



PROGRAM : BACCALAUREUS TECHNOLOGIAE
EXTRACTION METALLURGY.

SUBJECT : PROCESS ECONOMICS

CODE : MPI11-1

DATE : WINTER EXAMINATION
5 JUNE 2018

DURATION : (SESSION 1) 8:30-11:30 HRS

WEIGHT : 40: 60

TOTAL MARKS : 100

ASSESSOR : T.SHEKEDE

MODERATOR : MR.D.ZHARARE 5176

NUMBER OF PAGES : 5 PAGES

INSTRUCTIONS : ONLY ONE POCKET CALCULATOR PER
CANDIDATE MAY BE USED.

REQUIREMENTS : NONE.

INSTRUCTIONS TO STUDENTS

1. PLEASE ANSWER ALL QUESTIONS SECTION A.
2. CHOOSE FOUR QUESTIONS FROM SECTION B.

SECTION A [40 MARKS]

- 1.0 Define the following terms in economics:
- 1.1 Productivity. (1)
- 1.2 Cost of capital. (1)
- 1.2 Business risk. (1)
- 1.4 Financial risk. (1)
- 1.5 Economic order quantity. (1)
- 2.0 Explain briefly four factors that affect your budget in a production plant. (4)
- 3.0 You want to retire in 15 years' time and have estimated that a monthly pension of R7000 will be required for 20 years after retirement. The financial institution which will manage your annuity expects a return of 10% p.a, interest compounded monthly. Determine the monthly contribution that you have to make for the next 13 years. (3)
- 4.0 It was planned that a producing shaft will be worked out within 15 years. A new shaft will be sunk 10 years from date, the cost of which will be R50 million. With an average inflation rate of 15% what must be the semi-annual investment to enable the mining company to sink the shaft. (3)
- 5.0 Find the future value of an annuity of R250 per month for 10 years, if money is worth 7% compounded semi annually. (2)
- 6.0 Product Z has a profit volume ratio of 40%. Fixed operating costs directly attributable to product Z during the quarter two of the financial year 2017-18 will be R280 000.
- 6.0 (a) Calculate the sales revenue required to achieve a quarterly profit of R70 000. (2)
- 6.0 (b) State the assumptions of the cost volume profit analysis. (2)

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- 7.0 State and explain three psychological effects of inflation. (2)
- 8.0 Explain briefly three budgeting strategies and how they can be used to achieve the company's objectives in a production environment. (3)
- 9.0 Draw a P.P.F curve of a company producing similar products and explain the law of increasing opportunity costs. (2)
- 10.0 Draw an inventory control model of your choice and explain briefly where it's applicable. (3)
- 11.0 Explain briefly the theory of comparative advantages. (2)
- 12.0 A firm manufactures component BK and the unit costs for the current productions levels of 50000 units are:

Material	R25.00
Labor	R12.50
Variable overheads	R17.50
Fixed overheads	R35.00

Component BK 200 could be bought in for R77.50 and, if so, the production capacity utilized at present would be unused. Assuming that there are no overriding technical considerations, should BK 200 be bought in or continue to be manufactured. (5)

13.0 A monthly constant demand for a product in production facility is 900 units. The current cost is R80 per unit but the product is only sold in 5 unit's tins. The cost of placing an order is R50. Inventory holding costs is R5 per unit per year. Lead time from order to deliver is 5 working days. Re-order point for stock is 7 working day supply. Most economic order quantity. (2)

SECTION B

QUESTION 1

1.1 Construct a network diagram (A.O.N) with earliest and latest due date scheduling for the tender of the construction of slimes pretreatment plant. (10)

Table 1.0

Activity	Time (days)	Immediate predecessor
Laboratory trials	3	-
Pilot plant design	5	1
Pilot tenders	4	1
Erection	6	1
Commissioning	2	2

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Pilot plant trial	4	3,4
Evaluation	3	5,6
Slimes Pretreatment plant design	10	4
Tenders and awarding	2	7,8

1.2. Draw the latest due date scheduling bar chart for the project and indicate the critical path and the floats. (4)

1.3 Why do you use the earliest due date scheduling technique when you are implementing a project? (2)

1.4 State and explain two financial and non-financial models that can be used in a plant rehabilitation project. (4)

[20]

QUESTION 2

Your company has an average mark-up of 50%. It has cost of sales of R2, 500,000 for September.

(a) Determine the sales revenue and the gross profit. (4)

(b) Determine the net profit if the fixed costs is R450, 000. (4)

(c) Determine the average sales price per ton if the variable cost is R60/ton. (4)

(d) Determine the break even volume. (4)

(e) Determine the percentage increase in net profit if the sales were to increase by 15 %. (4)

[20]

QUESTION 3

Use the following information to produce a cash flow statement for the second quarter if the company has an outstanding balance of R6303 from the first quarter.

Amount brought forward for January: R10 000

Sales forecast at R10/unit .The Company wishes to maintain R10000 in cash all the times, and will borrow to achieve this. The client takes two months to pay her account:

Months	Sales forecasts(Units)
November(previous year)	3000
December(previous year)	1500
January	1100
February	2200
March	2900

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April	2500
May	2700
June	2700

Cost of Sales:

1. Material costs are R2 per unit. Supplier gives one-month credit.
2. Labor costs are R3.50 per unit. This is paid in the month of production.
3. 15% of sales are cash sales and 30% are collected in 30days and the rest in 60days arrears.
4. Bank charges 15% interest every year calculated on outstanding balance.
5. A dividend is paid of R3500 is to be paid in April.
6. Tax of R4000 is due February.
7. New equipment to be bought 10 June for R6500.
8. Rent every month is R3500.
9. Previous loan is being paid every month of R5000.

