

**University of Groningen
Faculty of Science and Engineering**

**Exam Management Accounting
For Industrial Engineering and Management
WPIE18004**

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Instructions:

This exam is an open book exam to be completed at home. This means that you are allowed to use the course textbook to assist you to provide the solutions of the exam. However, there are several restrictions that you need to adhere to. You need to complete this exam individually, without consulting others. You cannot consult any other sources, including the internet. You will need to complete the student pledge. Make sure you do, before commencing on the exam. An exam without pledge will not be marked, and result in a failure to complete the course. Your answers will be checked by the Ephorus plagiarism scanner to check for similarities in (wrong) answers. We will arrange an oral examination if we are unsure of your ability to achieve the course objectives. This oral examination will be taken through Skype. Should we find cheating or other forms of dishonest behaviour, this suspicion will be reported to the Board of Examiners.

The exam is in pdf. You need to complete your answers on a Word 2010/2011/2016/2019 (.doc/.docx) file on Windows or on Apple Macintosh. Make sure you clearly indicate the question number and subnumber in **bold**. So for example:

- 4.** This is the first sentence of my answer.
- 8.** This is the first sentence of my answer. Etc.

On the first page of your answer document, include your name, student number and university email address. *To facilitate your work, you can use the answering template, available on the course Nestor website.*

On some questions, if needed to, you can insert a picture of your calculations if you feel that Word does not offer you a way to express your answer. Use this sparingly and be aware that you are responsible for the clarity and legibility of the document, including any pictures included.

Please check that the file you submit is readable by the software. Submission of files that cannot be opened by Word for Mac or Word for Windows will not be marked and results in a failing grade (1) for the exam. No exceptions to this rule will be made, so check your file carefully, before submission.

Good luck!

Answer questions 1-3 using the information from the following case:

The year 2017 is coming to a close and Charles is considering to give up his job at Cheers, a bar in Boston. He thinks about starting his own business in January 2018, producing and selling his own special beer brand. He makes an overview of the relevant issues:

1. Charles's monthly salary at Cheers is € 900.
2. If Charles starts his business January the 1st, he estimates that he will produce and sell 5,000 bottles of beer each month (starting in January; at the end of the month there will be no work in progress). This he calls scenario "0". The selling price will be € 2.00 per unit.
3. Charles has some savings in the bank that are earning him € 80 interest each month. These savings will be withdrawn and used in order to get his business going.
4. Charles's girlfriend will do the selling for a commission of € 0.25 per bottles of beer sold.
5. The equipment needed to produce the beer can be leased at a cost of € 750 per month.
6. Charles estimates that each finished bottle of beer uses raw materials at a cost of € 0.40.
7. Exploring the potentials of the beer business, Charles has already spent € 350 as start-up costs; all these costs will be considered expenses for January if he starts his business.
8. Charles will need to rent a manufacturing facility at a cost of € 800 per month.
9. Workers need to be hired to produce the bottles of beer at a rate of € 0.30 per bottle.
10. Charles's brother will handle the advertising for € 500 per month.
11. Costs of distributing the bottles of beer to customers will be € 0.20 per bottle.
12. Charles can rent a facility as sales office at a cost of € 400 per month.

Besides scenario "0" (manufacturing and selling 5,000 bottles each month), we will also consider scenario "1" = manufacturing 5,000 bottles in January, but selling none of these in that same month; scenario "2" = manufacturing 10,000 bottles in January, and selling 7,500 of these in that same month; scenario "3" = manufacturing 5,000 bottles in January, and selling 3,750 of these in that same month at a price of € 2.50 (instead of € 2.00).

1. If Charles would have produced according to his plans, but would have sold nothing in January (scenario "1"), at what cost would a bottle of beer occur on the balance sheet of his business at the end of January?

Instruction

Show your calculation and the cost of a single bottle of beer on the balance sheet.

Answer: € 1.01

See calculations in Excel file.

2. If Charles would have produced 10,000 bottles of beer and would have sold 75% of this production in January (scenario "2"), compared to his **original plan scenario "0"**, the total cost of his business in January would have increased by how much?

