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...Pursuing the Frontiers of Knowledge...

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OFFICE OF THE DEPUTY PRINCIPAL

ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS

UNIVERSITY EXAMINATIONS

2018 /2019 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR O BUSINESS

MANAGEMENT/BA.ECONOMICS/EDUCATION

BUSINESS

COURSE CODE:BBM 123

COURSE TITLE: BUSINESS MATHEMATICS II

DATE:18/04/2019

TIME: 2.00-5.00 PM

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**



THIS PAPER CONSISTS OF 4 PRINTED PAGES

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INSTRUCTIONS:-

- Answer Question **ONE** and any other **TWO** questions.
 - Question **ONE** carries **30 Marks**
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QUESTION ONE

Your company manufactures large scale items. It has been shown that the marginal (or variable) cost which is the gradient of the total cost curve is $(92-2X)$ ksh in thousands, where X is the number of units of output per annum. The fixed cost of kshs 800,000 per annum. It has also been shown that the marginal revenue, which is the gradient of the total revenue curve is $(112-2X)$ ksh in thousands

Required:

- Establish by integration the equation of the total cost curve. (5 marks)
- Establish by integration the equation of the total revenue curve. (5 marks)
- Establish the break-even situation for your company. (5marks)
- Determine the number of units of output that would
 - Maximize the total revenue and (5marks)
 - Maximize the total cost together with the maximum total revenue and total costs (5 marks)
- Assuming that your company cannot manufacture more than 60 units of output per annum, what interpretation can be put on the results you obtain in d? (a sketch of total revenue and cost curve will be helpful) (5 marks)

QUESTION TWO

Your Company uses a machine in its production department which costs kshs 12,000 at the beginning of 2019. The machine will be replaced after five year usage by a new machine at the end of 2024. During the five years of operation of the machine it is estimated that the net cash inflows at the beginning of each year will be as follows:

Year	2020	2021	2022	2023	2024
Net cash inflows (ksh)	6600	6000	4500	1000	2600

Required:

- If the machine is being purchased with a five year loan which is compounded annually at 15%, an amortization schedule for the five equal annual repayments of the loan (4 marks)
- If the kshs 12,000 debt, which is compounded annually at 15% is to be discharged in 2024 by a sinking fund method, under which equal annual deposits will be made into a fund paying 10% annually, produce the schedule for the sinking fund (4 marks)

- c) Calculate the net present value of the net cash flows over the five years of operations of the machine at the 10% and 15% discount rates (4 marks)
- d) Determine the internal rate of return and comment on and compare the three sets of results ignoring taxation with a view to making payment for the machine (4 marks)

QUESTION THREE

- a) Briefly explain two commercial industrial or business uses of index numbers(4 marks)
- b) A cost accountant has derived the following information about basic weekly wages(W) and the number of people employed (E) in factories of large chemical company

Basic weekly rates (E's) and number of employee in (100's)

Technical group of employees	JULY 1979		JULY 1980		JULY 1981	
	W	E	W	E	W	E
Q	60	5	79	4	80	4
R	60	2	65	3	70	3
S	70	2	85	2	90	1
T	90	1	110	1	120	2

- I. Calculate a laspeyres (base weights) (6 marks)
All-item index number for the July 1980 basic weekly wage rates month July 1979=100
- II. Calculate the paasche (current weights) all-item index number for the July 1981 basic weekly wage rates, month July 1979=100 (6 marks)
- III. Briefly compare your index numbers for the company with the official government figures for chemical and allied industries which are given below (4 marks)

Year annual averages	1979	1980	1981
Weekly wage rates (July 1976=100)	156.3	187.4	203.4

(Source employment gazette, November 1981)

QUESTION FOUR

- a) The cost of producing a quantity Q of a product is given by an equation of the form $C=aQ^2-bQ+c$ where a, b, c are constants.
It is observed that $Q=10, C=2900$, but if $Q=40, C=800$ or if $Q=100, C=2000$
- Determine a, b, c. (3 marks)
 - Plot your cost function for values of Q between 0 and 120 and use the plot to determine the quantity that should be produced to minimize the total production cost (3 marks)
 - The product is sold at ksh 20 per unit. Write down the revenue function and plot it on the same graph in your cost function. Determine the range of production quantities over which the company can make a profit. (3 marks)
 - Estimate the minimum price at which the product must be sold to avoid a loss (3 marks)



b) It is estimated that in 10 years time production costs will have increased by kshs 4000 (i.e.kshs 4000 is added to the cost function)

- I. Calculate the new total costs and find their net present values assuming an interest rate of 10% per year. Plot the net present value function on your graph and determine the production quantities for which real costs are the same. (4 marks)
- II. Estimate the minimum price that the product must be sold at in 10 years to avoid loss (4 marks)

QUESTION FIVE

The daily output on your company over a four week period is shown in the table below

Number of units of output					
	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	187	203	208	207	217
Week 2	207	208	210	206	212
Week 3	202	210	212	205	214
Week 4	208	215	217	217	213

Required:

- a) Using the additive time series model, establish the five-period moving average trend of output (4 marks)
- b) Display on a graph the actual data together with the trend figures (4 marks)
- c) Establish the daily deviations from the trend and use these to determine the average daily variations (4 marks)
- d) Forecast the daily output for the first two days of week five to the nearest unit of production (4 marks)
- e) Comment upon the accuracy of the forecast that you have made. (4 marks)
