

PAPER – 5 : ADVANCED MANAGEMENT ACCOUNTING

Answer all question

Working notes should form part of the answer

Question 1

- (a) Lee Electronic manufactures four types of electronic products, A,B,C and D. All these products have a good demand in the market. The following figures are given to you:

	A	B	C	D
Material cost (Rs./u)	64	72	45	56
Machining Cost (Rs/u @ Rs. 8 per hour)	48	32	64	24
Other variable costs (Rs/u)	32	36	44	20
Selling Price (Rs/u)	162	156	173	118
Market Demand (Units)	52,000	48,500	26,500	30,000

Fixed overhead at different levels of operation are :

Level of operation (in production hours)	Total fixed cost (Rs.)
Upto 1,50,000	10,00,000
1,50,000 – 30,00,000	10,50,000
3,00,000 – 4,50,000	11,00,000
4,50,000- 6,00,000	11,50,000

At present, the available production capacity in the company is 4,98,000 machine hours. This capacity is not enough to meet the entire market demand and hence the production manager wants to increase the capacity. The company wants to retain the customers by meeting their demands through alternative ways. One alternative is to sub-contract a part of its production. The sub-contract offer received as under :

	A	B	C	D
Sub-contract Price (Rs./u)	146	126	155	108

The company seeks your advice in terms of products and quantities to be produced and/or sub-contracted, so as to achieve the maximum possible profit. You are required to also compute the profit expected from your suggestion. (18 Marks)

- (b) Explain briefly the concept of skimming pricing policy. (2 Marks)

Answer

- (a)

Demand	52,000	48,500	26,500	30,000
	A	B	C	D
Direct Material	64	72	45	56

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M/c	48	32	64	24
Other Variable Cost	<u>32</u>	<u>36</u>	<u>44</u>	<u>20</u>
Total Variable Cost	<u>144</u>	<u>140</u>	<u>153</u>	<u>100</u>
Selling Price	162	156	173	118
Contribution (Rs./u)	18	16	20	18
M/s Hours per unit	6	4	8	3
Contribution (Rs./ M/c hr.)	<u>3</u>	<u>4</u>	<u>2.5</u>	<u>6</u>
Ranking	III	II	IV	I
Sub-Contract Cost Rs./u)	146	126	155	108
Contribution (Rs./u) on (Sub-Contract)	16	30	18	8

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

1st Level of Operations: 1,50,000 hours, Produce D as much as possible.

Hours required = 30,000 units × 3 = 90,000 hours

Balance hours available: 60,000 hours.

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

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

1st Level of Operation:

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

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2nd Level of Operation:

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

∴ Contribution increases by $25,000 \times 2 = 50,000$

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

But increase in fixed Cost = 50,000

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

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

Unit of A that are needed = $[52,000 - 25,000 \text{ (2nd Level)} - 10,000 \text{ (1st Level)}]$

= $17,000 \text{ units} \times 6 \text{ hrs/u} = 1,02,000 \text{ hrs.}$

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

Increase in Contribution over Level 1st or 2nd :

A: $17,000 \times 2 = \text{Rs.}34,000$

C: $6,000 \times 2 = \underline{\text{Rs.}12,000}$

= Rs.46,000

Increase in fixed costs = Rs.50,000

Additional Loss = Rs. 4,000

4th Level Additional: 1,50,000 hrs can give $\frac{1,50,000}{8} = 18,750$ unit of C.

Increase in Contribution $18,750 \times 2 = \text{Rs. } 37,500$

Increase in Cost = (Rs. 50,000)

Level 3rd loss c/fd = (Rs. 4,000)

Level 1st profit will order by = (Rs. 16,500)

Advice: Do not expand capacities; sell maximum

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

Summary:

Product	Produce (Units)	Sub-Contract (Units)	Contribution (Production)	Contribution (Sub-Contract)	Total Contribution
A	10,000	42,000	1,80,000	6,72,000	8,52,000
B	-	48,500	-	14,55,000	14,55,000

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C	-	26,500	-	4,77,000	4,77,000
D	30,000	-	5,40,000	-	5,40,000
					33,24,000
Fixed Cost					10,00,000
Profit					23,24,000

(b) Skimming Pricing Policy:

When the product enters the market, a high price is charged so that price covers the initial cost of production and the demand is unknown e.g. Mobile Phones, Flat LCD TVs, etc. Price are gradually reduced.

