

Sreeram Coaching Point

Cost Management Model Question Paper

Question No. 1

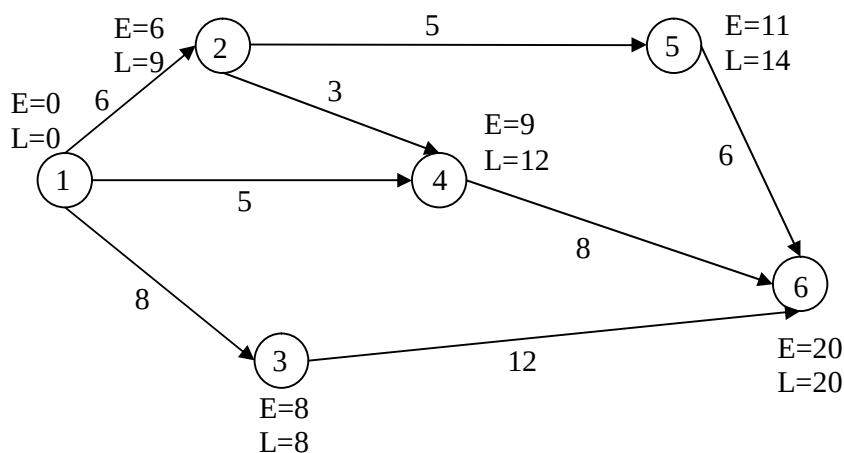
The following table shows for each activity needed to complete the project the normal time, shortest time in which the activity can be completed of a building contract and the cost per day for reducing the time of each activity. The contract includes a penalty clause of Rs 100 per day over 17 days. The overhead cost per day is Rs 160.

Activity	Normal time (in days)	Shortest time (in days)	Cost of reduction per day
1-2	6	4	80
1-3	8	4	90
1-4	5	3	30
2-4	3	3	-
2-5	5	3	40
3-6	12	8	200
4-6	8	5	50
5-6	6	6	-

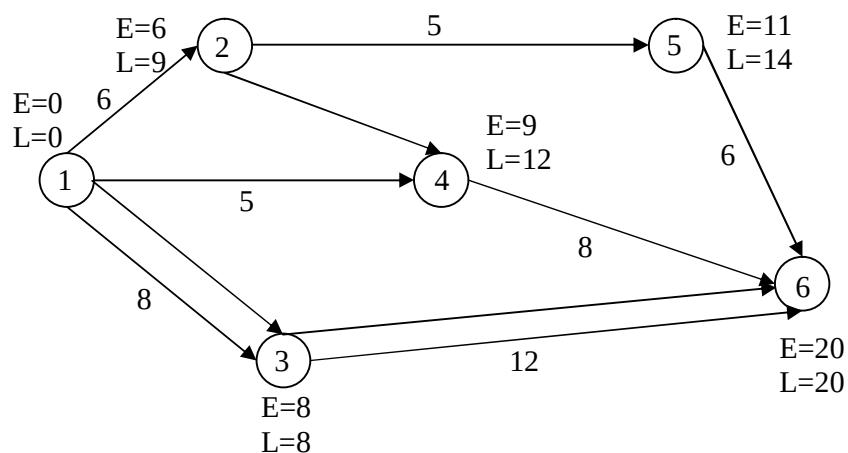
The cost of completing the eight activities in normal time is Rs. 6500.

1. Calculate the normal duration of the project, its cost and the critical path.
2. Calculate the cost time function for the project and state
 - i) The lowest cost and associated time.
 - ii) The shortest time and associated cost.

Solution to Question No. 1



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Paths Table-Final					
Paths	0	3	4	5	7
1-2-5-6	17	17	16	15	13
1-2-4-6	17	17	16	15	13
1-4-6	13	13	13	13	11
1-3-6	20	17	16	15	13

Slash Table - Final		
1-2	2/1/0	80
1-3	4/1/0	90
1-4	2	30
2-4	-	-
2-5	2/0	40
3-6	4/3/1	200
4-6	3/1	50
5-6	-	-

Cost Table			
Duration	Indirect Cost @ Rs. 160 per day	Crash cost- cumulative	Total Cost
20	3200	300 penalty	3500
17	2720	270	2990
16	2560	440	3000
15	2400	720	3120
13	2080	1300	3380

Evaluation Table - Final					
Stage	Act Cr.	Days	Rate	Cost	Cum. Cost
A	1-3	3	90	270	270
	3-6				

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Evaluation Table - Final					
Stage	Act Cr.	Days	Rate	Cost	Cum. Cost
B	1-3	1	90	270	270
	3-6				
	1-2	1	80	170	440
	2-5				
	5-6				
	1-2	Same			
	2-4				
	4-6				

Evaluation Table - Final					
Stage	Act Cr.	Days	Rate	Cost	Cum. Cost
C	3-6	1	200		
	1-2	1	80		
	2-5			280	720
	1-2	Same			
	4-6				

Evaluation Table - Final					
Stage	Act Cr.	Days	Rate	Cost	Cum. Cost
D	3-6	2	200		
	2-5	2	40	580 = 290 x 2	1300
	4-6	2	30		

Final Answer		
Type	Time in days	Cost in Rs.
Normal	20	3500
Optimal	17	2990
Minimum	13	3380

Question No. 2

A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and return to his starting point. The travelling cost for each city from a particular city is given below:

-
-

To city

		A	B	C	D	E
- From city	A	X	4	7	3	4
	B	4	X	6	3	4
	C	7	6	X	7	5
	D	3	3	7	X	7
	E	4	4	5	7	X

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What is the sequence of visit of the salesman, so that the cost is minimum?

