PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING

*Question No.**1** is compulsory.*

*Answer any **five** questions from the remaining **six** questions.*

Working notes should form part of the respective answers.

No statistical or other table will be provided with this question paper.

Question 1

(a) *JPR Limited manufactures three products by using a single machine which has 2,40,000 bottleneck hours per month. The details with regard to the three products are as under:*

	Products		
	P1	**P2**	**P3**
Selling price per unit (₹)	170	140	180
Direct Material cost (₹)	80	90	120
Direct Labour cost (₹)	30	25	35
Other Expenses (₹)	10	10	5
Maximum Demand (units)	20,000	15,000	25,000
Time required per unit (hours)	6	4	3

Required

Based on the concept of throughput accounting, calculate the optimum number of units to be produced for each product. ***(5 Marks)***

(b) *Hotel Park has four holiday resorts in a hill station. All the resorts are having equal carpet area but the facilities available are varying from each other. During a festival holiday four persons approached to reserve a resort for their family stay during the holiday on the same day. They were asked to quote their order of preference and the rent they are willing to pay per day. The particulars collected from them are given below:*

Persons	Rent quoted per day (₹)			
	Resort -1	**Resort-2**	**Resort-3**	**Resort-4**
P1	6,000	5,000	No quotation	No quotation
P2	4,000	6,000	4,000	1,000
P3	3,000	6,000	2,000	4,000
P4	6,000	4,000	No quotation	No quotation

Required

Decide an allocation that will maximize the per day revenue of the hotel and the amount of revenue possible from the allocation. ***(5 Marks)***

(c) *The details of the output presently available from a manufacturing department of JB Ltd. are as follows:*

Average output per week 50,000 units from 200 employees.

Saleable value of output………………………………………………….. ₹ 6,25,000

Contribution made by the output toward fixed expenses and profit………₹ 2,75,000

The Board of Directors plans to introduce more automation in the department at a capital cost of ₹ 12,50,000. The effect of this will be to reduce the number of employees to 160, but to increase the output per individual employee by 60%. To provide the necessary incentive to achieve the increased output the Board intends to offer 1% increase in the piecework rate of one rupee per article for every 2% increase in average individual output achieved. To sell the increased output, it will be necessary to decrease the selling price by 4%.

Required

Calculate the extra weekly contribution resulting from the proposed changes. ***(5 Marks)***

(d) *The output of a production line is checked by an inspector for one or more of three different types of defects, called D1, D2 and D3. If defect D1 occurs, the item is scrapped. If defect D2 and D3 occurs, the item must be reworked. The time required to rework a D2 defect is 10 minutes and the time required to rework a D3 defect is 20 minutes. The probabilities of D1, D2 and D3 defects are 0.20, 0.12 and 0.15 respectively.*

Use the following random numbers for simulation:

RN for Defect D1	*93*	*83*	*55*	*63*	*40*	*91*	*47*	*63*	*01*	*52*
RN for Defect D2	*79*	*10*	*36*	*13*	*04*	*57*	*57*	*13*	*55*	*09*
RN for Defect D3	*20*	*56*	*95*	*11*	*96*	*18*	*52*	*11*	*84*	*03*

For ten items coming of the assembly line, you are required to calculate:

(i) The total number of items without any defects

(ii) The number of items scrapped

(iii) The total minutes of rework time ***(5 Marks)***

Answer

(a) Statement Showing Optimum Units to be produced

Particulars	**P1**	**P2**	**P3**
Selling Price *per unit* (₹)	170	140	180
Direct Material Cost *per unit* (₹)	80	90	120
Throughput *per unit* (₹)	90	50	60

Time Required *per unit* (hrs.)	6	4	3
Return per Machine Hour (₹)	15	12.50	20
Rank	II	III	I
Allocation of Machine Time (hrs.)	1,20,000 (20,000 units × 6 hrs.)	45,000 (Balance)	75,000 (25,000 units × 3 hrs.)
Production (units)	20,000	11,250 (45,000 hrs. / 4 hrs.)	25,000

(b) The objective of the given problem is to identify the preferences of families about resorts so that hotel management could maximize its profit.

To solve this problem first convert it to a minimization problem by subtracting all the elements of the given matrix from its highest element. The matrix so obtained which is known as loss matrix is given below-

Loss Matrix/Resort

Persons	Resort-1	Resort-2	Resort-3	Resort-4
P1	0	1,000	X	X
P2	2,000	0	2,000	5,000
P3	3,000	0	4,000	2,000
P4	0	2,000	X	X

Now we can apply the assignment algorithm to find optimal solution. Subtracting the minimum element of each column from all elements of that column-

Loss Matrix/Resort

Persons	Resort-1	Resort-2	Resort-3	Resort-4
P1	0	1,000	X	X
P2	2,000	0	0	3,000
P3	3,000	0	2,000	0
P4	0	2,000	X	X

The minimum number of lines to cover all zeros is 3 which is less than the order of the square matrix (i.e.4), the above matrix will not give the optimal solution. Subtracting the minimum uncovered element (1,000) from all uncovered elements and add it to the elements lying on the intersection of two lines, we get the following matrix-

Loss Matrix/Resort

Persons	Resort-1	Resort-2	Resort-3	Resort-4
P1	0	$\boxed{0}$	X	X
P2	3,000	0	$\boxed{0}$	3,000
P3	4,000	0	2,000	$\boxed{0}$
P4	$\boxed{0}$	1,000	X	X

Since the minimum number of lines to cover all zeros is 4 which is equal to the order of the matrix, the above matrix will give the optimal solution which is given below-

