



PROGRAM : BACCALAUREUS TECHNOLOGIAE
EXTRACTION METALLURGY.

SUBJECT : PROCESS ECONOMICS

CODE : MPI11-1

DATE : WINTER EXAMINATION
29 MAY 2019

DURATION : 8:30-11:30

WEIGHT : 40: 60

TOTAL MARKS : 120

ASSESSOR : T.SHEKEDE

MODERATOR : MR.D.ZHARARE 5176

NUMBER OF PAGES : 8

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 State the differences between:

- 1.1 Static budget and flexible budget. (1)
- 1.2 Total absorption costing. and marginal costing. (1)
- 1.2 Marginal physical product and marginal revenue product of labour. (1)
- 1.4 Inflation and hyper-inflation. (1)
- 1.5 Economic order quantity and economic batch quantity. (1)

2.0 Explain briefly four objectives of budgeting in a Metallurgical plant operation. (4)

3.0 A mineral processing company has two options to buy new equipment. It can both buy it now and pay R25000 (including financing charges) per month for the next 5 years or it can save R30 000 per month and buy the unit in 5 years' time. Money is worth 10% per year and the anticipated inflation rate is 12%. The quoted price today is R1.5 million. Which option should he choose? (Show all test working) (4)

4.0 A mining company decides to build additional houses for its employees at a cost of R4 250 000. The company will put a deposit of R950 000 with the building society and will be given bonds over a period of 20 years. The interest rate is 15% per annum amortized monthly. Calculate the monthly repayments of the bond to the nearest cent. (3)

5.0 Find the future value of an annuity of R250 per month for 10 years, if money is worth 7% compounded monthly. (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 2018-19 will be R250 000.

(a) Calculate the sales revenue required to achieve a target profit of R350 000. (2)

7.0 State and explain two theories that cause inflation in a country. (2)

8.0 Explain briefly four factors that affect productivity in a metallurgical plant operation. (3)

9.0 Draw a P.P.F curve of a company producing similar products and explain the law of increasing opportunity costs. (3)

10.0 Draw the Pareto curve and explain how the theory is used in inventory control systems in a production environment. (Use diagrams and text) (4)

11.0 Explain briefly the theory of comparative advantages. (2)

12.0 A metallurgical company proposes to lease equipment now at a cost of R20 million per year payable in advance at the beginning of each year starting this year. The lease covers 4 years .To renew the lease after 4 years for another 4 years will cost R25 million per year payable as before, but the supplier of the equipment is prepared to sell the equipment outright now at a cost of R70 million. If the company buys the equipment it will also have to pay for an overhaul costing R40 million after using the equipment for 4 years. The equipment will be obsolete after 8 years. The cost of capital to the company is 25% per year. Using the present value method determine if the company should lease or buy equipment. (4)

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 Based on a study of a metallurgical plant operation by a project team it is recommended that an amount of R480 000 be invested to upgrade the plant. It is estimated that the equipment to be installed will have an effective life of 15 years. What amount must be invested into the sinking fund each month to replace the equipment in 12 years' time if the invested company offers a 14% per annum interest compounded monthly, under the following conditions?

1.1.1 The inflation rate is expected to be 12% per annum. (5)

1.1.2 The inflation rate is now 12 % per annum is expected to increase by 1 % per annum. (5)

1.2 The project team had further estimated that there would be substantial savings in operational costs in the plant as shown in the following table below:

Period (Year)	Annual savings in costs
1	R98 000
2	R107 000
3	R110 000
4	R114 000
5	R110 000
6-7	R108 000
8-12	R106 000

The company expects a 22% return on capital invested. Based on the upgrade of the plant and the annual savings and the expected rate of return you are to calculate:

1.2.1 The salvage value of the equipment is to be at the end of 12 years to comply with required rate of return. (5)

1.2.2 If the equipment will be obsolete at the end of 15 years what would additional savings be to comply with required rate of return? (5)

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QUESTION 2

Your company has an average mark-up of 50%. It has sales of R2, 500,000 for the month of September 2019.