Solution to Question No. 2

	A	B	C	D	E
A	M	4	7	3	4
B	4	M	6	3	4
C	7	6	M	7	5
D	3	3	7	M	7
E	4	4	5	7	M

Row Option				
M	1	4	0	1
1	M	3	0	1
2	1	M	2	0
0	0	4	M	4
0	0	1	3	M

Column Operation				
M	1	3	0	1
1	M	2	0	1
2	1	M	2	0
0	0	3	M	4
0	0	0	3	M

Covering maximum number of zero's with minimum number of lines

M	1	3	0	1
1	M	2	0	1
2	1	M	2	0
0	0	3	M	4
0	0	0	3	M

Is the number of lines = Order of Matrix? → No

Make 1st iteration before proceeding for assignment.

1st Iteration				
M	0	2	0	0
0	M	1	0	0
2	1	M	3	0
0	0	3	M	4
0	0	0	4	M

Covering maximum number of zero's with minimum number of lines

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M	0	2	0	0
0	M	1	0	0
2	1	M	3	0
0	0	3	M	4
0	0	0	4	M

Is the number of lines = Order of Matrix? → Yes

Proceed to make assignment

1st Iteration				
M	0	2	∞	∞
∞	M	1	0	∞
2	1	M	3	0
0	∞	3	M	4
∞	∞	0	4	M

City	City	Cost
A	B	4
B	D	3
C	E	5
D	A	3
E	C	5
		20

Loop
A → B → D → A
C → E → C

Note:

The assignment should form a single loop. The loop would ensure the terminal point and the starting point as same. In the initial basic solution two loops were formed for a total cost of Rs.20. Whereas the problem preconditions to form a single loop. Therefore, an improvement is to be sought.

Break the smaller loop of C → E → C i.e. do not assign against '0' in row C (in 1st iteration). Instead second lowest value of '1' shall be assigned that comes against column 'B'. The overall cost is likely to exceed marginally. But the sequencing condition is complied.

M	∞	2	0	0
∞	M	1	0	0
2	1	M	3	∞
0	∞	3	M	4
∞	∞	0	4	M

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Multiple Optimal Solution				
M	X	2	0	0
X	M	1	0	0
2	(1)	M	3	X
(0)	X	3	M	4
X	X	(0)	4	M

Alternative No. 1				
M	X	2	(0)	X
X	M	1	X	(0)
2	(1)	M	3	X
(0)	X	3	M	4
X	X	(0)	4	M

Loop	
B → E → C → B	
A → D → A	

It is not selected because there is no single loop.

Alternative No. 2				
M	X	2	X	(0)
X	M	1	(0)	X
2	(1)	M	3	X
(0)	X	3	M	4
X	X	(0)	4	M

Loop	
A → E → C → B → D → A	
4 + 5 + 6 + 3 + 3 = 21	

Question No. 3

$$\begin{aligned}
 &\text{Maximise } Z = 6x_1 + 20x_2 \\
 &\text{Subject to } \begin{aligned} 2x_1 + x_2 &\leq 32 \\ 3x_1 + 4x_2 &\leq 80 \\ x_1 &\geq 8 \\ x_2 &\geq 10 \end{aligned}
 \end{aligned}$$

Solution to Question No. 3

Max $Z = 6x_1 + 20x_2$
S.T. $2x_1 + x_2 \leq 32$
$3x_1 + 4x_2 \leq 80$
$x_1 \geq 8$
$x_2 \geq 10$

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Since X_1 & X_2 should be greater than 8 & 10 respectively, it is for sure 8 & 10 should be produced. From the overall availability, resources remained to produce 8 & 10 of X_1 and X_2 shall be deducted.

Let $x_1 = x_3 + 8$
$x_2 = x_4 + 10$

The problem can be rewritten as follows:

Max. $Z = 6(x_3 + 8) + 20(x_4 + 10)$
S.T. $2(x_3 + 8) + (x_4 + 10) \leq 32$
$3(x_3 + 8) + 4(x_4 + 10) \leq 80$
$x_3, x_4 \geq 0$

Max $Z = 6x_3 + 20x_4 + 248$
S.T. $2x_3 + x_4 \leq 6$
$3x_3 + 4x_4 \leq 16$
$x_3, x_4 \geq 0$

Note:

Short cut substitution can be used only when minimum requirement equation i.e., $\geq$ is used, with single variable on LHS.

Question No. 4

Toronto Business Associates, a division of Maple Leaf Services Corporation, offers management and computer consulting services to clients throughout Canada and the northeastern United states.