Question 2

- (a) A bank offers three products, viz., deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget:

	Activity	Present Cost (Rs.)	Estimation for the budget period
(i)	ATM Services:		
	(a) Machine maintenance	4,00,000	(all fixed, no change)
	(b) Rents	2,00,000	(fully fixed; no change)
	(c) Currency Replenishment Cost	1,00,000	(expected to double during budget period)
		7,00,000	(This activity is driven by no. of ATM transactions)
(ii)	Computer Processing	5,00,000	(Half this amount is fixed and no change is expected) (The variable portion is expected to increase to three times the current level). This activity is driven by the number of computer transactions.
(iii)	Issuing Statements	18,00,000	Presently, 3 lac statements are made. In the budget period, 5 lac statements are expected; For every increase of one lac statement, one lac rupees is the

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- (iv) Computer Inquiries 2,00,000 budgeted increase (this activity is driven by the number of statements) Estimated to increase by 80% during the budget period. (This activity is driven by telephone minutes).

The activity drivers and their budgeted quantifies are given below:

	Deposits	Loans	Credit Cards
No. of ATM Transactions	1,50,000	-	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts, and 14,000 Credit Card Accounts.

You are required to:

- Calculate the budgeted rate for each activity.
 - Prepare the budgeted cost statement activity wise.
 - Find the budgeted product cost per account for each product using (i) and (ii) above. (12 Marks)
- (b) How do you know whether an alternative solution exists for a transportation problem? (4 Marks)

Answer

(a) **Budget Cost Statement**

Activity	Activity Cost (Rs.) (Budgeted)	Activity Driver	No. of Units of Activity Driver (Budget)	Activity Rate (Rs.)	Deposits	Loans	Credit Cards
1. ATM Services	8,00,000	ATM Transaction	2,00,000	4	6,00,000	-	2,00,000
2. Computer Processing	10,00,000	Computer Transaction	20,00,000	0.50	7,50,000	1,00,000	1,50,000
3. Issuing Statements	20,00,000	No. of Statements	5,00,000	4.00	14,00,000	2,00,000	4,00,000
4. Customer Inquiries	3,60,000	Telephone Minutes	7,20,000	0.50	1,80,000	90,000	90,000
Budgeted Cost	41,60,000				29,30,000	3,90,000	8,40,000
Units of product as estimated in the budget period					58,600	13,000	14,000
Budgeted Cost per unit of the product					50	30	60

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Working Notes:

- (i) ATM $4,00,000 + 2,00,000 + 2 \times 1,00,000 = 8,00,000$
- (ii) Computer $5,00,000$ (Fixed = 2,50,000) Variable = 10,00,000
 $2,50,000$ increase to 3 times = 7,50,000
- (iii) Issuing Statements $2,00,000 + 80\% \times 2,00,000 = 2 + 1.6 = 3,60,000$.
- (b) The Δ_{ij} matrix = $\Delta_{ij} = C_{ij} - (u_i + v_j)$

Where c_i is the cost matrix and $(u_i + v_j)$ is the cell evaluation matrix for allocated cell.

The Δ_{ij} matrix has one or more 'Zero' elements, indicating that, if that cell is brought into the solution, the optional cost will not change though the allocation changes.

Thus, a 'Zero' element in the Δ_{ij} matrix reveals the possibility of an alternative solution.

