

MOCK TEST PAPER – 1
FINAL COURSE: GROUP – II
PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING
SUGGESTED ANSWERS/HINTS

GROUP - A

1. (i) (a) Purchases:

	P	Q	R	
	Upto 1,20,000 kg	Upto 1,60,000 kg	Any quantity	Equal to 2,00,000 kg.
Price (₹)	10.00	11.20	11.60	11.00
Variable transport cost (₹)	<u>1.20</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>
Total	<u>11.20</u>	<u>12.20</u>	<u>12.60</u>	<u>12.00</u>

Plan I	Quantity (kgs.)	1,20,000	80,000		
	Cost (₹)	13,44,000	9,76,000	Total	23,20,000
Plan II	Quantity (kgs.)				2,00,000
	Cost (₹)				24,00,000

Plan I being lesser in cost therefore it should be adopted, buy 1,20,000 kg from P and 80,000 kg from Q.

Fixed transport cost being constant is not relevant to the decision.

(b)		Kg.
Production:	Process A Input	2,00,000
	Loss 10%	<u>20,000</u>
	Output	1,80,000
	Process B Loss 5%	<u>9,000</u>
	Final output	<u>1,71,000</u>

Sales	K	L	M
	Upto	Upto	1,71,000 kg

	80,000 kg	1,60,000 kg	
Selling Price ₹	65.00	64.00	61.80
Discount 2%	<u>1.30</u>	<u>1.28</u>	—
Net selling price	63.70	62.72	61.80
Transport (V)	<u>2.60</u>	<u>1.44</u>	—
Net realisation	<u>61.10</u>	<u>61.28</u>	<u>61.80</u>

Plan I sell quantity	1,71,000 kg to M	Sales Revenue (₹)	1,05,67,800
Plan II sell quantity	(kgs.) 11,000 to K	1,60,000 to L	
	(₹) 6,72,100	98,04,800	1,04,76,900
Fixed delivery charges	₹ 5,000 × 12		<u>60,000</u>
		Sales Revenue (₹)	<u>1,04,16,900</u>

Since sales realisation is greater on selling to M, entire quantity should be sold to M

(ii)

Costs & profit statement

Process A	Kg.	₹
Raw materials	2,00,000	23,20,000
Fixed transport		2,00,000
Wages		22,00,000
Overheads		<u>9,56,000</u>
Total		56,76,000
Sale of scrap	<u>20,000 @ ₹ 1/-</u>	<u>(20,000)</u>
Net cost	<u>1,80,000</u>	<u>56,56,000</u>
Process B		
Process A	1,80,000	56,56,000
Wages		21,00,000
Overheads		<u>13,45,800</u>
Total	1,80,000	91,01,800
Sale of scrap	<u>9,000 @ ₹ 2/-</u>	<u>(18,000)</u>
Net cost	1,71,000	90,83,800
Net sales		<u>1,05,67,800</u>
Profit (₹)		<u>14,84,000</u>

2. (a) Costs incurred in the past, or revenue received in the past are not relevant because they cannot affect a decision about what is best for the future. Costs incurred to date of ₹ 50,000 and revenue received of ₹ 15,000 are 'sunk' and should be ignored.
- (b) Similarly, the price paid in the past for the materials is irrelevant. The only relevant cost of materials affecting the decision is the opportunity cost of the revenue from scrap which would be forgone – ₹ 2,000.

(c) Labour Costs

	₹
Labour costs required to complete work	8,000
Opportunity costs : contribution forgone by losing other work	18,000
₹ (30,000 – 12,000)	
Relevant cost of labour	26,000

- (d) The incremental cost of consultancy from completing the work is ₹ 2,500

	₹
Cost of completing work	4,000
Cost of cancelling contract	1,500
Incremental cost of completing work	2,500

- (e) Absorbed overhead is a notional accounting cost and should be ignored. Actual overhead incurred is the only overhead cost to consider. General overhead costs (and the absorbed overhead of the alternative work for the labour force) should be ignored.

- (f) Relevant costs may be summarised as follows.

