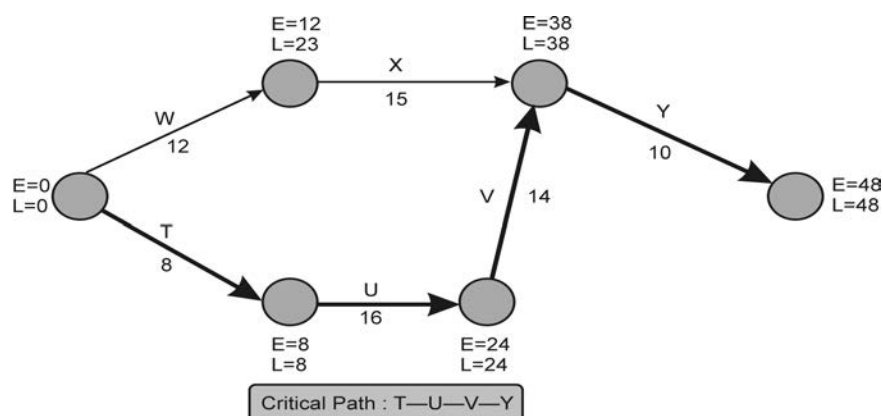


MOCK TEST PAPER – 1
FINAL COURSE: GROUP – II
PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING
SUGGESTED ANSWERS/HINTS

1. (a) **Network** for the given problem:



The **Various Paths** in the network are:

T–U–V–Y with duration 48 days

W–X–Y with duration 37 days

The critical path is T–U–V–Y with normal duration of 48 weeks.

Particulars	T	U	V	Y
Crash Days Possible (ΔT)	2	5	5	2
Crash Cost Less Normal Cost (ΔC)	Rs.500	Rs.875	Rs.750	Rs.360
Crashing Cost per Day [$(\Delta C) / (\Delta T)$]	Rs.250	Rs.175	Rs.150	Rs.180
Step I Crash V by 5 Days	---	---	Rs.750	---
Step II Crash U by 5 Days	---	Rs.875	---	---
Step III Crash Y by 1 Day	---	---	---	Rs.180

Minimum Cost of Crashing Exercise is Rs. 1,805 (Rs.750 + Rs.875 + Rs.180) for **Project Duration** of 11 Days.

- (b) The following is a possible scorecard for “Grand Nikko”

Financial Perspective	Economic Value Added Revenue per villa
Customer Perspective	% repeat customers Number of customer complaints

Internal Business	Service rating of spa Staff hours per guest % cost spent for maintenance Travel guide rank for restaurant
Innovation and Learning	Employee retention Number of new services offered

(c) BASIC CALCULATIONS

Actual Output produced is 630 Kg. The Standard Quantity of Material required for 630 Kg. of output is 700 Kg. $\left(\frac{630\text{Kg.}}{90} \times 100 \right)$

**Statement Showing
“Computation of Standard Cost / Actual Cost / Revised Actual Quantity”**

Material	Standard Cost			Actual Cost			Revised Actual Quantity [RAQ] (Kg.)
	Quantity [SQ] (Kg.)	Price [SP] (Rs.)	Amount [SQ × SP] (Rs.)	Quantity [AQ] (Kg.)	Price [AP] (Rs.)	Amount [AQ × AP] (Rs.)	
A	280 (40% of 700 Kg.)	30	8,400	350	25	8,750	300 (40% of 750 Kg.)
B	420 (60% of 700 Kg.)	40	16,800	400	45	18,000	450 (60% of 750 Kg.)
Total	700		25,200	750		26,750	750