Question 3

- (a) Hind Metals Manufactures an alloy product 'Incop' by using iron and Copper. The metals pass through two plants, X and Y. The company gives you the following details for the manufacture of one unit of Incop :

Materials	Iron: 10 kgs @ Rs.5 per kg. Cooper: 5 kg @ Rs.8 per kg.
Wages	3 hours @ Rs.15 per hour in Plant X 5 hours @ Rs.12 per hour in Plant Y
Overhead recovery	On the basis of direct labour hours
Fixed overhead	Rs.8 per hour in Plant X Rs.5 per hour in Plant Y
Variable overhead	Rs.8 per hour in Plant X Rs.5 per hour in Plant Y
Selling overhead :	(fully variable) – Rs.20 per unit

- (i) Find out the minimum price to be fixed for the alloy, when the alloy is new to the market. Briefly explain this pricing strategy.
- (ii) After the alloy is well established in the market. What should be the minimum selling price? Why? (6 Marks)
- (b) What are the critical success factors for the implementation of a "Total Quality Management" programme? (5 Marks)
- (c) How can value analysis achieve cost reduction? (5 Marks)

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Answer

(a)

Rs./u of alloy

Materials:		
Iron 10kg @ Rs.5/-	50	
Copper 5 kg @ Rs.8/-	<u>40</u>	90
Wages		
X : 3 hrs @ 15 Rs./Hr.	45	
Y : 5 hrs @ 12 Rs./Hr	<u>60</u>	105
Variable OH (Production)		
X : 8 hrs × 3 hrs	24	
Y : 5 hrs × 5 hrs	<u>25</u>	49
Variable OH – Selling		<u>20</u>
Total Variable Cost		264
Fixed Off:		
X : 8/hrs × 3 hrs.	24	
Y : 5/hrs × 5 hrs	<u>25</u>	<u>49</u>
Total Cost		313

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- (i) If pricing strategy is to penetrate the market, the minimum price for a new product should be the variable cost i.e. Rs.264/-. In some circumstances, it can also be sold below the variable cost, if it is expected to quickly penetrate the market and later absorb a price increase. Total Variable Cost is the penetration price.
 - (ii) When the alloy is well established, the minimum selling price will be the total cost – including the fixed cost i.e. Rs.313 per unit. Long run costs should cover at least the total cost.
- (b) Critical success factors of TQM:
- Focus on customer needs.
 - Everyone in the organisation should be involved.
 - Focus on continuous improvement.
 - Design quality in product and production process.
 - Effective performance measurement system.
 - Rewards and performance measurements should be renewed.
 - Appropriate training and education to everyone to understand the aim of TQM.

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(c) Value analysis can do cost reduction in the following manner:

- By identifying and removing unnecessary components in a product which had utility earlier.
- By introducing component substitution at a lesser cost without affecting the quality of the product.
- By simplifying the product design.
- By introducing alternative methods with less cost but improved efficiency.

Question 4

(a) Optically Ltd. makes two kinds of products, P (lenses) and Q (swimming goggles) in divisions P and Q respectively. P is an input for Q and two units of P are needed to make one unit of Q.

The following data is given to you for a period :

	P Rs./u of P	Q Rs./u of Q
Direct Materials	20	25 (excluding P)
Direct Labour	30	35
Variable Overhead	10	20
External Demand (units)	3,000	3,000
Capacity (units)	7,000	2,500
Selling Price Rs./u (outside market)	100	410

If Q buys P from outside, it has the following costs:

For order quantity 2,499 or less	Rs.90 per unit for the entire quantity ordered.
For order quantity 2,500 – 5,000	Rs.80 per unit for the entire quantity ordered.
For order quantity more than 5,000	Rs.70 per unit for the entire quantity ordered.

You are required to:

- (i) Evaluate the best strategies for Division P and Q.
 - (ii) Briefly explain the concept of goal congruence. (12 Marks)
- (b) In an assignment problem to assign jobs to men to minimize the time taken, suppose that one man does not know how to do a particular job, how will you eliminate this allocation from the solution? (4 Marks)

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Answer

(a)

Opticals Ltd manufactures P(lenses) and Q (swimming goggles).

Division P has option to supply to Division Q or sell to outside market.