	₹	₹
Revenue from completing work		34,000
Less : Relevant costs		
Materials: Opportunity cost	2,000	
Labour: basic pay	8,000	
opportunity cost	18,000	
Incremental cost of consultant	<u>2,500</u>	
		<u>30,500</u>
Extra profit to be earned by accepting the order		<u>3,500</u>

3. (i) VTA receives a 10% commission on each ticket: $10\% \times 9,000 = ₹ 900$, thus,

Selling price	= ₹ 900 per ticket
Variable cost per unit	= ₹ 200 per ticket
Contribution margin per unit	= ₹ 900 – ₹ 200 per ticket
	= ₹ 700 per ticket
Fixed costs	= ₹ 1,40,000 per ticket.

$$(a) \text{ Break - even number of tickets} = \frac{\text{Fixed costs}}{\text{Contribution margin per unit}}$$

$$= \frac{₹ 1,40,000}{₹ 700 \text{ per ticket}} = 200 \text{ tickets}$$

- (b) When target operating income = ₹ 70,000 per month:

$$\text{Quantity of tickets required to be sold} = \frac{(\text{Fixed costs} + \text{Target operating income})}{\text{Contribution per unit}}$$

$$= \frac{₹ 1,40,000 + ₹ 70,000}{₹ 700}$$

$$= \frac{₹ 2,10,000}{₹ 700} = 300 \text{ tickets.}$$

- (ii) Under the new system, VTA would receive only ₹ 500 on the ₹ 9,000 per ticket. Thus,

Selling price	= ₹ 500 per ticket
Variable cost per unit	= ₹ 200 per ticket
Contribution margin per unit	= ₹ 500 – ₹ 200 = ₹ 300 per ticket
Fixed costs	= ₹ 1,40,000 per month

$$(a) \text{ Break - even number of tickets} = \frac{₹ 1,40,000}{₹ 300 \text{ per ticket}} = 467 \text{ tickets (rounded up)}$$

$$(b) \text{ Quantity of tickets required to be sold} = \frac{₹ 2,10,000}{₹ 300 \text{ per ticket}} = 700 \text{ tickets}$$

The ₹ 500 cap on the commission paid per ticket causes the break-even point to more than double (from 200 to 467 tickets) and the tickets required to be sold to earn ₹ 70,000 per month to also more than double (from 300 to 700 tickets). As would be expected, travel agents reacted very negatively to the Dolphin Airlines decision to change commission payments.

4. (i) Desired profit from the production and sale of product M =

₹ 1,60,000 (₹ 16,00,000 × 10%)

- (ii) a. Total costs:

	₹
Variable (₹ 25 × 80,000 units)	20,00,000
Fixed (₹ 8,00,000 + ₹ 4,00,000)	<u>12,00,000</u>
Total	<u>32,00,000</u>

Cost per unit = ₹ 32,00,000 ÷ 80,000 units = ₹ 40.00

b. Markup percentage = $\frac{\text{Desired profit}}{\text{Total costs}}$

$$= \frac{\text{₹ 1,60,000}}{\text{₹ 32,00,000}} = 5\%$$

- c.

	₹
Cost amount per unit	40.00
Markup (₹ 40 × 5%)	<u>2.00</u>
Selling price	<u>42.00</u>

- (iii) a. Total manufacturing costs:

	₹
Variable (₹ 20 × 80,000 units)	16,00,000
Fixed factory overhead	<u>8,00,000</u>
Total	<u>24,00,000</u>

Cost amount per unit: ₹ 24,00,000 ÷ 80,000 units = ₹ 30.00

b. Markup percentage = $\frac{\text{Desired profit} + \text{Total selling and administrative expenses}}{\text{Total manufacturing costs}}$

$$= \frac{\text{₹ 1,60,000} + \text{₹ 4,00,000} + (\text{₹ 5} \times 80,000 \text{ units})}{\text{₹ 24,00,000}}$$

$$= \frac{₹ 1,60,000 + ₹ 4,00,000 + ₹ 4,00,000}{₹ 24,00,000}$$

$$= \frac{₹ 9,60,000}{₹ 24,00,000} = 40\%$$

c.	₹
Cost amount per unit	30.00
Markup (₹ 30 ´ 40%)	<u>12.00</u>
Selling price	<u>42.00</u>