COMPUTATION OF VARIANCES

Material Mix Variance	=	SP × (RAQ – AQ)
A	=	Rs. 30 × (300 Kg – 350 Kg)
	=	Rs. 1,500 (A)
B	=	Rs. 40 × (450 Kg. – 400 Kg.)
	=	Rs. 2,000 (F)
Total	=	Rs. 1,500 (A) + Rs. 2,000 (F)
	=	Rs. 500 (F)
Material Yield Variance	=	SP × (SQ – RAQ)
A	=	Rs. 30 × (280 Kg. – 300 Kg)
	=	Rs. 600 (A)
B	=	Rs. 40 × (420 Kg. – 450 Kg.)
	=	Rs. 1,200 (A)
Total	=	Rs. 600 (A) + Rs. 1,200 (A)
	=	Rs. 1,800 (A)

(d) (i) **Journal Entries** for July are as follows

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

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



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

2. (i) **Manufacturing Cost of Material Z, if Manufactured in Gurugram unit**

	Amount (Rs.)
Direct Labour (2 hours × Rs.45)	90.00
Direct Material M-2 (2.5 litre × Rs.30)	75.00
Variable Overhead, Varies with Labour Hours (2hours × Rs.5)	10.00
Variable Overhead, Varies with Machine Hours (3hours × Rs.3)	9.00
Total Variable Cost	184.00

The purchasing cost of material Z from the outside market is Rs.200, which is more than the cost to manufacture it in Gurugram unit. Hence, it will be beneficial for the CSR Ltd. to manufacture material Z in Gurugram unit itself.

(ii) Monthly Requirement of Direct Material M-1 & M-2

For Contracted units

	A-1	B-2	C-3	D-4	Total
Units to be Supplied to M Ltd. (units)	10,000	10,000	10,000	10,000	40,000
Direct Material M-1 (in Kg) [W.N.-1]	10,000	20,000	---	15,000	45,000
Direct Material M-2 (in Litre) [W.N.-2]	30,000	15,000	20,000	---	65,000

For Non-Contracted units

	A-1	B-2	C-3	D-4	Total
Demand in Outside Market (units)	90,000	95,000	80,000	75,000	3,40,000
Direct Material M-1 (in Kg) [W.N.-1]	90,000	1,90,000	---	1,12,500	3,92,500
Direct Material M-2 (in Litre) [W.N.-2]	2,70,000	1,42,500	1,60,000	---	5,72,500

Availability and Demand Comparison

	Direct Material M-1 (in Kg)	Direct Material M-2 (in Litre)
Availability in Market	6,50,000	6,00,000
Requirement	4,37,500 (45,000+3,92,500)	6,37,500 (65,000+5,72,500)

Material M-2 is a limiting factor as its availability is less than its requirement to produce contracted as well as for non-contracted units.

To optimum usage of resources available in Gurugram unit, prioritisation of production of products is necessary. The following is the comparison table of product A-1, B-2, C-3 and Z. Product D-4 is not taken into comparison as material M-2 is not required to produce product D-4.

Calculation of Contribution per litre of M-2

	A-1	B-2	C-3	Z
Contribution <i>per unit</i> (W.N-3 & 4)	Rs. 86.00	Rs. 53.00	Rs. 71.00	Rs. 16.00
Quantity of Material M-2 <i>per unit</i>	3 litre	1.5 litre	2 litre	2.5 litre
Contribution <i>per litre</i> of M-2	Rs. 28.67	Rs. 35.33	Rs.35.50	Rs. 6.40
Rank	III	II	I	IV

Since, contribution per unit of material Z is lowest as compared to other products consuming material M-2. Material –Z cannot be manufactured under the given resource constraint. Hence only existing products of Gurugram units should be manufactured.

Optimum Production Plan

Product	No. of Units	Quantity of M-2 Required (in Litre)	Balance Availability of M-2 (in Litre)
C-3	90,000	1,80,000 (90,000 units × 2 litre)	4,20,000 (6,00,000 – 1,80,000)

B-2	1,05,000	1,57,500 (1,05,000 units × 1.5 litre)	2,62,500 (4,20,000 – 1,57,500)
A-1	87,500*	2,62,500 (87,500 units × 3 litre)	0 (2,62,500 – 2,62,500)

(*) Units that can be produced with the help of available quantity of M-2 i.e. 2,62,500 litre.

