



STRATEGIC COST MANAGEMENT

Time Allowed: 3 Hours

Full Marks: 100

The figures in the margin on the right side indicate full marks.

SECTION – A (Compulsory)

1. Choose the correct option:

[15 x 2=30]

- (i) If project A has a net present value (NPV) of ₹30,00,000 and project B has an NPV of ₹50,00,000, what is the opportunity cost if project B is selected?
- a) ₹23,00,000
  - b) ₹30,00,000
  - c) ₹20,00,000
  - d) ₹50,00,000
- (ii) Marketing department of an organisation estimates that 40,000 of new mixers could be sold annually at a price of ₹60 each. To design, develop and produce these new mixers an investment of ₹40,00,000 would be required. The company desires a 15% return on investment (ROI). Given these data, the target cost to manufacture, sell, distribute and service one mixer will be
- a) ₹37.50
  - b) ₹40.00
  - c) ₹45.00
  - d) ₹48.60
- (iii) Activities required to design, develop, produce, market, distribute, and service a product is known as
- a) Target activities
  - b) Value-chain activities
  - c) Whole life activities
  - d) Overhead
- (iv) Which of the following is TRUE about the theory of constraints?
- a) TOC recognizes that lower inventories means slower response to customers.
  - b) TOC recognizes that lowering inventory decreases carrying costs and thus decreases operating expenses and improves net income.
  - c) TOC recognizes that lower inventories means more defects.
  - d) TOC recognizes that EOQ is important.



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- (v) Backflush costing is most likely to be used when:
- Management desires sequential tracking of costs
  - A Just-in-Time inventory philosophy has been adopted
  - The company carries significant amount of inventory
  - Actual production costs are debited to work-in-progress
- (vi) A company produces a product which is sold at a price of ₹80. Its Variable cost is ₹32. The company's Fixed cost is ₹11,52,000 p.a. The company operates at a margin of safety of 40%. The total sales of the company are: -
- 4,000 units
  - 40,000 units
  - 30,000 units
  - 20,000 units
- (vii) Max Ltd. Fixes the inter divisional transfer prices for its product on the basis of cost plus a return on investment in the division. The budget for division X for 2023-2024 appears as under –

Fixed Assets	₹5,00,000
Current assets	₹3,00,000
Debtors	₹2,00,000
<b>Annual fixed cost of the division</b>	<b>₹8,00,000</b>
Variable cost per unit of the product	₹10
Budgeted volume	4,00,000 units per year
Desired ROI	28%

Transfer price for division X is

- ₹12.70
  - ₹10.70
  - ₹8.70
  - ₹14.70
- (viii) Standard cost and budgeted cost are \_\_\_\_\_.
- Interrelated but not interdependent.
  - Interdependent but not interrelated.
  - Interrelated and interdependent.
  - None of the above
- (ix) Uniform costing is \_\_\_\_\_.
- a separate method of costing
  - a type of costing



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- c) a technique of costing  
d) None of the above
- (x) If the time taken to produce the first unit of a product is 4000 hrs, what will be the total time taken to produce the 5th to 8th unit of the product, when a 90% learning curve applies?  
a) 10,500 hours  
b) 12,968 hours  
c) 9,560 hours  
d) 10,368 hours
- (xi) In a transportation matrix (where  $R_i$  are rows and  $C_j$  are columns), the second allocation under the North West Corner Rule can be –  
a)  $R_1C_2$   
b)  $R_1C_3$   
c)  $R_2C_3$   
d) None of these
- (xii) Simulation may be applied to:  
a) Bricklaying  
b) Scheduling aircraft  
c) Paper manufacturing  
d) Toy manufacturing
- (xiii) In a PERT network, the optimistic time for a particular activity is 9 weeks and the pessimistic time is 21 weeks. Which one of the following is the best estimate of the standard deviation for the activity?  
a) 12  
b) 9  
c) 6  
d) 2
- (xiv) Tableau is a –  
a) Business Intelligence Tool  
b) Visualisation Tool  
c) Both (a) and (b)  
d) None of the above
- (xv) Script Ends – is related to which type of programming language?  
a) R Programming  
b) SAS  
c) Python  
d) SPSS



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## Answers:

i	ii	iii	iv	v	vi	vii	viii	ix	x
b	c	b	b	b	b	a	a	c	d
xi	xii	xiii	xiv	xv					
a	b	d	c	c					

## SECTION – B

(Answer any 5 questions out of 7 questions given. Each question carries 14 marks.)