- (iv) a. Variable cost amount per unit = ₹ 25
Total variable costs = ₹ 25 ´ 80,000 units = ₹ 20,00,000

b. Markup percentage = $\frac{\text{Desired profit} + \text{Total fixed costs}}{\text{Total variable costs}}$

$$= \frac{₹ 1,60,000 + ₹ 8,00,000 + ₹ 4,00,000}{₹ 20,00,000}$$

$$= \frac{₹ 13,60,000}{₹ 20,00,000} = 68\%$$

c.	₹
Cost amount per unit	25.00
Markup (₹ 25 ´ 68%)	<u>17.00</u>
Selling price	<u>42.00</u>

- (v) a. **Proposal to Sell to XYZ Ltd.**

	₹
Differential revenue from accepting offer:	
Revenue from sale of 4,000 additional units at ₹ 28	1,12,000
Differential cost from accepting offer:	
Variable production costs of 4,000 additional units at ₹ 20	<u>80,000</u>
Differential income from accepting offer	<u>32,000</u>

- b. The proposal should be accepted.

5 (i) Flexible Budget:

	(Fig' lacs of ₹)		
Units	6,00,000	10,00,000	12,00,000
	₹	₹	₹
Sales revenue: (A)	108	180	192
Direct materials	30	50	57
Direct wages	12	20	24
Variable factory overheads	12	20	24
Selling & Administration overheads	<u>6</u>	<u>10</u>	<u>13</u>
Total variable costs: (B)	<u>60</u>	<u>100</u>	<u>118</u>
Contribution : {(A) – (B)}	<u>48</u>	<u>80</u>	<u>74</u>
Less: Fixed factory overheads	16	16	16
Less: Fixed selling and administrative overheads			
Less: Additional fixed overheads	-	8	12
Less: Interest cost	-	3	3
Less: Depreciation	-	4	4
Less: Special advertisement	<u>-</u>	<u>2</u>	<u>-</u>
Profit	<u>16</u>	<u>31</u>	<u>23</u>

(ii) **Advise:** The company should choose 10 lacs level of output to arrive at optimum profit.

6. Computation of Standard Margin

	Product 1	Product 2	Product 3
Selling Price	₹15.00	₹ 20.00	₹ 40.00
Labour	₹4.00	₹ 5.00	₹ 8.00
Material	4.00	4.40	5.20
Energy	3.00	3.60	4.80
Variable costs	₹ 11.00	₹ 13.00	₹ 18.00
Contribution margin	4.00	7.00	22.00

(a) Sales Activity Variance = (Actual output – Budgeted output) × Standard margin
= (12,000 – 10,000) × 4 + (5,500 – 6,000) × 7 +
(1,800 – 2,000) × 22
= ₹ 100 Favourable

(b) Price –Recovery Variance = Sales Price Variance – Input Cost Variance

Where,

Sales Price Variance = (Actual price – Budgeted price) × Actual sales volume

Input cost variance = (Actual unit cost of input – Standard unit cost of input) × Actual inputs consumed.

Sales Price Variance = [(16 – 15) × 12,000 + (22 – 20) × 5,500 + (40 – 40) × 1,800]

= ₹ 23,000 Favourable

Input Cost Variance

	Actual unit costs	Budgeted unit costs	Difference	Actual Inputs	Input Cost Variances
Labour	21.00	20	1	5,212 hr.	₹ 5,212
Materials	4.40	4	0.40	21,920 kg.	8,768
Energy (kw hr.)	5.80	6	– 0.20	10,633 kw hr	(2,127)

Committed overhead 84,000 80,000 4,000 4,000

Input cost variance ₹ 15,853

Hence Price Recovery Variance = ₹ 23,000 – ₹ 15,853

= ₹ 7,147 Favourable.