(7)

3.1.1 State and explain the five advantages of cash flows.

(5)

3.2 A manufacturing company produces 2 types of products X and Y. X product must go through two stages of the manufacturing process: assembly, finishing and inspections. One product requires 1 hour of assembly, 45mins of finishing and of inspection. Y product requires 30 mins of assembly, 90mins of finishing and inspection. The profit for X is R90 while the other is R50. Currently, each week there are 400 hours of assembly time available, 600 hours of finishing and inspection time. A maximum of 500hrs are available for both products. Find the optimum initial solution to the production.

(8)

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QUESTION 4

4.1 Israel (Pvt) (Ltd) has prepared the following information for analysis:

Extract From a Standard Cost For A Part No. 50Y

Standard cost /Unit

Raw materials 60kgs at R35 per kg	R2100
Direct labor 15 hours @ R27.50 per hour	R412.50

Actual Results

Production	140 units
Direct material purchase	8000 kgs at a cost of R300000
Opening Stock Direct Material	1800 kgs
Closing Stock Direct Material	1450 kgs
Direct Wages	5805 for 2150 hrs

You are required to calculate all the variances and produce and budget variance report advising Management.

(10)

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4.2 Beta company manufactures three products R, S and T using different quantities of the same resources. Beta buys in a special component XX from supplier called Gamma that it uses in making product T at R350 per unit. It is considering manufacturing this component in-house and has established that the total cost per unit of doing so would be as follows direct material at 3kg/unit (R120)+ direct labour (R80)+variable overhead (R60) =R260. The material used to produce component XX is the same material A that is used in making products R,S and T. The quantity of output of component XX will relate directly to that of product T. Beta has established that it can obtain only 57 000 kg of direct material A per week for the foreseeable future.

Table 3.0 Manufacturing data for R, S and T.

Selling price	R720	R640	R1390
Cost per unit			
Direct material A @R40/kg	R240	R200	R320
Special component	0	0	R350
Direct labour	R100	R120	R140
Variable overheads	R60	R80	R120
Demand per week(units)	1800	3000	4200

You are required to:

4.2.1 Calculate whether the company should continue to purchase component XX from Gamma or whether it should manufacture this internally. (10)

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QUESTION 5

5.1 A single product company sells its products at R60 per unit. In 2015, the company operated at margin of safety of 40%. The fixed costs amounted to R360 000 and the variable costs ratio to sales was 80%. In 2016, it estimated that the variable costs will go up by 10% and the fixed costs will increase by 5%. Find the selling price to be fixed in 2016 to earn the same P/V ratio as in 2015. Assuming the same selling price R60 per unit in 2016, find the number units required to be produced and sold to earn the same profit as 2010. (10)

5.2 A waste screening project is expected to generate the following nominal cash stream:

Year	Nominal Cash Flow(R'000)
0	(R1500)
1	R900
2	R700
3	R300

Calculate the NPV at discounted rates of 0%, 5%, 10%, 15% and 20%. What is the I.R.R., and if the company has a cost of capital of 12%, is the project acceptable. (5)

5.3 State and explain briefly four financial and non-financial models that can be used to select a project. (5)

[20]

QUESTION 6

6.0 An ore processing company produces the following products with the following standard cost per unit for the budget period 1. The total supply of labor and material is limited to 4000hrs and 400 000kg respectively in period X. The problem is to decide which products to manufacture to maximize profit.

Table 4.0

Product	A	B	C	D
Selling price	R100	R150	R150	R180
Variable costs	R25	R40	R30	R50
Material @R1/kg	R20	R25	R50	R30
Resources/Unit				
Labor (hrs)	30mins	20mins	12min	10mins
Material(kgs)	20	25	50	30
Maximum demand(Sales)	6100	900	2500	2000

(5)

6.1 The mine has borrowed R2 500 000 and was contracted to pay it back in 36 equally monthly instalments. Money is worth 18% per year compounded monthly. After 5 instalments, it however decided to pay back the remainder of the debt in one payment. How much were they required to pay that in single lump sum? Complete a schedule to determine the amount. Verify this with an independent method. (5)

6.2 Rose of Sharon Enterprises makes and sales a single product A. The following information is available for use in the budgeting process for the year to 31 December 2018.

1. Sales Selling price per unit=R200

Table 5.0

Quarter	1	2	3	4	5
Production units	6000	4000	3600	5600	4800

2. Stock Levels

At 31 December 2017

-Finished Product A 1500

-Raw Material X 3500 kgs

3. Finished Product A Closing Stock

-at the end of each quarter it is budgeted as a percentage of the sales units of the following quarter as follows:

-at the end of quarters 1 and 2: 25%

-at the end of quarters 3 and 4: 35%

Closing Stock of Raw Materials X

-is budgeted to fall by 300kg at the end of each quarter in order to reduce holdings by 1200kgs during 2018.

4. Product A Unit Data

-Material 4kgs@ R11.60 per kg

-Direct Labor 0.60 hrs @ R35 per hour

Your are required to prepare for each quarter:

a) Production budget. (5)

b) Material purchases budget in both quantities and value. (5)

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TOTAL MARKS 120