[5 x 14 = 70]

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

Particulars	Core making (₹)	Melting and pouring (₹)	Moulding (₹)	Cleaning and Grinding (₹)
Labour	10,000	16,000	6,000	4,500
Variable overhead	3,000	1,000	1,000	1,000
Fixed overhead	5,000	9,000	2,000	1,000
	18,000	26,000	9,000	6,500
Labour and O.H. rate per direct labour hour	9.00	6.50	6.00	5.2

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

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

Core Making	0.09
Melting and pouring	0.15
Moulding	0.06



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Cleaning and grinding

0.06

Variable overheads would bear a normal relationship to labour cost in the melting and pouring department and in the moulding department. In core making, cleaning and grinding however, the extra labour requirements would not be accompanied by proportionate increases in variable overhead. Variable overhead would increase by ₹1.20 for every additional labour hour in core making and by 30 paise for every additional labour hour in cleaning and grinding. Standard wage rates are in operation in each department and no labour variances are anticipated.

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

You are required to:

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

(b) Determine the lowest price at which quotation can be given for 90,000 castings without incurring a loss. [14]

Answer:

## Computation of Labour and Overhead Rate

Particulars	Core making (₹)	Melting and pouring (₹)	Moulding (₹)	Cleaning and Grinding (₹)
Labour & overheads (₹)	18,000.00	26,000.00	9,000.00	6,500.00
Labour & overheads per hour (₹)	9.00	6.50	6.00	5.20
No. of hours	2,000.00	4,000.00	1,500.00	1,250.00
Variable overhead per hour (₹)	1.50	0.25	0.67	0.80
Labour rate per hour (₹)	5.00	4.00	4.00	3.60
Hours required for new order	1,350.00	2,250.00	900.00	900.00
Labour cost required for order (₹)	6,750.00	9,000.00	3,600.00	3,240.00
Variable overhead cost for order (₹)	1,620.00	563.00	600.00	270.00

## Revised monthly labour and overheads cost budget reflecting the additions of the order

Particulars	Core making (₹)	Melting and pouring (₹)	Moulding (₹)	Cleaning and Grinding (₹)	Total (₹)
Labour	10,000.00	16,000.00	6,000.00	4,500.00	
Labour for the order	6,750.00	9,000.00	3,600.00	3,240.00	



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	16,750.00	25,000.00	9,600.00	7,740.00	
Variable overheads	3,000.00	1,000.00	1,000.00	1,000.00	
Variable overheads for the order	1,620.00	563.00	600.00	270.00	
	4,620.00	1,563.00	1,600.00	1,270.00	
Fixed cost	5,000.00	9,000.00	2,000.00	1,000.00	
Total	26,370.00	35,563.00	13,200.00	10,010.00	85,143.00
Add : additional fixed cost					1,000.00
				Total:	86,143.00

## Computation of total price for the order

Particulars	(₹)	(₹)
Material	(15,000 x 1)	15,000.00
Labour & overheads	(86,143 – 59,500)	26,643.00
		41,643.00
Total Price of the order	(41,643 x 6)	2,49,858

3. (a) Transferor Ltd. has two processes, Preparing and Finishing. The normal output per week is 7,500 units (Completed) at a capacity of 75%. Transferee Ltd. had production problems in preparing and requires 2,000 units per week of prepared material for their finishing processes. The existing cost structure of one prepared unit of Transferor Ltd. at existing capacity is as follows:

Material = ₹2.00 (variable 100%) Labour = ₹2.00 (Variable 50%) Overhead = ₹4.00 (variable 25%)

The sale price of a completed unit of Transferor Ltd is ₹16 with a profit of ₹4 per unit.