(c) Productivity Variance

Productivity Variance = (Std. Consumption @ actual output – Actual Consumption) × Std. Price

Standard consumption

@actual output

	Product 1	Product 2	Product 3	Total	Actual Consumption	Diff	Std Price	Usage Variance
Labour	2,400	1,375	720	4,495	5,212	717	₹ 20	₹14,340
Material	12,000	6,050	2,340	20,390	21,920	1,530	4	6,120
Energy	6,000	3,300	1,440	10,740	10,633	- 107	6	(642)
Productivity Variance								₹19,818

7. (a) (i) Monthly profits at present level of L & M Ltd.

(₹' 000)

L Ltd.: Sales (10,000 drums* @ ₹20 per drum) 200

Less : Costs: Raw materials @ ₹ 9 per drum 90

Other costs @ ₹3 per drum	<u>30</u>
Contribution	80
Less : Fixed costs	<u>40</u>
Profit	<u>40</u>
M Ltd.: Sales (7,50,000 kilolitres at ₹ 9 per 25 litres)	270
Less: Costs: Variable (@ ₹ 0.20 per Kilolitre)	<u>150</u>
Contribution	120
Less : Fixed costs	<u>60</u>
Profit	<u>60</u>

Note: * Sales of L Ltd. = (2,50,000 kilolitres internal transfers / 25 litres per drum.)
= 10,000 drums

(ii) Monthly profits at higher sales level

	(₹' 000)
L Ltd.: Sales (18,000 drums* at ₹16 per drum)	288
Less: Costs: Raw materials (₹ 9 per drum)	162
Other expenses (₹3 per drum)	<u>54</u>
Contribution	72
Less: Fixed costs	<u>40</u>
Profit	<u>32</u>
M Ltd. Sales (9,50,000 kilolitres * at ₹ 9 per 25 litres)	342
Costs: Variable (@ ₹0.20 per kilolitre)	<u>190</u>
Contribution	152
Less : Fixed costs	60
Profit	<u>92</u>

Note: * Internal transfers (18,000 drums of 25 litres per drum) plus 5,00,000 kilolitres external sales.

- (b) (i)** The use of a market price as the transfer price produces difficulties because L Ltd. is not motivated to reduce the selling price, in order to increase volume, because its profit declines from ₹ 40,000 to ₹ 32,000. However, the profits of M Ltd. increase from ₹ 60,000 to ₹ 92,000. Thus, the profits for the company

as a whole increase by ₹ 24,000. Hence the transfer price does not encourage goal congruence in this particular situation.

(ii) In order to overcome the above difficulties, there is a need to offer some inducement to L Ltd. such that its profits will increase as a result of lowering the selling price in order to increase volume. Factors to consider are the following:

1. The significance of the loss in profits arising from the difference between profits at the optimum output level and profits based on the output using the current transfer pricing system.
2. Savings in selling and distribution costs arising from internal transfers compared with external sales. The savings per unit should be deducted from the market price.

8. (a) **Target Costing:** It is a management tool used for reducing a product cost over its entire life cycle. It is driven by external Market factors. Marketing management prior to designing and introducing a new product determines a target market price. This target price is set at a level that will permit the company to achieve a desired market share and sales volume. A desired profit margin is then deducted to determine the target maximum allowable product cost. Target costing also develops methods for achieving those targets and means to test the cost effectiveness of different cost-cutting scenarios.

Stages of Target Costing:

1. **Conception (planning) Phase:** Under this stage of life cycle, competitors products are to be analysed, with regard to price, quality, service and support, delivery and technology. The features which consumers would like to have like consumer value etc. established. After preliminary testing, the company may be asked to pinpoint a market niche, it believes, is under supplied and which might have some competitive advantage.
2. **Development phase:** The design department should select the most competitive product in the market and study in detail the requirement of material, manufacturing process along with competitors cost structure. The firm should also develop estimates of internal cost structure based on internal cost of similar products being produced by the company. If possible the company should develop both the cost structures (competitors and own) in terms of cost drivers for better analysis and cost reduction.
3. **Production phase:** This phase concentrates its search for better and less expensive products, cost benefit analysis in different features of a product priority wise, more towards less expensive means of production, as well as production techniques etc.

