Lecture 1: Exercises

Exercise 1.1 Cost Flow, product costs and period costs in manufacturing firms

ABC is a manufacturing firm. At the end of the fiscal year 2022, it presents the following data (amounts in thousands €).

Raw materials – Beginning Inventory:	200
Raw materials – Purchases:	1,200
Raw materials – Ending Inventory:	300
Semi-finished goods (work-in-progress) – Beginning Inventory:	700
Semi-finished goods (work-in-progress) – Ending Inventory:	100
Finished goods – Beginning Inventory:	400
Finished goods – Ending Inventory:	500
Direct labor for production:	800
Indirect labor for production:	250
Indirect raw materials for production:	450
Electricity for the production process:	50
Administration expenses:	350
Rent costs for the production department:	200
Maintenance costs for production machines:	150
Selling expenses:	550
Depreciation for production machines:	150
Fuel costs for production machines:	50
Interest expense	10
Tax expense	390
Sales revenue:	6,000

Required: Calculate the gross profit and net income before taxes for ABC.

Solution

Direct Materials

	Raw materials – Beginning Inventory:	200
Plus:	Raw materials – Purchases:	1,200
Less:	Raw materials – Ending Inventory:	(300)
	Direct materials	1,100

Work-in-progress

	Semi-finished goods (work-in-progress) – Beginning Inventory:		700
Plus:	Production cost		
	Direct materials		1,100
	Direct labor for production:		800
	Overheads		
	Indirect labor for production:	250	
	Indirect raw materials for production:	450	

	Electricity for the production process:	50	
	Rent costs for the production department:	200	
	Maintenance costs for production machines:	150	
	Depreciation for production machines:	150	
	Fuel costs for production machines:	50	1,300
Less:	Semi-finished goods (work-in-progress) – Ending Inventory:		(100)
	Cost of Goods Produced		3,800

Finished Goods

	Finished goods – Beginning Inventory:	400
Plus:	Cost of Goods Produced	3,800
Less:	Finished goods – Ending Inventory:	(500)
	Cost of Goods Sold	3,700

Income Statement 1/1-31/12/2022

	Sales revenue:	6,000
Less:	Cost of Goods Sold	(3,700)
	Gross Profit	2,300
Less:	Administration expenses:	(350)
	Selling expenses:	(550)
	Operating Income	1,400
Less:	Interest expense	(10)
	Net Income Before Taxes	1,390
Less:	Tax expense	(390)
	Net Income	1,000

Exercise 1.2 Master budget

ABC is a manufacturing firm that produces the product X. ABC has the following information regarding the forecasted sales for the next year 2023:

	Quarter				
	1st	2nd	3rd	4th	Total
Forecasted sales (in units)	20,000	30,000	30,000	40,000	120,000

The selling price for X is €20. The cash collection policy of ABC is as follows: 60% of revenues is collected in the quarter that the sale was made and the rest 40% in the quarter following. At the end of 2022, “Accounts Receivable” had a balance of €180.000.

Required: Prepare a sales budget and cash receipts schedule.

Solution

Sales Budget	Quarter				
	1st	2nd	3rd	4th	Total
Forecasted Sales (in units)	20,000	30,000	30,000	40,000	120,000
Selling price per unit	20	20	20	20	20
Sales Revenues	400,000	600,000	600,000	800,000	2,400,000

Cash Receipts Schedule	Quarter				
	1st	2nd	3rd	4th	Total
Cash receipts from sales made in the previous year	180,000				180,000
Cash receipts from 1st quarter sales	240,000	160,000			400,000
Cash receipts from 2nd quarter sales		360,000	240,000		600,000
Cash receipts from 3rd quarter sales			360,000	240,000	600,000
Cash receipts from 4th quarter sales				480,000	480,000
Total cash receipts	420,000	520,000	600,000	720,000	2,260,000
Accounts receivable 31/12/2023				320,000	

At the end of each quarter, ABC would like the ending inventory of finished products being equal to 30% of the sales (in units) of the next quarter. At the end of the fiscal year, the ending inventory should be equal to 4,000 units. At the end of 2022, the finished products were 9,000 units.
Required: Prepare a Production Budget.

