
- $$= \frac{450 \text{ units} \times 10 \text{ hrs.}}{528 \text{ units} \times 10 \text{ hrs.}} \times 100$$
- $$= 85.23\%$$

$$\begin{aligned}
 \text{(iii) Capacity Ratio} &= \frac{\text{Actual Hours (worked)}}{\text{Budgeted Hours}} \times 100 \\
 &= \frac{6,000 \text{ hrs.}}{528 \text{ units} \times 10 \text{ hrs.}} \times 100 \\
 &= 113.64\%
 \end{aligned}$$

#### 10. Analysis of WIP Account

|                                           | November      | December      |
|-------------------------------------------|---------------|---------------|
| Opening WIP                               | 36,000        | <b>56,600</b> |
| Add: Direct Materials Usage               | 50,000        | 56,000        |
| Add: Direct Labor                         | 53,100        | 69,000        |
| Add: Variable Overhead                    | 25,000        | 29,000        |
| Total Inflow into WIP                     | 1,64,100      | 2,10,600      |
| Less: Variable Cost of Goods Manufactured | 1,07,500      | 1,15,900      |
| Ending WIP                                | <b>56,600</b> | <b>94,700</b> |

#### Analysis of Finished Goods Inventory Account

|                                  | November      | December      |
|----------------------------------|---------------|---------------|
| Opening Finished Goods           | 44,000        | <b>28,500</b> |
| Add: Cost of Goods Manufactured  | 1,07,500      | 1,15,900      |
| Cost of Goods Available for Sale | 1,51,500      | 1,44,400      |
| Less: Cost of Goods Sold         | 1,23,000      | <b>99,400</b> |
| Ending Finished Goods Inventory  | <b>28,500</b> | 45,000        |

#### 11. Statement Showing Reconciliation Between Budgeted [F.Y. 2014-15] & Actual Profit [F.Y. 2015-16]

| Particulars                   | (₹ in lacs) | (₹ in lacs) |
|-------------------------------|-------------|-------------|
| Budgeted Profit               |             | 200.00      |
| Sales Contribution Variances: |             |             |
| Price                         | 427.50 (F)  |             |
| Volume                        | 25 (A)      | 402.50 (F)  |
| Direct Material Variances:    |             |             |
| Price                         | 307.50 (A)  |             |
| Usage                         | 150.00 (A)  | 457.50 (A)  |

|                               |           |           |
|-------------------------------|-----------|-----------|
| Variable Overheads Variances: |           |           |
| Expenditure                   | 25.00 (A) |           |
| Efficiency                    | 25.00 (A) | 50.00 (A) |
| Fixed Overheads Variances:    |           |           |
| Expenditure                   | 67.50 (A) |           |
| Volume                        | N.A.      | 67.50 (A) |
| Actual Profit                 |           | 27.50     |

**Computation of Variances (₹ In Lacs)****Sales Variances (W.N.1)**

$$\begin{aligned}
 \text{Price Variance} &= \text{Actual Sales} - \text{Standard Sales} \\
 &= ₹ 3,277.50 - ₹ 2,850.00 \\
 &= ₹ 427.50 (F)
 \end{aligned}$$

$$\begin{aligned}
 \text{Volume Variance} &= \text{Standard Sales} - \text{Budgeted Sales} \\
 &= ₹ 2,850.00 - ₹ 3,000.00 \\
 &= ₹ 150 (A)
 \end{aligned}$$

**Sales Contribution Variances**

$$\text{Sales Contribution} = \text{Sales Price Variance}$$

**Price Variance**

$$= ₹ 427.50 (F)$$

$$\text{Sales Contribution} = \text{Sales Volume Variance} \times \text{Budgeted PV Ratio}$$

**Volume Variance**

$$\begin{aligned}
 &= ₹ 150 (A) \times \left( \frac{₹ 200 + ₹ 300}{₹ 3,000} \right) \\
 &= ₹ 25 (A)
 \end{aligned}$$

**Material Variances (W.N.2)****Material Price Variance**

$$\begin{aligned}
 &= \text{Standard Cost of Actual Quantity} - \text{Actual Cost} \\
 &= ₹ 2,050.00 - ₹ 2,357.50 \\
 &= ₹ 307.50 (A)
 \end{aligned}$$

**Material Usage Variance**

$$\begin{aligned}
 &= \text{Standard Cost of Standard Quantity for Actual Output} - \text{Standard Cost of Actual Quantity} \\
 &= ₹ 1,900 - ₹ 2,050 \\
 &= ₹ 150 (A)
 \end{aligned}$$

**Variable Overhead Variances (W.N.3)****Expenditure Variance**

$$\begin{aligned}
 &= \text{Budgeted Variable Overheads for Actual Hours} - \text{Actual Variable Overheads} \\
 &\text{Or} \\
 &= \text{Std. Rate per unit} \times \text{Expected Output for Actual Hours Worked} - \text{Actual Variable Overheads} \\
 &= ₹ 500 - ₹ 525 \\
 &= ₹ 25 (A)
 \end{aligned}$$

$$\text{Efficiency Variances} = \text{Standard Variable Overheads for Production} - \text{Budgeted Variable Overheads for Actual Hours}$$

Or

$$\begin{aligned}
 &= \text{Std. Rate per unit} \times \text{Actual Output} - \text{Std. Rate per unit} \times \text{Expected Output for Actual Hours Worked} \\
 &= ₹ 475 - ₹ 500 \\
 &= ₹ 25 (A)
 \end{aligned}$$

**Fixed Overhead Variances (W.N.4)****Expenditure Variance**

$$\begin{aligned}
 &= \text{Budgeted Fixed Overheads} - \text{Actual Fixed Overheads.} \\
 &= ₹ 300.00 - ₹ 367.50 \\
 &= ₹ 67.50 (A)
 \end{aligned}$$

**Working Notes (₹ in lacs)****Note-1:**

|                                                                    |          |
|--------------------------------------------------------------------|----------|
| Sales in F.Y. 2015-2016                                            | 3,277.50 |
| Less: Increase due to <i>price rise</i> [₹ 3,277.50 lacs x 15/115] | 427.50   |
| Sales in F.Y. 2015-2016 at F.Y. 2014-2015 Prices [Standard Sales]  | 2,850.00 |

|                                                               |          |
|---------------------------------------------------------------|----------|
| Sales in F.Y. 2014-2015                                       | 3,000.00 |
| Fall in Sales in F.Y. 2015-2016 [₹ 3,000 lacs - ₹ 2,850 lacs] | 150.00   |
| Percentage fall                                               | 5%       |

**Note-2:**

|                                                                                                            |          |
|------------------------------------------------------------------------------------------------------------|----------|
| Material Cost in F.Y. 2014-2015                                                                            | 2,000.00 |
| Less: 5% for Decrease in Volume                                                                            | 100.00   |
| 'Standard Material Usage' at F.Y. 2014-15 Prices<br>(Standard Cost of Standard Quantity for Actual output) | 1,900.00 |
| Actual Material Cost F.Y. 2015-2016                                                                        | 2,357.50 |
| Less: 15% Increase in Prices [₹ 2,357.50 lakhs x 15/115]                                                   | 307.50   |
| Actual Materials Used, at F.Y. 2014-2015 Prices<br>(Standard Cost of Actual Quantity)                      | 2,050.00 |

**Note-3:**

|                                                                                                       |        |
|-------------------------------------------------------------------------------------------------------|--------|
| Variable Overheads Cost in F.Y. 2014-15                                                               | 500.00 |
| Less: 5% due to fall in Volume of Sales in F.Y. 2015-16                                               | 25.00  |
| "Standard Overheads for Production" in F.Y. 2015-16                                                   | 475.00 |
| Actual Variable Overheads Incurred in F.Y. 2015-16                                                    | 525.00 |
| Less: 5% for Increase in Price [₹ 525 lacs x 5 / 105]                                                 | 25.00  |
| Amount Spent in F.Y. 2015-16 at F.Y. 2014-15 Prices<br>(Budgeted Variable Overheads for Actual Hours) | 500.00 |

12. (i) New Product *tie up* --- Innovation / Learning Perspective  
 (ii) Growth of Volume --- Financial Perspective  
 (iii) Time for Loan / Fresh Products --- Customer Perspective
13. Let  $x_1$ ,  $x_2$  and  $x_3$  denote the number of advertisements to be released in three magazines A, B and C respectively. Let Z denote the total exposure to the principal buyers of the goods.

*Objective function:*

Since the exposure in any magazine is the number of advertisements multiplied by the number of principal buyers, therefore, the value of Z is given by:

$$\begin{aligned}
 Z &= (0.40 \times 50,000) x_1 + (0.30 \times 30,000) x_2 + (0.16 \times 20,000) x_3 \\
 &= 20,000x_1 + 9,000x_2 + 3,200x_3
 \end{aligned}$$

Constraints:

The budgeted amount for the advertisements is at the most ₹1,50,000

Hence,  $12,000x_1 + 9,000x_2 + 7,500x_3 \leq 1,50,000$

Also, the magazine A should have no more than 8 advertisements, B and C each should get at least 4 advertisements.

Hence,

$$\begin{aligned} x_1 &\leq 8, \\ x_2 &\geq 4 \text{ and} \\ x_3 &\geq 4 \end{aligned}$$

The linear programming model for the problem:

Maximise

$Z = 20,000x_1 + 9,000x_2 + 3,200x_3$

Subject to the Constraints:

$$12,000x_1 + 9,000x_2 + 7,500x_3 \leq 1,50,000$$

$$x_1 \leq 8$$

$$x_2 \geq 4$$

$$x_3 \geq 4$$

Where  $x_1, x_2 \text{ and } x_3 \geq 0$

14. Dummy machine ( $X_5$ ) is inserted to make it a balanced cost matrix and assume its installation cost to be zero. Cost of install at cell  $X_3$  (P) and  $X_2$  (R) is very high marked as M.

|               | P  | Q  | R  | S  | T  |
|---------------|----|----|----|----|----|
| $X_1$         | 9  | 11 | 15 | 10 | 11 |
| $X_2$         | 12 | 9  | M  | 10 | 9  |
| $X_3$         | M  | 11 | 14 | 11 | 7  |
| $X_4$         | 14 | 8  | 12 | 7  | 8  |
| $X_5$ (Dummy) | 0  | 0  | 0  | 0  | 0  |

**Step 1**

Subtract the minimum element of each row from each element of that row-

|                        | P | Q | R | S | T |
|------------------------|---|---|---|---|---|
| X <sub>1</sub>         | 0 | 2 | 6 | 1 | 2 |
| X <sub>2</sub>         | 3 | 0 | M | 1 | 0 |
| X <sub>3</sub>         | M | 4 | 7 | 4 | 0 |
| X <sub>4</sub>         | 7 | 1 | 5 | 0 | 1 |
| X <sub>5</sub> (Dummy) | 0 | 0 | 0 | 0 | 0 |

**Step 2**

Subtract the minimum element of each column from each element of that column-

|                        | P | Q | R | S | T |
|------------------------|---|---|---|---|---|
| X <sub>1</sub>         | 0 | 2 | 6 | 1 | 2 |
| X <sub>2</sub>         | 3 | 0 | M | 1 | 0 |
| X <sub>3</sub>         | M | 4 | 7 | 4 | 0 |
| X <sub>4</sub>         | 7 | 1 | 5 | 0 | 1 |
| X <sub>5</sub> (Dummy) | 0 | 0 | 0 | 0 | 0 |

**Step 3**

Draw lines to connect the zeros as under-

|                        | P | Q | R | S | T |
|------------------------|---|---|---|---|---|
| X <sub>1</sub>         | 0 | 2 | 6 | 1 | 2 |
| X <sub>2</sub>         | 3 | 0 | M | 1 | 0 |
| X <sub>3</sub>         | M | 4 | 7 | 4 | 0 |
| X <sub>4</sub>         | 7 | 1 | 5 | 0 | 1 |
| X <sub>5</sub> (Dummy) | 0 | 0 | 0 | 0 | 0 |



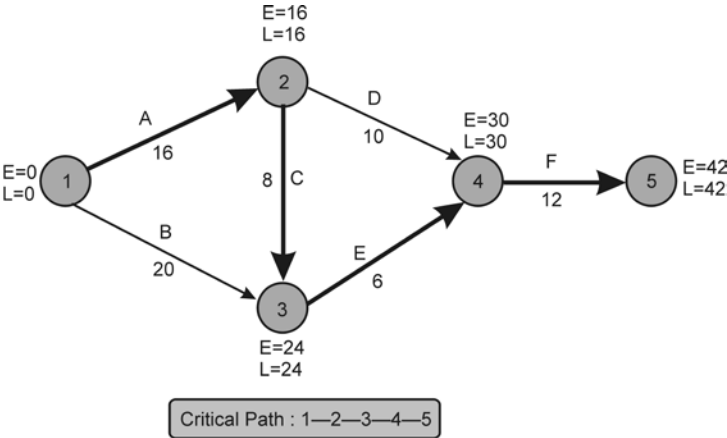
There are five lines which are equal to the order of the matrix. Hence the solution is optimal. We may proceed to make the assignment as under-

|                        | P  | Q  | R | S  | T  |
|------------------------|----|----|---|----|----|
| X <sub>1</sub>         | 0  | 2  | 6 | 1  | 2  |
| X <sub>2</sub>         | 3  | 0  | M | 1  | >0 |
| X <sub>3</sub>         | M  | 4  | 7 | 4  | 0  |
| X <sub>4</sub>         | 7  | 1  | 5 | 0  | 1  |
| X <sub>5</sub> (Dummy) | >0 | >0 | 0 | >0 | >0 |

The following is the assignment which keeps the total cost at minimum-

| Machines               | Location | Costs (₹) |
|------------------------|----------|-----------|
| X <sub>1</sub>         | P        | 9         |
| X <sub>2</sub>         | Q        | 9         |
| X <sub>3</sub>         | T        | 7         |
| X <sub>4</sub>         | S        | 7         |
| X <sub>5</sub> (Dummy) | R        | 0         |
| Total                  |          | 32        |

15. (i) The **Network** for the given problem:



(ii) **Critical Path:** 1–2–3–4–5 (A–C–E–F).