- (b) Traditional accounting systems record the flow of inventory through elaborate accounting procedures. Such systems are required in those manufacturing environment where inventory/WIP values are large. However, since JIT systems operate in modern manufacturing environment characterized by low inventory and WIP values, usually also associated with low cost variances, the requirements of such elaborate accounting procedures does not exist.

Back flushing requires no data entry of any kind until a finished product is completed. At that time the total amount finished is entered into the computer system which is multiplied by all components as per the Bill of materials (BOM) for each item produced. This yields a lengthy list of components that should have been used in the production process and this is subtracted from the opening stock to arrive at the closing stock to arrive at the closing stock/inventory.

The problems with back flushing that must be corrected before it works properly are:

- (i) The total production quantity entered into the system must be absolutely correct, if not, then wrong components and quantities will be subtracted from the stock.
 - (ii) All abnormal scrap must be diligently tracked and recorded. Otherwise materials will fall outside the back flushing system and will not be charged to inventory.
 - (iii) Lot tracing is impossible under the back flushing system. This is required when a manufacturer needs to keep records of which production lots were used to create a product in case all the items in a lot need be recalled.
 - (iv) The inventory balance may be too high at all times because the back flushing transactions that relieves inventory usually does so only once a day, during which time other inventory is sent to the production process. This makes it difficult to maintain an accurate set of inventory records in the warehouse.
- (c) **Opportunity Cost** : It is the cost of Opportunity lost by diversion of an input factor from one use to another. It is the measure of the benefit of Opportunity foregone. The introduction of opportunity cost concept is helpful to the management in making profitability calculations when one or more of the inputs required by one or more of the alternative courses of action are already available. These inputs may nevertheless have a cost and this is measured by the sacrifice made by the alternative action chosen or the cost that is given up in order to make them available for the current proposal.

The examples of Opportunity cost are :-

- (i) The opportunity cost of using a machine to produce a particular product is the foregone earnings that would have been possible if the machine was used to produce other products.
- (ii) The opportunity cost of funds invested in a business is the interest that could

have been earned by investing the funds in alternative avenues say Bank deposit.

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

(d) The following requisites should be considered while installing a system of inter-firm comparison:—

1. Centre for Inter-Comparison — For collection and analysing data received from member units, for doing a comparative study and for dissemination of the results of study a Central body is necessary. The functions of such a body may be :—
 - (a) Collection of data and information from its members;
 - (b) Dissemination of results to its members;
 - (c) Undertaking research and development for common and individual benefit of its members;
 - (d) Organising training programmes and publishing magazines.
2. Membership — Another requirement for the success of inter-firm comparison is that the firms of different sizes should become members of the Centre entrusted with the task of carrying out inter-firm comparison.
3. Nature of information to be collected — Although there is no limit to information, yet the following information useful to the management is in general collected by the Centre for inter-firm comparison.
 - a. Information regarding costs and cost structures.
 - b. Raw material consumption.
 - c. Stock of raw material, wastage of materials, etc.
 - d. Labour efficiency and labour utilisation.
 - e. Machine utilisation and machine efficiency.
 - f. Capital employed and Return on capital.
 - g. Liquidity of the organisation.
 - h. Reserve and appropriation of profit.
 - i. Creditors and debtors.
 - j. Methods of production and technical aspects.

GROUP B

9. The given L.P.P. is

$$\text{Minimize } Z = 2x_1 + x_2$$

Subject to

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 3, \quad x_1, x_2 \geq 0$$

We shall convert the constraints into eqn.

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 - x_3 = 6$$

$$x_1 + 2x_2 + x_4 = 3$$

Where $x_1, x_2, x_3, x_4 \geq 0$ and x_3 is called surplus variables and x_4 is called slack variable.

We shall add artificial variables in the above equations.

$$3x_1 + x_2 + x_5 = 3$$

$$4x_1 + 3x_2 - x_3 + x_6 = 6$$

$$x_1 + 2x_2 + x_4 = 3$$

Here, x_5, x_6 are called artificial variable.