The division specializes in website development and other Internet applications. The corporate management at Maple Leaf Services is pleased with the performance of Toronto Business Associates for the first nine months of the current year and has recommended that the division manager, Richard Howell, submit a revised forecast for the remaining quarter, as the division has exceeded the annual plan year-to-date by 20 percent of operating income. An unexpected increase in billed hour volume over the original plan is the main reason for this increase in income. The original operating budget for the first three quarters for Toronto Business Associates follows.

TORONTO BUSINESS ASSOCIATES 20x1 Operating Budget				
	1st Quarter	2nd Quarter	3rd Quarter	Total for First Three Quarters
Revenue:				
Consulting fees:				
Computer system consulting	4,21,875	4,21,875	4,21,875	12,65,625
Management consulting	3,15,000	3,15,000	3,15,000	9,45,000
Total consulting fees	7,36,875	7,36,875	7,36,875	22,10,625
Other revenue	10,000	10,000	10,000	30,000

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Total revenue	7,46,875	7,46,875	7,46,875	22,40,625
Expenses:				
Consultant salary expenses	3,86,750	3,86,750	3,86,750	11,60,250
Travel and related expense	45,625	45,625	45,625	1,36,875
General and administrative expenses	1,00,000	1,00,000	1,00,000	3,00,000
Depreciation expense	40,000	40,000	40,000	1,20,000
Corporate expense allocation	50,000	50,000	50,000	1,50,000
<i>Total expenses</i>	6,22,375	6,22,375	6,22,375	18,67,125
Operating income	1,24,500	1,24,500	1,24,500	3,73,500

Howell will reflect the following information in his revised forecast for the fourth quarter.

- Toronto Business Associates currently has 25 consultants on staff, 10 for management consulting and 15 for computer systems consulting. Three additional management consultant have been hired to start work at the beginning of the fourth quarter in order to meet the increased client demand.
- The hourly billing rate for consulting revenue will remain at 90 per hour for each management consultant and 75 per hour for each computer consultant. However, due to the favorable increase in billing hour volume when compared to the plan, the hours for each consultant will be increased by 50 hours per quarter.
- The budgeted annual salaries and actual annual salaries, paid monthly, are the same: 50,000 for a management consultant and 46,000 for a computer consultant. Corporate management has approved a merit increase of 10 percent at the beginning of the fourth quarter for all 25 existing consultants, while the new consultants will be compensated at the planned rate.
- The planned salary expense includes a provision for employee fringe benefits amounting to 30 percent of the annual salaries. However, the improvement of some corporate wide employee programs will increase the fringe benefits to 40 percent.
- The original plan assumes a fixed hourly rate for travel and other related expenses for each billing hour of consulting. These are expense that are not reimbursed by the client, and the previously determined hourly rate has proven to be adequate to cover these costs.
- Other revenue is derived from temporary rentals and interest income and remains unchanged for the fourth quarter.

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- General and administrative expense have been favourable at 7 percent below the plan; this 7 percent savings on fourth quarter expenses will be reflected in the revised plan.
- Depreciation of office equipment and personal computers will stay constant at the projected straight-line rate.
- Due to the favourable experience for the first three quarters and the division's increased ability to absorb costs, the corporate management at Maple Leaf Services has increased the corporate expenses allocation by 50 percent.

Required:

- 1) Prepare a revised operating budget for the fourth quarter for Toronto Business Associates that Richard Howell will present to corporate management.
- 2) Discuss the reasons why an organization would prepare a revised operating budget.

Solution to Question No. 4

Toronto Business Association		
1) Revenue Budget		
	Mgt.	Computation
Billing	315000	421875
Rate	90	75
Hours	3500	5625
Incr. Hrs 4 th Quarter	$650\{50 \times (10+3)\}$	$750 (50 \times 13)$
Hours	4150	6375
Revenue	373500	478125

2) Allocation of Salaries				
		Mgt.	Computer	Total
Salary		50	46	--
Hours		10	15	--
Value		500	290	1190
Actuals		162500	224250	386
Salary	100	125000	172500	750
F.B.	30	37500	51750	--

4th Quarter		
Nos. Old	10	15
New	3	--
As per 3 rd Quarter	125000	172500
For New	37500	--

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Revised Salary	137500 (125000 + 10%)	189750 (172500 x 10%)
New	37500	--
Total	175000	189750
F.B. @ 40%	70000	75900
	248000	265650

Question No. 5

AB LIMITED, which buys and sells machinery, has three departments:

- New machines (manager, Newman)
- Second-hand machines (manager, Handley)
- Repair workshops (manager, Walker)

In selling new machines Newman is often asked to accept an old machine in part exchange. In such cases the old machine is disposed of by Handley. The workshops do work both for outside customers and also for the other two departments. Walker charges his outside customers for materials at cost and for labour time at Rs.8 per hour. This Rs.8 is made up as follows:

	Per hour	
	(Rs.)	
Fixed costs	2.00	(10,000 budgeted hours per annum)
Variable costs	4.50	
Profit	1.50	
	Rs.8.00	

AB Limited wishes to go over to a profit centre basis of calculations so as to be able to reward its three managers according to their results. It wishes to assess the situation in the context of the following transaction:

Newman sold to PQ Limited a new machine at list price of Rs.16, 000, the cost of which to AB Limited was Rs.12, 000. To make the sale, however, Newman had to allow PQ Limited Rs.5, 000 for its old machine in part exchange.