- (iii) Decision in requirement (i) will be changed as material Z cannot be manufactured in Gurugram unit as noted in requirement (ii). *The minimum purchase price of material Z at which decision taken in (i) above can be sustained is calculated as below:*

Amount (Rs.)	
Existing Purchase Price	200.00
Add: Market Price to be increased by [W.N.-5]	55.68
Total	255.68

Working Notes

(1) Quantity of M-1 required per unit of production

	A-1	B-2	D-4
Cost per unit	Rs.50	Rs.100	Rs.75
Rate per Kg.	Rs.50	Rs.50	Rs.50
Quantity per unit of Production	1Kg.	2Kg.	1.5Kg.

(2) Quantity of M-2 required per unit of production

	A-1	B-2	C-3
Cost of per unit	Rs.90	Rs.45	Rs.60
Rate per Kg.	Rs.30	Rs.30	Rs.30
Quantity per unit of Production	3 litre	1.5 litre	2 litre

(3) Contribution per unit (Rs.)

	A-1	B-2	C-3	D-4
Selling Price per unit	360	285	290	210
Less: Variable Cost per unit	274	232	219	165
Contribution per unit	86	53	71	45

(4) Contribution (Benefit) per unit of Material Z

	(Rs.)
Purchasing Cost per unit	200
Less: Cost of Manufacture	184
Contribution per unit	16

- (5) The next best product to material Z is A-1 {as calculated in (ii) above} which has a contribution of Rs. 28.67 per litre of M-2 which is Rs. 22.27 (Rs. 28.67 – Rs. 6.40) higher

than the contribution per litre of M-2 for material Z. Material Z required 2.5 litre of M-2, therefore, purchase price of material Z would have to Rs. 55.68 (2.5 litre × Rs. 22.27) higher than the existing market price.

- (b) The product life cycle span the time from the initial R & D on a product to when customer service and support is no longer offered for that product.

Life Cycle Costing technique is particularly important when:

- (i) High percentage of total life-cycle costs are incurred before production begins and revenue are earned over several years and
- (ii) High fraction of the life cycle costs are locked in at the R & D and design stages.

Sandy Lee should identify those industries and then companies belonging to those industries where above mentioned feature are prevalent. For example, Automobile and Pharmaceutical Industries companies like Tata Motors Ltd. and Dabur India Ltd. will be good candidates for study on product life cycle costing.

3. (a)

Statement Showing “Pareto Analysis”

Model	Sales (Rs.'000)	% of Total Sales	Cumulative Total	Model	Cont. (Rs.'000)	% of Total Cont.	Cumulative Total %
Pareto Analysis Sales				Pareto Analysis Contribution			
A001	5,100	35.05%	35.05%	B002	690	30.87%	30.87%
B002	3,000	20.62%	55.67%	E005	435	19.47%*	50.34%
C003	2,100	14.43%	70.10%	C003	300	13.42%	63.76%
D004	1,800	12.37%	82.47%	D004	255	11.41%	75.17%
E005	1,050	7.22%	89.69%	F006	195	8.73%*	83.90%
F006	750	5.15%	94.84%	A001	180	8.05%	91.95%
G007	450	3.09%	97.93%	G007	120	5.37%	97.32%
H008	225	1.55%	99.48%	I009	45	2.01%	99.33%
I009	75	0.52%	100.00%	H008	15	0.67%	100.00%
	14,550	100.00%			2,235	100.00%	

(*) Rounding - off difference adjusted.

Recommendations

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

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

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

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

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

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

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

(b) (i) Working

Introducing Slack/ Surplus/ Artificial Variables

In Case of Maximization...

$$Z = x_1 + 5x_2 + 0s_1 + 0s_2 - MA_2 \quad \dots (1)$$

Subject to:

$$6x_1 + 8x_2 + s_1 = 12 \quad \dots (2)$$

$$5x_1 + 15x_2 - s_2 + A_2 = 10 \quad \dots (3)$$

$$x_1, x_2, s_1, s_2, A_2 \geq 0 \quad \dots (4)$$

For Equation (1)

Coefficients of s_1 , s_2 , and A_2 are 0, 0 and $-M$ respectively.