(iii) **Total Float** and **Free Float** for each activity:

| Activity   | Duration        | EST            | EFT                              | LST                              | LFT            | Slack of Tail Event             | Slack of Head Event             | Total Float | Free Float                        |
|------------|-----------------|----------------|----------------------------------|----------------------------------|----------------|---------------------------------|---------------------------------|-------------|-----------------------------------|
|            | D <sub>ij</sub> | E <sub>i</sub> | E <sub>i</sub> + D <sub>ij</sub> | L <sub>j</sub> - D <sub>ij</sub> | L <sub>j</sub> | L <sub>i</sub> - E <sub>i</sub> | L <sub>j</sub> - E <sub>j</sub> | LST - EST   | Total Float - Slack of Head Event |
| A<br>(1-2) | 16              | 0              | 16                               | 0                                | 16             | 0                               | 0                               | 0           | 0                                 |
| B<br>(1-3) | 20              | 0              | 20                               | 4                                | 24             | 0                               | 0                               | 4           | 4                                 |
| C<br>(2-3) | 8               | 16             | 24                               | 16                               | 24             | 0                               | 0                               | 0           | 0                                 |
| D<br>(2-4) | 10              | 16             | 26                               | 20                               | 30             | 0                               | 0                               | 4           | 4                                 |
| E<br>(3-4) | 6               | 24             | 30                               | 24                               | 30             | 0                               | 0                               | 0           | 0                                 |
| F<br>(4-5) | 12              | 30             | 42                               | 30                               | 42             | 0                               | 0                               | 0           | 0                                 |

16. (i)

| ₹ / u<br>Avg. / unit (4 units) |       |
|--------------------------------|-------|
| Variable Cost                  | 1,000 |
| Labour                         | 405   |
| Target Contribution            | 750   |
| Price to be Quoted             | 2,155 |

- (ii) No, Corcodile Ltd. cannot quote this price for varying products because the learning curve Ratio does not apply to non-repeated jobs. Each product will carry a different price according to its direct labour hours.

17. (i)

|                     |                                  |
|---------------------|----------------------------------|
| Human Resource Cost | 1. Number of employee            |
|                     | 2. Number of training Hours      |
|                     | 3. Number of benefit changes     |
|                     | 4. Number of insurance claims    |
|                     | 5. Number of pension changes     |
|                     | 6. Number of recruiting contacts |

(ii)

|                 |                                     |
|-----------------|-------------------------------------|
| Accounting Cost | 1. Number of billings               |
|                 | 2. Number of cash receipts          |
|                 | 3. Number of check payments         |
|                 | 4. Number of general ledger entries |
|                 | 5. Number of reports issued         |
|                 | 6. Number of responsibility centre  |

18. (i) Invalid; (ii) Invalid; (iii) Invalid; (iv) Valid; (v) Valid

19. (i) Invalid; (ii) Valid; (iii) Valid; (iv) Valid; (v) Valid

**AMA RTP NOV 2016**  
**PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING**  
**QUESTIONS**

**Value Added/ Non Value Added**

- Queenstown Furniture (QF) manufactures high-quality wooden doors within the forests of Queenstown since 1952. Management is having emphasize on creativity, engineering, innovation and experience to provide customers with the door they desire, whether it is a standard design or a one-of-a-kind custom door. The following information pertains to operations during April:

|                 |           |              |           |
|-----------------|-----------|--------------|-----------|
| Processing time | 9.0 hrs.* | Waiting time | 6.0 hrs.* |
| Inspection time | 1.5 hr.*  | Move time    | 7.5 hrs.* |
| Units per batch | 60 units  |              |           |

(\*) average time per batch

**Required**

Compute the following operational measures:

- Average non-value-added time per batch
- Average value added time per batch
- Manufacturing cycle efficiency
- Manufacturing cycle time

**Activity Based Costing at Hospital**

- 'SM' hospital is a primary medical care facility and trauma center that serves National Capital Territory. The hospital offers all the medical/ surgical services of typical small hospital.

**Required**

- Using your (limited, moderate, or in-depth) knowledge of a hospital's operations, identify 4 key activities that are important.
- For each of the activities, suggest an appropriate cost driver.

**Life Cycle Costing**

- In WM Ltd. the 'OB' equipment is about to be replaced either by 'CF' system or by an 'OF' system. Finance costs 12% a year and the other estimated costs are as follows:

|                        | CF<br>(₹)   | OF<br>(₹)   |
|------------------------|-------------|-------------|
| Initial Cost           | 28,000      | 40,000      |
| Annual Operating Costs | 24,000 p.a. | 18,000 p.a. |

**Required**

If the company expected the new system (either CF or OF) to last at least for 12 years, which system should be chosen?

4. Examine the **Validity** of following statements:

- (i) In the introduction stage, usual marketing strategy is to strengthen the supply chain relationships to make the product easily accessible by target customers.
- (ii) In the introduction stage, competitors will purchase the product to carry out reverse engineering and understand how the product works, so that they can develop their own similar, but different product.
- (iii) In the introduction phase, the firm will seek to avoid this competition by maintaining its selling price at the end of the introduction stage.
- (iv) In the growth stage, if the product cannot be differentiated in other ways, the firm may need further reductions in selling price to maintain growth.
- (v) In the maturity stage, firms are tempted to engage in costly promotional price wars to wean away market share from competitors.
- (vi) In the decline stage, failing sales may induce firms to slash marketing expenditure. Brand loyalty will be exploited to create profits.

**JIT Production System > Backflush Costing System**

5. Napier Company uses a backflush costing system with three trigger points:

- (a) Purchase of Direct Materials
- (b) Completion of Good Finished Units of Product
- (c) Sales of Finished Goods

You are provided with the following information for July 2016.

|                            |           |                                     |           |
|----------------------------|-----------|-------------------------------------|-----------|
| Direct Materials Purchased | ₹2,64,000 | Conversion Costs Allocated          | ₹1,20,000 |
| Direct Materials Used      | ₹2,55,000 | Costs Transferred to Finished Goods | ₹3,75,000 |
| Conversion Costs Incurred  | ₹1,26,600 | Cost of Goods Sold                  | ₹3,57,000 |

**Required**

- (i) Prepared journal entries for July (without disposing of under allocated/ over allocated conversion costs).
- (ii) Under an ideal JIT production system, how would the amounts in your journal entries change from the journal entries in requirement (i)?

*Note*

- There are no beginning inventories.
- Assume there are no direct material variances.

**Cost Classification**

6. Swastik Ltd. manufactures and sells 4 Valve Engine (DTK-I). Company appoints Mr. Watson to coordinate shipments of the DTK-I from the factory to distribution warehouses located in various parts of the India so that goods will be available as orders are received from customers. Swastik Ltd. is unsure how to classify his annual salary of ₹24,00,000 in its cost records. The company's cost analyst says that Mr. Watson's salary should be classified as manufacturing cost; the finance controllers says that it should be classified as selling cost; and the managing director says that it does not matter which way Mr. Watson's salary cost is classified.

**Required**

Which view point is correct and why?

7. ANZB Financial Services Limited is an Indian banking and financial services company headquartered in Chennai, Tamil Nadu. Apart from lending to individuals, the company grants loans to micro, small and medium business enterprises. Listed below are several costs incurred in the loan division of ANZB Financial Services Limited.
- (i) Remuneration of the loan division manager.
  - (ii) Cost of Printer Paper, File Folders, View Binders, Ink, Toner & Ribbons used in the loan division.
  - (iii) Cost of the division's MacBook Pro purchased by the loan division manager last year.
  - (iv) Cost of advertising in business newspaper by the bank, which is allocated to the loan division.

**Cost Classification**

|                                             |                                    |                    |
|---------------------------------------------|------------------------------------|--------------------|
| Controllable by the loan division manager   | Direct cost of the loan division   | Sunk Cost          |
| Uncontrollable by the loan division manager | Indirect Cost of the loan division | Out of Pocket Cost |

**Required**

For each Cost, indicate which of the above mentioned Cost Classification best describe the cost.

*Note*

More than one classification may apply to the same cost item.

**Relevant Costing**

8. Aves Airlines Ltd. operates its services under the brand 'Yellow Bird'. The 'Yellow Bird' route network spans prominent business metropolis as well as key leisure destinations across the Indian subcontinent. 'Yellow Bird', a low-fare carrier launched with the objective of commoditizing air travel, offers airline seats at marginal premium to train fares across India.

Profits of the 'Yellow Bird' have been decreasing for several years. In an effort to improve the company's performance, consideration is being given to dropping several flights that appear to be unprofitable.

Income statement for one such flight from 'New Delhi' to 'Kullu' (Y-09) is given below (per flight):

|                                                                     | ₹        | ₹        |
|---------------------------------------------------------------------|----------|----------|
| Ticket Revenue<br>(175 seats x 80% Occupancy x ₹7,000 ticket price) |          | 9,80,000 |
| Less: Variable Expenses (₹1,400 per person)                         |          | 1,96,000 |
| Contribution Margin                                                 |          | 7,84,000 |
| Less: Flight Expenses:                                              |          |          |
| Salaries, Flight Crew                                               | 2,05,000 |          |
| Salaries, Flight Assistants                                         | 45,500   |          |
| Baggage Loading and Flight Preparation                              | 72,000   |          |
| Overnight Costs for Flight Crew and Assistants at destination       | 18,000   |          |
| Fuel for Aircraft                                                   | 2,55,000 |          |
| Depreciation on Aircraft                                            | 51,000*  |          |
| Liability Insurance                                                 | 1,53,000 |          |
| Flight Promotion                                                    | 35,000   |          |
| Hanger Parking Fee for Aircraft at destination                      | 15,000   | 8,49,500 |
| Net Gain / (Loss)                                                   |          | (65,500) |

\* Based on obsolescence

The following additional information is available about flight Y-09.

- Members of the flight crew are paid fixed annual salaries, whereas the flight assistants are paid by the flight.

- The baggage loading and flight preparation expense is an allocation of ground crew's salaries and depreciation of ground equipment.
- One third of the liability insurance is a special charge assessed against flight Y-09 because in the opinion of insurance company, the destination of the flight is in a "high-risk" area.
- The hanger parking fee is a standard fee charged for aircraft at all airports.
- If flight Y-09 is dropped, 'Golden Bird' Airlines has no authorization at present to replace it with another flight.

### **Required**

Prepare an analysis showing what impact dropping flight Y-09 would have on the airline's profit.

### **Qualitative Factors**

9. State any 5 Qualitative Factors relevant for decision making.

### **Budget & Budgetary Control**

10. Country N's regional administration is organized in 10 states, with 9 of them subdivided into 210 municipalities. The municipal sector is a provider of vital services to the country N's public. The municipalities have wide powers over the local economy, with the state exercising strict supervision. They have the right to tax and to use their resources to support education, libraries, social security, and public works such as streetcar lines, gas and electricity works, roads, and town planning, but they are usually aided in these activities by state funds. The municipalities submit a budget each year to respective state which forms the basis of the fund received.

The following information is available as part of the 2016 budget preparation about a municipality NZ.

#### **Street Maintenance**

Like all structures, streets deteriorate over time. Deterioration is primarily due to accumulated damage from vehicles, however environmental effects often contribute. In 2016 it is anticipated that 5 km of the street will need maintenance but a contingency of extra 10% has been decided.

In 2015 the average cost of a street maintenance was ₹14 million per km maintained, but this excluded any cost effects of extreme weather conditions. The following probability estimates have been made in respect of 2016

| Weather Type Predicted | Probability | Increase in Maintenance Cost |
|------------------------|-------------|------------------------------|
| Good                   | 0.65        | 0                            |



|       |      |      |
|-------|------|------|
| Poor  | 0.05 | +5%  |
| Lousy | 0.30 | +30% |

Inflation on street revamping costs is anticipated to be 2% between 2015 & 2016.