PQ Limited's old machine was in need of repair before it could be re-sold and Newman and Handley were agreed in their estimate of those repairs as Rs.50 in materials and 100 hours of workshops labour time. That estimate was proved to be correct when the workshops undertook the repair. At the time of taking PQ Limited's machine in part exchange Handley would have been able to buy a similar machine from other dealers for Rs.3, 700 without the need for any repair. When the machine had been repaired he sold it to ST Limited for Rs.4, 200.

You are required to:

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- (a) Show how you would calculate to profit contribution for each of the three departments from the above transaction.
- (b) Re-calculate the profit contribution for each department if there were the following alternative changes of circumstances:
- 1) When the workshops came to repair the old machine they found that they required an extra 50 hours of labour time because of a fault not previously noticed.
 - 2) Before deciding on the figure he would allow PQ Limited for their old machine, Newman asks Walker to estimate the cost of repairs. This estimates is Rs.50 in materials and 100 hours of workshops labour time. When, however, workshops came to repair the old machine, it took them 50% longer than estimated.

Solution to Question No. 5

Working Note (i)			
	1	2	3
	N	H	W
Selling Price	16000	4200	850
Cost	12000	5000	700
Repair Cost	--	850	---
	12000	5850	700
Profit	4000	(1650)	150
Net Profit = 2500			

Revenue		
N	16000	
H	4200	
R	-----	20200
Cost		
N	12000	
H	5000	
R	700	17700
Net profit		2500

Working Note (ii)			
	1	2	3
	N	H	W
Selling Price	16000	4200	1250
Cost	12000	5000	1025
Repair Cost	--	1250	---
	12000	6250	1025
Profit	4000	(2050)	225

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Question No. 6

A firm sells its product at Rs.25 per unit. Its Cost behaviour for various production ranges is:

Units of production	Cumulative fixed Cost	Variable Cost per Unit
0 –16,000	2,50,000	16.00
16,001 – 60,000	3,50,000	17.00
60,001 and above	5,00,000	20.00

Identify the break-even point(s) in units.

Solution to Question 6

Whenever the fixed cost and Variable cost/Unit are varying at different levels, then the usage of formula will not be rewarding.

Use the spirit of basic knowledge of marginal costing in solving the BEP.

At BEP, sales = Cost or Profit = 0

Level	Variable Cost	Contribution/Unit
I	16	9
II	17	8
III	20	5

Calculation of BEP in Range I	
Selling Price	25
VC	16
Contribution	9
Fixed Cost	2,50,000
BEP	$2,50,000/9 = 27,778$ Units
We cannot call 27,778 units as BEP because Range I exist only up to 16,000 units, beyond which the cost pattern itself changes. We can conclude that there is no BEP in Range I i.e. Range I generates only loss.	

Un-recovered Fixed Cost in Range I	
Contribution (16,000 x 9)	1,44,000
Fixed Cost	2,50,000
Un-recovered Fixed Cost	1,06,000

Calculation of BEP in Range II	
Selling Price per unit	25
VC per unit	17
Contribution per unit	8
Incremental Fixed Cost for Range II	1,00,000
Un-recovered Fixed Cost of Range I	1,06,000

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Fixed Cost recoverable in Range II	2,06,000
Units required to recover (2,06,000/8)	25,750 units
BEP (25,750 + 16,000)	41,750 units

Company breathes air of profit only after reaching 41,750 units in Range II.	Profit generated by Range II	
	Profit generating Units - MOS	18,250 units
	Contribution	Rs. 8 per unit
	Profit (18,250 x 8)	1,46,000
Range II extends upto 60,000 units		
From 41,750 units to 60,000 units the contribution generated result in profit.		

Calculation of BEP in Range III	
Selling price per unit	25
Variable Cost per unit	20
Contribution per unit	5
Incremental Fixed Cost For Range III	1,50,000
Recovery through profit from Range II	1,46,000
Fixed Cost Recoverable in Range III	4,000
Units required to recover (4,000/5)	800 units
BEP ₂ (60,000 + 800)	60800

Question No. 7

Z Ltd is considering various product pricing and material purchasing options with regard to a new product it has in development. Estimates of demand and costs are as follows:

		Sales volume at	
Selling price		Rs.15	Rs.20
Forecasts	Probability	(000 units)	(000 units)
Optimistic	0.3	36	28
Most likely	0.5	28	23
Pessimistic	0.2	18	13
Variable manufacturing costs (excluding materials) per unit		Rs.3	Rs.3
Advertising and selling costs (000s)		Rs.25	Rs.96
General fixed costs (000s)		Rs.40	Rs.40

Each unit requires 3 kg of material and because of storage problems any unused material must be sold at Re.1 per kg. The sole suppliers of the material offer three purchase options, which must be decided at the outset, as follows:

- (i) Any quantity at Rs.3 per kg, or
- (ii) A price of Rs.2.75 per kg for a minimum quantity of 50,000 kg,

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(iii) A price of Rs.2.50 per kg for a minimum quantity of 70,000 kg.