Instruction:

provide the calculation and the total amount by which the total cost increased.

Answer: € 4,625

See calculations in Excel file.

3. If Charles would have started his business according to his plans and would have sold all his products he had manufactured in January (scenario "0"), which costs would **not** have appeared on his income statement?

- a. opportunity costs
- b. sunk costs
- c. period costs
- d. cost of goods manufactured

Instruction

Provide the correct alternative and explain why this answer is correct.

Answer a. is correct. See the textbook.

4. On January the 1st company Bird Homes started to manufacture bird cages. For the production, wooden planks are required. On March the 31st the company draws up the balance sheet.

Assignment

Up to a maximum of how many stock items on the balance sheet can the cost of these wooden planks be traced?

Answer is 3. The cost of wooden planks can be traced to (1) the raw materials stock, (2) the work in progress stock and (3) the finished goods stock.

5. Explain the concept of 'cost behavior' and indicate to which cost categories this concept commonly refers.

Answer is fixed and variable costs and how they behave when volume changes.

6. Indicate whether the following statement is *True* or *False*: *A company should immediately drop a product line if the total variable costs of that product line exceed its contribution margin.*

Instructions

Indicate whether the following statement is *True* or *False* and explain your answer.

Answer: *False*. The correct answer is: *A company should immediately drop a product line if the decrease in fixed costs of dropping that product line exceeds its contribution margin.* As long as (part of the) fixed costs are covered by its contribution margin, a company should not drop a product line, unless fixed costs drop faster than the contribution margin. This could happen for example in a long-term decision.

7. Drunk & Drunk sells bottles of wine. The margin of safety percentage for the sales of this product is 40%. The net operating income is € 10,000. The variable costs are one-thirds of sales.

Assignment

Given this information, calculate the sales (revenue) at the break-even point.

Instructions

Provide your answer including all calculations.

- a. € 10,000
- b. € 15,000
- c. € 22,500
- d. € 45,000

Answer: c. is correct. See calculations in Excel file.

8. Consider the following statement: ‘A number of assumptions underlie Cost Volume Profit Analysis. The sales mix, the selling price per unit product and the variable cost per unit product are considered constant throughout the relevant range’.

Assignment

Explain whether this statement is *True* or *False* and explain your answer.

Answer *True* is correct. See textbook.

9. Operating leverage is an accounting concept used to indicate how, from a starting point, profit changes due to a change in sales. If the degree of operating leverage is undefined (infinite),
- the starting point of the sales must be equal to the sales in the break-even point
 - the change in sales must be equal to the sales in the break-even point
 - the starting point of the sales plus the change in sales must be equal to the sales in the break-even point
 - the starting point of the sales minus the change in sales must be equal to the sales in the break-even point

Assignment

Explain which of the above 4 answers is correct and why.

Instruction

Make sure to provide both the answer and the explanation of your answer.

Answer a. is correct. The degree of operating is determined by dividing the contribution margin by the profit. As profit is in the break-even point is zero, the outcome is undefined (infinite).

10. You have begun a new business selling milk shakes in Greenland. Several figures concerning the cost of your current machine, your sales, the use of supplies and other costs are listed below. After 6 months, you have to make a decision on replacing your current machine with a new one (see the data below). The disposal value of your current machine at that moment will be € 2,000.

	Current machine		New machine	
Sales				
sales in quantity per month		7,500		7,500
selling price per product	€	1.00	€	1.00
Milk and supplies per product	€	0.30	€	0.27
Direct labor				
labor costs per product	€	0.30	€	0.30
Depreciation machine				
Original cost	€	6,000	€	4,800
Expected life (in months)		24		18
Book value at disposal	€	600	€	300
Depreciation each month	€	225	€	250

Selling / marketing			
sales labor costs per month	€	750	€ 750
sales labor costs per product	€	0.05	€ 0.05
Administrative costs (monthly)			
Rent office	€	200	€ 200
License	€	800	€ 800
Mobile phone etc.	€	50	€ 50
Sub-total	€	1,050	€ 1,050
Disposal value after 6 months	€	2,000	

Assignment

If you were to replace your current machine with the new one, compared with the current situation, explain by how much your total profit for the remaining 18 months would be affected.