#### New Streets

New streets are budgeted on a zero basis and will have to enter for funds along with other capital projects such as hospitals and libraries.

#### **Required**

- (i) Calculate the budgets for street maintenances for 2016.
- (ii) Explain the process involved for zero based budgeting.

#### **Variance Analysis in Activity Based Costing**

11. N & S Co. (NSC) is a multiple product manufacturer. NSC produces the unit and all overheads are associated with the delivery of units to its customers.

| Particulars                 | Budget | Actual |
|-----------------------------|--------|--------|
| Overheads (₹)               | 4,000  | 3,900  |
| Output (units)              | 2,000  | 2,100  |
| Customer Deliveries (no.'s) | 20     | 19     |

#### **Required**

Calculate Efficiency Variance and Expenditure Variance by adopting ABC approach.

#### **Interpretation of Variances**

12. State possible **Impact on Variances** in each of the following independent situations:
  - (i) More units were produced than was budgeted.
  - (ii) Careless handling of materials by production personnel
  - (iii) The purchase of inferior quality material
  - (iv) New competition entered the market.
  - (v) New suppliers were used.
  - (vi) New production staff were recruited.
  - (vii) Market share has fallen from 20% to 18%
13. Explain whether a production manager should be accountable for direct labour and direct materials cost variances.

### Balanced Score Card

14. AEB Banking Corp. is the world's largest card issuer by purchase volume and having vision statement "to be leading provider of payment solutions in India".

#### Required

Suggest performance indicators to include in the Balanced Scorecard.

### Linear Programming

15. In a chemical industry two products P and Q are made involving two operations. The production of Q also results in a by-product R. The product P can be sold at a profit of ₹ 3 per unit and Q at a profit of ₹ 8 per unit. The by-product R has a profit of ₹ 2 per unit. Forecast show that upto 5 units of R can be sold. The company gets 3 units of R for each unit of Q produced. The manufacturing times are 3 hrs per unit for P on each of the operation one and two and 4 hrs and 5 hrs per unit for Q on operation one and two respectively. Because the product R results from producing Q, no time is used in producing R. The available times are 18 hrs and 21 hrs of operation one and two respectively. The company desires to know that how much P and Q should be produced keeping R in mind to make the highest profit.

#### Required

Formulate LP model for this problem.

### Simulation

16. JCB Ltd. is considering a new project which will require an initial investment of ₹ 25,000. The company has determined the following probabilities for net cash flows for three years generated by this project:

#### Annual Net Cash Flows

| Year 1 |       | Year 2 |       | Year 3 |       |
|--------|-------|--------|-------|--------|-------|
| CF     | Prob. | CF     | Prob. | CF     | Prob. |
| 7,500  | 0.20  | 10,000 | 0.10  | 7,500  | 0.10  |
| 10,000 | 0.50  | 12,500 | 0.30  | 10,000 | 0.20  |
| 12,500 | 0.30  | 15,000 | 0.20  | 12,500 | 0.50  |
|        |       | 17,500 | 0.40  | 15,000 | 0.20  |

The firm wants to perform 5 simulation runs of this project's life. The firm's cost of capital is 10%.

To simulate the probability distributions of annual net cash flows, use the following sets of random numbers

4, 4, 2; 9, 6, 3; 5, 7, 8; 0, 1, 6; 3, 1, 5

**Required**

Using simulation results. Calculate the average NPV.

**Note**

Assign a value ranging from 0 to 9 (in digits) to each year's cash flow in such a way that the number of digits assigned is proportionate to the probability of cash flow.

**SUGGESTED ANSWERS/ HINTS**1. (i) Average Non Value Added Time *per batch*

$$\begin{aligned}
 &= \text{Inspection Time} + \text{Waiting Time} + \text{Move Time} \\
 &= 1.5 \text{ hr.} + 6.0 \text{ hrs.} + 7.5 \text{ hrs.} \\
 &= 15 \text{ hrs.}
 \end{aligned}$$

## (ii) Average Value Added Time per batch

$$\begin{aligned}
 &= \text{Processing Time} \\
 &= 9 \text{ hrs.}
 \end{aligned}$$

## (iii) Manufacturing Cycle Efficiency

$$\begin{aligned}
 &= \frac{\text{Processing Time}}{\text{Processing Time} + \text{Inspection Time} + \text{Waiting Time} + \text{Move Time}} \\
 &= \frac{9.0 \text{ hrs.}}{9.0 \text{ hrs.} + 1.5 \text{ hr.} + 6.0 \text{ hrs.} + 7.5 \text{ hrs.}} \\
 &= 37.5\%
 \end{aligned}$$

## (iv) Manufacturing Cycle Time

$$\begin{aligned}
 &= \frac{\text{Total Production Time}}{\text{Units per Batch}} \\
 &= \frac{24 \text{ hrs.}}{60 \text{ units}} \\
 &= 0.40 \text{ hrs. per unit}
 \end{aligned}$$

2. **Activities / Cost Drivers for 'SM' hospital**

| Activities                                                                      | Cost Driver                        |
|---------------------------------------------------------------------------------|------------------------------------|
| Purchase of medical supplies, maintain records/inventory (dispense medications) | Number of medication orders filled |
| Reservation/Scheduling, inpatient registration, billing and                     | Number of patients                 |

|                                                                                  |                        |
|----------------------------------------------------------------------------------|------------------------|
| insurance verification (admit patients)                                          | admitted               |
| Prepare patient, perform ECG procedure, interpret results (administer ECG tests) | Number of tests        |
| Obtain specimens, perform test, report results (administer laboratory tests)     | Number of test by type |

### 3. Calculation of Life-cycle Costs

|                             | CF<br>(₹)                     | OF<br>(₹)                     |
|-----------------------------|-------------------------------|-------------------------------|
| Initial Cost                | 28,000                        | 40,000                        |
| Add: Annual Operating Costs | 1,48,656<br>(₹24,000 × 6.194) | 1,11,492<br>(₹18,000 × 6.194) |
| Total Life Cycle Costs      | 1,76,656                      | 1,51,492                      |

The annuity of 12% finance costs for 12 years is 6.194.

#### Analysis

When we compare only the initial cost, we will tend to purchase CF system, for its cheap acquisition cost. But when we compare the total life-cycle costs, the OF system is most preferable, for its lowest total life-cycle costs.

### 4. Valid or Invalid

| Sl. No. | Statements                                                                                                                                                                                                 | Valid or Invalid |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| (i)     | In the introduction stage, usual marketing strategy is to strengthen the supply chain relationships to make the product easily accessible by target customers.                                             | Valid            |
| (ii)    | In the introduction stage, competitors will purchase the product to carry out reverse engineering and understand how the product works, so that they can develop their own similar, but different product. | Valid            |
| (iii)   | In the introduction phase, the firm will seek to avoid this competition by maintaining its selling price at the end of the introduction stage.                                                             | Invalid          |
| (iv)    | In the growth stage, if the product cannot be differentiated in other ways, the firm may need further reductions in selling price to maintain growth.                                                      | Valid            |
| (v)     | In the maturity stage, firms are tempted to engage in costly promotional price wars to wean away market share from competitors.                                                                            | Valid            |

|      |                                                                                                                                         |       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------|-------|
| (vi) | In the decline stage, failing sales may induce firms to slash marketing expenditure. Brand loyalty will be exploited to create profits. | Valid |
|------|-----------------------------------------------------------------------------------------------------------------------------------------|-------|

5. (i) **Journal Entries** for July are as follows

|                                                                                                                                                                         | ₹        | ₹                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|
| <b>E.1</b><br>Material and In-Process Inventory Control<br>Accounts Payable Control<br>(Direct Materials Purchased)                                                     | 2,64,000 | 2,64,000             |
| <b>E.2</b><br>Conversion Costs Control<br>Various Accounts<br>(Conversion Cost Incurred)                                                                                | 1,26,600 | 1,26,600             |
| <b>E.3</b><br>Finished Goods Control<br>Materials and In-Process Inventory<br>Control Conversion Costs Allocated<br>( <b>standard cost</b> of finished goods completed) | 3,75,000 | 2,55,000<br>1,20,000 |
| <b>E.4</b><br>Cost of Goods Sold<br>Finished Goods Control<br>( <b>standard cost</b> of finished goods sold)                                                            | 3,57,000 | 3,57,000             |

- (ii) Zero inventory is the goal of an *ideal* JIT production system. Accordingly, entry (E.3) would be ₹3,57,000 finished goods production, not ₹3,75,000. If the marketing division could only sell goods costing ₹3,57,000, the JIT production system would call for direct materials purchases and conversion costs lower than ₹2,64,000 and ₹1,26,600, respectively, in entries (E.1) and (E.2).



When a JIT system is created, the amount of inventory retained in a company drops continuously. Raw materials inventory is reduced because suppliers deliver only small quantities of parts as and when they are needed. Work-in-process inventory drops because the conversion to machine cells and the use of Kanban Cards greatly reduces the need to pile up inventory between machines. Finally, finished goods inventory drops because inventory is produced only when there are orders in hand from customers (though finished goods inventories are also allowed to build if a company experiences high seasonal sales). Consequently, the cost of maintaining inventory declines, which in turn reduces the overhead costs associated with inventories that are charged to products.

6. **Selling Costs** would include all costs necessary to secure customer orders and get the finished product into the hands of customers.

The responsibility of Mr. Watson as described in the problem is coordination of shipments of DTK-I from the factory to distribution warehouses and same would appear to fall in this class.

Accordingly, the finance controller is correct in his view point that the salary cost should be classified as selling cost.

7. **Cost Incurred – Cost Classification**

| S. No. | Cost Incurred                                                                                      | Classification 1                             | Classification 2                    | Classification 3   |
|--------|----------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------|--------------------|
| (i)    | Remuneration of the loan division manager.                                                         | Uncontrollable by the loan division manager. | Direct cost of the loan division.   | Out of Pocket Cost |
| (ii)   | Cost of Printer Paper, File Folders, View Binders, Ink, Toner & Ribbons used in the loan division. | Controllable by the loan division manager.   | Direct cost of the loan division.   | Out of Pocket Cost |
| (iii)  | Cost of the division's MacBook Pro purchased by the loan division manager last year.               | Controllable by the loan division manager.   | Direct cost of the loan division.   | Sunk Cost          |
| (iv)   | Cost of advertising in business newspaper by the bank, which is allocated to the loan division.    | Uncontrollable by the loan division manager. | Indirect Cost of the loan division. | Out of Pocket Cost |

8. **Statement Showing Impact on Airline's Profit if Flight Y-09 is Discontinued**

|                                                                        |          |            |
|------------------------------------------------------------------------|----------|------------|
|                                                                        | ₹        | ₹          |
| Contribution Margin lost if the flight is discontinued                 |          | (7,84,000) |
| Less: Flight Costs which can be avoided if the flight is discontinued: |          |            |
| Flight Promotion.....                                                  | 35,000   |            |
| Fuel for Aircraft.....                                                 | 2,55,000 |            |
| Liability Insurance (1/3 x ₹1,53,000).....                             | 51,000   |            |

|                                                     |               |                 |
|-----------------------------------------------------|---------------|-----------------|
| Salaries, Flight Assistants.....                    | 45,500        |                 |
| Overnight Costs for Flight Crew and Assistants..... | <u>18,000</u> | <u>4,04,500</u> |
|                                                     |               | (3,79,500)      |

If Aves Airlines Ltd. goes for discontinuation of flight K-09, its profit will go down by ₹3,79,500.

Following costs are **not relevant** to the decision:

- Salaries, flight crew - Fixed annual salaries which will not change
- Baggage loading and flight preparation- This is an allocated cost, which will continue even if the flight is discontinued.
- Depreciation of aircraft -Sunk Cost
- Liability insurance (two third)
- Hanger parking fee- This cost will be incurred regardless of whether the flight is made.

9. Qualitative Factors may include:

- (i) The liquidity risk;
- (ii) The state of the economy, and its levels of inflation;
- (iii) Effect of new technological breakthroughs;
- (iv) Effect of a decision on employee morale, motivation, leadership and so on;
- (v) Effect of a decision on long-term future profitability;
- (vi) Effect of a decision on a company's public image and the reaction of customers.

10. (i) The street maintenance budget will be based on 5 km of street maintenance; it is common to include a contingency in case streets unexpectedly need maintenance.

The weather conditions could add an extra cost to the budget if poor or lousy conditions exist.

The adjustment needed is based on an expected value calculation:

$$(0.65 \times 0\%) + (0.05 \times 5\%) + (0.30 \times 30\%) = 9.25\%$$

Hence the budget (after allowing for a 2% inflation adjustment) will be:

$$5 \text{ km} \times ₹14 \text{ million} \times 1.0925 \times 1.02 = ₹7,80,04,500$$

(ii) Zero based budgeting involves following main steps:

- Determination of a set of objects is the pre-requisite and essential step in the direction of ZBB technique.
- Deciding about the extent to which the technique of ZBB is to be applied whether in all areas of municipal activities or only in a few selected areas on trial basis.