Required:

Construct the effect on the profits of Transferor Ltd., for six months (25 weeks) of supplying units to Transferee Ltd. with the following alternative transfer prices per unit:

- I. Marginal Cost
- II. Marginal Cost + 25%
- III. Marginal Cost + 15% Return on capital (assume capital employed as ₹20 lakhs)
- IV. Existing Cost
- V. Existing Cost + a portion of profit on the basis of  $\{(\text{Preparing cost} \div \text{Total Cost}) \times \text{Unit Profit}\}$
- VI. At an agreed market price of ₹8.50. Assume no increase in fixed cost. [7]



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Answer:

Evaluation of the effect of transfer of 2,000 units per week for 25 weeks on profit

Sl.	Alternative	TP (₹)	Effect on Profit (₹)	
			Per Unit (TP – Profit)	For 50,000 units (WN 2)
(i)	Marginal Cost (Working Note 1)	4.00	(4.00 - 4.00) = 0	Nil
(ii)	Marginal Cost + 25% (Working Note 3)	4.00 + 25% = 5.00	(5.00 - 4.00) = 1.00	50,000 × 1 = ₹50,000
(iii)	Marginal Cost + 15% ROI (Working Note 3)	4.00 + 3.00 = 7.00	(7.00 - 4.00) = 3.00	50,000 × 3 = ₹1,50,000
(iv)	Existing Cost (Working Note 1)	8.00	(8.00 - 4.00) = 4.00	50,000 × 4 = ₹ 2,00,000
(v)	Existing Cost + Proportionate Profit (Working Note 4)	8.00 + 2.67 = 10.67	(10.67 - 4.00) =6.67	50,000 × 6.67 = ₹3,33,500
(vi)	Agreed Market Price	8.50	(8.50 - 4.00) = 4.50	50,000 × 4.50 = ₹2,25,000

Working Note 1

Existing Cost Structure One Prepared Unit of Preparing Unit

Serial	Element	Workings	(₹)
1	Variable (Marginal) Costs		
	(i) Material (100%)		2.00
	(ii) Labour (50%)	(2.00 × 50%)	1.00
	(iii) Overheads (25%)	(4.00 × 25%)	1.00
	Total (i to iii)		4.00
2	Fixed Costs		
	(i) Labour (50%)	(2.00 × 50%)	1.00
	(ii) Overheads (75%)	(4.00 × 75%)	3.00
	Total (i to ii)		4.00
3	Total Preparing Cost (1 + 2)		8.00

Working Note 2

Units to be Transferred in 25 weeks = 25 × 2,000 = 50,000



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**Working Note 3**

Capital Employed = ₹20,00,000

ROI per annum @ 15% = 20,00,000 × 15% = ₹3,00,000

ROI for 6 months = {(3,00,000 ÷ 12) × 6} = ₹1,50,000

ROI per Unit = (1,50,000 ÷ 50,000) = ₹3.00

**Working Note 4**

Sale Price of the Completed Unit = ₹16.00 Profit per Unit – ₹4.00

Cost per Completed Unit = (16.00 – 4.00) = 12.00

Proportionate Profit for Prepared Unit = {(Preparing cost ÷ Total Cost) × Unit Profit}  
= {(8 ÷ 12) × 4} = ₹2.67

(Explanatory Comment: The problem highlights different methods of adopting the transfer price within an organisation)

(b) S Ltd. has sales of 2,00,000 units at a price of ₹100.00 per unit and profit of ₹70.00 Lakhs in the current year. Due to stiff competition, next year the Company has to reduce its price of product @ 3% to achieve same target volume of sales. The cost structure and profit for the current year is given as below:

Particulars	(₹ Lakhs)
Direct Material	50.00
Direct Wages	40.00
Variable Factory Overheads	15.00
Fixed Overheads including Sales & Admin Expenses	25.00
Total Cost	130.00

To achieve the Target Cost to maintain the same profit, the Company is evaluating the proposal to reduce Labour Cost and Fixed Factory Overheads. A Vendor supplying the Machine suitable for the Company's operations has offered an advanced technology Semi-Automatic Machine of ₹10 Lakhs as replacement of Old Machine worth ₹3 Lakhs. The Vendor is agreeable to take back the Old Machine at ₹1 Lakh only. The Company's policy is to charge depreciation at 15% on WDV. The Maintenance Charge of the Existing Machine is ₹1 Lakh per annum whereas there will be warranty of services free of cost for the New Machine first two years. There are 7 Supervisors whose Salary is ₹1.50 Lakhs per annum. The New Machine having Conveyor Belt is expected to help in cost cutting measures in the following ways -

- (1) Improve Productivity of workers by 10%
- (2) Cut-down Material Wastage by 5%
- (3) Elimination of services of Supervisors because of automatic facilities of the machine
- (4) Saving in Packaging Cost by ₹1 Lakhs.