Division Q has option to buy from Division P or purchase from outside market.

However, both divisions have to work within their individual capacity.

Variable Cost for product P in Division P = Rs 60.

Variable cost for product Q in Division Q (excluding 2 Nos P's) = Rs 80.

Division P has better market price of its product P than the market price offered to Q division.

For maximizing profit of the organization : Rs

P division should optimise its profit by selling maximum units to outside market.

Contribution per unit for sale to outside for division P 40

Contribution per unit for Div Q as follows :

Sale price - Variable cost (excluding lenses) 330

Max Contribution per unit (if procured from P div at its variable cost i.e Rs 60) 210

Min Contribution per unit (if procured at Rs 90 per unit from outside) 150

Contribution per unit at transfer price of Rs 70 i.e minimum market price 190

Option 1 : Division Q buys 5001 units from market @ Rs 70 and meets its capacity. Division P sells 3000 units to outside market @ Rs 100

Sale / Transfer	Contrib. /unit	Contribution in thousand rupees		
		Rs P Div	Q Div	Total
DivP :Sale of 3000 units to outside market @ Rs 100	40	120		120
DivQ: Sale of 2500 units with P from market @ Rs 70	190		475	475
Less : cost of rejection of one unit of product P			-0.07	-0.07
Total		120	474.93	594.93

Option 2 : Division P sells 3000 units to outside market, transfer 4000 units to div Q and Division Q buys 1000 units from outside market to work within the capacity

P Division agrees to a transfer price so that profitability of Q is not affected. To maintain the same profitability of Q, contribution required from 2000 units for Div Q is Rs 400,000 i.e contribution per unit Rs 200 i.e transfer price per unit of P is Rs 65 per unit to make cost of lenses Rs 130

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Sale / Transfer	Contrib /unit	Contribution in thousand rupees		
	Rs	P Div	Q Div	Total
Div P : Sale of 3000 units to outside market	40	120		120
Div P : Transfer of 4000 units to div Q at Rs 65	5	20		20
Div Q : Sale of 2000 units with P from P div @ Rs 65	200		400	400
Div Q : Sale of 500 units with P from market @ Rs 90	150		75	75
Total		140	475	615

Under Option 1, both divisions worked dis-jointly without caring for capacity utilization resulting lower profitability of the organization.

Under Option 2, both divisions worked with mutual advantages for optimizing their individual profits and overall profit for the organization has gone up by effective utilization of capacity.

Product P from Division P fetches higher price from open market indicating good quality of product. Moreover, supply from P division is well assured in the long run which is the justification of establishment of two parallel divisions.

Hence, Option 2 is suggested.

- (ii) Division functioning as profit centers strive to achieve maximum divisional profits, either by internal transfers or from outside purchase. This may not match with the organisation's objective of maximum overall profits. Divisions may be commercial to advice overall objects objectives, where divisional decisions are in line with the overall best for the company, and this is goal congruence. Divisions at a disadvantage may be given due weightage while appraising their performance. Goal incongruence defeats the purpose of divisional profit centre system.
- (b) In an assignment minimization problem, if one task cannot be assigned to one person, introduce a prohibitively large cost for that allocation, say M, where M has a high the value. Then, while doing the row minimum and column minimum operations, automatically this allocation will get eliminated.

Question 5

- (a) The following information relates to labour of x Ltd.

Type of Labour	Skilled	Semi Skilled	Unskilled	Total
No. of workers in standard gang	4	3	2	9
Standard rate per hour (Rs)	6	3	1	-
Number of workers in actual gang				
Actual rate per hour (Rs.)	7	2	2	-

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In a 40 hours week, the gang produced 270 standard hours.

The actual number of semi-skilled workers is two times the actual number of unskilled workers. The rate variance of semi-skilled workers is Rs.160 (F).