- Identify those areas where decisions are required to be taken.
- Developing decision packages and *ranking them in order of decreasing benefits*.

For example, The Municipality have to decide which of the activities offer the greatest value for money (VFM) or the greatest benefit for the lowest cost.

Legal obligations are 'must do' activities; others may be viewed as discretionary.

- Preparation of budget that is translating decision packages into practicable units/items and allocating financial/resources.

In real terms the Zero base budgeting is simply an extension of the cost, benefit, analysis method to the area of corporate planning and budgeting.

## 11. Computation of Variances

$$\begin{aligned}
 \text{Efficiency Variance} &= \text{Cost Impact of } \textit{undertaking activities more/ less than standard} \\
 &= (21 \text{ deliveries}^* - 19 \text{ deliveries}) \times ₹200 \\
 &= ₹400 \text{ F}
 \end{aligned}$$

$$(*) \left( \frac{20 \text{ Deliveries}}{2,000 \text{ units.}} \right) \times 2,100 \text{ units}$$

$$\begin{aligned}
 \text{Expenditure Variance} &= \text{Cost impact of paying more/ less than standard for actual activities undertaken} \\
 &= 19 \text{ deliveries} \times ₹200 - ₹3,900 \\
 &= ₹100 \text{ (A)}
 \end{aligned}$$

## 12. Impact on Variances

| Sl. No. | Independent Situations                                 | Impact on Variances                                 |
|---------|--------------------------------------------------------|-----------------------------------------------------|
| (i)     | More units were produced than was budgeted.            | Favourable Fixed Overhead Volume                    |
| (ii)    | Careless handling of materials by production personnel | Adverse Material Usage                              |
| (iii)   | The purchase of inferior quality material              | Adverse Material Usage<br>Favourable Material Price |
| (iv)    | New competition entered the market.                    | Adverse Sales Price                                 |
| (v)     | New suppliers were used.                               | Adverse Material Price                              |
| (vi)    | New production staff were recruited.                   | Adverse Labour Efficiency                           |
| (vii)   | Market share has fallen from 20% to 18%                | Adverse Market Share Variance                       |



13. Performance should be measured against the element of direct cost which the manager can *control*. For example,

The purchase manager is responsible for the price of raw materials to be purchased at the time of *purchase*.

The production manager is responsible for the amount of raw material *used*, and this responsibility exercised when the materials are used in production. However, he/ she may not be able to influence the cost of material, the quality of the material, the cost of labour and the quality of labour.

14. **Balanced Scorecard 'Credit Card Company'.**

| Financial Indicators of Performance | Customers Indicators of Performance |
|-------------------------------------|-------------------------------------|
| Increase market share               | Discourage businesses off cheques   |
| Reduce debt                         | Focus on large spenders             |
| Increase % fee                      | Issue more cards                    |

| Learning and Growth Indicators of Performance | Internal Processes Indicators of Performance |
|-----------------------------------------------|----------------------------------------------|
| Outsource IT jobs                             | Increased marketing spend                    |
| Improve staff training levels                 | Achieve economies to scale                   |
| Acquire other companies                       | Offer more products                          |

15. Let  $y_1$ ,  $y_2$ ,  $y_3$  be the number of units produced of products P, Q and R respectively.

*Objective function:*

Then the profit gained by the industry is given by

$$Z = 3y_1 + 8y_2 + 2y_3$$

Here it is assumed that all the units of products P and Q are sold.

*Condition-1:*

In first operation, P takes 3 hrs of manufacturer's time and Q takes 4 hrs of manufacturer's time. Therefore, total number of hours required in first operation becomes-

$$3y_1 + 4y_2$$

In second operation, per unit of P takes 3 hrs of manufacturer's time and per unit Q takes 5 hrs of manufacturer's time. Therefore, the total number of hours used in second operation becomes

$$3y_1 + 5y_2$$

Since there are 18 hrs available in first operation and 21 hrs in second operation, the restrictions become

$$3y_1 + 4y_2 \leq 18$$

$$3y_1 + 5y_2 \leq 21$$

*Condition-2:*

Since the maximum number of units of R that can be sold is 5, therefore,

$$y_3 \leq 5$$

*Condition-3:*

Further, the company gets three units of by product R for every unit of product Q produced, therefore

$$y_3 = 3y_2$$

Now, the allocation problem of the industry can be finally put in the following linear programming problem:

Maximise

$$Z = 3y_1 + 8y_2 + 2y_3$$

Subject to the Constraints:

$$3y_1 + yx_2 \leq 18$$

$$3y_1 + 5y_2 \leq 21$$

$$y_3 \leq 5$$

$$y_3 = 3y_2$$

$$y_1, y_2, y_3 \geq 0$$

## 16. Assigning Digit Values to Cash Flows

| Year 1 |       |        | Year 2 |       |        | Year 3 |       |        |
|--------|-------|--------|--------|-------|--------|--------|-------|--------|
| CF     | Prob. | Digits | CF     | Prob. | Digits | CF     | Prob. | Digits |
| 7,500  | 0.20  | 0-1    | 10,000 | 0.10  | 0-0    | 7,500  | 0.10  | 0-0    |
| 10,000 | 0.50  | 2-6    | 12,500 | 0.30  | 1-3    | 10,000 | 0.20  | 1-2    |
| 12,500 | 0.30  | 7-9    | 15,000 | 0.20  | 4-5    | 12,500 | 0.50  | 3-7    |
|        |       |        | 17,500 | 0.40  | 6-9    | 15,000 | 0.20  | 8-9    |

## Identifying Cash Flows Matching Random Numbers

| Set | Year 1 |        | Year 2 |        | Year 3 |        |
|-----|--------|--------|--------|--------|--------|--------|
|     | R. No. | CF     | R. No. | CF     | R. No. | CF     |
| 1   | 4      | 10,000 | 4      | 15,000 | 2      | 10,000 |

|   |   |        |   |        |   |        |
|---|---|--------|---|--------|---|--------|
| 2 | 9 | 12,500 | 6 | 17,500 | 3 | 12,500 |
| 3 | 5 | 10,000 | 7 | 17,500 | 8 | 15,000 |
| 4 | 0 | 7,500  | 1 | 12,500 | 6 | 12,500 |
| 5 | 3 | 10,000 | 1 | 12,500 | 5 | 12,500 |

**Calculated Simulated Average NPVs**

| Set         | Year 1       |        | Year 2       |        | Year 3       |        | Initial Outflow | NPV    |
|-------------|--------------|--------|--------------|--------|--------------|--------|-----------------|--------|
|             | PVF* = 0.909 |        | PVF* = 0.826 |        | PVF* = 0.751 |        |                 |        |
|             | CF           | PV     | CF           | PV     | CF           | PV     |                 |        |
| 1           | 10,000       | 9,090  | 15,000       | 12,390 | 10,000       | 7,510  | 25,000          | 3,990  |
| 2           | 12,500       | 11,363 | 17,500       | 14,455 | 12,500       | 9,388  | 25,000          | 10,206 |
| 3           | 10,000       | 9,090  | 17,500       | 14,455 | 15,000       | 11,265 | 25,000          | 9,810  |
| 4           | 7,500        | 6,818  | 12,500       | 10,325 | 12,500       | 9,388  | 25,000          | 1,531  |
| 5           | 10,000       | 9,090  | 12,500       | 10,325 | 12,500       | 9,388  | 25,000          | 3,803  |
| Total       |              |        |              |        |              |        |                 | 29,340 |
| Average NPV |              |        |              |        |              |        |                 | 5,868  |

\* PVF (Present Value Factor) at 10% discount rate.

## PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING

### QUESTIONS

#### Total Quality Management

1. KNM Road Carriers is a transporting company that transports goods from one place to another. It measures quality of service in terms of:

- (i) Time required to transport goods
- (ii) On-time delivery
- (iii) Number of lost or damaged cartons.

To improve its business prospects and performance the company is seriously considering to install a scheduling and tracking system, which involves an annual outlay of ₹1,25,000. The company furnishes the following information about its present and anticipated future performance:

|                                           | Current | Expected |
|-------------------------------------------|---------|----------|
| On-time delivery                          | 85%     | 95%      |
| Variable costs per carton lost or damaged | ₹ 55    | ₹ 55     |
| Fixed costs per carton lost or damaged    | ₹ 45    | ₹ 45     |
| Number of cartons lost or damaged         | 2,500   | 1,200    |

The company expects that each half per cent point increase in on-time performance will result in revenue increase of ₹9,000 per annum. Contribution margin of 45% is required.

#### **Required**

- (i) Should KNM Road Carriers acquire and install the new system?
- (ii) Also calculate additional amount of revenue required if benefits from new system is equal to cost & Contribution margin is 47.5%.

#### Kaizen Costing System

2. FZ India Ltd. (FZIL) is an automobile manufacturer in India and a subsidiary of Japanese automobile and motorcycle manufacturer Fuji. It manufactures and sells a complete range of cars from the entry level to the hatchback to sedans and has a present market share of 27% of the Indian passenger car markets. FZIL uses a system of standard costing to set its budgets. Budgets are set semi-annually by the Finance department after the approval of the Board of Directors at FZIL. The Finance department prepares variance reports each month for review in the Board of Directors meeting, where actual performance is compared with the budgeted figures. Ms. Kiyoshi, group CEO of the Fuji is of the opinion that Kaizen costing method should be implemented as a system of planning and control in the FZIL.

### Required

Recommend key changes vital to FZIL's planning and control system to support the adoption of Kaizen Costing Concepts.

### Activity Based Costing

3. A manufacturing company produces Ball Pens that are printed with the logos of various companies. Each Pen is priced at ₹5. Costs are as follows:

| Cost Driver       | Unit Variable Cost (₹) | Level of Cost Driver |
|-------------------|------------------------|----------------------|
| Units Sold        | 2.5                    | -                    |
| Setups            | 225                    | 40                   |
| Engineering hours | 10                     | 250                  |

Other Data

Total Fixed Costs (conventional) ₹ 48,000

Total Fixed Costs (ABC) ₹ 36,500

### Required

- Compute the break-even point in units using activity-based analysis.
- Suppose that company could reduce the setup cost by ₹ 75 per setup and could reduce the number of engineering hours needed to 215. How many units must be sold to break even in this case?

### Just in Time

4. Haigh Ltd. is a leading manufacturing company. Under increasing pressure to reduce costs, to contain inventory and to improve service, Haigh's Costing Department has recently undertaken a decision to *implement a JIT System*.

The management of Haigh is convinced of the benefits of their changes. But Supplies Manager Mr. Smith fears with the Costing Department's decision. He said:

*"We've been driven by suppliers for years ... they would insist that we could only purchase in thousands, that we would have to wait weeks, or that they would only deliver on Mondays!"*

### Required

Is Mr. Smith's view point correct and why?

### Limiting Factor

5. List out the basis for deciding the priority of selecting the best product in the different circumstances stated below:
- When maximum sales (in value) is a limiting factor.
  - When raw-material is a limiting factor.

- (iii) When labour hour is a limiting factor.
- (iv) When there is a heavy demand for the product.

### Break-even Point (Batches)

6. DRB Ltd. is a leading Home Appliances manufacturer. The company uses just-in- time manufacturing process, thereby having no inventory. Manufacturing is done in batch size of 100 units which cannot be altered without significant cost implications. Although the products are manufactured in batches of 100 units, they are sold as single units at the market price. Due to fierce competition in the market, the company is forced to follow market price of each product. The following table provides the financial results of its four unique products:

|                     | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | Total      |
|---------------------|----------------|----------------|----------------|----------------|------------|
| Sales (units)       | 2,00,000       | 2,60,000       | 1,60,000       | 3,00,000       |            |
|                     | (₹)            | (₹)            | (₹)            | (₹)            | (₹)        |
| Revenue             | 26,00,000      | 45,20,000      | 42,40,000      | 32,00,000      | 145,60,000 |
| Less: Material Cost | 6,00,000       | 18,20,000      | 18,80,000      | 10,00,000      | 53,00,000  |
| Less: Labour Cost   | 8,00,000       | 20,80,000      | 12,80,000      | 12,00,000      | 53,60,000  |
| Less: Overheads     | 8,00,000       | 7,80,000       | 3,20,000       | 12,00,000      | 31,00,000  |
| Profit / (Loss)     | 4,00,000       | (1,60,000)     | 7,60,000       | (2,00,000)     | 8,00,000   |

Since, company is concerned about loss in manufacturing and selling of two products so, it has approached you to clear picture on its products and costs. You have conducted a detailed investigation whose findings are below:

The overhead absorption rate of ₹2 per machine hour has been used to allocate overheads into the above product costs. Further analysis of the overhead cost shows that some of it is caused by the number of machine hours used, some is caused by the number of batches produced and some are product specific fixed overheads that would be avoided if the product were discontinued. Other general fixed overhead costs would be avoided only by the closure of the factory. Numeric details are summarized below:

|                                  | ₹               | ₹                |
|----------------------------------|-----------------|------------------|
| Machine hour related             |                 | 6,20,000         |
| Batch related                    |                 | 4,60,000         |
| Product specific fixed overhead: |                 |                  |
| D <sub>1</sub>                   | 10,00,000       |                  |
| D <sub>2</sub>                   | 1,00,000        |                  |
| D <sub>3</sub>                   | 2,00,000        |                  |
| D <sub>4</sub>                   | <u>1,00,000</u> | 14,00,000        |
| General fixed overheads          |                 | <u>6,20,000</u>  |
|                                  |                 | <u>31,00,000</u> |

The other information is as follows:-

|               | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | Total     |
|---------------|----------------|----------------|----------------|----------------|-----------|
| Machine Hours | 4,00,000       | 3,90,000       | 1,60,000       | 6,00,000       | 15,50,000 |
| Labour Hours  | 1,00,000       | 2,60,000       | 1,60,000       | 1,50,000       | 6,70,000  |

### Required

- Prepare a profitability statement that is more useful for decision making than the profit statement prepared by DRB Ltd.
- Calculate the break-even volume in batches and also in approximate units for Product 'D<sub>1</sub>'.