The no. of variables $n = 6$

The no. of constraints $m = 3$

$$\therefore n - m = 6 - 3 = 3.$$

Let us assume that

$$x_1 = 0, x_2 = 0, x_3 = 0$$

\ The starting basic feasible solution is

$$x_5 = 3, x_6 = 6, x_4 = 3$$

Now, then new objective function.

$$Z = 2x_1 + x_2 + 0x_3 + 0x_4 + Mx_5 + Mx_6$$

		C (2 1 0 M M 0)							
C_B	Y_B	X_B	Y_1	Y_2	Y_3	Y_5	Y_6	Y_4	Min Ratio
M	Y_5	3	3	1	1	1	0	0	$\frac{3}{3} = 1$ ←
M	Y_6	6	4	3	-1	0	1	0	$\frac{6}{4} = 1.5$
O	Y_4	3	1	2	0	0	0	1	$\frac{3}{1} = 3$
		$Z = 9M$	$7M - 2$	$4M - 2$	$-M$	0	0	0	

There Y_1 is the entering variable

Y_5 is the leaving variable

and 3 is the leading common element.

		C	(2	1	0	M	0)	
C _B	Y _B	X _B	Y ₁	Y ₂	Y ₃	Y ₆	Y ₄	Min. Ratio
2	Y ₁	1	1	1/3	0	0	0	$\frac{1}{1/3}=3$
M	Y ₆	2	0	5/3	- 1	1	0	$2 \cdot \frac{3}{5}$ ←
								= 1.2
O	Y ₄	2	0	5/3	0	0	1	$\frac{6}{5}=1.2$
		Z = 2M+2	0	$\frac{5M - 1}{5}$	- M	0	0	

Y_2 is the entering variable

Y_6 is the leaving variable

$\frac{5}{3}$ is the leading common element.

		C (.2 1 0 0)				
C_B	Y_B	X_B	Y_1	Y_2	Y_3	Y_4
2	Y_1	3/5	1	0	1/5	0
1	Y_2	6/5	0	1	-3/5	0
0	Y_4	0	0	0	1	1
		$Z=12/5$	0	0	-1/5	0

Since all the element $Z_j - C_j$ of non-positive. The above table gives the optimum solution.

\ The solution is $x_1 = \frac{3}{5}$, $x_2 = \frac{6}{5}$ and $Z = \frac{12}{5}$

10.

Table : 1

	A	B	C	D	E
1	8	2	0	12	0
2	0	16	12	19	4
3	0	14	8	11	4
4	19	3	0	5	5
5	11	7	0	5	1

Table : 2

	A	B	C	D	E
1	8	0	0	7	0
2	0	14	12	14	4
3	0	12	8	6	4
4	19	18	0	0	5
5	11	5	0	0	1

In table 2, the minimum number of lines = $N = 4$

The order of matrix = $n = 5$

\ $N < n$.

Table : 3

	A	B	C	D	E
1	8	0	1	8	0
2	0	13	12	14	3
3	0	11	8	6	3
4	19	0	0	0	4
5	14	4	0	0	0

Here $N < n$

Table : 4

	A	B	C	D	E
1	12	0	1	18	0
2	0	10	9	11	0
3	0	8	5	3	0
4	22	0	0	0	4
5	14	4	0	0	0

Here $N = n$

We can set allocation assignment schedule.