Assuming Cost of Capital to be 15%, calculate how many Supervisors should be removed from the production activities to achieve the Target Cost. [7]





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**Answer:****A. Targeted Cost Reduction**

Targeted price Reduction	= 3% of 200 lakhs = ₹6 lakhs
Targeted Cost Reduction	= ₹6 lakhs

**B. Net Savings on account of New Machine****1. Savings on account of the New Machine**

a. Reduction in wages due to Improve Productivity of workers by 10%	
= {40 lakhs – [(40 lakhs ÷ 110) × 100]}	= (40.00 - 36.36) = ₹3.64 lakhs
b. Cut-down Material Wastage by 5%	= 5% of 50 lakhs = ₹2.50 lakhs
c. Saving in Packaging Cost	= ₹1.00 lakhs
d. Saving in Maintenance Cost	= ₹1.00 lakhs
e. Total Savings	= 3.64 + 2.50 + 1.00 + 1.00 = ₹8.14 lakhs

**2. Additional Costs on account of the New Machine**

a. Loss in Disposal of Old Machine	= (₹3 lakhs - ₹1 lakhs) = ₹2.00 lakhs
b. Difference in Depreciation	= (₹10 lakhs - ₹3 lakhs) × 15% = ₹1.05 lakhs
c. Cost of Capital Investment	= (₹10 lakhs × 15%) = ₹1.50 lakhs
d. Total Additional Costs	= (2.00 + 1.05 + 1.50) = ₹4.55 lakhs

**3. Net Savings**

$$= (8.14 - 4.55) = ₹3.59 \text{ lakhs}$$

**C. Supervisors to be Removed**

Short Fall = (A-B)	= (6.00 - 3.59) = ₹2.41 lakhs
Number of Supervisors to be removed	= (2.41 lakhs ÷ 1.50 lakhs per supervisors)
	= 1.61 i.e. say 2 Supervisors

**4. (a) B Ltd. has decided to adopt JIT policy for materials. The following effects of JIT policy are identified-**

1. To implement JIT, the company has to modify its production and material receipt facilities at a capital cost of ₹10,00,000. The new machine will require a cash operating cost ₹1,08,000 p.a. The capital cost will be depreciated over 5 years.
  2. Raw material stockholding will be reduced from ₹40,00,000 to ₹10,00,000.
  3. The company can earn 15% on its long-term investments.
  4. The company can avoid rental expenditure on storage facilities amounting to ₹33,000 per annum. Property. Taxes and insurance amounting to ₹22,000 will be saved due to JIT programme
  5. Presently there are 7 workers in the store department at a salary of ₹5,000 each per month. After implementing JIT scheme, only 5 workers will be required in this department. Balance 2 workers' employment will be terminated.
  6. Due to receipt of smaller lots of Raw Materials, there will be some disruption of production. The costs of stock-outs are estimated at ₹77,000 per annum.
- Determine the financial impact of the JIT policy. Is it advisable for the company to implement JIT system? [7]



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Answer:

Cost-Benefit Analysis of JIT policy

A. Costs (Per annum)

Serial	Particulars	(₹)
1	Interest on capital for modifying production facilities (₹ 10,00,000 × 15%) / Interest Income Fore gone	1,50,000
2	Operating Costs of new production facilities (given)	1,08,000
3	Stock-Outs Costs (given)	77,000
4	<b>Total Costs</b>	<b>3,35,000</b>

B. Benefits (per Annum)

Serial	Particulars	(₹)
1	Interest on investment on funds released due to reduction in raw material stocking (₹ 40,00,000 - ₹ 10,00,000) × 15%	4,50,000
2	Saving in salary of 2 workers terminated (₹ 5,000 × 12 months × 2)	1,20,000
3	Saving in Rental Expenditure	33,000
4	Saving in Property Tax & Insurance	22,000
6	<b>Total Benefits</b>	<b>6,25,000</b>

C. Net Benefits = (6,25,000 – 3,35,000) = ₹2,90,000

Advise: The JIT policy may be implemented, as there is a Net Benefit of ₹2,90,000 per annum.

Note: Depreciation, being apportionment of capital cost, is ignored in decision-making, Tax Saving on Depreciation is not considered in the above analysis.