Loss Matrix/Resort

Persons	Resort-1	Resort-2	Resort-3	Resort-4
P1	~~0~~	$\boxed{0}$	X	X
P2	3,000	~~0~~	$\boxed{0}$	3,000
P3	4,000	~~0~~	2,000	$\boxed{0}$
P4	$\boxed{0}$	1,000	X	X

Optimal Schedule is-

Persons	Resort	Revenue (₹)
P1	2	5,000
P2	3	4,000
P3	4	4,000
P4	1	6,000
Total		**19,000**

(c) Workings

Present average output per employee and total future expected output per week

Present average output per employees per week

$$= \left(\frac{50{,}000 \text{ units}}{200 \text{ employees}}\right)$$

$$= 250 \text{ units}$$

Total Future expected output per week = Total number of future employees × (present output + 60% of present output per employee)

= 160 employees × (250 units + 60% × 250 units)

= 64,000 units

Present piece work rate and proposed piece work rate

Present piece work rate = ₹ 1.00 per unit

Proposed piece work rate = Present piece work rate + 30% × ₹ 1

= ₹ 1.00 + 0.30 P

= ₹ 1.30 per unit

Present and proposed sale price per unit

Present sales price per unit = ₹ 12.50

(₹ 6,25,000/ 50,000 units)

Proposed sales price per unit = ₹ 12.00

(₹ 12.50 - 4% of ₹ 12.50)

Marginal Cost (excluding wages)

Present marginal cost (excluding wages) per unit =

$$\left(\frac{\text{Present Sales Value - Fixed Expenses \& Profits - Present Wages}}{\text{Present Output (in units)}}\right)$$

$$= \left(\frac{₹\,6{,}25{,}000 - ₹\,2{,}75{,}000 - ₹\,50{,}000}{50{,}000 \text{ units}}\right)$$

= ₹ 6

Statement of Extra Weekly Contribution

Expected Sales Units	64,000
Sales Value (64,000 units × ₹ 12)	7,68,000
Less: Marginal Costs Ex. Wages (64,000 units × ₹ 6.00)	3,84,000
Less: Wages (64,000 units × ₹ 1.30)	83,200
Marginal Contribution	3,00,800
Less: Present Contribution	2,75,000
Increase in Contribution (per week)	**25,800**

(d) Workings

Probability Distribution (Defect D1)

Event	Probability	Cumulative Probability	Random Numbers
Defect	0.20	0.20	0-19
No defect	0.80	1.00	20-99

Probability Distribution (Defect D2)

Event	Probability	Cumulative Probability	Random Numbers
Defect	0.12	0.12	0-11
No defect	0.88	1.00	12-99

Probability Distribution (Defect D3)

Event	Probability	Cumulative Probability	Random Numbers
Defect	0.15	0.15	0-14
No defect	0.85	1.00	15-99

Simulation Sheet

Trial	Random Numbers			Event			Time required to rework
	D1	D2	D3	Defect D1	Defect D2	Defect D3	
1	93	79	20	No	No	No	--
2	83	10	56	No	**Yes**	No	10 m
3	55	36	95	No	No	No	---
4	63	13	11	No	No	**Yes**	20 m
5	40	04	96	No	**Yes**	No	10 m
6	91	57	18	No	No	No	---
7	47	57	52	No	No	No	---
8	63	13	11	No	No	**Yes**	20m
9	01	55	84	**Yes**	No	No	Scrapped
10	52	09	03	No	**Yes**	**Yes**	10 m+20 m
							90m

(i) Total Number of Items without any defects = **4 items**

(ii) The number of items scrapped = **1 item**

(iii) The total minutes of rework time = **90 minutes**

Question 2

(a) *ABC Ltd. is engaged in production of four products, the relevant information of products are as follows:*

Products	L	M	N	O
Output in units	66,000	60,000	45,000	57,000
Selling price (in ₹)	300	320	210	200
Cost per unit:				
Direct Material (in ₹)	80	100	70	60
Direct Labour (in ₹)	48	35	40	20
Machine hours (per unit)	5	4	3	4

Market research has indicated that if ABC Ltd. can reduce the selling prices of the products by 5%, it will be useful in getting bulk orders and gain significant share of market share of those products. The company's profit mark up is 25% on cost of the products.

The four products are produced in production run of 300 units and sold in batches of 150 units. The production overhead is currently absorbed by using a machine hour rate and the total of the production overheads for the period has been analysed as follows:

Particulars	₹
Machine departmental costs	83,97,000
Set up costs	20,90,000
Stores receiving	19,50,000
Inspection/Quality control	11,40,000
Material handling & dispatch	15,20,000

The cost drivers to be used for the overhead costs are as follows:

Costs	Cost drivers
Set up costs	Number of production runs
Stores receiving	Requisition raised
Inspection/quality control	Number of production runs
Material handling & dispatch	Order executed

The number of requisitions raised in the stores was 1,250 for each product and the total number of orders executed was 1,520, each order being for a batch of 150 units of a product.

You are required to calculate:

(i) Target cost for each product.

(ii) Total overhead cost of each product using Activity Based Costing.