Solution

Production Budget	Quarter				
	1st	2nd	3rd	4th	Total
Forecasted sales in units	20,000	30,000	30,000	40,000	120,000
Plus: Required ending inventory	9,000	9,000	12,000	*4,000*	4,000
Less: Beginning inventory	*-9,000*	-9000	-9000	-12000	-9,000
Units to be produced	20,000	30,000	33,000	32,000	115,000

To produce X, ABC uses a raw material called Y. Production requirements suggest that 1 unit of X requires 5 kilos of Y. Moreover, at the end of each quarter, ABC wants an ending inventory of raw materials equal to 10% of the required raw materials for the production of the next quarter. At the end of the fiscal year, the ending inventory of raw materials should be equal to 20,000 kilos. The beginning inventory of Y is 10,000 kilos.
The price of Y is €0.3 per kilo. ABC pays 50% of the purchase cost in cash and 50% in the quarter following. At the end of 2022, "Accounts Payable" had a balance of €15,000.
Required: Prepare a Raw Materials Budget and Cash Payment Schedule for raw materials purchases.

Solution

Direct Materials Budget	Quarter				
	1st	2nd	3rd	4th	Total
Units to be produced	20,000	30,000	33,000	32,000	115,000
Required raw material per unit	5	5	5	5	5
Required raw materials for the production	100,000	150,000	165,000	160,000	575,000
Plus: Required ending inventory	15,000	16,500	16,000	20,000	20,000
Less: Beginning inventory	-10,000	-15,000	-16,500	-16,000	-10,000
Raw materials units to be purchased	105,000	151,500	164,500	164,000	585,000
Cost per raw materials unit	0,30	0,30	0,30	0,30	0,30
Purchase cost	31,500	45,450	49,350	49,200	175,500

Cash payment schedule	Quarter				
	1st	2nd	3rd	4th	Total
Cash payments for purchases of the previous year	15,000				15,000
Cash payments for purchases of the 1st quarter	15,750	15750			31,500
Cash payments for purchases of the 2nd quarter		22725	22725		45,450
Cash payments for purchases of the 3rd quarter			24675	24675	49,350
Cash payments for purchases of the 4th quarter				24600	24,600
Total payments	30,750	38,475	47,400	49,275	165,900
Accounts Payable 31/12/2023				24,600	

ABC has estimated that 1 unit of X requires 0.5 direct labor hours (DLH). The cost of each hour is €15.
Required: Prepare a Direct Labor Budget.

Solution

Direct Labor Budget	Quarter				
	1st	2nd	3rd	4th	Total
Units to be produced	20,000	30,000	33,000	32,000	115,000
×Required DLH per unit	0,5	0,5	0,5	0,5	0,5
Required DLH	10,000	15,000	16,500	16,000	57,500
×Cost per DLH	15	15	15	15	15
DL Cost	150,000	225,000	247,500	240,000	862,500

General Manufacturing Overheads are a mixed cost. For the variable part, ABC uses an overhead rate equal to €5/DLH. The fixed part is estimated to €57,500 per quarter.
Required: Prepare an overheads budget and calculate the total overheads rate per DLH.

Solution

Overhead Budget	Quarter				
	1st	2nd	3rd	4th	Total
DLH	10,000	15,000	16,500	16,000	57,500
×Variable OH Rate	5	5	5	5	5
Variable OH	50,000	75,000	82,500	80,000	287,500
Plus: Fixed OH	57,500	57,500	57,500	57,500	230,000
Total OH	107,500	132,500	140,000	137,500	517,500
Total DLH					57,500
OH rate					9

A standard policy of ABC is to retain zero beginning and ending inventories of work in progress.
Required: Prepare an ending inventory budget.