You are required, assuming that the company is risk neutral, to

- a) Prepare calculations to show what pricing and purchasing decisions the company should make, clearly indicating the recommended decisions;
- b) Calculate the maximum price you would pay for perfect information as to whether the demand would be optimistic or most likely pessimistic.

Solution to Question No. 7

Working Note 1: Computation to find out the Requirement of Material

State	When SP is 15	When SP is 20
Optimistic	$36,000 \times 3 = 1,08,000$ kgs	$28,000 \times 3 = 84,000$ kgs
Most Likely	$28,000 \times 3 = 84,000$ kgs	$23,000 \times 3 = 69,000$ kgs
Pessimistic	$18,000 \times 3 = 54,000$ kgs	$13,000 \times 3 = 39,000$ kgs
■ Shaded portion indicates cases where the material requirements are less than the Order Size available.		

Working Note 2: Computation for finding out the Loss on purchasing excess stock

Case 1	When S.P. is 15, under pessimistic excess qty. $= 70,000 - 54,000 = 16,000$ kgs	Loss per unit is $S.P. - V.C. = 1 - 2.5 = (1.5)$	Total Loss is $16,000 \times 1.5 = \text{Rs. } 24,000$
Case 2	When S.P. is 20, under most likely excess qty. $= 70,000 - 69,000 = 1,000$ kgs	Loss per unit is $S.P. - V.C. = 1 - 2.5 = (1.5)$	Total loss is $1,000 \times 1.5 = \text{Rs. } 1,500$
Case 3	When S.P. is 20, under pessimistic excess qty. $= 50,000 - 39,000 = 11,000$ kgs.	Loss per unit is $S.P. - V.C. = -2.75 = (1.75)$	Total Loss is $11,000 \times 1.75 = \text{Rs. } 1,925$
Case 4	When S.P. is 20, under pessimistic excess qty. $= 70,000 - 39,000 = 31,000$ kgs.	Loss per unit is $S.P. - V.C. = 1 - 2.5 = (1.5)$	Total Loss is $31,000 \times 1.5 = \text{Rs. } 46,500$

Working Note 3: Computation of Contribution per unit

Particulars	Alt I	Alt II	Alt III	Alt I	Alt II	Alt III
Purchase price	3	2.75	2.5	3	2.75	2.5
Selling price	15	15	15	20	20	20
- Material Cost	9	8.25	7.5	9	8.25	7.5
- Variable Manufacturing Cost	3	3	3	3	3	3
Total Variable Cost	12	11.25	10.5	12	11.25	10.5
Contribution	3	3.75	4.5	8	8.75	9.5

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Computation of Profit under various alternatives

a) When selling price is Rs. 15

Alternative – 1

State	P	Units	C.P.U.	Con.	Loss	Net Con.	Expected con.
Optimistic	0.3	36000	3	Rs. 1,08,000	Nil	Rs. 1,08,000	Rs. 32,400
Most likely	0.5	28000	3	Rs. 84,000	Nil	Rs.84,000	Rs. 42,000
Pessimistic	0.2	18000	3	Rs. 54,000	Nil	Rs.54,000	Rs. 10,800

Total Contribution	Rs. 85,200
(Less) Fixed Cost	Rs. 65,000
Profit	Rs. 20,200

Alternative – 2

State	P	Units	C.P.U.	Con.	Loss	Net Con.	Expected con.
Optimistic	0.3	36000	3.75	Rs. 1,35,000	Nil	Rs. 1,35,000	Rs. 40,500
Most likely	0.5	28000	3.75	Rs. 1,05,000	Nil	Rs.1,05,000	Rs. 52,500
Pessimistic	0.2	18000	3.75	Rs. 67,000	Nil	Rs.67,500	Rs. 13,500

Total Contribution	Rs. 1,06,500
(Less) Fixed Cost	Rs. 65,000
Profit	Rs. 41,500

Alternative – 3

State	P	Units	C.P.U.	Con.	Loss	Net Con.	Expected con.
Optimistic	0.3	36000	4.5	Rs. 1,62,000	Nil	Rs. 1,62,000	Rs. 48,600
Most likely	0.5	28000	4.5	Rs. 1,26,000	Nil	Rs.1,26,000	Rs. 63,000
Pessimistic	0.2	18000	4.5	Rs. 81,000	(24,000)	Rs.57,000	Rs. 11,400

Total Contribution	Rs. 1,23,000
(Less) Fixed Cost	Rs. 65,000
Profit	Rs. 58,000

b) When selling Price is Rs. 20 - Alternative – 1

State	P	Units	C.P.U.	Con.	Loss	Net Con.	Expected con.
Optimistic	0.3	36000	8	Rs. 2,24,000	Nil	Rs. 2,24,000	Rs. 67,200
Most likely	0.5	28000	8	Rs. 1,84,000	Nil	Rs.1,84,000	Rs. 92,000
Pessimistic	0.2	18000	8	Rs. 1,04,000	Nil	Rs.1,04,000	Rs. 20,800