For Equation (3)

Coefficients of s_1 , s_2 , and A_2 are 0, -1 and 1 respectively.

(ii) s_1 is **Slack Variable** and s_2 is **Surplus Variable**.

(iii) In any Maximisation problem, this tableau must satisfy the following requirements:

- All the Slack Variables (and thus Surplus Variables as well) must form part of the initial solution mix (basis).
- The table must contain as many rows as there are constraints.
- The elements in the columns of variables appearing in the basis must form a unit vector.

If s_2 is included in the basis, the elements of the s_2 will be 0 and -1 and thus not a unit vector. This is contrary to the non-negativity restriction i.e. all variables must have a positive value. This problem is solved by adding an Artificial Variable (denoted by A_i) to the equation, that is, a variable that has a positive value. Artificial variables do not represent any quantity relating to the decision problem and must not be present in the final solution (if at all they do, it represents a situation of infeasibility). Accordingly, in the initial tableau we will place A_2 along with s_1 to eliminate the impact of them first.

(iv) Working

Introducing Slack/ Surplus/ Artificial Variables

In Case of Minimization...

$$Z = x_1 + 5x_2 + 0s_1 + 0s_2 + MA_2 \quad \dots (1)$$

Subject to:

$$6x_1 + 8x_2 + s_1 = 12 \quad \dots (2)$$

$$5x_1 + 15x_2 - s_2 + A_2 = 10 \quad \dots (3)$$

$$x_1, x_2, s_1, s_2, A_2 \geq 0 \quad \dots (4)$$

For Equation (1)

Coefficients of s_1 , s_2 , and A_2 are 0, 0 and M respectively.

For Equation (3)

Coefficients of s_1 , s_2 , and A_2 are 0, -1 and 1 respectively.

4. (a) (i) Statement of Profit of 2020

	A	B	C	D	Total
Sales (units)	32,000	20,000	16,000	24,000	92,000
	(Rs. In Lacs)				
Sales	96.00	120.00	120.00	120.00	456.00
Direct Material	19.20	28.00	25.60	14.40	87.20
Direct Wages	16.00	16.00	24.00	14.40	70.40
Variable Overhead	32.00	32.00	48.00	28.80	140.80
Variable Cost	67.20	76.00	97.60	57.60	298.40
Contribution	28.80	44.00	22.40	62.40	157.60
Fixed Overhead	32.00	32.00	48.00	28.80	140.80
Profit / (Loss)	(3.20)	12.00	(25.60)	33.60	16.80
	A	B	C	D	Total
Direct Labour Hours per Unit	12.50	20.00	37.50	15.00	
Direct Labour Hours Required	400,000	400,000	600,000	360,000	1,760,000

(ii) Statement of Budget 2021 (After Impact of Inflation)

	A	B	C	D	Total
Sales (units)	32,000	20,000	16,000	24,000	92,000
	(Rs. In Lacs)				
Sales	105.60	132.00	132.00	132.00	501.60
Direct Material	21.12	30.80	28.16	15.84	95.92
Direct Wages	19.20	19.20	28.80	17.28	84.48
Variable Overhead	38.40	38.40	57.60	34.56	168.96
Variable Cost	78.72	88.40	114.56	67.68	349.36
Contribution	26.88	43.60	17.44	64.32	152.24
Fixed Overhead (140.80+1.60)					142.40

Profit / (Loss)					9.84
	A	B	C	D	Total
Direct Labour Hours	400,000	400,000	600,000	360,000	1,760,000
Contribution per Labour Hour (₹)	6.72	10.90	2.91	17.87	8.65