(iii) Compare per unit target cost and per unit activity based cost of each product and comment whether the price reduction is profitable or not. ***(10 Marks)***

(b) The "Bollywood theatre Company" owned a theatre and plays three shows each day on weekends - Saturday & Sunday, in the year of 52 weeks. The total capacity of the theatre is 1,000 seats which is divided into three classes are as follows:

Royal - First 5 rows of 40 seats per row

Premium - The next 10 rows of 35 seats per row

Classic - The next 15 rows of 30 seats per row

Costs data with regard to show for the year will be as follows:

Employees	No of Employees	Salaries p.m. (in ₹)
Manager	2	₹ 62,500 each
Gate-keeper	15	₹ 15,000 each
Operators	3	₹ 30,000 each
Clerks	5	₹ 22,000 each

Other costs for the year are as follows;

Electricity & oil	1,67,400
Carbon	72,530
Misc. Expenditure	64,880
Advertisement	88,080
Administrative Expenses	1,14,610

The premises is valued at ₹ 35,00,000 and the estimated life is 14 years.

Projectors and other equipments costs ₹8,70,000 on which 15% depreciation is to be charged.

Other relevant information are as follows:

(i) 20% of the total seats of each class remains vacant

(ii) Every time a show is staged, one row of Royal circle is occupied free of charge, by virtue of passes granted to the guests.

(iii) Weightage to be given to the three classes in the ratio 3:2:1

Required

Determine the proceeds per Man show and rates for each class if the management expects 25% return on gross proceeds.

Answer

(a) (i) Cost of Products Under 'Target Costing'

Statement Showing "Cost *per unit*"

Particulars	**L**	**M**	**N**	**O**
Selling Price	300.00	320.00	210.00	200.00
Less: Reduction in Selling Price by 5%	15.00	16.00	10.50	10.00
Estimated Selling Price *after reduction* in price	285.00	304.00	199.50	190.00
Profit Mark up 25% on Cost (20 % on Selling Price)	57.00	60.80	39.90	38.00
Target Cost of Production (per unit)	**228.00**	**243.20**	**159.60**	**152.00**

(ii) Overhead Cost of Product Under 'Activity Based Costing'

Particulars	**L**	**M**	**N**	**O**
Machine Department Cost	29,70,000 (3,30,000×9)	21,60,000 (2,40,000×9)	12,15,000 (1,35,000×9)	20,52,000 (2,28,000×9)
Setup Cost	6,05,000 (220×2,750)	5,50,000 (200×2,750)	4,12,500 (150×2,750)	5,22,500 (190×2,750)
Stores Receiving Cost	4,87,500 (1,250×390)	4,87,500 (1,250×390)	4,87,500 (1,250×390)	4,87,500 (1,250×390)
Inspection and Quality Control Cost	3,30,000 (220×1,500)	3,00,000 (200×1,500)	2,25,000 (150×1,500)	2,85,000 (190×1,500)
Material Handling and Dispatch	4,40,000 (440×1,000)	4,00,000 (400×1,000)	3,00,000 (300×1,000)	3,80,000 (380×1,000)
Total O/H Cost	48,32,500	38,97,500	26,40,000	37,27,000
No. of Units	66,000 units	60,000 units	45,000 units	57,000 units
O/h Cost per unit	**73. 22**	**64.96**	**58.67**	**65.39**

Working Notes

Calculation of "Activity Rate"

Cost Pool	Cost (₹) [A]	Cost Driver [B]	Cost Driver Quantity [C]	Cost Driver Rate (₹) [D] = [A]÷[C]
Machine Department Cost	83,97,000	Machine Hours	9,33,000	9
Setup Costs	20,90,000	No. of Production Runs	760	2,750
Stores Receiving	19,50,000	No. of Requisitions Raised	5,000	390
Inspection/ Quality Control	11,40,000	No. of Production Runs	760	1,500
Material Handling and Dispatch	15,20,000	No. of Orders Executed	1,520	1,000

Calculation of Cost Driver Quantity

Particulars	L	M	N	O	Total
Machine Hours (Output × M/c hrs.)	3,30,000	2,40,000	1,35,000	2,28,000	9,33,000
No. of Requisitions Raised in the Stores	1,250	1,250	1,250	1,250	5,000
No. of Production Runs (Output/300)	220	200	150	190	760
No. of Orders Executed (Output/150)	440	400	300	380	1,520

Cost of Products Under 'Activity Based Costing'

Particulars	L	M	N	O
Direct Material Cost	80.00	100.00	70.00	60.00
Direct Labour Cost	48.00	35.00	40.00	20.00
O/H Cost	73.22	64.96	58.67	65.39
Cost Per unit	**201.22**	**199.96**	**168.67**	**145.39**

(ii) Comparative Analysis of 'Cost of Production'

Particulars	L	M	N	O
(a) As per Target Costing	228.00	243.20	159.60	152.00
(b) As per Activity Based Costing	201.22	199.96	168.67	145.39
…(a) – (b)	26.78	43.24	(9.07)	6.61

Comment

The total cost (ABC) of L, M and O product is less than the target cost so there is no problem in reducing the selling price of these products by 5% from the present price. It will increase the profitability of the company but the cost of **N is *slightly more than the target cost***, it is therefore, suggested that the company should either control it or redesign it.