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Total Contribution	Rs. 1,80,000
(Less) Fixed Cost	Rs. 1,36,000
Profit	Rs. 44,000

Alternative – 2

State	P	Units	C.P.U.	Con.	Loss	Net Con.	Expected con.
Optimistic	0.3	36000	8.75	Rs. 2,45,000	Nil	Rs. 2,45,000	Rs. 73,500
Most likely	0.5	28000	8.75	Rs. 2,01,250	Nil	Rs.2,01,250	Rs. 1,06,625
Pessimistic	0.2	18000	8.75	Rs. 1,13,750	(19,250)	Rs.94,500	Rs. 18,900

Total Contribution	Rs. 1,93,025
(Less) Fixed Cost	Rs. 1,36,000
Profit	Rs. 57,025

Alternative – 3

State	P	Units	C.P.U.	Con.	Loss	Net Con.	Expected con.
Optimistic	0.3	36000	9.5	Rs. 2,66,000	Nil	Rs. 2,66,000	Rs. 79,800
Most likely	0.5	28000	9.5	Rs. 2,18,500	(1,500)	Rs.2,17,250	Rs. 1,08,500
Pessimistic	0.2	18000	9.5	Rs. 1,23,500	(46,500)	Rs.77,000	Rs. 15,400

Total Contribution	Rs. 2,03,700
(Less) Fixed Cost	Rs. 1,36,000
Profit	Rs. 67,700

Comparison Statement

	Selling Price Rs. 15			Selling Price Rs. 20		
Particulars	Alt I	Alt II	Alt III	Alt I	Alt II	Alt III
Purchase price	3	2.75	.5	3	2.75	2.5
Selling Price	15	15	15	20	20	20
Profit	20,200	41,500	58,000	44,000	57,025	67,700

Question No. 8

Supreme Auto Ltd suffered a strike by production labour that lasted for two weeks. During that period, no cars were produced. The company issued a statement to the press that the cost of the strike was Rs.50 crores this figures was estimated on the basis of lost production of 1000 vehicles of an average price of Rs.5 lakhs each. The company's accountant feels that this figure is released in a hurry and overstates the cost of the strike.

He produces the following statement to support his views:

	Rs. in lakhs
Materials (Rs.1 lakh per car)	1,000
Production Labour (Rs.0.50 lakh per car)	500
Depreciation of machinery	1,750

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Overhead (200% of production labour)	1,000
Total expenses avoided	4,250
Loss of revenue	5,000
Cost of strike	750

The following additional information is available

- (a) Depreciation of machines is based on the straight-line method of calculation. However, the plant manager estimates that the machines will fall in value by Rs.125 lakhs per week regardless of the level of production. He feels that in addition, its value will fall by Rs.150 lakhs for every 100 cars that are produced.
- (b) Overhead expenses are recorded at the rate of 200% on production labour. Most of the overhead expenses are unaffected by the level of production; for example, rent, rates, maintenance and staff wages. But some such as power and lighting vary directly with production. The general manager estimates that the later type of overhead expenses amount to Rs.10 lakhs for every 100 cars produced.
- (c) During the period of the strike, the maintenance staff, whose wages are included in the fixed overhead expenses, carried out a major overhaul on some of the machines using material costing Rs.10 lakhs. This overhaul would normally have been performed by an outside contractor at a price (including materials) of Rs.100 lakhs.
- (d) The sales manager feels that about 50% of the production lost could be made up and sold in the next month by the production labour working overtime. Labour is paid at the rate of time and half for overtime working.

You are requested to advise a major shareholder who doubts the validity of both and press statement and the accountant's statement as to the true cost of the strike.

Solution to Question No. 8

	No Strike	Strike
Number of vehicles	1000	500 (50% 1000 made up in OT)
Sales per unit	5 L	5 L
Sales Rs. (in lakhs)	5000	2500
Material @ 1 lakh	1000	500
Labour normal @ 0.5 lakhs	500	250
Labour (Over time 50% of normal)	--	125
Fall in value of machine (DEPR)	--	
Depreciation – Time 2 weeks* 124	250	250
Production 150/100 x 1000 or 500 units	1500	750
Production overheads (20% of labour i.e., 500 x 2 = 1000)		
Variable @900 10 for 100 cars	100	50

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Fixed (remains-- fixed)	900(1000 – 100)	900
Maintenance		
Contract	100	---
Material	---	10
Total	4350	2385
	650	(335)
Cost of strike		985

Cost of strike		
SP		5
Material	1	
Labour (given)	0.5	
VPOH (10/100)	0.1	
V-Depr.	1.5	3.1
Contribution per unit		1.9 L
Unit Loss		500
Ctr. Loss		950
OT Premium		125
Maintenance cost (Incremental 100 – 10)		(60)
Cost of the strike (profit lost)		985

Question No. 9

A company which employs a salesman in each of its territories has decided to use the following standards salesmen's performance:

- a) Target sales are based on each territory's annual potential. For territory 1 these are Rs.1, 80,000 p.a. and for territory 2 these are Rs.2, 95,000 p.a.
- b) Each territory's standard sales mix contribution is 32%
 - I. Commission is payable at 3½% of sales.
 - II. If sales exceed 110% of target, an extra 1% of the excess is payable.
 - III. If the contribution percentage is above standard, commission increases by 20% of the gain.
 - IV. If the contribution percentage is below standard, commission decreased by 10% of the loss.
- c) Standard salesmen's expenses and travelling costs:
- d) Mileage allowance at 0.2 miles per Rs. of sales

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- e) Travelling costs at Rs.0.15 per mile.