(iii) **Statement of Profit 2021 on the Basis of Proposals of Marketing Team**

	A	B	C	D	Total
Sales (units)	28,800	18,000	19,200	31,200	97,200
	(Rs. In Lacs)				
Sales	112.32	118.80	158.40	140.40	529.92
Less: Commission	---	---	6.34	---	6.34
Net Sales	112.32	118.80	152.06	140.40	523.58
Direct Material	19.01	22.32	33.79	20.59	95.71
Direct Wages	17.28	17.28	34.56	22.46	91.58
Variable Overhead	34.56	34.56	69.12	44.93	183.17
Variable Cost	70.85	74.16	137.47	87.98	370.46
Contribution	41.47	44.64	14.59	52.42	153.12
Fixed Overhead					142.40
Profit / (Loss)					10.72
	A	B	C	D	Total
Labour Hrs. Required	3,60,000	3,60,000	7,20,000	4,68,000	1,908,000
Contribution per Labour Hours (Rs.)	11.52	12.40	2.03	11.20	

Revised Position on the basis of the 'Proposal of Marketing Team' and Product Mix after taking into consideration the 'Inflation in Costs and Prices' but subject to the 'Constraint of Available Labour Hours'.

	A	B	C*	D*	Total
Sales (units)	28,800	18,000	16,000	24,000	86,800
	(Rs. In Lacs)				
Sales	112.32	118.80	132.00	132.00	495.12
Less: Commission	---	---	---	---	---
Net Sales	112.32	118.80	132.00	132.00	495.12
Direct Material	19.01	22.32	28.16	15.84	85.33
Direct Wages	17.28	17.28	28.80	17.28	80.64
Variable Overhead	34.56	34.56	57.60	34.56	161.28
Variable Cost	70.85	74.16	114.56	67.68	327.25
Contribution	41.47	44.64	17.44	64.32	167.87
Fixed Overhead					142.40
Profit/(Loss)					25.47

	A	B	C	D	Total
Labour Hrs Required	360,000	360,000	600,000	360,000	1,680,000
Contribution per Labour Hour (Rs.)	11.52	12.40	2.91	17.87	

(*) By following the strategy of Marketing Team, Contribution per Labour Hour has reduced in case of Product C & D. Therefore, strategy of Marketing Team should be followed in Case of Product A&B only.

- (b) The condition for degeneracy is that the number of allocations in a solution is less than $m+n-1$.

The given problem is an unbalanced situation and hence a dummy row is to be added, since the column quantity is greater than that of the row quantity. The total number of rows and columns will be 9 i.e. (5 rows and 4 columns). Therefore, $m+n-1 (= 8)$, i.e. if the number of allocations is less than 8, then degeneracy would occur.

5. (a) The usual learning curve model is

$$y = ax^b$$

Where

y = Average time per part for x parts

a = Time required for first part (100 minutes)

x = Cumulative number of parts

b = Learning coefficient and is equal to -0.322
(learning rate 80%)

Calculation of total time for 40 parts:

$$y = 100 \times (40)^{-0.322}$$

$$\log y = \log 100 - 0.322 \times \log 40$$

$$\log y = \log 100 - 0.322 \times [3 \times \log 2 + \log 5]$$

$$\log y = 2 - 0.322 \times [3 \times 0.30103 + 0.69897]$$

$$\log y = 1.484$$

$$y = \text{antilog of } 1.484$$

$$y = 30.48 \text{ minutes}$$

$$\text{Total time for 40 Parts} = 40 \text{ Parts} \times 30.48 \text{ minutes}$$

$$= 1,219 \text{ minutes (A)}$$

Calculation of total time for 60 parts:

$$y = 100 \times (60)^{-0.322}$$

$$\log y = \log 100 - 0.322 \times \log 60$$

$$\log y = \log 100 - 0.322 \times [2 \times \log 2 + \log 5 + \log 3]$$

$$\log y = 2 - 0.322 \times [2 \times 0.30103 + 0.69897 + 0.47712]$$

$$\log y = 1.4274$$

$$y = \text{antilog of } 1.4274$$

$$y = 26.75 \text{ minutes}$$

$$\begin{aligned}\text{Total Time for 60 Parts} &= 60 \text{ Parts} \times 26.75 \text{ minutes} \\ &= 1,605 \text{ minutes (B)}\end{aligned}$$