(b) (i) Statement Showing Proceeds per Man Show

Particulars	Amount (₹)
Salary	
-Manager (2 no. × ₹ 62,500 × 12 m)	15,00,000
-Gate Keeper (15 no. × ₹ 15,000 × 12 m)	27,00,000
-Operators (3 no. × ₹ 30,000 × 12 m)	10,80,000
-Clerks (5 no. × ₹ 22,000 × 12 m)	13,20,000
Electricity & Oil	1,67,400
Carbon	72,530
Misc. Expenditure	64,880
Advertisement	88,080
Administrative Expenses	1,14,610
Depreciation on Premises (₹ 35,00,000/ 14y)	2,50,000
Depreciation on Projector and Other Equipment (15% of 8,70,000)	1,30,500
Total Annual Cost	74,88,000
Add: Margin (74,88,000 × 1/3)	24,96,000
Total Annual Proceeds	99,84,000
Total Man Shows (52 Weeks × 2 Days × 3 Shows × 1,280*)	3,99, 360
Proceeds per Man Show	25

Workings (*)

Particulars	Royal	Premium	Classic	Total
Gross Seats	200	350	450	1,000
Less: Vacant @20%	40	70	90	200
Less: Free Seats	40	---	---	40
Saleable Seats	120	280	360	760
Weight	3	2	1	---
Weighted Seats	360	560	360	1,280

(ii) Statement Showing Rates for Each Class

Particulars	Royal	Premium	Classic
Rate	= 75 (25×3)	= 50 (25×2)	= 25 (25×1)

Question 3

(a) JKL Ltd. is engaged in marketing of wide range of consumer goods. A, B, C and D are the zonal sales officers and the company fixes annual sale target for them individually.

You are furnished with the following :

(1) The standard costs of sales target in respect of A, B, C and D are ₹ 5,82,250, ₹ 4,50,500, ₹ 4,93,000 and ₹ 5,35,500 respectively.

(2) A, B, C and D respectively earned ₹ 40,800, ₹ 32,400, ₹ 35,520 and ₹ 38,700 as commission at 6% on actual sales effected by them during the previous year.

(3) The relevant variances as computed by a qualified cost accountant are as follows :

Particulars	*A*	*B*	*C*	*D*
	(₹)	*(₹)*	*(₹)*	*(₹)*
Sales Price Variance	*6,000 (F)*	*8,000 (A)*	*7,000 (A)*	*5,000 (A)*
Sales Volume Variance	*11,000 (A)*	*18,000 (F)*	*19,000 (F)*	*20,000 (F)*
Sales Margin Mix Variance	*10,750 (A)*	*5,500 (F)*	*12,000 (F)*	*9,500 (A)*

Assume sales margin quantity variance is zero.

Required

(i) Compute the amount of sales target fixed and the actual amount of margin earned in case of each of the zonal sales officer.

(ii) Evaluate the overall performance of these zonal sales officers taking three relevant base factors and then recommend whose performance is the best. ***(10 Marks)***

(b) Rose Ltd., has produced its first 10 units whose cost details are as given.

	₹
Material	*5,000*
Labour @ ₹ 20 p.u.	*6,000*
Variable overhead	*2,000*
Other expenses	*3,000*
Machine set up costs	*4,000*

Variable overhead is directly proportionate to labour cost and other expenses constitute one-half of labour cost. Machine set-up costs were fully recovered from the first order. From one machine set-up, 100 units can be produced.

The customer who purchased the above mentioned 10 units asked to quote price for another 30 units.

Required

Estimate the price to be quoted for the 30 units so as to earn a profit of 20% on cost by using 80% learning curve effect. ***(6 Marks)***

Answer

(a) (i) Statement Showing "Sales Target Fixed & Actual Margin"

(₹)

Particulars	Zonal Sales Officers			
	A	B	C	D
Commissioned Earned	40,800	32,400	35,520	38,700
Actual Sales (Commission Earned / 6%)	6,80,000	5,40,000	5,92,000	6,45,000
Sales Price Variance	6,000(F)	8,000(A)	7,000(A)	5,000(A)
Sales Volume Variance	11,000(A)	18,000(F)	19,000(F)	20,000(F)
Sales Target (Budgeted Sales)	6,85,000	5,30,000	5,80,000	6,30,000
Standard Cost of Sales Target	5,82,250	4,50,500	4,93,000	5,35,500
Budgeted Margin	1,02,750	79,500	87,000	94,500
Sales Margin Mix Variance	10,750(A)	5,500(F)	12,000(F)	9,500(A)
Sales Price Variance	6,000(F)	8,000(A)	7,000(A)	5,000(A)
Actual Margin	98,000	77,000	92,000	80,000

(ii) Statement Showing "Evaluation of the Performance of Zonal Sales Officers"

Particulars	Zonal Sales Officers			
	A	B	C	D
Efficiency towards the Target Sales				
(a) Whether target achieved	No	Yes	Yes	Yes
(b) Actual Sales to Target Sales Ratio	99.27%	101.89%	102.07%	102.38%
(c) Rank	IV	III	II	I
Margin Approach				

(a) Margin Earned (₹)	98,000	77,000	92,000	80,000
(b) Rank	I	IV	II	III
Margin Vs Sales Ratio				
(a) Budgeted Margin/Sales Target Ratio	15.00%	15.00%	15.00%	15.00%
(b) Actual Margin Vs Actual Sales Ratio	14.41%	14.26%	15.54%	12.40%
(c) Rank	II	III	I	IV

An analysis on performance of four Zonal Sales Officers based on three base factors, the performance of **Officer C** is the best.