Territory	Actual sales	Actual sales mix contribution	Actual mileage run	Fixed expenses incurred	Budgeted fixed expenses
1	Rs.2,40,000	29%	58,000	Rs.2,900	Rs 2000
2	Rs.2,70,000	33%	42,000	Rs.1,800	Rs 2000

You are required to:

(a) Calculate

1. The standard profit for Territory 1
2. The actual profit for Territory 2;

(b) Calculate variances that show the performance of the salesman in each of the two territories.

Solution to Question No. 9

It is a problem involving application of standard costing in performance evaluation of salesmen.

Salesmen are awarded extra commission in case the sales were above the targets by 110%. The extra commission quantum is 1% on the excess over 110%.

- ✓ Salesmen are allowed 0.2 miles for every Rupee sales.
- ✓ Each miles allowed they are reimbursed Re.0.15 per mile.
- ✓ Besides these variable items, fixed expenses, though not a huge sum, is also budgeted for the period for each territory.
- ✓ Anything over and above is an adverse variance.

	Standard	Actual
Sales	180000	240000
PVR	32%	29%
Contribution	57600	69600
Commission	6300 3.5% x 180000	8400 3.5% 240000
Extra Commission	--	420
Travel Cost	--	(720) (32-29)% x 240000 x 10%
Fixed Expenses	5400	8700

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Total Expenses	13700	19700
Profit	43900	49900

Increase in Profit Rs. 6000. The increase in sales because of increase in quantity and not price as selling price gone down as PV Ratio decreased from 32% to 29%

1	2	3
BQ x BM	AQ x AM	AQ x BM
57600	69600	76800 (240000 x 32%)

TSV	1 – 2	=	12000	(F)
SPV	3 – 2	=	7200	(A)
SVV	1 – 3	=	19200	(F)

Budgeted Profit			43,900
	Volume	Expenditure	
Contribution	19,200	(7,200)	
Commission	(2,100)	-	
Extra Commission	(420)	-	
Penalty	-	720	
Travel	(1,800)	(1,500)	
Fixed Expenses	-	(900)	
	14,880	8,880	6,000
Actual Profit			49,900

Question No. 10

SteelTech Ltd., is an automotive supplier that uses automatic screw machines to manufacture precision parts from steel bars. SteelTech's inventory of raw steel averages Rs.6, 00,000 with a turnover rate of four times per year. John, president of SteelTech, is concerned about the costs of carrying inventory. He is considering the adoption of just-in-time inventory procedures in order to eliminate the need to carry any raw steel inventory. John has asked the company's financial controller, to evaluate the feasibility of JIT for the corporation. He has identified the following effects of adopting JIT.

- Without scheduling any overtime, lost sales due to stock outs would increase by 35,000 units per year. However, by incurring overtime premiums of Rs.40, 000 per year, the increase in lost sales could be reduced to 20,000 units. This would be the maximum amount of overtime that would be feasible for SteelTech.
- Two warehouses presently used for steel bar storage would no longer be needed. SteelTech rents one warehouse from another company at an annual cost of Rs.60, 000. The other warehouse is owned by SteelTech and contains 12,000 square feet. Three-fourths of the space in the owned warehouse could be rented out for Rs.1.50 per square foot per year.

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- Insurance totaling Rs.14, 000 per year would be eliminated.

SteelTech's projected operating results for 2001 are as follows. Long-term capital investments by SteelTech are expected to produce a rate of return of 20 percent before taxes.

Steeltech, Inc. Budgeted Income Statement For the Year Ended December 31, 2001 (in thousands)		
Sales (9,00,000 units)		Rs.10, 800
Cost of goods sold:		
Variable	Rs.4, 050	
Fixed	1,450	5,500
Gross margin		Rs.5, 300
Selling and administrative expenses:		
Variable	Rs.900	
Fixed	1,500	2,400
Income before interest and income taxes		Rs.2, 900
Interest expenses		900
Income before taxes		Rs.2, 000

Required

Calculate the estimated savings or loss for SteelTech, Ltd. that would result in 2001 from the adoption of just-in-time inventory methods. Ignore income taxes.