### Flexible Budget

- WDG Ltd. Had prepared fixed and flexible budget for the financial year 2015-16 as under:

|                         | Fixed Budget for full capacity<br>(₹) | Flexible Budget for 75% level<br>(₹) |
|-------------------------|---------------------------------------|--------------------------------------|
| Sales                   | 13,50,000                             | 10,12,500                            |
| Direct Material         | 4,25,000                              | 3,18,750                             |
| Direct Labour           | 1,85,000                              | 1,38,750                             |
| Variable Overheads      | 2,15,000                              | 1,61,250                             |
| Semi-Variable Overheads | 3,65,000                              | 3,23,750                             |
| Profit                  | 1,60,000                              | 70,000                               |

After the closing of the financial year 2015-16, total actual sales stood at ₹11,07,000 and there was a favourable sales price variance of ₹17,000 (F).

### Required

Prepare a flexible budget for the actual level of sales.

### Pareto Analysis

- Nine Plus Technology Ltd. develops cutting-edge innovations that are powering the next revolution in mobility and has nine tablet smart phone models currently in the market whose previous year financial data is given below:

| Model      | Sales (₹'000) | Profit-Volume (PV) Ratio |
|------------|---------------|--------------------------|
| Tab - A001 | 5,100         | 3.53%                    |
| Tab - B002 | 3,000         | 23.00%                   |
| Tab - C003 | 2,100         | 14.29%                   |
| Tab - D004 | 1,800         | 14.17%                   |
| Tab - E005 | 1,050         | 41.43%                   |

|            |     |        |
|------------|-----|--------|
| Tab - F006 | 750 | 26.00% |
| Tab - G007 | 450 | 26.67% |
| Tab - H008 | 225 | 6.67%  |
| Tab - I009 | 75  | 60.00% |

### **Required**

Using the financial data, carry out a Pareto analysis (80/20 rule) of Sales and Contribution. Discuss your findings with appropriate recommendations.

### **Standard Costing**

9. Sapporo Manufacturing Co. (SMC) is a leading consumer goods company. The budgeted and actual data of SMC for the year 2014-15 are as follows:-

| Particulars                | Budget    | Actual    | Variance   |
|----------------------------|-----------|-----------|------------|
| Sales / Production (units) | 2,00,000  | 1,65,000  | (35,000)   |
| Sales (₹)                  | 21,00,000 | 16,92,900 | (4,07,100) |
| Less: Variable Costs (₹)   | 12,66,000 | 10,74,150 | 1,91,850   |
| Less: Fixed Costs (₹)      | 3,15,000  | 3,30,000  | (15,000)   |
| Profit                     | 5,19,000  | 2,88,750  | (2,30,250) |

The budgeted data shown in the table is based on the assumption that total market size would be 4,00,000 units but it turned out to be 3,75,000 units.

### **Required**

Prepare a statement showing reconciliation of budget profit to actual profit through marginal costing approach for the year 2014-15 in as much detail as possible.

### **Decision Making**

10. South Roadways Services Pvt. Ltd. is planning to run a fleet of 15 buses in Chittoor District on a fixed route. Company has estimated a total of 2,51,85,000 passenger kilometers per annum. It is estimated buses to have 100% load factor. Buses are purchased at a price of ₹ 44,00,000 per unit whose scrap value at the end of 5 years life is ₹ 5,50,000. Seating capacity of a bus excluding a Driver's seat is 42. Each bus can give a mileage of 5 kmpl. Average cost of fuel is ₹ 66 per liter. Cost of Lubricants & Sundries per 1,000 km would be ₹ 3,300. Company will pay ₹ 27,500 per month to Driver and two attendants for each bus.

Other annual charges per bus: Insurance ₹ 55,000, Garage Charges ₹ 33,000, Repairs & Maintenance ₹ 55,000. Route Permit Charges upto 20,000 km is ₹ 5,500 and ₹ 2,200 for every additional 5,000 km or part thereof.



### **Required**

- (i) Calculate a suggested fare per passenger/km taking into account markup on cost @ 20% to cover general overheads and sufficient profit.
- (ii) The Transport Sector of Chittoor is highly regulated. The Government has fixed the fare @ ₹ 1.35 for next 2 years. Comment on the two year's profitability taking into consideration the inflation rate of 8%.

Note: Route permit charges is not subject to Inflation.

### **Transfer Pricing**

11. AWB Ltd. has two divisions Division W and Division B. Division W produces product Z, which it sells to external market and also to Division B. Divisions in the AWB Ltd. are treated as profit centres and divisions are given autonomy to set transfer prices and to choose their supplier. Performance of each division measured on the basis of target profit given for each period.

Division W can produce 1,00,000 units of product Z at full capacity. Demand for product Z in the external market is for 70,000 units only at selling price of ₹ 2,500 per unit. To produce product Z Division W incurs ₹ 1,600 as variable cost per unit and total fixed overhead of ₹ 4,00,00,000. Division W has employed ₹ 12,00,00,000 as working capital, working capital is financed by cash credit facility provided by its lender bank @ 11.50% p.a. Division W has been given a profit target of ₹ 2,50,00,000 for the year.

Division B has found two other suppliers C Ltd and H Ltd. who are agreed to supply product Z.

Division B has requested a quotation for 40,000 units of product Z from Division W.

### **Required**

- (i) Calculate the transfer price per unit of product Z that Division W should quote in order to meet target profit for the year.
- (ii) Calculate the two prices Division W would have to quote to Division B, if it became AWB Ltd. policy to quote transfer prices based on opportunity costs.

### **Linear Programming**

12. The manufacturing company has 100 kg of A, 180 kg of B and 120 kg of C ingredients available per month. Company can use these materials to make three basic products namely 5-10-5, 5-5-10 and 20-5-10, where the numbers in each case represent the percentage of weight of A, B and C respectively in each of products. The cost of these raw materials are as follows:

| Ingredient        | Cost per Kg. (₹) |
|-------------------|------------------|
| A                 | 64               |
| B                 | 16               |
| C                 | 40               |
| Inert Ingredients | 16               |

Selling price of these products are ₹ 32.60, ₹ 34.80, and ₹ 36.00 per Kg, respectively. There is capacity restriction of the company product 5-10-5, so that company cannot produce more than 30 Kg per month.

### **Required**

Formulate this problem as an LP model to determine the productions (in Kg.) of each product which will maximise its monthly profit.

Note: Formulate Only

## **Transportation Problem**

13. Coupers Partners a leading CA firm has three managers. Each manager can work up to 176 hours during the next month, during which time three assignments must be completed. Tax Accounting (TA) Assignment will take 143 hours, Tax Performance Advisory (TPA) will take 154 hours, and Global Compliance & Reporting (GCR) will take 176 hours. The amount per hour that can be billed for assigning each manager to each assignment is given below:

| Manager        | Assignment |            |            |
|----------------|------------|------------|------------|
|                | TA<br>(₹)  | TPA<br>(₹) | GCR<br>(₹) |
| C <sub>1</sub> | 1,800      | 2,250      | 2,850      |
| C <sub>2</sub> | 2,100      | 1,950      | 1,800      |
| C <sub>3</sub> | 2,400      | 2,100      | 2,250      |

### **Required**

Formulate this as a transportation problem and find the optimal solution. Also find out the maximum total billings during the next month.

Note: A manager may be involved in more than one assignment.

## **PERT and CPM**

14. State the Validity of following statements along with the reasons:
- Two activities have common predecessor and successor activities. So, they can have common initial and final nodes.
  - In respect of any activity whether real or dummy, the terminal node should bear a number higher than the initial node number.
  - The difference between the latest event time and the earliest event time is termed as free float.
  - For every critical activity in a network, the earliest start and the earliest finish time as well as the latest finish time and the latest start time are the same.
  - The optimal duration of a project is the minimum time in which it can be completed.

- (vi) Resource leveling aims at smoothening of the resource usage rate without changing the project duration.

## Simulation

15. Finance Controller of Dunk Limited has drawn the following projections with probability distribution:

| Raw Material |             | Wages & Other Variable Overheads |             | Sales    |             |
|--------------|-------------|----------------------------------|-------------|----------|-------------|
| ₹ in 000     | Probability | ₹ in 000                         | Probability | ₹ in 000 | Probability |
| 08 – 10      | 0.2         | 11 – 13                          | 0.3         | 34 – 38  | 0.1         |
| 10 – 12      | 0.3         | 13 – 15                          | 0.5         | 38 – 42  | 0.3         |
| 12 – 14      | 0.3         | 15 – 17                          | 0.2         | 42 – 46  | 0.4         |
| 14 – 16      | 0.2         |                                  |             | 46 – 50  | 0.2         |

Opening cash balance is ₹ 40,000 and fixed cost is estimated at ₹ 15,000 per month.

### Required

Simulate cash flow projection and expected cash balance at the end of the sixth month. Use the following single digit random numbers.

|                                  |             |
|----------------------------------|-------------|
| Raw Material                     | 4 3 1 0 4 6 |
| Wages & Other Variable Overheads | 2 7 9 1 8 9 |
| Sales                            | 0 6 6 0 2 8 |

## Learning Curve

16. Marketing manager of AV Ltd. has conducted a market research on the price-demand relationship for its consumer durable product 'K-2'. K-2 is a recently launched product. The price-demand pattern will be as follows:

| Price per unit (₹) | Demand (units) |
|--------------------|----------------|
| 11,100             | 1,000          |
| 10,700             | 2,000          |
| 9,600              | 3,000          |
| 8,700              | 4,000          |

K-2 is produced in batches of 1,000 units. Production manager of AV Ltd. has also researched and studied the production pattern and has believe that 50% of the variable manufacturing cost would have learning and experience curve effect. This learning & experience curve effect will be continued upto 4,000 units of production at a constant rate. But after 4,000 units of production, unit variable manufacturing cost would be equal to the unit cost at the 4<sup>th</sup> batch. The manufacturing unit cost of the first batch will be

₹ 4,400 of which only 50% is subjected to learning and experience curve effect. The average unit variable cost of all 4 batches will be ₹4,120.

### Required

- (i) Calculate the rate of learning that has been expected by the Production manager.
- (ii) Calculate the price at which AV Ltd. should sell the K-2 in order to maximise its contribution.

Note

$$\log 0.93 = -0.0315, \log 2 = 0.3010, 2^{-0.1047} = 0.9299, 3^{-0.1047} = 0.8913, 4^{-0.1047} = 0.8649$$

## SUGGESTED ANSWERS/ HINTS

### 1. (i) Should KNM Road Carriers acquire and install the new system?

| ₹                                                                                  |          |
|------------------------------------------------------------------------------------|----------|
| Additional Costs of the new scheduling & tracking system p.a.                      | 1,25,000 |
| Additional Revenue from improvement in on-time performance<br>(₹ 9,000 × 10%/0.5%) | 1,80,000 |
| Contribution from Additional Annual Revenue (45% × ₹ 1,80,000) (A)                 | 81,000   |
| Cost Saving in respect of Cartons [(2,500-1,200) × ₹ 55] ... (B)                   | 71,500   |
| Total Benefits ... (A+B)                                                           | 1,52,500 |

As Expected Benefits are more than the cost. Accordingly company should install the new system.

**Calculation of additional amount of revenue required if benefits from new system is equal to cost & Contribution margin is 47.5%:**

| ₹                                                     |          |
|-------------------------------------------------------|----------|
| Costs of the new scheduling & tracking system ... (A) | 1,25,000 |
| Cost Saving in respect of Cartons ... (B)             | 71,500   |
| Contribution Margin ... (A – B)                       | 53,500   |
| Contribution Margin%                                  | 47.5     |
| Corresponding Additional Revenue                      | 1,12,632 |

2. **Kaizen Costing** emphasizes on *small but continuous improvement*. Targets once set at the beginning of the year or activities are *updated continuously* to reflect the improvement that has already been achieved and that are yet to be achieved.