	A	B	C	D	E
1		○			⊗
2	⊗				○
3	○				⊗
4		⊗	○	⊗	
5			⊗	○	⊗

1 $\frac{3}{4}$ @ B

2 $\frac{3}{4}$ @ E

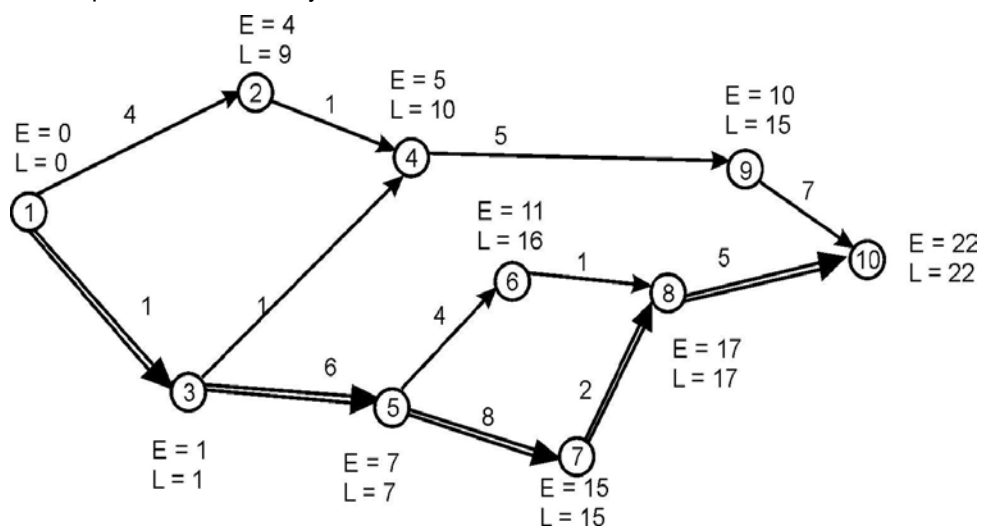
3 $\frac{3}{4}$ @ A

4 $\frac{3}{4}$ @ C

5 $\frac{3}{4}$ @ D

\ Maximum Sales = $38 + 36 + 41 + 41 + 35 = 191$ units.

11. The given data results in a network shown in the figure. The figure along the arrows represent the activity times.



The earliest occurrence time (E) and the latest occurrence time (L) of each event are now computed by employing forward and backward pass calculations.

Network analysis table is given below :

Activity	Duration (week)	Start Time		Finish Time		Total float
		Earliest	Latest	Earliest	Latest	
1-2	4	0	5	4	9	5
1-3	1	0	0	1	1	0
2-4	1	4	9	5	10	5
3-4	1	1	9	2	10	8
3-5	6	1	1	7	7	0
4-9	5	5	10	10	15	5
5-6	4	7	12	11	16	5
5-7	8	7	7	15	15	0
6-8	1	11	16	12	17	5
7-8	2	15	15	17	17	0
8-10	5	17	17	22	22	0
9-10	7	10	15	17	22	5

\ Path 1-3-5-7-8-10 with project duration of 22 weeks is the critical path.

First, the cost slope for each activity and the normal direct cost of the project are calculated. This is shown in the table below :

Activity : 1-2 2-3 2-4 2-5 3-5 4-5 5-6 6-7 6-8 7-8

Cost Slope : 100 - 80 45 50 - 45 70 40 200

(₹/Week)

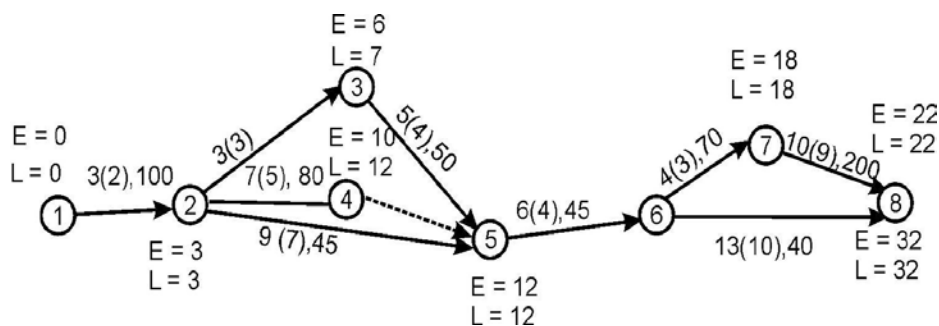
Normal direct cost = ₹ 4,220.

Next, the network is drawn and the critical path is found. This is shown the network diagram.

(a) The critical path is 1-2-5-6-7-8

(b) Normal project duration = 32 weeks.