Solution to Question No. 10

Just in Time (JIT – Cost Savings)

Whether to Manufacture under over time		
Working Note:1	Rs. '000	Per unit
Sales	10,800	122
(-) Variable Cost		
- Manufacturing	4,050	4.5
- Marketing	900	1.0
	4,950	5.5
Contribution	5,850	6.5

Working Note: 2 Contribution (from working OT)	
(35,000 – 20,000)	97,500
(-) Overtime premium	40,000
Net Contribution	57,500

Computation of Impact of JIT			
Cost		Benefit	
Overtime premium	40,000	Savings in carrying cost 6,00,000 x 20%	1,20,000
Lost CTR (20,000 x 6.5)	1,30,000	2) Rental Savings	60,000
		3) Rental Income (12,000 x 75/100 x 1.5)	13,500
		4) Insurance Saved	14,0010
Total	1,70,000	Total	2,07,500

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Net Benefit = 37,500
It is advisable to go for Just-in-time

Particulars	Before JIT	After JIT	
		OT	Without OT
Units	9,00,000	8,80,000	8,65,000
CTR @ 6.5	58,50,000	57,20,000	56,22,500
(-) OT premium		(40,000)	
Fixed Cost	(29,50,000)	(28,76,000)	(28,76,000)
		2950000 – 60000 – 14000	
Interest	(9,00,000)	(7,80,000)	(7,80,000)
Rental Inc.	--	13,500	13,500
Profit	20,00,000	20,37,500	19,80,000
Strategy – Go for JIT			

Question No. 11

Multi-News Shops Limited owns a large chain of news agents. The sales pattern of a particular weekly magazine is being studied.

The magazine sells for Rs. 3.00 a copy and costs Rs. 2.00 per copy from the publishers. There is a sale or return agreement whereby the publishers will take back unsold copies at cost price less a 40 paise per copy handling charge.

The demand pattern of a typical shop has been recorded, and is as follows.

Demand Copies	Probability
0 < 100	0.07
100 < 200	0.12
200 < 300	0.14
300 < 400	0.19
400 < 500	0.18
500 < 600	0.09
600 < 700	0.07
700 < 800	0.07
800 < 900	0.05
900 < 1000	0.02

At present, a typical shop orders 400 copies of the magazine a week.

There has been a suggestion that an insight may be gained into the situation if the magazine's demand pattern is simulated. As a consequence, a Random Number table has been consulted, a 20-number extract from which is shown below.

00	27	74	69	32	17	98	57	71	51
03	96	15	13	56	15	83	62	32	17

Required:

- (a) Allocate random numbers to the demand pattern for a typical shop.

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- (b) Using a tabular format, simulate 20 weeks' operations for a typical shop, ordering 400 copies per week, showing weekly profit or loss, returns and lost sales.

Note: Use random number 00 for week 1, 27 for week 2, and so on.

- (c) Interpret the results of your simulation.
- (d) Discuss the strengths and weaknesses of simulations in this context.

Solution to Question No. 11

Step: 1				
Demand	Average	Probability	Cumulative Probability	Class Interval
0<100	50	0.07	0.07	00 - 06
100<200	150	0.12	0.19	07 - 18
200<300	250	0.14	0.33	19 - 32
300<400	350	0.19	0.52	33 - 51
400<500	450	0.18	0.70	52 - 69
500<600	550	0.09	0.79	70 - 78
600<700	650	0.07	0.86	79 - 85
700<800	750	0.07	0.93	86 - 92
800<900	850	0.05	0.98	93 - 97
900<1000	950	0.02	1.00	98 - 99

Step: 2			
Random No	Demand	Random No	Demand
00	50	03	50
27	250	96	850
74	550	15	150
69	450	13	150
32	250	56	450
17	150	15	150
98	950	83	650
57	450	62	450
71	550	32	250
51	350	17	150

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Step: 3						a	b	c		
	No of copies									
Simulation Run	Purchases	Demand	Sales	Excess stock	Short stock/lost sales	Purchase cost	Sales	Returns	Profit or loss for the week	Lost Sales
						Rs. 2 per copy	Rs. 3 per copy	Rs.1.6 per copy	[b+c - a]	Rs. 3 per copy
Week										
1	400	50	50	350	0	800	150	560	-90	0
2	400	250	250	150	0	800	750	240	190	0
3	400	550	400	0	150	800	1200	0	400	450
4	400	450	400	0	50	800	1200	0	400	150
5	400	250	250	150	0	800	750	240	190	0
6	400	150	150	250	0	800	450	400	50	0
7	400	950	400	0	550	800	1200	0	400	1650
8	400	450	400	0	50	800	1200	0	400	150
9	400	550	400	0	150	800	1200	0	400	450
10	400	350	350	50	0	800	1050	80	330	0
11	400	50	50	350	0	800	150	560	-90	0
12	400	850	400	0	450	800	1200	0	400	1350
13	400	150	150	250	0	800	450	400	50	0
14	400	150	150	250	0	800	450	400	50	0
15	400	450	400	0	50	800	1200	0	400	150
16	400	150	150	250	0	800	450	400	50	0
17	400	650	400	0	250	800	1200	0	400	750
18	400	450	400	0	50	800	1200	0	400	150
19	400	250	250	150	0	800	750	240	190	0
20	400	150	150	250	0	800	450	400	50	0

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