Instruction

Explain if your profit will *decrease* or *increase* and by how much. Include your calculations.

Answer: increase with € 950. See calculations in Excel file.

11. You have started another business selling cups of coffee in Italy. Because you are too busy studying, you hired a girl, Rebecca, to do the preparation and selling of cups of coffee (as Rebecca will only prepare a cup of coffee when it is sold, we will speak of cups of coffee sold). Customers can choose between four different brands: Argentin, Bueno, Costa, Dominica. Rebecca is selling at capacity: demand for each brand is much higher than Rebecca can sell. Each brand requires a different number of units of labour time to sell. Rebecca gets paid for every cup she sells; due to the differences mentioned, her reward (and your direct labour costs) differs between brands. Direct material costs also differ between brands. All other costs are common fixed costs and are allocated each month to the cups of coffee sold; the cost per unit being the total common fixed costs divided by the cups of coffee sold (so these costs do not differ per unit between brands).

Assignment

To maximize your monthly profit, Rebecca should maximise which metric?

Instruction

Explain your answer.

Answer: contribution margin per unit labour time. The company is most profitable if it uses its constraint resource (labour) in the most profitable way.

12. Stocks UAE makes plastic crates for transportation of goods. The company's cost to produce 10 crates is as follows:

Direct materials	€ 20.00
Direct labour	€ 13.75
Variable manufacturing overhead	€ 17.50
Fixed manufacturing overhead, traceable	€ 15.00
Fixed manufacturing overhead, common	€ 12.00
Total production costs	€ 78.25

The company has been approached by a Belgian company which offers to sell the crates. Stocks UAE can purchase from them the plastic crates at a cost of € 65.00 per 10 crates.

40% of the traceable fixed manufacturing costs are costs of lease equipment that can be eliminated if the plastic crates are purchased. The balance of the traceable fixed manufacturing costs is depreciation of the manufacturing equipment that has no resale value. Some of the space being used to produce the crates could be used to store other manufacturing equipment, eliminating a rented warehouse and reducing common manufacturing fixed costs by 25%. The rest of the space could be rented to another company, generating revenues of € 20,000 per year. Stocks UAE produces 50,000 plastic crates per year.

Assignment

Explain if Stocks UAE should accept or reject the offer from the Belgian company and show in your calculations the yearly benefit from your selected alternative.

Instruction

Make sure to provide both the answer and the calculation.

Answer: Reject. The net total advantage of making the plastic crates rather than purchasing them is € 3,750 per year. See calculations in Excel file.

13. A manager faces sunk costs and future costs as she is trying to make a decision between alternative courses of action.

Which of the following statements is true:

- a. Sunk costs and future costs can be relevant in decision making.
- b. Sunk costs can be and future costs are always relevant in decision making.
- c. Sunk costs are never and future costs are always relevant in decision making.
- d. Sunk costs are never and future costs can be relevant in decision making.

Instruction

Make sure to provide both the answer and its explanation.

Answer d. is correct. Future costs that do not differ between alternatives are irrelevant costs in decision making.

14. Schnuckems Company uses a predetermined overhead rate to apply manufacturing overhead to jobs.

The controller of the company has provided the following estimated costs for next year:

Sales commissions	€ 222,000
Rent on factory equipment	€ 180,000
Direct Labour	€ 1,620,000
Salaries of production supervisors	€ 120,000
Indirect materials	€ 150,000
Advertising costs	€ 300,000
Direct materials	€ 360,000

The controller estimates that 45,000 direct labour hours and 60,000 machine hours will be worked during the year. Only direct labour hours or machines hours (and NOT a combination of both) will be used to apply manufacturing overhead to jobs.

Assignment

Calculate the predetermined overhead rate per direct labour hour.