(b) Estimated Price for 30 Units

Particulars	**(₹) 10 Units (1 Batch)**	**(₹) 40 Units (4 Batches)**	**(₹) 30 Units**
Material	5,000	20,000	15,000
Labour $(300 hrs. × 0.80 × 0.80 × 4 batches ×₹ 20.00)	6,000	**15,360$**	**9,360**
Variable Overhead [@33.33….% of L]	2,000	5,120	3,120
Other Expenses [1/2 of L] ***(assumed variable)***	3,000	7,680	4,680
Machine Setup	4,000	4,000	---
Total Cost	20,000	52,160	32,160
Add: Profit @ 20%			6,432
Price to be Quoted			**38,592**

Question 4

(a) PS Ltd. is producing a single product currently working at 80% capacity by producing 6,000 units per month. From 4 units of raw material it produces 5 units of finished product. The raw material required for production is available both in open market price and controlled price. The company is eligible to receive 3,500 units of raw material every month at controlled price from the Government at the rate of ₹200 p.u. Additional materials required for production can be procured from the open market at the rate of ₹260 p.u. Out of the monthly total cost of production, the fixed cost is amounted to ₹4,00,000 and the balance comprised of material cost and other variable costs. Productions are sold at ₹700 p.u. which includes 20% profit on sales.

The company wants to work at full capacity as it has good demand for its product. Assume that there will be no change in material prices.

Required

Compute the minimum selling price per unit to be maintained by the company when it is working at full capacity and wants to earn:

(i) the same amount of profit as it can earn at 80% capacity.

(ii) the same rate of profit as it can earn at 80% capacity. ***(8 Marks)***

(b) Veda Ltd. has two divisions DV_1 and DV_2 which are treated as separate profit centres and are given autonomy to fix transfer prices and to select suppliers. DV_1 produces one product which can be sold internally to DV_2 and externally in the open market. It is the practice of the company to measure the performance of the divisions by fixing target profit for each period. For a particular period the following details of DV_1 are given to you:

Installed capacity	*6,000 units*
Variable cost p.u.	*₹600*
Selling price in open market	*₹900 p.u*
Open market demand	*4,500 units*
Selling commission	*₹80 p.u.*
Total fixed cost	*₹7,05,000*
Target profit fixed	*₹6,65,0000*

DV_2 procure its material requirements from DV_1 and from one external supplier who is ready to supply all the requirements of the division. During this period DV_2 has asked DV_1 to quote a price for 2,000 units.

You are required:

(i) to determine the transfer price to be quoted to DV_2 so as to enable DV_1 to achieve the target profit.

(ii) Calculate the two prices DV_1 would have to quote to DV_2 if it became company policy to Quote transfer price on opportunity costs. ***(8 Marks)***

Answer

(a) (i) Statement Showing Minimum Selling Price at Full Capacity "Same Amount of Profit"

Particulars	**Amount (₹)**
Raw Material [₹200 × 3,500 units + ₹260 × (6,000 units/80% × 4/5 – 3,500)]	13,50,000
Other Variable Costs (₹19,22,000 /80%)	24,02,500

Fixed Cost	4,00,000
Total Cost at Full Capacity	41,52,500
Add: Desired Profit (₹700 × 20% × 6,000 units)	8,40,000
Total Sales	49,92,500
Units	7,500
Minimum Selling Price per unit	**665.67**

Workings

Statement Showing 'Other Variable Costs'

Particulars	Amount (₹)
Current Cost of Sales (₹700 × 80% × 6,000 units)	33,60,000
Less: Raw Material [₹200 × 3,500 units + ₹260 × (6,000 units × 4/5 – 3,500)]	10,38,000
Fixed Cost	4,00,000
Other Variable Costs	19,22,000

(ii) Statement Showing Minimum Selling Price at Full Capacity "Same Rate of Profit"

Particulars	Amount (₹)
Raw Material [₹200 × 3,500 units + ₹260 × (6,000 units/80% × 4/5 – 3,500)]	13,50,000
Other Variable Cost (₹19,22,000 /80%)	24,02,500
Fixed Cost	4,00,000
Total Cost at Full Capacity	41,52,500
Add: Desired Profit (₹41,52,500 / 80 × 20)	10,38,125
Total Sales	51,90,625
Units	7,500
Minimum Selling Price per unit	**692.08**

(b) Target Profit ₹ 66,50,000

(i) Transfer Price per unit of DV_1's Product that should Quote in order to meet Target Profit

Quotation for the 2,000 units of DV_1's Product should be such that meet Division DV_1 target profit. Therefore, the minimum quote for DV_1's Product will be calculated as follows:

Particulars	Amount (₹)
Target Profit (given for the year)	**66,50,000**
Add: Fixed Cost	7,05,000
Target Contribution	73,55,000
Less: Contribution Earned ***– External Sales*** {4,000 units × (₹ 900 – ₹ 600 – ₹ 80)}	8,80,000
Contribution Required ***– Internal Sales***	64,75,000
Contribution *per unit* of Product (₹ 64,75,000 ÷ 2,000 units)	3,237.50
Transfer Price of Product DV_1 to Division DV_2 (Variable Cost *per unit* + Contribution *per unit*)	3,837.50

Note: Selling commission will be not incurred on internal transfer units

(ii) The Two Transfer Prices Based on Opportunity Costs

For the 1,500 units (i.e. maximum capacity – maximum external market demand) at variable cost of production i.e. ₹ 600 per unit.