(b) Discuss the phases of Value Analysis.

[7]

Answer:

Value Analysis may consist of the following seven phases.

- (i) **Origination:** The phase of origination starts with the identification of a project to undertake value analysis. After selecting the project, a project team consisting of experts from various fields and departments is constituted.



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- (ii) **Information:** The second phase is that of collecting relevant information. In this phase, the relevant facts relating to specifications, drawings, methods, materials, etc. are collected. Costs are, also, ascertained for each of the elements that are being studied.
- (iii) **Functional Analysis:** Then follows the important phase of functional analysis. After familiarisation with the relevant facts & figures, a functional analysis is carried out to determine the functions and uses of the product and its components. The cost and importance of each function are identified. A value index is computed on the basis of cost benefit ratio for each of the functions. A list of the functions is prepared wherein the functions are arranged in decreasing order of their value.
- (iv) **Innovation:** This is the creative phase concerned with the generation of new alternatives to replace or remove the existing ones. The objective is to produce ideas and to formulate alternative means and methods for accomplishing the essential functions and improving the value of the element under consideration. Creative problem solving techniques are utilized to discover alternatives that will provide essential or required functions at the lowest possible cost.
- (v) **Evaluation:** During the stage of evaluation, each and every alternative is analysed and the most promising alternatives are selected. These alternatives are further examined for economic and technical feasibility. The alternatives finally selected must be capable of performing the desired functions satisfactorily. They must meet the standards of accuracy, reliability, safety, maintenance and repairs, environmental effects, and so on.
- (vi) **Choice:** In this phase, the decision makers choose the best of alternatives. The programs and action plans are then developed to implement the chosen alternative.
- (vii) **Implementation:** The chosen alternative is put to the actual use with the help of the programs and action plans. The progress of implementation is continuously monitored and followed up to ensure that the desired results are achieved.

5.

Particulars	₹ In Lakhs)	
	31-03-2023	31-03-2024
Sales	120	129.60
Prime Cost of Sales	80	91.10
Variable Overheads	20	24
Fixed expenses	15	18.50
Profit	5	(4)

During 2023-24, average prices increased over those of the previous years

- (1) 20% in case of sales
- (2) 15% in case of prime cost
- (3) 10% in case of Overheads.

Prepare a profit variance statement from the above data.

[14]

Answer:

Step 1: Calculation of Variances:

1. Sales Price Variance =  $129.60 - (120 \times 100/120) = ₹21.60$  (F)

(Increase in sale price by 20%)



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2. Sales Volume Variance =  $(129.60 \times 100/120) - 120 = ₹12$  (A)  
(Reduction in sales volume = 10%)
3. Sales Value Variance =  $129.60 - 120 = ₹9.60$  (F)
4. Prime Cost Price Variance =  $(91.10 \times 100/115) - 91.10 = ₹11.88$  (A)
5. Prime Cost Volume Variance =  $80 \times 10/100 = ₹8$  (F) (Reduction corresponding to Sales)
6. Prime Cost Usage or Efficiency Variance =  $(80 \times 90/100) - (91.10 \times 100/115) = ₹7.22$  (A)
7. Prime Cost Variance =  $80 - 91.1 = ₹11.1$  (A)
8. Variable Overhead Price Variance =  $(24 \times 100/110) - 24 = ₹2.18$  (A)
9. Variable Overhead Volume Variance =  $20 \times 10/100 = ₹2$  (F)
10. Variable Overhead Efficiency Variance =  $(20 \times 90/100) - (24 \times 100/110) = ₹3.82$  (A)
11. Variable Overhead Cost Variance =  $20 - 24 = ₹4$  (A)
12. Fixed Overhead Price Variance =  $(18.50 \times 100/110) - 18.50 = ₹1.68$  (A)
13. Fixed Overhead Efficiency Variance =  $15 - (18.50 \times 100/110) = ₹1.82$  (A)
14. Fixed Overhead Cost Variance =  $15 - 18.50 = ₹3.5$  (A)

**Step 2: Profit Variance Statement**

Particulars	(₹ In Lakhs)	(₹ In Lakhs)
Budgeted Profit		5.00
Add: Sales price variance	21.60	
Prime cost volume variance	8.00	
Variable overhead variance	2.00	31.60
		36.60
Less: Sales volume variance	12.00	
Prime cost price variance	11.88	
Prime cost usage variance	7.22	
Variable overhead price variance	2.18	
Variable overhead efficiency variance	3.82	
Fixed overhead price variance	1.68	
Fixed overhead efficiency variance	1.82	40.60
Actual Loss		4.00