Instruction

Make sure to provide both the answer and the calculation.

Answer: € 10.00

See calculations in Excel file.

15. To allocate costs to products companies can use a traditional full costing system and/or an activity-based costing system. Companies in manufacturing industries face the costs of unused capacity of their resources.

Assignment

Explain how the costs of unused productive capacity are allocated under (1) the traditional full-costing system; and (2) under the activity-based costing system.

Instruction

Make sure to provide the answer for both of the costing systems.

Answer:

The costs of this idle capacity are assigned to products under traditional full costing, but not under activity-based costing. Costs of idle capacity are not assigned to products under activity-based costing, as these costs represent resources that are not consumed by the products. Under traditional full costing all manufacturing costs are allocated to products.

16. The direct method is a cost allocating method. Explain if profitability of a supporting department is desirable, from the standpoint of the firm.

Instruction

Make sure you motivate your answer with an explanation.

Answer:

A supporting department delivers services to other internal departments. If it makes a profit, that means it overcharges other internal departments. In turn, this makes final products more expensive than they should be and the company runs the risk of being run out of business, due to high prices.

17. Company Magic Eight has been using a traditional overhead allocation system based on machine-hours. For next year, Magic Eight decides to switch to an activity-based costing system using machine-hours and the number of batches processed as measures of activity. Information on these measures of activity and related overhead rates for the current year is as follows:

	estimated activity	predetermined overhead rate
machine hours	3,000	€ 50 per machine-hour
number of batches	200	€ 900 per batch

A specific job for next year will require a certain quantity of machine-hours and 10 batches to be processed.

Assignment

What is the number of machine-hours if this job would have been **over**costed by € 600 under the traditional system?

Answer: 160. See calculations in Excel file.

Answer the following two questions using the information from the following case:

Martijn Manufacturing has implemented an Activity Based Costing (ABC) system.
See the data below:

Cost-data three products:	Jupiter	Mars	Saturn
Annual production	5.500	6.000	3.900
Material cost per unit	€ 60,00	€ 55,00	€ 50,00
Direct labour cost per unit	€ 120,00	€ 145,00	€ 130,00
ABC-data three products:	Jupiter	Mars	Saturn
Number of set-ups	220	300	275
Machine maintenance (hours)	500	300	220
Number of purchases	240	240	50
Number of shipments	80	40	30
ABC-data for all products:	Annual cost	Annual volume	
Number of set-ups	€ 8.100.000	2.700	
Machine maintenance (hours)	€ 2.160.000	18.000	
Number of purchases	€ 2.700.000	1.440	
Number of shipments	€ 3.240.000	540	

18. Calculate the total cost per unit of *Jupiter*, given that Martijn Manufacturing uses the ABC system.

Instruction

Show the calculations for your answer.

Answer: 480. See calculations in Excel file.

19. How many predetermined overhead rates will Martijn Manufacturing use if ABC is implemented?

Answer:

4. There are 4 activities which each have a separate overhead rate.

20. The Clay Division of Wanderer Company produces and sells bags of pottery clay that can either be sold to outside customers or transferred to the Sports Division of Wanderer Company. The following data are available from the last year:

Clay Division:

Production capacity	18,000 bags
Selling price per bag to outside customers	€ 30.00
Variable production costs per bag	€ 20.00
Variable selling costs per bag	€ 4.00

Sports Division:

Number of bags needed annually	6,000 bags
Price per bag paid to an outside supplier	€ 28.00

The selling costs per bag of units sold to the Sports Division are half of those sold to outside customers. Currently, the Clay Division is selling 13,000 bags annually to outside customers.

The managers of the Clay Division and the Sports Division decide to do business with each other: the Sports Division will no longer buy the bags it annually needs from an outside supplier, but from the Clay Division. Each division will get an equal share of the increase in profit for the company as a whole due to this new transfer agreement.

Assignment

Calculate the selling price at which the Clay Division will sell bags to the Sports Division.

Answer: € 25.50. See calculations in Excel file.