(a) Determine the gross profit for the month of September. (4)

(b) Determine the net profit if the fixed costs is R500, 000. (4)

(c) Determine the average sales price per ton if the variable cost is R80/ton. (4)

(d) Draw the cost volume profit analysis graph for this company and state three assumptions of the graph. (4)

(e) Determine the percentage increase in net profit if the sales were to increase by 12 %. (4)

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QUESTION 3

3.0 Diamond mine company has the following sales figures and forecast:

Table 1.0

Month.	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sales in tons.	1500	1800	300	500	1300	1500	1800	1600

20% of the sales are paid in 60days arrears, 50% are paid within 30days and the rest in cash. The selling price is R20000/t, labour cost R9000/t and is paid in the month of production. Material costs R6000/t and 30 days credit was negotiated. Overheads costs R5000000 per month and a long-term loan re-payment is set at R1500000/month. The yearly tax is due February and is estimated at R8000000. The company had R15000000 in cash on January 1st

(a) How much cash will it have on hand at the end of March? (10)

(b) State and explain the four advantages of cash flows. (3)

3.1 A manufacturing company produces 2 types of products X and Y. X can be sold for a profit of R300/product and Y at R100 /product. The company can afford to spend up to 40 hours per week working and takes six hours to make product X and three hours to make Y. Customer demand requires that he makes at least three times as many Y as compared to X. X takes up four times as much storage space as Y and there is space for at most four X each week. Formulate this problem as a linear programming problem and solve it graphically. (7)

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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 @ R35 per hour	R525

Actual Results

Production	140 units
Direct material purchase	8000 kgs at a cost of R300000

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Opening Stock Direct Material	1800 kgs
Closing Stock Direct Material	1150 kgs
Direct Wages	R6000 for 2100 hrs.

4.1.1 You are required to calculate all the variances and produce and budget variance report advising Management. (10)

4.2 Construct a network diagram (A.O.N) with earliest and latest due date scheduling for the tender of the construction of slimes pretreatment plant. (5)

Table 2.0

Activity	Time (days)	Immediate predecessor		
Laboratory trials	3	-		
Pilot plant design	5	1		
Pilot tenders	10	1		
Erection	6	1		
Commissioning	2	2		
Pilot plant trial	5	3,4		
Evaluation	3	5,6		
Slimes Pretreatment plant design	15	4		
Tenders and awarding	2	7,8		

4.2.1. Draw the latest due date scheduling bar chart for the project and indicate the critical path and the floats. (2)

4.2.2 Why do you use the earliest due date scheduling technique when you are implementing a project? (1)

4.2.3 State and explain two financial and non-financial models that can be used in a plant rehabilitation project. (2)

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QUESTION 5

5.1 A single product company sells its products at R60 per unit. In 2018, the company operated at margin of safety of 30%.The fixed costs amounted to R360 000 and the variable costs ratio to sales was 70%.In 2019,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 2019 to earn the same P/V ratio as in 2018.Assuming the same selling price R60 per unit in 2019, find the number units required to be produced and sold to earn the same profit as 2018. (10)

5.2 You work for a company, which expects to:

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- Earn a least 18 percent on its investments.
- Positive NPV.
- Pay-back period of less than 4 years.

Omega Year	Inflow	Outflow	Alpha Year	Inflow	Outflow
0	R0	R225000	0	R0	R300000
1	R0	R190000	1	R50000	R100000
2	R150000	R0	2	R15000	R0
3	R220000	R30000	3	R25000	R50000
4	R215000	R0	4	R25000	R0
5	R205000	R30000	5	R20000	R50000
6	R197000	R0	6	R18000	R0
7	R100000	R30000	7	R12000	R30000

You have to choose between two similar projects .The above information shows the cash flows for each project. The anticipated inflation is expected to be 12% per annum. Which of the two projects would you fund if the decision is based only on financial information? Why? (10)

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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 4200hrs and 300 000kg respectively in period X.The problem is to decide which products to manufacture to maximize profit. (5)

Table 3.0

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

(10)

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6.1 Rose of Sheron 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 4.0

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

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.

3. Product A Unit Data

-Material 4kgs@ R11.60 per kg

-Direct Labor 0.60 hrs @ R35 per hour

You 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