Find the following:

- (i) The number of workers in each category
 - (ii) Total gang variance
 - (iii) Total Sub-efficiency variance
 - (iv) Total labour rate variance
 - (v) Total labour cost variance (10 Marks)
- (b) The following is a linear programming problem. You are required to set up the initial simplex tableau. (Please do not attempt further iterations or solution):

Maximise

$$100x_1 = 80x_2$$

Subject to

$$3x_1 + 5x_2 \leq 150$$

$$x_2 \leq 20$$

$$8x_1 + 5x_2 \leq 300$$

$$x_1 + x_2 \geq 25$$

$$x_1, x_2 \geq 0$$

(6 Marks)

Answer

(a)

	SR	SH		SR	RSH		SR	AH		AR	AH	
Skill	6×	120	720	6×	960	160	6×	120	120	7×	120	840
Semi-Skill	3×	90	270	3×	360	120	3×	160	480	2×	160	320
Unskilled	1×	60	<u>60</u>	1×	<u>80</u>	80	1×	80	<u>80</u>	2×	80	<u>160</u>
			<u>1050</u>		<u>1400</u>				<u>1280</u>			<u>1320</u>
	Sub-efficiency Variance				Gang Variance				Rate Variance			
	350 (A)				120 (F)				40 (A)			
	Cost Variance = 270 (A)											

Workings Note:

Standard hours produced = 270

Standard Mix : $270 \div 9 = 30$

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	Skill	Semi-Skill	Unskilled
Ratio	4:	3:	2:
Hrs.	120	90	60

Actual hrs = $40 \times 9 = 360$ hrs.

Actual hrs in Standard Ratio = 360

4:	3:	2:
$\frac{360}{9} \times 4 = 160$	$\frac{360}{9} \times 3 = 120$	$\frac{360}{9} \times 2 = 80$

[(Standard Rate = Actual Rate) Actual hrs.] = Rate Variance

Semi-skilled = 160

(3 – 2) Actual hrs = 160

Actual hrs = 160 (for semi-skilled)

Actual Semi-skilled = 2 (Unskilled actual)

160 = 2 (Unskilled)

Unskilled hrs (actual) = $\frac{160}{2} = 80$

Total Actual = 360

∴ Actual hrs – skilled = $360 - (160 + 80)$
 $= 360 - 240 = 120$

Actual Hrs.	Skilled	Semi-skilled	Unskilled
	120	160	80

40 hr week

∴ $\frac{120}{40} = 3$ $\frac{160}{40} = 4$ $\frac{80}{40} = 2$

No. of Workers

(i) 3 4 2

(ii) Gang Variance:

= (Actual Hrs in Standard Ratio – Actual Hrs in Actual Ratio) × Standard Rate
 $= 1400 - 1280 = 120$ (F)

(iii) Sub-efficiency Variance:

= Standard Rate (Standard Hrs – Actual Hrs in Standard Ratio)
 $= 1050 - 1400 = 350$ (A)

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(iv) Total Labour Rate Variance:

= Actual Hrs (Standard Rate – Actual Rate)

= 1280 – 1320 = 40 (A)

(v) Labour Cost Variance:

= (Standard Rate × Standard Hrs – Actual Rate × Actual Hrs.)

= 1050 – 1320 = 270 (A)

(b) Under the usual notations where

S₁, S₂, S₃ are stock Variables,

A₄ = the artificial variable

S₄ = Surplus Variable

We have,

Max. Z = 100x₁ + 80x₂ + 0S₁ + 0S₂ + 0S₃ + 0S₄ – M A₄.

S.t.