6. (a) A farmer has a farm with 125 acres. He produces Carrot, Beetroot and Potato. Whatever he produces is fully sold in the market. He gets ₹5 per kg for Carrot, ₹4 per kg for Beetroot and ₹5 per kg for Potato. The average yield is 1,500 kg of Carrot per acre, 1,800 kg of Beetroot per acre and 1,200 kg of Potato per acre. To produce each 100 kg of Carrot and Beetroot and 80 kg of Potato, a sum of ₹12.50 has to be spent for manure. Labour required for each acre to raise the crop is 6 man-days for Carrot and Potato each and 5 man-days for Beetroot. A total of 500 man-days of labour at the rate of ₹40 per man-day are available.



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Formulate a LLP to maximise the farmer's total profit.

[7]

**Answer:**

Let C, B and P be the number of acres allotted for cultivating Carrot, Beetroot and Potato respectively. The profit from the produces is determined in the following manner –

Particulars per acre	Carrot	Beetroot	Potato
Selling Price	₹ 5 / Kg x 1,500 kgs = ₹ 7,500	₹ 4 / kg x 1,800 kgs = ₹ 7,200	₹ 5 / kg x 1,200 kgs = ₹ 6,000
Less: Manure Cost	1,500 kgs x ₹12.50/100 = ₹ 187.50	1,800 kgs x ₹12.50/100 = ₹ 225.00	1,200 kgs x ₹ 12.50/80 = ₹ 187.50
Less: Labour Cost	₹ 40 x 6 = ₹ 240	₹ 40 x 5 = ₹ 200	₹ 40 x 6 = ₹ 240
Profit per acre	₹ 7,072.50	₹ 6,775	₹ 5,572.50

Maximise Profit  $Z = 7,072.50 C + 6,775 B + 5,572.5 P$

subject to,  $C + B + P \leq 125$  (Land Availability)

$6C + 5B + 6P \leq 500$  (Man Days Availability)

$C, B, P \geq 0$  (Non-Negativity Assumption)

(b) A Small retailer has studied the weekly receipts and payments over the past 200 weeks and has developed the following set of information

Weekly Receipts (₹)	Probability	Weekly Payments (₹)	Probability
3000	0.20	4000	0.30
5000	0.30	6000	0.40
7000	0.40	8000	0.20
12000	0.10	10000	0.10

Using the following set of random numbers, simulate the weekly pattern of receipts and payments for the 12 weeks of the next quarter, assuming further that the beginning bank balance is ₹8000. What is the estimated balance at the end of the 12week period? What is the highest weekly balance during the quarter? What is the average weekly balance for the quarter? [7]

**Random Numbers**

For Receipts	03	91	38	55	17	46	32	43	69	72	24	22
For Payments	61	96	30	32	03	88	48	28	88	18	71	99



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Answer:

Table showing Range of Random Numbers for Receipts and Payments

Receipt (₹)	Probability	Cumulative Probability	Range	Payment (₹)	Probability	Cumulative Probability	Range
3000	0.20	0.20	00-19	4000	0.30	0.30	00-29
5000	0.30	0.50	20-49	6000	0.40	0.70	30-69
7000	0.40	0.90	50-89	8000	0.20	0.90	70-89
12000	0.10	1.00	90-99	10000	0.10	1.00	90-99

Simulated values of Receipts & Payments for the next 12 weeks and Calculation of week end Balances

Week	Random No. for Receipts	Expected Receipts (₹)	Random No. for Payments	Expected Payments (₹)	End of week Balance (₹)
Opening balance					8000
1	03	3000	61	6000	5000
2	91	12000	96	10000	7000
3	38	5000	30	6000	6000
4	55	7000	32	6000	7000
5	17	3000	03	4000	6000
6	46	5000	88	8000	3000
7	32	5000	48	6000	2000
8	43	5000	28	4000	3000
9	69	7000	88	8000	2000
10	72	7000	18	4000	5000
11	24	5000	71	8000	2000
12	22	5000	99	10000	(3000)
Total					45000