For the next 500 units (i.e. external market demand – maximum possible sale) at market selling price i.e. ₹ 900 per unit. (Variable Cost + Opportunity Cost)

Target Profit ₹ 6,65,000/-

(i) Transfer Price per unit of DV_1's Product that should Quote in order to meet Target Profit

Quotation for the 2,000 units of DV_1's Product should be such that meet Division DV_1 target profit. Therefore, the minimum quote for DV_1's Product will be calculated as follows:

Particulars	Amount (₹)
Target Profit (given for the year)	6,65,000
Add: Fixed Cost	7,05,000
Target Contribution	13,70,000
Less: Contribution Earned ***– External Sales*** {4,000 units × (₹ 900 – ₹ 600 – ₹ 80)}	8,80,000
Contribution Required ***– Internal Sales***	4,90,000
Contribution *per unit* of Product (₹ 4,90,000 ÷ 2,000 units)	245
Transfer Price of Product DV_1 to Division DV_2 (Variable Cost *per unit* + Contribution *per unit*)	845

Note: Selling commission will be not incurred on internal transfer units

(ii) The Two Transfer Prices Based on Opportunity Costs

For the 1,500 units (i.e. maximum capacity – maximum external market demand) at variable cost of production i.e. ₹ 600 per unit.

For the next 500 units (i.e. external market demand – maximum possible sale) at market selling price i.e. ₹ 900 per unit. (Variable Cost + Opportunity Cost)

☞

This question has been solved in two alternative ways by taking 'Target profit fixed' as ₹6,65,000 and ₹66,50,000 respectively.

Question 5

(a) PRP Industries has three factories at locations L_1, L_2 and L_3 which supply cement to warehouses located at A, B and C. Monthly factory capacities are 10, 80 and 15 tonnes respectively and monthly warehouse requirements are 75, 20 and 50 tonnes respectively. The shipping costs per tonnes in rupees are given below:

Factories	***Warehouses***		
	A	***B***	***C***
L_1	*5*	*1*	*7*
L_2	*6*	*4*	*6*
L_3	*3*	*2*	*5*

If any of the demand of any warehouse is not being satisfied, the unsatisfied demands at the warehouse A, B and C are subject to a penalty of ₹8, ₹5 and ₹3 per tonne respectively.

Required

(i) Find the initial feasible solution by using Vogel's Approximation method.

(ii) Perform optimality test and final transportation and penalty cost associated with the solution. (V_f = 0) ***(8 Marks)***

(b) Following information are taken from the records of PV Ltd.:

Budgeted sales for June, 2019 : ₹ 5,00,000

Budgeted sales for July, 2019 : ₹ 6,00,000

Materials are purchased @ 70% of selling price of finished goods.

Selling Commission is paid @ 10% on sales in the month of sales itself.

Monthly operating expenses (including depreciation) ₹ 1,10,000

Cash balance as on 31st May, 2019 ₹ 75,000

Actual sales in May, 2019 ₹ 4,00,000

Stock of materials is maintained equal to 100% of next month's requirements.

For purchase of materials 40% paid in the month of purchase and the balance in the following month.

Out of sales, 50% collected immediately and the balance collected in the next month.

All other expenses are paid in the respective month.

The company planned to declare 10% dividend in June, 2019, payable in August 2019. The authorized and paid up capitals are respectively ₹ 80 lakhs and ₹ 50 lakhs.

Depreciation is charged under straight line method @ 15% p.a. on the fixed assets worth ₹ 20 lakhs.

Required

Prepare a cash Budget for the month of June, 2019. ***(8 Marks)***

Answer

(a) (i) The Initial Feasible Solution

Since requirement 145 (75 + 20 + 50) is greater than capacity 105 (10 + 80 + 15) by 40 units, the given problem is an unbalanced one. We introduce a dummy factory with a supply of 40 units. It is given that for the unsatisfied demands, the penalty cost is rupees 8, 5, and 3 for Warehouses (A), (B) and (C) respectively. Hence, the transportation problem becomes-

Factory	Warehouses			Capacity
	A	B	C	
L_1	5	1	7	10
L_2	6	4	6	80
L_3	3	2	5	15
Dummy	8	5	3	40
Requirements	75	20	50	145

	A	B	C	Supply	Difference
L_1	5	1 [10]	7	10/0	4 - -
L_2	6 [60]	4 [10]	6 [10]	80/70/10/0	2 2 2
L_3	3 [15]	2	5	15/0	1 1 -
Dummy	8	5	3 [40]	40/0	2 2 2
Demand	75/60/0	20/10/0	50/10/0	145	
Difference	2	1	2		
	3	2	2		
	2	1	3		

The initial solution is given in the table below-

	A	B	C	Supply
L_1	5	1 [10]	7	10
L_2	6 [60]	4 [10]	6 [10]	80
L_3	3 [15]	2	5	15
Dummy	8	5	3 [40]	40
Demand	75	20	50	145

(ii) Optimality Test

The number of allocations is 6 which is equal to the required m + n - 1 (= 6) allocations. Also, these allocations are in dependent. Hence, both the conditions are satisfied.

We now apply the optimality test to find whether the initial solution found above is optimal or not.

Let us now introduce u_i [i = (1, 2, 3, 4)] and v_j [j = (1, 2, 3)] such that $\Delta_{ij} = C_{ij} - (u_i + v_j)$ for allocated cells. We assume that $v_1 = 0$ and remaining u_i's, v_j's and Δ_{ij}'s are calculated as below-

($u_i + v_j$) Matrix for Allocated / Unallocated Cells

				u_i
	3	1	3	3
	6	4	6	6
	3	1	3	3
	3	1	3	3
v_j	**0**	-2	0	

Now we calculate $\Delta_{ij} = C_{ij} - (u_i + v_j)$ for non basic cells which are given in the table below-

Δ_{ij} Matrix

2		4
	1	2
5	4	

Since all Δ_{ij}'s for non basic cells are positive, therefore, the solution obtained above is an optimal one. The allocation of factories to destinations and their cost is given below-

Factory	Warehouses	Units	Cost (₹)	Total Cost (₹)	Type
L_1	B	10	1	10	Transportation Cost **₹515/-**
L_2	A	60	6	360	
L_2	B	10	4	40	
L_2	C	10	6	60	
L_3	A	15	3	45	
Dummy	C	40	3	**120**	Penalty Cost
			Total	**635**	

☞

> This question has been solved by taking v_1 as ZERO and can also be solved by taking other alternative options, for example, u_2 as ZERO.