The suggestive changes which are required to be adopted Kaizen Costing concepts in FZIL are as follows:

*Standard Cost Control System to Cost Reduction System:* Traditionally Standard Costing system assumes stability in the current manufacturing process and standards are set keeping the normal manufacturing process into account thus the whole effort is on to meet performance cost standard. On the other hand Kaizen Costing believes in continuous improvements in manufacturing processes and hence, the goal is to achieve cost reduction target. The first change required is the standard setting methodology i.e. from earlier Cost Control System to Cost Reduction System.

*Reduction in the periodicity of setting Standards and Variance Analysis:* Under the existing planning and control system followed by the FZIL, standards are set semi-annually and based on these standards monthly variance reports are generated for analysis. But under Kaizen Costing system cost reduction targets are set for small periods say for a week or a month. So the period covered under a standard should be reduced from semi-annually to monthly and the current practice of generating variance reports may be continued or may be reduced to a week.

*Participation of Executives or Workers in standard setting:* Under the Kaizen Costing system participation of workers or executives who are actually involved in the manufacturing process are highly appreciated while setting standards. So the current system of setting budgets and standards by the Finance department with the mere consent of Board of Directors required to be changed.

### 3. Break Even Units

1. 
$$\frac{[\text{Fixed Costs} + (\text{Setup Cost} \times \text{Setups}) + (\text{Engineering Cost} \times \text{Engineering Hours})]}{(\text{Sale Price} - \text{Variable Cost})}$$
  

$$= \frac{[36,500 + (\text{₹ } 225 \times 40) + (\text{₹ } 10 \times 250)]}{(\text{₹ } 5 - \text{₹ } 2.5)}$$
  

$$= 19,200 \text{ units}$$
2. 
$$\frac{[\text{Fixed Costs} + (\text{Setup Cost} \times \text{Setups}) + (\text{Engineering Cost} \times \text{Engineering Hours})]}{(\text{Sale Price} - \text{Variable Cost})}$$
  

$$= \frac{[36,500 + (\text{₹ } 150 \times 40) + (\text{₹ } 10 \times 215)]}{(\text{₹ } 5 - \text{₹ } 2.5)}$$
  

$$= 17,860 \text{ Units}$$

### 4. JIT Inventory System

*“For successful operation of JIT inventory system, the suppliers chosen must be willing to make frequent deliveries in small lots. Rather than deliver a week’s or a month’s material at one time, suppliers must be willing to make deliveries several times a day and in the exact quantities specified by the buyer.”*

It is described in the problem that suppliers are not willing to

- make frequent deliveries and
- make supplies in the exact quantities as required

Accordingly, Mr. Smith’s doubt is correct on successful implementation of JIT System.

## 5. Limiting Factor

| Case                                             | Basis for Selecting Priority of Product                                         |
|--------------------------------------------------|---------------------------------------------------------------------------------|
| If maximum sales (in value) is a limiting factor | Profit Volume Ratio                                                             |
| If raw material is a limiting factor             | Contribution per unit of raw material required to produce one unit of a product |
| If labour hour is a limiting factor              | Contribution per unit of labour hour required to produce one unit of a product  |
| If there is a heavy demand for the product       | Profit Volume Ratio                                                             |

## 6. (i) Statement of Profitability of DRB Ltd

|                                  | Products (Amount in ₹) |                |                |                |             |
|----------------------------------|------------------------|----------------|----------------|----------------|-------------|
|                                  | D <sub>1</sub>         | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | Total       |
| Sales                            | 26,00,000              | 45,20,000      | 42,40,000      | 32,00,000      | 1,45,60,000 |
| Direct Materials                 | 6,00,000               | 18,20,000      | 18,80,000      | 10,00,000      | 53,00,000   |
| Direct Wages                     | 8,00,000               | 20,80,000      | 12,80,000      | 12,00,000      | 53,60,000   |
| Overheads(W.N.2):                |                        |                |                |                |             |
| Machine Related                  | 1,60,000               | 1,56,000       | 64,000         | 2,40,000       | 6,20,000    |
| Batch Related                    | 1,00,000               | 1,30,000       | 80,000         | 1,50,000       | 4,60,000    |
| Contribution                     | 9,40,000               | 3,34,000       | 9,36,000       | 6,10,000       | 28,20,000   |
| Product Specific Fixed Overheads | 10,00,000              | 1,00,000       | 2,00,000       | 1,00,000       | 14,00,000   |
| Gross Profit                     | (60,000)               | 2,34,000       | 7,36,000       | 5,10,000       | 14,20,000   |
| General Fixed Overheads          |                        |                |                |                | 6,20,000    |
| Profit                           |                        |                |                |                | 8,00,000    |

## (ii) Break-even Point

$$\begin{aligned}
 \text{Total Sale Value of Product 'D}_1\text{' } &= ₹ 26,00,000 \\
 \text{Total Contribution of Product 'D}_1\text{' } &= ₹ 9,40,000 \\
 \text{Specific Fixed Overheads (Product D}_1\text{)} &= ₹ 10,00,000 \\
 \text{Break-even Sales (₹)} &= \frac{\text{Specific Fixed Cost}}{\text{Total Contribution}} \times \text{Total Sales Value} \\
 &= \frac{₹ 10,00,000}{₹ 9,40,000} \times ₹ 26,00,000 \\
 &= ₹ 27,65,957.45
 \end{aligned}$$

$$\text{Break-even Sales (units)} = \frac{\text{₹ } 27,65,957.45}{\text{₹ } 13.00} = 2,12,766 \text{ units}$$

However, production must be done in batches of 100 units. Therefore, **2,128 batches** are required for break even. Due to the production in batches, 34 units (2,128 batches × 100 units – 2,12,766 units) would be produced extra. These 34 units would add extra cost ₹ 282.20 (34 units × ₹ 8.3\*). Accordingly, break-even units as calculated above will increase by 22 units  $\left( \frac{\text{₹ } 282.20}{\text{₹ } 13.00} \right)$ .

$$(*) \left( \frac{\text{₹ } 6,00,000 + \text{₹ } 8,00,000 + \text{₹ } 1,60,000 + \text{₹ } 1,00,000}{2,00,000 \text{ units}} \right)$$

Break-even units of product 'D<sub>1</sub>' is 2,12,788 units (2,12,766 units + 22 units).

### Workings

#### W.N.-1

#### Calculation Showing Overhead Rates

| Overhead's Related Factors | Overhead Cost(₹)<br>[a] | Total No. of Units of Factors<br>[b] | Overhead Rate (₹)<br>[a] / [b] |
|----------------------------|-------------------------|--------------------------------------|--------------------------------|
| Machining Hours            | 6,20,000                | 15,50,000 hrs.                       | 0.40                           |
| Batch Production           | 4,60,000                | 9,200 batches                        | 50.00                          |

#### W.N.-2

#### Statement Showing - Overhead Costs Related to Product

| Particulars                      | D <sub>1</sub>                      | D <sub>2</sub>                      | D <sub>3</sub>                    | D <sub>4</sub>                      |
|----------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|
| Machining hrs. related overheads | ₹1,60,000<br>(4,00,000 hrs × ₹0.40) | ₹1,56,000<br>(3,90,000 hrs × ₹0.40) | ₹64,000<br>(1,60,000 hrs × ₹0.40) | ₹2,40,000<br>(6,00,000 hrs × ₹0.40) |
| Batch related overheads          | ₹1,00,000<br>(2,000 batches × ₹50)  | ₹1,30,000<br>(2,600 batches × ₹50)  | ₹80,000<br>(1,600 batches × ₹50)  | ₹1,50,000<br>(3,000 batches × ₹50)  |

## 7. Working Notes

### (1) Calculation of Actual Sales at Budgeted Prices

| (₹)                             |           |
|---------------------------------|-----------|
| Actual Sales at Actual Price    | 11,07,000 |
| Less: Sales Price Variance (F)  | 17,000    |
| Actual Sales at Budgeted Prices | 10,90,000 |

$$\begin{aligned}
 \text{Activity Level} &= \frac{\text{Actual Sales at Budgeted Prices}}{\text{Budgeted Sales at Full Capacity}} \times 100 \\
 &= \frac{₹10,90,000}{₹13,50,000} \times 100 \\
 &= 80.74\%
 \end{aligned}$$

## (2) Segregation of Fixed & Variable Cost Element from Semi-Variable Overheads

$$\begin{aligned}
 \text{Variable Overhead} &= \frac{\text{Overhead at Full Capacity} - \text{Overhead at 75\% Capacity}}{\text{Difference in Activity Level}} \\
 &= \frac{₹3,65,000 - ₹3,23,750}{25} \\
 &= ₹1,650 \\
 \text{Fixed Overhead} &= \text{Total SV Overheads at 100\% Level} - \text{Variable Overheads at 100\% level} \\
 &= ₹3,65,000 - (₹1,650 \times 100) \\
 &= ₹2,00,000
 \end{aligned}$$

### Flexible Budget at 80.74% Activity Level

| (Amount in ₹)                            |           |
|------------------------------------------|-----------|
| Sales                                    | 10,90,000 |
| Less:                                    |           |
| Direct Material (₹4,25,000 × 80.74%)     | 3,43,148  |
| Direct Labour (₹1,85,000 × 80.74%)       | 1,49,370  |
| Variable Overheads (₹2,15,000 × 80.74%)  | 1,73,593  |
| Semi-Variable Overheads                  |           |
| Variable Cost (₹1,650 × 80.74%) [W.N.-2] | 1,33,222  |
| Fixed Cost [W.N.-2]                      | 2,00,000  |
| Profit                                   | 90,667    |

8.

### Statement Showing 'Pareto Analysis'

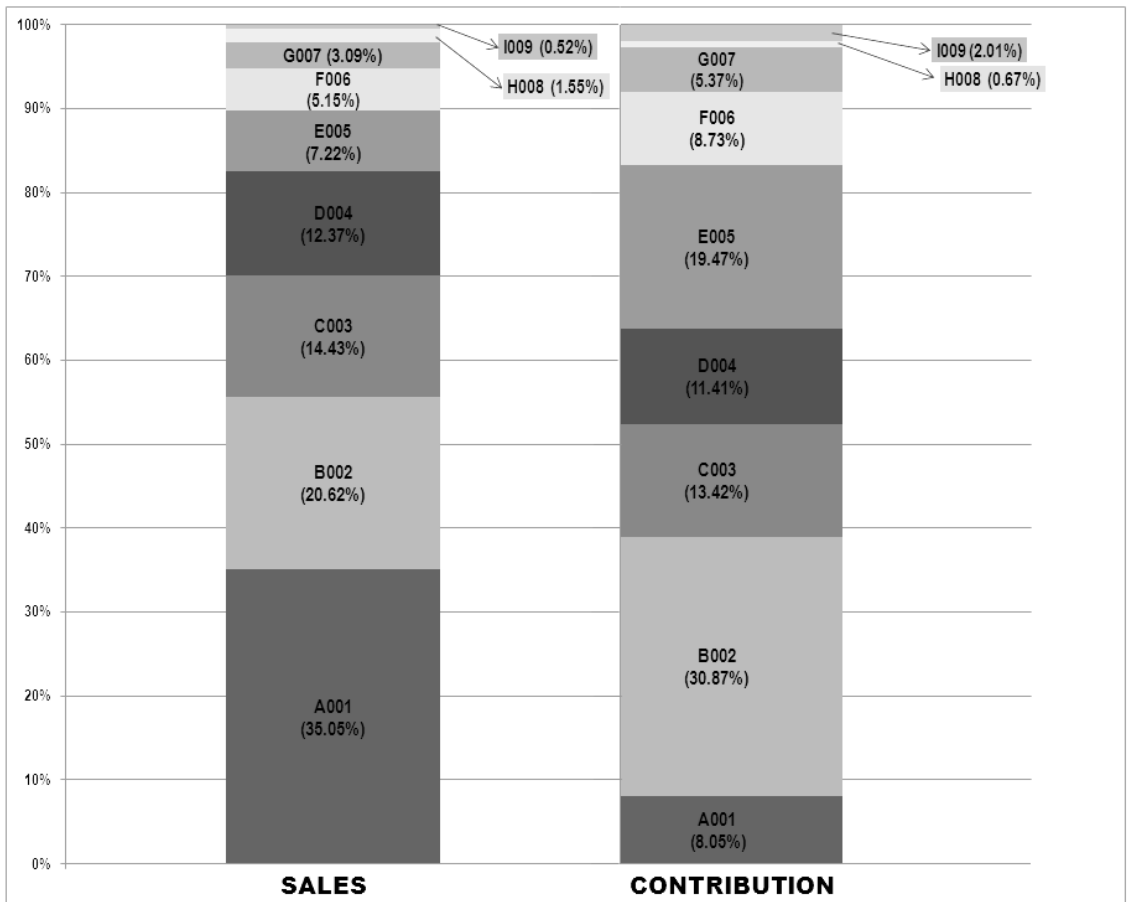
| Model                 | Sales<br>(₹'000) | % of Total<br>Sales | Cumulative<br>Total | Model                        | Cont.<br>(₹'000) | % of<br>Total Cont. | Cumulative<br>Total % |
|-----------------------|------------------|---------------------|---------------------|------------------------------|------------------|---------------------|-----------------------|
| Pareto Analysis Sales |                  |                     |                     | Pareto Analysis Contribution |                  |                     |                       |
| A001                  | 5,100            | 35.05%              | 35.05%              | B002                         | 690              | 30.87%              | 30.87%                |
| B002                  | 3,000            | 20.62%              | 55.67%              | E005                         | 435              | 19.47%*             | 50.34%                |
| C003                  | 2,100            | 14.43%              | 70.10%              | C003                         | 300              | 13.42%              | 63.76%                |



|      |        |         |         |      |       |         |         |
|------|--------|---------|---------|------|-------|---------|---------|
| D004 | 1,800  | 12.37%  | 82.47%  | D004 | 255   | 11.41%  | 75.17%  |
| E005 | 1,050  | 7.22%   | 89.69%  | F006 | 195   | 8.73%*  | 83.90%  |
| F006 | 750    | 5.15%   | 94.84%  | A001 | 180   | 8.05%   | 91.95%  |
| G007 | 450    | 3.09%   | 97.93%  | G007 | 120   | 5.37%   | 97.32%  |
| H008 | 225    | 1.55%   | 99.48%  | I009 | 45    | 2.01%   | 99.33%  |
| I009 | 75     | 0.52%   | 100.00% | H008 | 15    | 0.67%   | 100.00% |
|      | 14,550 | 100.00% |         |      | 2,235 | 100.00% |         |

(\*) Rounding - off difference adjusted.