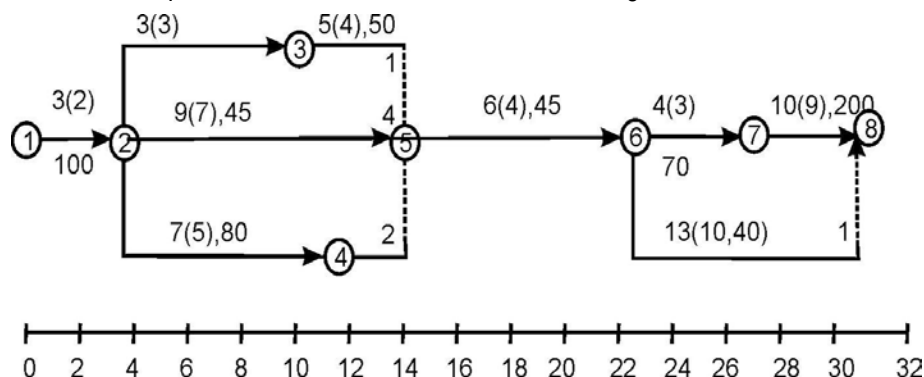
Normal project cost = ₹ (4,220 + 32 × 50)
= ₹ 5,820



(c) Total float for each activity is found in the table below :

Activity	Duration	Start		Finish		Total Float
		Earliest	Late	Earliest	Late	
1-2	3	0	0	3	3	0
2-3	3	3	4	6	7	1
2-4	7	3	5	10	12	2
2-5	9	3	3	12	12	0
3-5	5	6	7	11	12	1
4-5	0	10	12	10	12	2
5-6	6	12	12	18	18	0
6-7	4	18	18	22	22	0
6-8	13	18	19	31	32	1
7-8	10	22	22	32	32	0

- (d) Since the indirect cost is ₹ 50. Week and the network is to be crashed only upto optimum time and cost, only those activities need to be crashed for which the total cost slope is ₹ 50/- week. The time scaled diagram of the network is in the figure:



Crash activity 5-6 by 2 days at a crash cost of ₹ 45 per week.

Crash cost = ₹ (2 × 45) = ₹ 90

Project duration = 30 weeks.

Crash activity 2-5 by 1 day at a crash cost of ₹ 45 per week

Crash cost = ₹ (90 + 45) = ₹ 135.

Project duration = 29 weeks.

12. First of all, random numbers 00-99 are allocated in proportion to the probabilities associated with the sales of cars as given below:

Table 1

Sales of Car	Probability	Cumulative Probability	Range for random number
37	0.10	0.10	00-09
38	0.15	0.25	10-24
39	0.20	0.45	25-44
40	0.35	0.80	45-79
41	0.15	0.95	80-94
42	0.05	1.00	95-99

Based on the given random numbers, we simulate the estimated sales and calculate the profit/loss on the basis of specified units of production.

Table 2 :

Day	Random Numbers	Estimated Sale	Profit (Production 40 Cars /(day) (Rs. laksh)	Profit (Production 39 cars /day
1	9	37	$37 \times 1 - 3 \times 2 = 31$	$37 \times 1 - 2 \times 2 = 33$
2	98	42	$40 \times 1 - 2 \times 1 = 38$	$39 \times 1 - 3 \times 1 = 36$
3	64	40	$40 \times 1 = 40$	$39 \times 1 - 1 \times 1 = 38$
4	98	42	$40 \times 1 - 2 \times 1 = 38$	$39 \times 1 - 3 \times 1 = 36$
5	94	41	$40 \times 1 - 1 \times 1 = 39$	$39 \times 1 - 2 \times 1 = 37$
6	01	37	$37 \times 1 - 3 \times 2 = 31$	$37 \times 1 - 2 \times 2 = 33$
7	78	40	$40 \times 1 = 40$	$39 \times 1 - 1 \times 1 = 38$
8	10	38	$38 \times 1 - 2 \times 2 = 34$	$38 \times 1 - 1 \times 2 = 36$
9	15	38	$38 \times 1 - 2 \times 2 = 34$	$38 \times 1 - 1 \times 2 = 36$
10	19	38	$38 \times 1 - 2 \times 2 = 34$	$38 \times 1 - 1 \times 2 = 36$

Total = 359

Total = 359

There is no additional profit or loss if the company decides to reduce production to 39 cars per day.