(b) **PV Ltd.**

Cash Budget for Jun 2019

Particulars		**(₹)**
Opening Balance:		75,000
Receipts:		
Cash Collection (50% of current month's sales i.e. ₹ 5,00,000)		2,50,000
From Debtors (50% of last month's sales i.e. ₹ 4,00,000/-)		2,00,000
Total Cash Available	…(A)	5,25,000
Payments:		
Purchase of Material (40% of next month's requirement i.e.70% of 6,00,000)		1,68,000
To Creditors (60% of last month's purchase i.e. 70% of 5,00,000)		2,10,000
Sales Commission (10% of current month's sales i.e. 5,00,000)		50,000
Monthly Cash Operating Expenses (₹ 1,10,000 - ₹20L × 15%/12)		85,000
Dividend Paid		---
Total Payments	…(B)	5,13,000
Closing Balance	…(A-B)	12,000

Question 6

(a) Madura Ltd. is manufacturing three products. The selling price and production costs for the products for next year are estimated as given below:

	P	***Q***	***R***
	(₹)	***(₹)***	***(₹)***
Selling price	*38*	*78*	*145*
Direct material cost	*12*	*20*	*25*

Direct labour cost	*15*	*27*	*60*
Variable overheads	*6*	*13*	*30*

Total fixed overhead is estimated as ₹ 30,000 for the year and direct labour is calculated at the rate of ₹ 3 per hour. It is also planned to use the available labour hours to produce 800 units of each product to meet out the demand of regular customers and the balance hours to produce Product P. Total labour hours available for the year will be 39,800.

Required:

(i) *Prepare an income statement for the above proposal.*

(ii) *If you feel that there is an alternative proposal which would be more profitable than the above one, prepare an income statement for the same. Assume that all the units to be produced can be sold in the market.* ***(8 Marks)***

(b) *A manufacturing company manufactures a product and sells its through four dealers D_1, D_2, D_3 and D_4. The transaction details with the dealers during a period is given below:*

	D_1	D_2	D_3	D_4
Selling price p.u. (₹)	*200*	*200*	*200*	*200*
No. of units sold	*2,000*	*3,000*	*5,000*	*4,000*
Size of order (units)	*500*	*300*	*250*	*400*
Units delivered per delivery	*250*	*300*	*250*	*200*
No. of sales visits	*8*	*3*	*10*	*2*
No. of speed deliveries in total deliveries	*1*	*-*	*2*	*-*
Distance per delivery (km.)	*15*	*20*	*10*	*30*
No. of warranty complaints	*-*	*8*	*-*	*9*

Additional information:

Order processing cost	*₹ 50 per order*
Cost per sales visit	*₹ 2,000*
Product handling expenses	*₹ 0.20 p.u.*
Ordinary delivery cost per km	*₹ 3*
Speed delivery cost per km *Cost of production*	*₹ 5* *60% of sales*
Average expenses per warranty complaint	*₹ 6,000*

Required

Analyze the profitability for each dealer, which dealer is the most profitable. ***(8 Marks)***

Answer

(a) (i) Statement Showing "Calculation of Contribution/ unit"

	P (₹)	Q (₹)	R (₹)
Selling Price	38	78	145
Less: Variable Costs			
Direct Material	12	20	25
Direct Labour	15 (₹3×5h)	27 (₹3×9h)	60 (₹3×20h)
Variable Overheads	6	13	30
Contribution *per unit*	5	18	30

Labour Hours Allocation

39,800 hrs. Total	4,000 hrs. (800 units × 5h)	7,200 hrs. (800 units × 9h)	16,000 hrs. (800 units × 20h)	12,600 hrs. (2,520×5h)
	P	Q	R	P (Balance)

Income Statement

Product	No of Units	Contribution/unit (₹)	Total Cont. (₹)
P	800+2,520	5	16,600
Q	800	18	14,400
R	800	30	24,000
Total Contribution			55,000
Less: Fixed Overheads			30,000
Net Profit			**25,000**

(ii) Statement Showing "Calculation of Contribution/ hour"

	P (₹)	Q (₹)	R (₹)
Contribution *per unit*	5	18	30
Hours *per unit*	5	9	20
Contribution *per hour* (₹)	1	2	1.5
Ranking	**III**	**I**	**II**

Optimum Labour Hours Allocation

39,800 hrs. Total	4,000 hrs. (800 units × 5h)	7,200 hrs. (800 units × 9h)	16,000 hrs. (800 units ×20h)	12,600 hrs. (1,400×9h)
	P	Q	R	Q (Balance)

Income Statement

Product	No of Units	Contribution/unit (₹)	Total Cont. (₹)
P	800	5	4,000
Q	800+1,400	18	39,600
R	800	30	24,000
Total Contribution			67,600
Less: Fixed Overheads			30,000
Net Profit			**37,600**