3x₁ + 5x₂ + S₁ = 150

x₂ + S₂ = 20

8x₁ + 5x₂ + S₃ = 300

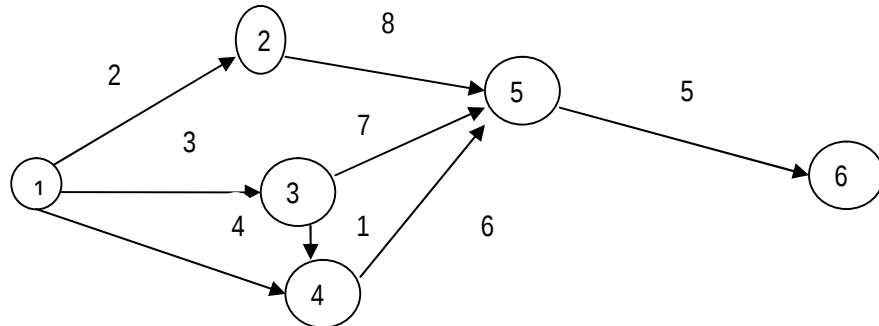
x₁ + x₂ + - S₄ + A₄ = 25

		x ₁	x ₂	S ₁	S ₂	S ₃	S ₄	A ₄		
Basis	$\begin{matrix} C_j \\ C_B \end{matrix}$	100	80	0	0	0	0	- M		
S ₁	0	3	5	1	0	0	0	0	150	✓
S ₂	0	0	1	0	1	0	0	0	20	✓
S ₃	0	8	5	0	0	1	0	0	300	✓
A ₄	- M	1	1	0	0	0	-1	1	25	✓
Z _j		- M	- M	0	0	0	M	-M	-25M	✓
C _j -Z _j		100+M	80+M	0	0	0	-M	0		✓

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Question 6

(a) The following network gives the duration in days for each activity :



- (i) You are required to list the critical paths.
 - (ii) Given that each activity can be crashed by a maximum of one day, choose to crash any four activities so that the project duration is reduced by 2 days. (6 Marks)
- (b) In the past, a machine has produced pipes of diameter 50 mm. To determine whether the machine is in proper working order, a sample of 10 pipes is chosen, for which mean diameter is 53 mm and the standard deviation is 3 mm. Test the hypothesis that the machine is in proper working order, given that the critical value of the test statistic from the table is 2.26. (4 Marks)
- (c) The Gifts Company 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. (6 Marks)

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

	Rs./unit
Direct variable costs (excluding labour)	2,000
Direct labour (20 hours @ Rs. 50 hour)	1,000

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

- (i) What is the price per piece to be quoted for this customer if the targeted contribution is Rs.1,500 per unit?
- (ii) 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?

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Answer

(a) Critical Paths:

All are critical paths:

$$(i) \quad 1 - 2 - 5 - 6 \qquad 2 + 8 + 5 \qquad = 15$$

$$(ii) \quad 1 - 3 - 5 - 6 \qquad 3 + 7 + 5 \qquad = 15$$

$$(iii) \quad 1 - 4 - 5 - 6 \qquad 4 + 6 + 5 \qquad = 15$$

$$(iv) \quad 1 - 3 - 4 - 5 - 6 \qquad 3 + 1 + 6 + 5 \qquad = 15$$

(i) Choose 5 – 6, common path;

Crash by 1 day

(ii) Choose: 1 – 2, 1 – 3, 1 – 4

Or

(iii) Choose: 1 – 2, 3 – 5, 4 – 5

Or

(iv) Choose: 2 – 5, 3 – 5, 4 – 5 Or

(v) Choose: 1 – 3, 1 – 4, 2 – 5

(b) Null Hypothesis $H_0 : \mu = 50$ mm i.e. the M/c works properly.

$H_1 : \mu \neq 50$ mm. i.e. the M/c does not work properly

Sample Size = 10, small.

use 't' statistic

$$t = \frac{\bar{x} - \mu}{S / \sqrt{n-1}}$$

$$\bar{x} = 53$$

$$\mu = 50$$

$$n = 10; \sqrt{n-1} = \sqrt{9} = 3$$

$$S = \text{std dev} = 3$$

$$T = \frac{53-50}{3/3} = \frac{3}{1} = 3$$

Table Value = 2.26

Calculated t > table value

Reject H_0

i.e. The M/c is not working properly.

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(c) (i)		Rs/u
	1 st unit	Avg/u after 4 th at
Variable Cost	2000	2000
Labour	1000	810
Target Contribution		1500
Price to be quoted		4310 (Rs./u)

(ii) No, the company 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.