Calculation of total time for 41 to 60 parts (B) – (A):

$$\begin{aligned}&= 1,605 \text{ minutes} - 1,219 \text{ minutes} \\ &= 386 \text{ minutes}\end{aligned}$$

(b) (i)	QTA receives a 10% Commission on each ticket	=	Rs.900(10% × Rs.9,000)
	Commission per ticket	=	Rs.900
	Variable Cost per ticket	=	Rs.200
	Contribution per ticket	=	Rs.900 – Rs.200
		=	Rs.700
	Fixed Costs	=	Rs.1,40,000 per month
(a)	Break-even Number of Tickets	=	$\frac{\text{Fixed Costs}}{\text{Contribution per ticket}}$
		=	$\frac{\text{Rs.1,40,000}}{\text{Rs.700 per ticket}}$
		=	200 tickets
(b)	When Target Operating Income	=	Rs.70,000 per month
	Quantity of Tickets required to be sold	=	$\frac{\text{Rs.1,40,000} + \text{Rs.70,000}}{\text{Rs.700 per ticket}}$
		=	$\frac{\text{Rs.2,10,000}}{\text{Rs.700}}$
		=	300 tickets
(ii)	Under the New System, QTA would receive only Rs.500 on the Rs.9,000 per ticket. Thus,		
	Commission per ticket	=	Rs.500
	Variable Cost per ticket	=	Rs.200
	Contribution per ticket	=	Rs.500 – Rs.200
		=	Rs.300
	Fixed Costs	=	Rs.1,40,000 per month
	Break-even Number of Tickets	=	$\frac{\text{Rs.1,40,000}}{\text{Rs.300}}$
		=	467 tickets (rounded up)
	Quantity of Tickets required to be sold	=	$\frac{\text{Rs.2,10,000}}{\text{Rs.300}}$
		=	700 tickets

The Rs.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 Rs. 70,000 per month to also more than double (from 300 to 700 tickets).

As would be expected, travel agents will react *very negatively* to the Darwin Airlines decision to change commission payments.

6. (a) **Ranking of Products When Availability of Time is the Key Factor**

Products	A	B	C	D
Market Price (Rs.)	150	146	140	130
Less: Variable Cost (Rs.)	130	100	90	85
Contribution <i>per unit</i> (Rs.)	20	46	50	45
Labour Hours <i>per unit</i>	3 hrs.	4 hrs.	2 hrs.	3 hrs.
Contribution <i>per Labour Hour</i>	6.67	11.50	25.00	15.00
Ranking	IV	III	I	II
Maximum Demand (units)	2,800	2,500	2,300	1,600
Total No. of Hours	8,400	10,000	4,600	4,800
Allocation of 20,000 Hours on the Basis of Ranking	600*	10,000	4,600	4,800

(*) **Balancing Figure**

Note

Time required to meeting the demand of 2,500 units of Product D for Division Y is 7,500 hrs. This requirement of time viz. 7,500 hrs for providing 2,500 units of Product D for Division Y can be met by sacrificing 600 hours of Product A (200 units) and 6,900 hours of Product B (1,725 units).

$$\begin{aligned}
 \text{Transfer Price} &= \text{Variable Cost} + \text{Opportunity Cost} \\
 &= \text{Rs. } 85 + \frac{(6,900 \text{ hrs.} \times \text{Rs. } 11.5 + 600 \text{ hrs.} \times \text{Rs. } 6.66)}{2,500 \text{ units}} \\
 &= \text{Rs. } 85 + \frac{\text{Rs. } 79,350 + \text{Rs. } 4,000}{2,500 \text{ units}} \\
 &= \text{Rs. } 85 + \text{Rs. } 33.34 \\
 &= \text{Rs. } 118.34
 \end{aligned}$$

- (b) The given problem is a balanced minimization problem. Subtracting the minimum element of each row from all its elements in turn, the given problem reduces to-

Contractors	Job A	Job B	Job C	Job D
1	40	20	0	10
2	10	20	40	0
3	10	40	20	0
4	10	10	0	10

Now subtract the minimum element of each column from all its elements in turn. Draw the minimum number of lines horizontal or vertical so as to cover all zeros.