**N.B - End of week Balance for a particular week = End of week Balance for the previous week + Receipt during the week – Payment made in the week]**

Estimated balance at the end of 12<sup>th</sup> week = ₹(3,000)

Highest weekly balance during the quarter = ₹ 7,000

Average weekly balance for the quarter = 45,000/12 = ₹3750



STRATEGIC COST MANAGEMENT

7. (a) A small maintenance project consists of the following twelve jobs whose precedence relations are identified with their node number:

Job (i,j)	:	(1,2)	(1,3)	(1,4)	(2,3)	(2,5)	(2,6)
Duration (in days)	:	10	4	6	5	12	9
Job (i,j)	:	(3,7)	(4,5)	(5,6)	(6,7)	(6,8)	(7,8)
Duration (in days)	:	12	15	6	5	4	7

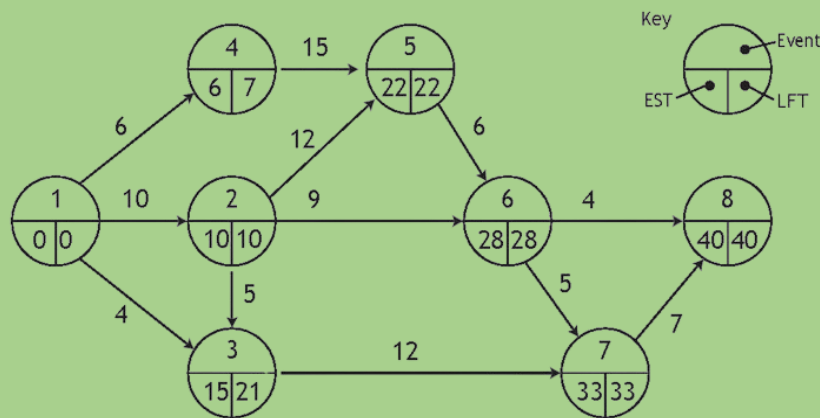
(i) Draw an arrow diagram representing the project.

(ii) Calculate earliest start, earliest finish, latest finish time for all the jobs.

[7]

Answer:

(i) The network diagram of the project corresponding to normal duration is given below:



(ii) Statement showing Earliest Start Time (EST), Earliest Finish Time (EFT), Latest Start Time (LST) and Latest Finish Time (LFT) for all jobs.

Jobs	Duration in days	Earliest Start time (EST)	Earliest finish time (EFT)	Latest Start time (LST)	Latest Finish time (LFT)
1-2	10	0	10	0	10
1-3	4	0	4	17	21
1-4	6	0	6	1	7
2-3	5	10	15	16	21
2-5	12	10	22	10	22
2-6	9	10	19	19	28
3-7	12	15	27	21	33
4-5	15	6	21	7	22
5-6	6	22	28	22	28
6-7	5	28	33	28	33



## STRATEGIC COST MANAGEMENT

6-8	4	28	32	36	40
7-8	7	33	40	33	40

(b) The Learning Curve in management accounting has now become or is going to become an accepted tool in industry, for its applications are almost unlimited. When it is used correctly, it can lead to increased business and higher profits; when used without proper knowledge, it can lead to lost business and bankruptcy. State precisely:

(i) Your understanding of the Learning Curve:

(ii) The theory of Learning Curve;

(iii) The areas where Learning Curves may assist in management accounting; and

(iv) Illustrate the use of Learning Curves for calculating the expected average unit cost of making–

(a) 4 machines (b) 8 machines

Using the data below:

Data:

Direct Labour needed to make first machine = 1000 hrs.

Learning Curve = 90%

Direct Labour cost = ₹15 per hour.

Direct materials cost = ₹1,50,000

Fixed cost for either size orders = ₹60,000.

[7]

Answer:

Statement showing computation of expected average cost of making 4 machines & 8 machines:

No of machines	Average time (Hours)	Labour cost (@₹ 15/Hr)	Material Cost (₹)	Fixed cost (₹)	Total Cost (₹)
1	1000	15,000	1,50,000	60,000	2,25,000
2	900	13,500	1,50,000	30,000	1,93,500
4	810	12,150	1,50,000	15,000	1,77,150
8	729	10,935	1,50,000	7,500	1,68,435

Average cost of making 4 machines - ₹ 1,77,150

Average cost of making 8 machines - ₹ 1,68,435

8. (a) A firm has the Cost Function  $C = x^3/3 - 7x^2 + 111x + 50$  and Demand function  $x = 100 - p$ . Determine the Equilibrium Output, Price and Profit earned.