Solution

Production cost per unit	Quantity	Cost	Total
Direct materials	5	0,3	1.5
Direct labor	0.5	15	7.5
Manufacturing OH	0.5	9	4.5
Total production cost			13.5
Cost of ending inventory of finished products	4,000	13.5	54,000
Raw Materials	20,000	0.3	6,000
Work-in-progress	0	n/a	0

At the end of 2022, finished products were equal to €50,000.
Required: Prepare a Cost of Goods Produced Budget and a Cost of Goods Sold Budget.

Solution

Cost of Goods Produced and Cost of Goods Sold Budget	
Beginning Inventory of WIP	0
Plus: Direct Materials	172,500
Direct Labor	862,500
Manufacturing OH	517,500
Less: Ending Inventory of WIP	0
Cost of Goods Produced	1,552,500
Plus: Beginning Inventory of Finished Goods	50,000
Less: Ending Inventory of Finished Goods	-54,000
Cost of Goods Sold	1,548,500

SGA Expenses consist of variable and fixed costs. The variable part is estimated as €1,80/unit. The fixed cost is €99,000 per quarter.
Required: Prepare an SGA Budget.

Solution

SGA Expenses Budget	Quarter				
	1st	2nd	3rd	4th	Total
Forecasted sales in units	20,000	30,000	30,000	40,000	120,000
×Variable SGA rate	1,8	1,8	1,8	1,8	1,8
Variable SGA cost	36,000	54,000	54,000	72,000	216,000
+Fixed Cost	99,000	99,000	99,000	99,000	396,000
Total SGA expenses	135,000	153,000	153,000	171,000	612,000

The following information is available for ABC:

- Beginning cash balance was €102,250,
- Direct labor cost is paid in cash. Manufacturing OH are paid in cash but they include €20,000 depreciation costs per quarter. SGA expenses are paid in cash but they include €15,000 depreciation costs per quarter.
- The firm will acquire an equipment of €260,000 and the cash payments will be as follows: 1st quarter: €140,000; 2nd quarter: €60,000; 3rd quarter: €40,000; and 4th quarter: €20,000.
- A cash dividend of €8,000 will be distributed each quarter.
- The ending cash balance of each quarter should be at least €100,000.
- ABC has an agreement with a local bank to receive loans that are multiples of €10,000 (e.g., €10,000, 20,000, 30,000, etc.) at the beginning of each quarter. The monthly interest rate is 1% (assume simple interest for ease of calculations). The borrowed capital and the accrued interest are repaid at the end of the year as long as the minimum threshold of €100,000 ending cash balance is satisfied.

Required: Prepare a Cash Budget.

Solution

Cash Budget	Quarter				
	1st	2nd	3rd	4th	Total
Beginning Cash Balance	102,250	106,000	104,025	103,125	102,250
Plus: Cash Receipts	420,000	520,000	600,000	720,000	2,260,000
Less: Cash Disbursements					
Direct Materials	-30,750	-38,475	-47,400	-49,275	-165,900
Direct Labor	-150000	-225000	-247500	-240000	-862500
Manufacturing OH	-87,500	-112,500	-120,000	-117,500	-437500
SGA Expenses	-120,000	-138,000	-138,000	-156,000	-552000
Acquisition of Equipment	-140,000	-60,000	-40,000	-20,000	-260,000
Dividends Distribution	-8,000	-8,000	-8,000	-8,000	-32,000
Total Disbursements	-536,250	-581,975	-600,900	-590,775	-2,309,900
Excess Cash (Deficiency)	**-14,000**	**44,025**	**103,125**	**232,350**	**52,350**
Financing					
Borrowing	120,000	60,000			180,000
Capital repayment				-112,550	-112,550
Interest repayment				-19,800	-19,800
Total Financing	120,000	60,000	0	-132,350	47,650
Ending Cash Balance	106,000	104,025	103,125	100,000	100,000

120,000×1%×12+60,000×1%×9=€19.800

Required: Prepare a pro-forma Income Statement (in simplified form with net income before taxes as the final stage).

Solution

Proforma IS	
Sales Revenues	2,400,000
Less: Cost of Goods Sold	-1,548,500
Gross Profit	851,500
Less: SGA Expenses	-612,000
Operating Income	239,500
Less: Interest Expense	-19,800
Net income before taxes	219,700