21. A company has two divisions, A and B. Division A sells 2,000 products each month to outside customers at a selling price of € 400 per product, making a profit of € 50 per product. At the same time, division B is in need of 400 of these products monthly. The Chief Financial Officer (CFO) of the company decides that Division A must deliver the products division B needs at a transfer price of € 360. As division A has no idle capacity, it can meet the CFO's requirement by reducing the delivery to outside customers by 400 products.

Assignment

Calculate the cost of the transfer of products from division A to division B as far as the company is concerned.

Answer is € 400.00 per product. If division A has no idle capacity, the market price in the intermediate market reflects the value of the product. The reason for this is that the real cost of the transfer as far as the company is concerned is the opportunity cost of the lost revenue on the outside sale.

Answer the following two questions using the information from the case below:

Shamrock, a merchandising firm, has budgeted its activity for April according to the following information:

- Merchandise inventory on March the 31st was € 160,000.
- Budgeted depreciation for April is € 20,000.
- Sales are budgeted at € 300,000; two-third of this amount will generate cash in April.
- The cost of goods sold is 65% of the selling price.
- The cash balance April on the 1st has been € 12,000.
- All purchases are paid for in cash.
- Selling and administrative expenses are budgeted at € 25,000 for April and are paid for in cash.
- The planned merchandise inventory on April the 30th is € 175,000.
- Sales in March were € 255,000, 30% of which will generate cash in April.

22. Calculate the budgeted net income for April.

Answer: € 60,000. See calculations in Excel file.

23. Calculate the budgeted cash balance on April the 30th.

Answer: € 53,500. See calculations in Excel file.

24. Explain in your own words what 'Participative budgeting' is.

Answer: self-imposed budgets, that is that managers take part in the setting of budgets/targets for themselves.

25. As junior assistant of the Accounting Department, you get part of the draft of the direct materials budget for your company for next year on a quarterly basis (Q = Quarter), see the statement below:

Direct materials budget	Q1	Q2	Q3	Q4	Year
Needed for production:					
production in units product	16,200	18,700	18,900	16,700	70,500
kilos per unit product	40	40	40	40	40
kilos needed for production	648,000	748,000	756,000	668,000	2,820,000
Required ending stock in kilos	149,600	151,200	133,600	144,800	Y
Total raw materials needed in kilos	X1	X2	X3	X4	Z

Assignment

Calculate the quantity of kilos Z in the Direct materials budget (see above table for Z).

Answer: 2,964,800. See calculations in Excel file. Total raw materials needed in kilos is the sum of kilos needed for production and the required ending stock in kilos. The ending stock Q1 = the beginning stock Q2 etc. (and not the other way around). In the year's totals, the ending stock is the ending stock of Q4 and not the sum of all four ending stocks of all the quarters.

26. The sales budget of a company displays the figures as presented below.

Sales budget	Q1	Q2	Q3	Q4
Budgeted sales in units	13,000	16,000	17,000	14,000
Sales price per unit (€)	30	30	30	30
Total sales (€)	390,000	480,000	510,000	420,000
cash same quarter (€)	234,000	288,000	306,000	252,000
cash sales previous quarter (€)	90,000	156,000	192,000	204,000
Total cash collections (€)	324,000	444,000	498,000	456,000

Accounts receivable end of quarter (€)	156,000	192,000	204,000	168,000
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The sales budget will provide the three figures displayed in the grey fields for three different budgets of the third quarter (Q3): € 510,000 for the budgeted income statement, € 498,000 for the cash budget, and € 204,000 for the budgeted balance sheet.

Assignment

Explain whether this statement (*in italics*) is True or False, and provide an explanation.

Answer: true is correct. Total sales → the budgeted income statement, Total cash collections → the cash budget, and Accounts receivable end of quarter → the budgeted balance sheet.

Answer the following 2 assignments using the information from the case below.