(b) **Dealer Profitability Statement**

Particulars	D_1	D_2	D_3	D_4
Sales (units)	2,000	3,000	5,000	4,000
	(₹)	(₹)	(₹)	(₹)
Sales Revenue ...(A)	4,00,000	6,00,000	10,00,000	8,00,000
Less: Cost of Production @60% (B)	2,40,000	3,60,000	6,00,000	4,80,000
Contribution ...(A) - (B)	1,60,000	2,40,000	4,00,000	3,20,000
Less: Additional Overheads				
Delivery Cost (No. of K.M. × ₹ 3)	315 {(2,000/250)-1} ×15 × ₹3	600 (3,000/300) × 20 × ₹3	540 {(5,000/250) -2} × 10 × ₹3	1,800 (4,000/200) × 30 × ₹3
Speed Delivery Cost No. of Emergency Delivery ×₹5)	75 (1x15) × ₹5	---	100 (2x10) × ₹5	---
Order Processing Cost (No. of Orders × ₹ 50)	200 (2,000/500) × ₹50	500 (3,000/300) × ₹50	1,000 (5,000/250) × ₹50	500 (4,000/400) × ₹50
Sales Visit Cost	16,000	6,000	20,000	4,000

(No. of Visits × ₹2,000)	(8 × ₹2,000)	(3 × ₹2,000)	(10 × ₹2,000)	(2 × ₹2,000)
Product Handling Cost (No. of units × ₹ 0.20)	400 (2,000 × ₹0.20)	600 (3,000 × ₹0.20)	1,000 (5,000 × ₹ 0.20)	800 (4,000 × ₹0.20)
Warranty Complaint (No. of complaints × ₹6,000)	---	48,000 (8 × ₹ 6,000)	---	54,000 (9 × ₹ 6,000)
Profit *per dealer*	**1,43,010**	**1,84,300**	**3,77,360**	**2,58,900**
Profit *per dealer* (%)	**35.75%**	**30.72%**	**37.74%**	**32.36%**
Rank	II	IV	I	III

Analysis

The contribution margin is 40% for each dealer but when the other overheads costs *per dealer* is included in the above Profitability Statement the profitability of the three dealers become different. D_3 is the most profitable dealer.

Question 7

*Answer any **four** out of the following **five** questions :*

(a) *Classify the following under category of cost control or cost reduction:*

(i) *Cost exceeding budgets or standards is investigated.*

(ii) *Preventive Function*

(iii) *Corrective Function*

(iv) *Measures to standardize for increasing productivity.*

(v) *Provision for proper storage facilities for materials.*

(vi) *Continuous comparison of actual with the standard set.*

(vii) *Challenges the standard.*

(viii) *Value analysis*

(b) *Brief the principles associated with synchronous manufacturing.*

(c) *State whether the following statements are **True or False** in the context of PERT/CPM:*

(i) *A delay in the completion of critical activities need not cause a delay in the completion of the whole project.*

(ii) *Total float is the aggregate of the free, interfering and independent floats.*

(iii) *The optimal duration of a project is the minimum time in which it can be completed.*

(iv) *Activity which is not connected to any of the intermediate events or end event is called dangling activity.*

(d) Classify the following measures under appropriate categories in a Balanced scorecard for a banking company which excels in its home loan products:

(i) A new product related to life insurance is being considered for a tie up with the successful housing loan disbursements, e.g. Every housing loan applicant to be advised to take life policy or compelled to take fire insurance policy.

(ii) How different sectors of housing loans with different interest rates have been sanctioned, their volumes of growth in the past 4 quarters?

(iii) How many days are taken to service a loan, how many loans have taken longer, what additionally loans are to be released soon, etc.?

(iv) After sanctioning of the loan taking feedback from the customers about the time, behaviour of staff and suggestion for improvement of the product.

(e) Fill the extra variable and co-efficient of extra variable in following types of constraint in linear programming problems:

Types of Constraint	***Extra variable required***	***Co-efficient of extra variables in the Objective function***	
		Max-Z	***Min-Z***
Less than or equal to (≤)			
Greater than or equals to (≥)			
Equal to (=)			

(4 x 4 = 16 Marks)

Answer

(a) **(i)** Cost Control

(ii) Cost Control

(iii) Cost Reduction

(iv) Cost Reduction

(v) Cost Control

(vi) Cost Control

(vii) Cost Reduction

(viii) Cost Reduction

(b) It is an all encompassing manufacturing management philosophy which includes a set of principles, procedures, and techniques where every action is evaluated in terms of common goals of the organization.

The seven principles are:

(i) Focus on synchronizing the production flow than on idle capacities.

(ii) Value of time at a bottleneck resource is equal to the throughput rate of products processed by the bottle neck.

(iii) Value of time at a non- bottleneck resource is negligible.

(iv) Level of utilization of a non- bottleneck resource is controlled by other constraints within the system.

(v) Resources must be utilized, not simply activated.

(vi) Transfer batch should not be equal to the process batch.

(vii) A process batch should be variable both along its route and overtime.

(c) **(i)** False

(ii) False

(iii) False

(iv) True

(d) **(i)** New Product *tie up* --- Innovation /Learning Perspective

(ii) Growth of Volume --- Financial Perspective

(iii) Time for Loan / Fresh Products --- Customer Perspective

(iv) Suggestions for Improvements --- Internal Perspective

(e)

Types of Constraint	**Extra Variable Required**	**Coefficients of Extra Variables in the Objective Function**	
		Max Z	**Min Z**
Less than or equal to (≤)	A Slack Variable is to be added	0	0
Greater than or equal to (≥)	A Surplus Variable is to be subtracted	0	0
	and An Artificial Variable is to be added.	-M	+M
Equal to (=)	Only an artificial variable is to be added	-M	+M