[7]

Answer:

Demand function is  $x = 100 - p$  or,  $p = 100 - x$

So, Total Revenue =  $TR = p \cdot x$  or,  $TR = (100 - x) \cdot x$  Or,  $TR = 100x - x^2$

Also Profit = Total Revenue – Cost

Or,  $\pi = TR - C$

Or,  $\pi = (100x - x^2) - (x^3/3 - 7x^2 + 111x + 50)$

Or,  $\pi = -x^3/3 + 6x^2 - 11x - 50$





## STRATEGIC COST MANAGEMENT

Differentiating both sides with respect to x

we have  $d/dx(\pi) = -x^2 + 12x - 11$  ----- (1)

As per the necessary condition of maximization we have  $d/dx(\pi) = 0$

Or,  $-x^2 + 12x - 11 = 0$

Or,  $(x - 1)(x - 11) = 0$

So the critical values are  $x = 1$  and  $x = 11$

Now differentiating both sides of (1) we have  $d^2/dx^2(\pi) = -2x + 12$

When  $x = 1$  then  $d^2/dx^2(\pi) = -2.1 + 12 = 10 > 0$

So by the sufficient condition of 2nd Order Derivative test there is a minima at  $x = 1$

When  $x = 11$  then  $d^2/dx^2(\pi) = -2.11 + 12 = -10 < 0$

So by the sufficient condition of 2nd Order Derivative test there is a maxima at  $x = 11$

Thus Profit ( $\pi$ ) is Maximum when  $x = 11$  units. This is the required Equilibrium Output.

Equilibrium Price =  $p_{\text{Equilibrium}} = [100 - x]$  at  $x = 11 = 100 - 11 = ₹89$

Equilibrium Profit =  $(\pi)_{\text{Max}} = [-x^3/3 + 6x^2 - 11x - 50]$

$$= - (11)^3/3 + 6(11)^2 - 11.11 - 50 = ₹111.33$$

[Note – The equilibrium output can be determined by using the relation  $MR = MC$ . Subsequently this value of output can be substituted in the Demand and Profit functions to obtain Equilibrium Price and Profit.]

(b) The following table relates to the tourist arrivals in India during 2015 to 2021.

Year	2015	2016	2017	2018	2019	2020	2021
Tourist arrivals (lakhs)	18	20	23	25	24	28	30

Fit a Straight Line trend by the Method of Least Squares and estimate the number of tourists that would arrive in the year 2025. [7]

**Answer:**

Let the best fit Trend line to the given data be  $y = a + bx$  (Origin at the year 2018 and x unit = 1 year

Normal equations are  $\Sigma y = a.n + b.\Sigma x$  ..... (1) and  $\Sigma xy = a.\Sigma x + b.\Sigma x^2$ ------(2) where n = No. of years = 7 (here)

#### Calculations for fitting Straight Line Trend

Year	Tourist arrivals (y in lakhs)	x	x <sup>2</sup>	xy
2015	18	-3	9	- 54
2016	20	-2	4	- 40
2017	23	-1	1	- 23
2018	25	0	0	0

**FINAL EXAMINATION****SET - 1****MODEL ANSWERS****TERM – DECEMBER 2024****PAPER – 16****SYLLABUS 2022****STRATEGIC COST MANAGEMENT**

2019	24	1	1	24
2020	28	2	4	56
2021	30	3	9	90
Total	168	0	28	53

Putting the values of  $\Sigma y$ ,  $\Sigma x$  and  $n$  in equation (1) we get  $168 = a.7 + b.0$  Or,  $a = 24$

Also putting the values of  $\Sigma xy$ ,  $\Sigma x$  and  $\Sigma x^2$  in equation (2) we get,  $53 = a.0 + b.28$  Or,  $b = 1.893$

So the required equation of Straight Line Trend is  $y = 24 + 1.893x$  (Origin = 2018,  $x$  unit = 1 year)

For the year 2025,  $x = 7$ . So the estimated number of tourists in the year 2025 =  $24 + 1.893.7 = ₹37.25$  lakhs