C.C. produces and sells iron radiators. The following standards have been set for each batch (of 10 radiators) produced:

	Standard Hours or Quantity	Standard Price or Rate
Direct labour	11.00 hours	€ 10.00 per hour
Direct materials	60.00 kilos	€ 2.50 per kilo

During December, C.C. produced 2,500 batches. On December the 1st, no direct materials (iron) were on hand. The following events occurred during December:

- 156,000 kilos of iron were purchased.
- The materials price variance for December was € 7,800 unfavourable.
- 155,376 kilos of iron were used to produce finished batches of radiators.
- The actual direct labour hours were worked at a cost of € 267,500.
- The labour rate variance for December was equal to the labour efficiency variance for December.

27. Calculate the actual labour hours worked in December.

Answer: 27,125. See calculations in Excel file.

28. Calculate the actual materials price per kilo of iron in December.

Answer: € 2,55. See calculations in Excel file.

29. For one unit of finished product, the standard cost card shows the following figures:

	<u>standard quantity or hours</u>	<u>standard price or rate</u>
direct materials	90 pounds	€ 54.00 per pound
direct labour	36 hours	€ 21.00 per hour
variable manufact. overhead	??? hours	€ 48.00 per hour

In December, 2,800 finished products were sold. The beginning stock of finished goods in December was 0 units, the ending stock 200 units. The total standard variable cost of these 200 units of finished product was € 1,944,000.

In December the actual variable manufacturing overhead rate was € 47.75 per hour and the actual quantity of variable manufacturing overhead used per product was 85 hours.

Assignment

Calculate the variable manufacturing overhead efficiency variance in December.

Instruction

Provide in your calculations the variance *and* whether this variance is favourable or unfavourable.

Answer: € 72,000 favourable. See calculations and explanations in Excel file.

30. Coffee Night (CN) is a successful Dutch coffeehouse chain which was founded in 1997. It has 64 locations in the Netherlands and Belgium. Since tea is becoming more and more popular among young adults, CN's top management sees opportunities to enter a new market. It considers to open tea cafés under the name Tea Night (TN). Until now, the average operating assets used each year for CN has been €32,000,000. Furthermore, the following financial performance information is available for CN's most recent year:

sales revenue	€ 50,500,000
variable costs	€ 26,500,000
contribution margin	€ 24,000,000
fixed costs	€ 14,000,000

If CN's top management decides to invest in TN, this will require average operating assets of €5,000,000. Furthermore, the following financial performance information is estimated for TN per year:

project data TN, per year	Totals
sales revenue	€ 7,000,000
variable cost	€ 3,600,000
contribution margin	€ 3,400,000
fixed costs	€ 2,200,000

The required minimum return on investments is 20%.

Assignment

Calculate the Residual Income (RI) for the total investments in Café Noir and Thé Noir (so after the investment in Thé Noir has been accepted).

Answer: €3,800,000.

31. Raw Products has three business segments in Europe, the performance segment report for year 2017 is included in the table below:

Company segments	Friesland	Groningen	Drenthe
Sales	€ 850,000	€ 1,125,000	€ 850,000
Net operating profit	€ 175,000	€ 240,000	€ 110,000
Average operating assets	€ 1,300,000	€ 1,400,000	€ 625,000

Assignment

If the company's weighted average cost of capital (WACC) is 15%, explain which of the three segments show satisfactory performance based on the return on investment (ROI) measure.

Instruction

You are allowed select more than one segment. Make sure you motivate your answer.

Answer: Groningen & Drenthe

32. In your own words, explain what is 'strategic' about strategic management accounting (SMA).

Answer: they involve decisions on how and where to compete. Answers about long term decisions are also correct.

33. The balanced scorecard assumes causal linkages between the perspectives.

See the figure below:

a.	b.	c.	d.
↓ Learning and growth	↑ Internal process	↓ Customer	↑ Financial
↓ Internal process	↑ Financial	↓ Internal process	↑ Customer
↓ Customer	↑ Customer	↓ Financial	↑ Learning and growth
↓ Financial	↑ Learning and growth	↓ Learning and growth	↑ Internal process

Answer a. is correct. Answer d. gets about 75% of points.

End of EXAM