### Diagram Showing 'Sales and Contribution' ( NOT COMPULSORY)



This Diagram is shown for **better understanding** of the concept.

## Recommendations

Pareto Analysis is a rule that recommends focus on most important aspects of the decision making in order to simplify the process of decision making. The very purpose of this analysis is to direct attention and efforts of management to the product or area where best returns can be achieved by taking appropriate actions.

Pareto Analysis is based on the 80/20 rule which implies that 20% of the products account for 80% of the revenue. But this is not the fixed percentage rule; in general business sense it means that a few of the products, goods or customers may make up most of the value for the firm.

In present case, five models namely A001, B002, C003, D004 account for 80% of total sales where as 80% of the company's contribution is derived from models B002, E005, C003, D004 and F006.

Models B002 and E005 together account for 50.34% of total contribution but having only 27.84% share in total sales. So, these two models are the key models and should be the top priority of management. Boths C003 and D004 are among the models giving 80% of total contribution as well as 80% of total sales so; they can also be clubbed with B002 and E005 as key models. Management of the company should allocate maximum resources to these four models.

Model F006 features among the models giving 80%of total contribution with relatively lower share in total sales. Management should focus on its promotional activities.

Model A001 accounts for 35.05% of total sales with only 8.05% share in total contribution. Company should review its pricing structure to enhance its contribution.

Models G007, H008 and I009 have lower share in both total sales as well as contribution. Company can delegate the pricing decision of these models to the lower levels of management, thus freeing themselves to focus on the pricing decisions for key models.

### 9. Statement of Reconciliation - Budgeted Vs Actual Profit

| Particulars                                                   | ₹        |
|---------------------------------------------------------------|----------|
| Budgeted Profit                                               | 5,19,000 |
| Less:Sales Volume Contribution Planning Variance (Adverse)    | 52,125   |
| Less:Sales Volume Contribution Operational Variance (Adverse) | 93,825   |
| Less:Sales Price Variance (Adverse)                           | 39,600   |
| Less:Variable Cost Variance (Adverse)                         | 29,700   |
| Less:Fixed Cost Variance (Adverse)                            | 15,000   |
| Actual Profit                                                 | 2,88,750 |

## Workings

### Basic Workings

$$\begin{aligned}\text{Budgeted Market Share (in \%)} &= \frac{2,00,000\text{units}}{4,00,000\text{units}} \\ &= 50\% \\ \text{Actual Market Share (in \%)} &= \frac{1,65,000\text{units}}{3,75,000\text{units}} \\ &= 44\% \\ \text{Budgeted Contribution} &= ₹ 21,00,000 - ₹ 12,66,000 \\ &= ₹ 8,34,000 \\ \text{Average Budgeted Contribution (per unit)} &= \frac{₹ 8,34,000}{₹ 2,00,000} \\ &= ₹ 4.17 \\ \text{Budgeted Sales Price per unit} &= \frac{₹ 21,00,000}{₹ 2,00,000} \\ &= ₹ 10.50 \\ \text{Actual Sales Price per unit} &= \frac{₹ 16,92,900}{₹ 1,65,000} \\ &= ₹ 10.26 \\ \text{Standard Variable Cost per unit} &= \frac{₹ 12,66,000}{₹ 2,00,000} \\ &= ₹ 6.33 \\ \text{Actual Variable Cost per unit} &= \frac{₹ 10,74,150}{₹ 1,65,000} \\ &= ₹ 6.51\end{aligned}$$

### Calculation of Variances

Sales Variances:.....

$$\begin{aligned}\text{Volume Contribution Planning*} &= \text{Budgeted Market Share \%} \times (\text{Actual Industry Sales Quantity in units} - \text{Budgeted Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit}) \\ &= 50\% \times (3,75,000 \text{ units} - 4,00,000 \text{ units}) \times ₹ 4.17 \\ &= 52,125(A)\end{aligned}$$

(\*)Market Size Variance

$$\begin{aligned}
 \text{Volume Contribution Operational}^{**} &= (\text{Actual Market Share \%} - \text{Budgeted Market Share \%}) \times (\text{Actual Industry Sales Quantity in units}) \times (\text{Average Budgeted Contribution per unit}) \\
 &= (44\% - 50\%) \times 3,75,000 \text{ units} \times ₹ 4.17 \\
 &= 93,825 \text{ (A)}
 \end{aligned}$$

(\*\*)Market Share Variance

$$\begin{aligned}
 \text{Price} &= \text{Actual Sales} - \text{Standard Sales} \\
 &= \text{Actual Sales Quantity} \times (\text{Actual Price} - \text{Budgeted Price}) \\
 &= 1,65,000 \text{ units} \times (₹ 10.26 - ₹ 10.50) = 39,600 \text{ (A)}
 \end{aligned}$$

Variable Cost Variances:.....

$$\begin{aligned}
 \text{Cost} &= \text{Standard Cost for Production} - \text{Actual Cost} \\
 &= \text{Actual Production} \times (\text{Standard Cost per unit} - \text{Actual Cost per unit}) \\
 &= 1,65,000 \text{ units} \times (₹ 6.33 - ₹ 6.51) \\
 &= ₹ 29,700 \text{ (A)}
 \end{aligned}$$

Fixed Cost Variances:.....

$$\begin{aligned}
 \text{Expenditure} &= \text{Budgeted Fixed Cost} - \text{Actual Fixed Cost} \\
 &= ₹ 3,15,000 - ₹ 3,30,000 \\
 &= ₹ 15,000 \text{ (A)}
 \end{aligned}$$



**Fixed Overhead Volume Variance** does not arise in a Marginal Costing system.

#### 10. (i) Statement Suggesting Fare *per passenger – km* (Each Bus)

| Particulars                     | Cost per annum (₹) |
|---------------------------------|--------------------|
| Fixed Expenses:                 |                    |
| Insurance                       | 55,000.00          |
| Garage Charges                  | 33,000.00          |
| Depreciation                    | 7,70,000.00        |
| Running Expenses:               |                    |
| Repair and Maintenance          | 55,000.00          |
| Cost of Lubricants and Sundries | 1,38,517.50        |

|                                                            |              |
|------------------------------------------------------------|--------------|
| Fuel Cost                                                  | 5,54,070.00  |
| Salary of Driver and Two Attendants                        | 3,30,000.00  |
| Route Permit Charges                                       | 16,500.00    |
| Total Cost <i>per annum</i>                                | 19,52,087.50 |
| Add: Markup @ 20% of Total Cost or 16.67% of Total Revenue | 3,90,417.50  |
| Total Revenue                                              | 23,42,505.00 |

Rate *per passenger- km* equals to ₹1.395

### Workings

|                                         |                                    |
|-----------------------------------------|------------------------------------|
| Total Passenger Kms                     | = 2,51,85,000                      |
| Total Buses                             | = 15                               |
| Passenger Kms <i>per bus</i>            | = 16,79,000 (2,51,85,000 Kms / 15) |
| Total Passenger Capacity <i>per bus</i> | = 42 – 2                           |
|                                         | = 40                               |
| Annual Distance Covered <i>by a bus</i> | = 41,975 Kms. (16,79,000Kms/40)    |

(ii) Regulated Fare *per passenger km* is ₹1.35

### Profitability Statement for *Each Bus*

| Particulars                         | Year 1 (₹)   | Year 2 (₹)   |
|-------------------------------------|--------------|--------------|
| Fixed Expenses:                     |              |              |
| Insurance                           | 59,400.00    | 64,152.00    |
| Garage Charges                      | 35,640.00    | 38,491.20    |
| Depreciation                        | 7,70,000.00  | 7,70,000.00  |
| Running Expenses:                   |              |              |
| Repair and Maintenance              | 59,400.00    | 64,152.00    |
| Cost of Lubricants and Sundries     | 1,49,598.90  | 1,61,566.81  |
| Fuel Cost                           | 5,98,395.60  | 6,46,267.25  |
| Salary of Driver and Two Attendants | 3,56,400.00  | 3,84,912.00  |
| Route Permit Charges                | 16,500.00    | 16,500.00    |
| Total Cost ...[A]                   | 20,45,334.50 | 21,46,041.26 |
| Total Revenue (Regulated) ...[B]    | 22,66,650.00 | 22,66,650.00 |
| Gross Margin ...[B] – [A]           | 2,21,315.50  | 1,20,608.74  |
| Gross Margin to Total Revenue       | 9.76%        | 5.32%        |

The gross margin is showing a downward trend because the cost components have taken into the effect of inflation hence increasing year by year but the total revenue has remained stagnant due to Government regulations which resulted in reduction in gross margin per bus.

The company's gross margin to total revenue ratio has come out to be 9.76% and 5.32% in first and second year respectively but initially the company's desired gross margin to total revenue ratio is 16.67% to cover general overheads and sufficient profit. Though the amount of general overheads is not given but we can safely assume that they may also subject to inflation i.e. increase year by year then in such case the company needs to maintain or increase its gross margin per bus to maintain its net profit after general overheads which is not possible in regulated environment. The information about regulated fare in the given case is regarding first two years only but if this regulated fare scenario persists for further years then the project may not be viable for the company.

**11. (i) Transfer Price *per unit* of Product Z that Division W Should Quote *in order to meet Target Profit***

Quotation for the 40,000 units of product Z should be such that meet Division W's target profit and interest cost on working capital. Therefore the minimum quote for product Z will be calculated as follows:

| Particulars                                                                                                  | Amount (₹)  |
|--------------------------------------------------------------------------------------------------------------|-------------|
| Target Profit (given for the year)                                                                           | 2,50,00,000 |
| Add: Interest Cost on Working Capital (₹12,00,00,000 @11.5%)                                                 | 1,38,00,000 |
| Required Profit                                                                                              | 3,88,00,000 |
| Add: Fixed Overhead                                                                                          | 4,00,00,000 |
| Target Contribution                                                                                          | 7,88,00,000 |
| Less: Contribution Earned --- External Sales<br>{60,000 units × (₹2,500 – ₹1,600)}                           | 5,40,00,000 |
| Contribution Required – Internal Sales                                                                       | 2,48,00,000 |
| Contribution <i>per unit</i> of Product Z (₹2,48,00,000 ÷ 40,000 units)                                      | 620         |
| Transfer Price of Product Z to Division B<br>(Variable Cost <i>per unit</i> + Contribution <i>per unit</i> ) | 2,220       |

**(ii) The Two Transfer Prices Based on Opportunity Costs**

For the 30,000 units (i.e. maximum capacity – maximum external market demand) at variable cost of production i.e. ₹1,600 per unit.

For the next 10,000 units (i.e. external market demand – maximum possible sale) at market selling price i.e. ₹2,500 per unit.