Contractors	Job A	Job B	Job C	Job D
1	30	10	0	10
2	0	10	40	0
3	0	30	20	0
4	0	0	0	10

Since the minimum number of lines to cover all zeros is equal to 4 (order of the matrix), this matrix will give optimal solution. The optimal assignment is made in the matrix below-

Contractors	Job A	Job B	Job C	Job D
1	30	10	0	10
2	0	10	40	~~0~~
3	~~0~~	30	20	0
4	~~0~~	0	~~0~~	10

The optimal assignment is-

Contractor	Job	Cost ('000 Rs.)
1	C	80
2	A	80
3	D	100
4	B	90

Hence, total minimum cost of the project will be Rs. 3,50,000.

(c) (i) Average Non Value Added Time *per batch*

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

(ii) Average Value Added Time *per batch*

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

(iii) Manufacturing Cycle Efficiency

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

(iv) Manufacturing Cycle Time

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

7. (a) Target cost is the difference between estimated selling price of a proposed product with specified functionality and quality and the target margin. This is a cost management technique that aims to produce and sell products that will ensure the target margin. It is an integral part of the product design. While designing the product, the company needs to understand what value target customers will assign to different attributes and different aspects of quality. This requires use of techniques like value engineering and value analysis. Intensive marketing research is required to understand customer preferences and the value they assign to each attribute and quality parameter. This insight is required to be developed must before the product is introduced. The company plays within the space between the maximum attributes and quality that the company can offer and the minimum acceptable to target customers. Therefore, in absence of intensive marketing research, the target costing technique cannot be used effectively.

- (b) **Standard, ex post:** *After the event.* An ex post budget, or standard, is set after the end of a period of activity, when it can represent the optimum achievable level of performance in the conditions which were experienced. Thus the budget can be flexed, and standards can reflect factors such as unanticipated changes in technology and in price levels. This approach may be used in conjunction with sophisticated cost and revenue modelling to determine how far both the plan and the achieved results differed from the performance that would have been expected in the circumstances which were experienced.

Standard, ex ante: *Before the event.* An ex ante budget or standard is set before a period of activity commences

- (c) It is a network technique used for smoothening peak resource requirement during different periods of the project network. Under this technique the total project duration is maintained at the minimum level. For example, if the duration of a project is 15 days, then the project duration is maintained, but the resources required for completing different activities of a project are smoothened by utilising floats available on non critical activities. These non critical activities having floats are rescheduled or shifted so that a uniform demand on resources is achieved. In other words, the constraint in the case of resource smoothing operation would be on the project duration time. Resource smoothing is a useful technique or business managers to estimate the total resource requirements for various project activities.

In resources smoothing, the time-scaled diagram of various activities and their floats (if any), along with resource requirements are used. The periods of maximum demand for resources are identified and non critical activities during these periods are staggered by rescheduling them according to their floats for balancing the resource requirements.

- (d) The following are the limitations in the implementation of a scheme of inter-firm comparison:
- (i) There is a fear of losing secrecy of the production method or some peculiar process or method among the top management.
 - (ii) Middle management is usually not convinced with the utility of such a comparison.
 - (iii) In the absence of a suitable cost accounting system, the figures supplied may not be reliable for the purpose of comparison.
 - (iv) Suitable basis for comparison may not be available.

(e) Committed Fixed Cost / Discretionary Fixed Cost

Committed Fixed Cost	Discretionary Fixed Cost
(i) Salary and Wage increase.	(ii) New Advertisement Cost.
(iii) Rents payable for the next 6 months.	
(iv) Legal Fees for filing for patent rights.	