12. Let the  $P_1$ ,  $P_2$  and  $P_3$  be the three products to be manufactured. Then the data are as follows:

| Products        | Product ingredients |     |     |                   |
|-----------------|---------------------|-----|-----|-------------------|
|                 | A                   | B   | C   | Inert Ingredients |
| $P_1$           | 5 %                 | 10% | 5%  | 80%               |
| $P_2$           | 5%                  | 5%  | 10% | 80%               |
| $P_3$           | 20%                 | 5%  | 10% | 65%               |
| Cost per kg (₹) | 64                  | 16  | 40  | 16                |

**Cost of Product  $P_1$**

$$= 5\% \times ₹ 64 + 10\% \times ₹ 16 + 5\% \times ₹ 40 + 80\% \times ₹ 16$$

$$= ₹ 19.60 \text{ per kg}$$

**Cost of Product  $P_2$**

$$= 5\% \times ₹ 64 + 5\% \times ₹ 16 + 10\% \times ₹ 40 + 80\% \times ₹ 16$$

$$= ₹ 20.80 \text{ per kg.}$$

**Cost of Product  $P_3$**

$$= 20\% \times ₹ 64 + 5\% \times ₹ 16 + 10\% \times ₹ 40 + 65\% \times ₹ 16$$

$$= ₹ 28.00 \text{ per kg.}$$

Let  $x_1$ ,  $x_2$ , and  $x_3$  be the quantity (in kg) of  $P_1$ ,  $P_2$ , and  $P_3$  respectively to be manufactured. The LP problem can be formulated:

*Objective function:*

$$\begin{aligned} \text{Maximise } Z &= (\text{Selling Price} - \text{Cost Price}) \times \text{Quantity of Product} \\ &= (₹32.60 - ₹19.60) x_1 + (₹34.80 - ₹20.80) x_2 + (₹36.00 - ₹28) x_3 \\ &= 13x_1 + 14x_2 + 8x_3 \end{aligned}$$

*Subject to Constraints:*

$$1/20 x_1 + 1/20 x_2 + 1/5 x_3 \leq 100$$

$$\text{Or } x_1 + x_2 + 4x_3 \leq 2,000$$

$$1/10 x_1 + 1/20 x_2 + 1/20 x_3 \leq 180$$

$$\text{Or } 2x_1 + x_2 + x_3 \leq 3,600$$

$$1/20 x_1 + 1/10 x_2 + 1/10 x_3 \leq 120$$

$$\text{Or } x_1 + 2x_2 + 2x_3 \leq 2,400$$

$$x_1 \leq 30$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

13. The given information can be tabulated in following transportation problem-

| Manager               | Assignment |         |         | Time Available (Hours) |
|-----------------------|------------|---------|---------|------------------------|
|                       | TA (₹)     | TPA (₹) | GCR (₹) |                        |
| C <sub>1</sub>        | 1,800      | 2,250   | 2,850   | 176                    |
| C <sub>2</sub>        | 2,100      | 1,950   | 1,800   | 176                    |
| C <sub>3</sub>        | 2,400      | 2,100   | 2,250   | 176                    |
| Time Required (Hours) | 143        | 154     | 176     |                        |

The given problem is an unbalanced transportation problem. Introducing a dummy assignment to balance it, we get-

| Manager               | Assignment |         |         |           | Time Available (Hours) |
|-----------------------|------------|---------|---------|-----------|------------------------|
|                       | TA (₹)     | TPA (₹) | GCR (₹) | Dummy (₹) |                        |
| C <sub>1</sub>        | 1,800      | 2,250   | 2,850   | 0         | 176                    |
| C <sub>2</sub>        | 2,100      | 1,950   | 1,800   | 0         | 176                    |
| C <sub>3</sub>        | 2,400      | 2,100   | 2,250   | 0         | 176                    |
| Time Required (Hours) | 143        | 154     | 176     | 55        | 528                    |

The objective here is to maximize total billing amount of the auditors. For achieving this objective, let us convert this maximization problem into a minimization problem by subtracting all the elements of the above payoff matrix from the highest payoff i.e. ₹2,850.

| Manager               | Assignment |         |         |           | Time Available (Hours) |
|-----------------------|------------|---------|---------|-----------|------------------------|
|                       | TA (₹)     | TPA (₹) | GCR (₹) | Dummy (₹) |                        |
| C <sub>1</sub>        | 1,050      | 600     | 0       | 2,850     | 176                    |
| C <sub>2</sub>        | 750        | 900     | 1,050   | 2,850     | 176                    |
| C <sub>3</sub>        | 450        | 750     | 600     | 2,850     | 176                    |
| Time Required (Hours) | 143        | 154     | 176     | 55        | 528                    |

Now, let us apply VAM method to the above matrix for finding the initial feasible solution.



| Manager        | Assignment |           |         |           | Time Avail. (Hours) | Difference      |
|----------------|------------|-----------|---------|-----------|---------------------|-----------------|
|                | TA (₹)     | TPA (₹)   | GCR (₹) | Dummy (₹) |                     |                 |
| C <sub>1</sub> | 1,050      | 600       | 0 176   | 2,850     | 176/0               | 600 - -         |
| C <sub>2</sub> | 750        | 900 121   | 1,050   | 2,850 55  | 176/55/0            | 150, 150 1,950  |
| C <sub>3</sub> | 450 143    | 750 33    | 600     | 2,850     | 176/33/0            | 150, 300, 2,100 |
| Time Required  | 143/0      | 154/121/0 | 176/0   | 55/0      | 528                 |                 |
| Difference     | 300        | 150       | 600     | 0         |                     |                 |
|                | 300        | 150       | -       | 0         |                     |                 |
|                | -          | 150       | -       | 0         |                     |                 |

The initial solution is given below. It can be seen that it is a degenerate solution since the number of allocation is 5. In order to apply optimality test, the total number of allocations should be 6 ( $m + n - 1$ ). To make the initial solution a non-degenerate, we introduce a very small quantity in the least cost independent cell which is cell of C<sub>3</sub>, GCR.

| Manager        | Assignment |         |         |           |
|----------------|------------|---------|---------|-----------|
|                | TA (₹)     | TPA (₹) | GCR (₹) | Dummy (₹) |
| C <sub>1</sub> | 1,050      | 600     | 0 176   | 2,850     |
| C <sub>2</sub> | 750        | 900 121 | 1,050   | 2,850 55  |
| C <sub>3</sub> | 450 143    | 750 33  | 600 e   | 2,850     |

Let us test the above solution for optimality-

**( $u_i + v_j$ ) Matrix for Allocated / Unallocated Cells**

|                |      |     |     |                |      |
|----------------|------|-----|-----|----------------|------|
|                |      |     |     | U <sub>i</sub> |      |
| v <sub>j</sub> | -150 | 150 | 0   | 2,100          | -600 |
|                | 600  | 900 | 750 | 2,850          | 150  |
|                | 450  | 750 | 600 | 2,700          | 0    |
|                | 450  | 750 | 600 | 2,700          |      |

Now we calculate  $\Delta_{ij} = C_{ij} - (u_i + v_j)$  for non basic cells which are given in the table below-

**$\Delta_{ij}$  Matrix**

|       |     |     |     |
|-------|-----|-----|-----|
| 1,200 | 450 |     | 750 |
| 150   |     | 300 |     |
|       |     |     | 150 |

Since, all allocations in  $\Delta_{ij} = C_{ij} - (u_i + v_j)$  are non negative, the allocation is optimal. The allocation of assignments to managers and their billing amount is given below:

| Manager              | Assignment                          | Billing Amount                   |
|----------------------|-------------------------------------|----------------------------------|
| <b>C<sub>1</sub></b> | Global Compliance & Reporting (GCR) | ₹5,01,600<br>(176 hrs. × ₹2,850) |
| <b>C<sub>2</sub></b> | Tax Performance Advisory (TPA)      | ₹2,35,950<br>(121 hrs. × ₹1,950) |
| <b>C<sub>3</sub></b> | Tax Accounting (TA)                 | ₹3,43,200<br>(143 hrs. × ₹2,400) |
| <b>C<sub>3</sub></b> | Tax Performance Advisory (TPA)      | ₹69,300<br>(33 hrs. × ₹2,100)    |
| Total Billing        |                                     | ₹11,50,050                       |

#### 14. (i) Invalid

Reason: As per the rules of network construction, parallel activities between two events, without intervening events, are prohibited. Dummy activities are needed when two or more activities have same initial and terminal events. Dummy activities do not consume time or resources.

#### (ii) Valid

Reason: As per the conventions adopted in drawing networks, the head event or terminal node always has a number higher than that of initial node or tail event.

#### (iii) Invalid

Reason: The difference between the latest event time and the earliest event time is termed as slack of an event. Free float is determined by subtracting head event slack from the total float of an activity.

#### (iv) Invalid

Reason: For every critical activity in a network, the earliest start time and the latest start time is same and also the earliest finish time and the latest finish time is same.

(v) **Invalid**

Reason: The optimum duration is the time period in which the total cost of the project is minimum.

(vi) **Valid**

Reason: Resource leveling is a network technique used for reducing the requirement of a particular resource due to its paucity or insufficiency within a constraint on the project duration. The process of resource leveling utilize the large floats available on non-critical activities of the project and cuts down the demand of the resource.

**15. Allocation of Random Numbers**

| Raw Material |            |             | Wages &<br>Other Variable Overheads |            |             | Sales     |            |             |
|--------------|------------|-------------|-------------------------------------|------------|-------------|-----------|------------|-------------|
| Mid Point    | Cum. Prob. | Random Nos. | Mid Point                           | Cum. Prob. | Random Nos. | Mid Point | Cum. Prob. | Random Nos. |
| 9            | 0.2        | 0 – 1       | 12                                  | 0.3        | 0 – 2       | 36        | 0.1        | 0           |
| 11           | 0.5        | 2 – 4       | 14                                  | 0.8        | 3 – 7       | 40        | 0.4        | 1 – 3       |
| 13           | 0.8        | 5 – 7       | 16                                  | 1.0        | 8 – 9       | 44        | 0.8        | 4 – 7       |
| 15           | 1.0        | 8 – 9       |                                     |            |             | 48        | 1.0        | 8 – 9       |

**Simulation Table**

(₹ in 000)

| Month | Raw Material | Wages &<br>Other V.O | Sales | Fixed Cost | Net Cash Flow | Cash Balancing<br>(Opening ₹40 thousand) |
|-------|--------------|----------------------|-------|------------|---------------|------------------------------------------|
| 1     | 11           | 12                   | 36    | 15         | -2            | 38                                       |
| 2     | 11           | 14                   | 44    | 15         | +4            | 42                                       |
| 3     | 9            | 16                   | 44    | 15         | +4            | 46                                       |
| 4     | 9            | 12                   | 36    | 15         | 0             | 46                                       |
| 5     | 11           | 16                   | 40    | 15         | -2            | 44                                       |
| 6     | 13           | 16                   | 48    | 15         | +4            | <b>48</b>                                |

16. (i) Variable cost per unit that will be effected by learning and experience curve is ₹2,200 (₹4,400 – 50% of ₹ 4,400).

Let, 'r' be the learning curve rate.

| No. of Batch (x) | Cumulative Average Cost <i>per unit</i> (y) |
|------------------|---------------------------------------------|
| 1                | 2,200                                       |
| 2                | 2,200 r                                     |
| 4                | 2,200 r <sup>2</sup>                        |

$$\begin{aligned}
 \text{If } 2,200 r^2 &= ₹1,920 \text{ (₹4,120 – 50\% of ₹ 4,400)} \\
 r^2 &= 0.8727 \\
 r &= 0.934 \\
 \text{Therefore, Learning Curve Effect} &= 93\% \text{ (rounded off)}
 \end{aligned}$$

## (ii) Calculation of Optimum Price

| Price<br>per unit<br>(₹) | Demand<br>(units) | Variable<br>Cost<br>per unit *<br>[W.N.]<br>(₹) | Variable<br>Cost<br>per unit **<br>(₹) | Total<br>Variable<br>Cost<br>per unit<br>(₹) | Contribution<br>per unit<br>(₹) | Total<br>Contribution<br>(₹) |
|--------------------------|-------------------|-------------------------------------------------|----------------------------------------|----------------------------------------------|---------------------------------|------------------------------|
| 11,100.00                | 1,000             | 2,200.00                                        | 2,200.00                               | 4,400.00                                     | 6,700.00                        | 67,00,000                    |
| 10,700.00                | 2,000             | 2,046.00                                        | 2,200.00                               | 4,246.00                                     | 6,454.00                        | 1,29,08,000                  |
| 9,600.00                 | 3,000             | 1960.86                                         | 2,200.00                               | 4,160.86                                     | 5,439.14                        | 1,63,17,420                  |
| 8,700.00                 | 4,000             | 1,902.78                                        | 2,200.00                               | 4,102.78                                     | 4,597.22                        | 1,83,88,880                  |

(\*) This represents variable cost part which is affected by the learning and experience curve effect.

(\*\*) This represents variable cost part which is not affected by the learning and experience curve effect.

### Working Note [W.N.]

#### Variable Cost per unit

| Output in<br>Batches (x) | Average Cost of<br>the First Unit (a) | $x^{-0.1047}$ | Cumulative Average<br>Cost per unit (y) |
|--------------------------|---------------------------------------|---------------|-----------------------------------------|
| 1                        | 2,200                                 | 1.0000        | 2,200.00                                |
| 2                        | 2,200                                 | 0.9299        | 2,046.00                                |
| 3                        | 2,200                                 | 0.8913        | 1,960.86                                |
| 4                        | 2,200                                 | 0.8649        | 1,902.78                                |

$$y = ax^b$$

Where,

y = Cumulative average unit costs

a = Average cost of the first unit

x = Cumulative number of batches

b = Log of learning ratio ÷ Log of 2

$$= \log 0.93 \div \log 2$$

$$= -0.0315 \div 0.3010 = -0.1047$$