MUEO

MOI UNIVERSITY

OFFICE OF THE DEPUTY VICE CHANCELLOR, ACADEMIC AFFAIRS, RESEARCH & EXTENSION

UNIVERSITY EXAMINATIONS

2014/2015 ACADEMIC YEAR

FIRST YEAR END OF SEMESTER EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF BUSINESS MANAGEMENT

EXAM CODE:- BBM 123

COURSE TITLE:- BUSINESS MATHEMATICS II

DATE:- 21ST APRIL, 2015 **TIME:- 9.00A.M. – 12.00NOON.**

INSTRUCTION TO CANDIDATES
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BBM 123: BUSINESS MATHEMATICS II
MAIN EXAMINATION

INSTRUCTIONS:-
- Answer Question ONE and any other THREE questions.
- Question ONE carries **25 Marks**
- Time allowed: **3 hours**

QUESTION ONE – Compulsory [25 marks]

a) Explain five uses of forecasts in business management giving examples in each case. **(5 marks)**

b) i) Ms. Mwangi expects to receive Shs. 750,000 at the end of the four- year contract with her employer. The discounting rate is 8%. Compute the present value of this amount. **(2 marks)**

   ii) Ms. Metto is saving Sh. 150,000 p.a. for the next five years for her trip to USA. Savings are made at the beginning of each year. The appropriate discounting rate is 10%. Compute the present value of the savings. **(2 marks)**

c) Demand function for a firm is given by:

$$P = 12 - 0.4Q$$

P is the price of the product, Q is the quantity demanded, and the total cost (C) is given by

$$C = 5 + 4Q + 0.6Q^2$$

At what price and quantity will the firm have maximum profit? If the firm aims at maximizing sales, what price should it charge? **(4 marks)**

d) A trader bought an electronic device at Ksh. 2,000. He later sold the device at Kshs. 2,500. Determine the percentage profit on:
   i) Selling price. **(1 marks)**
   ii) Cost price. **(1 marks)**

e) The same supermarket then decided to investigate the spending habits of husbands and wives. They were thinking of starting late 'family shopping' evenings and as an experiment asked both partners to shop separately. The amounts spent by 14 husbands and their wives were selected randomly from all the pairs with the following results: Determine the coefficient of correlation and comment on the results.

Family	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Husband (Shs)	9	20	9	9	6	16	20	3	15	0	18	3	16	23
Wife (Shs)	3	30	3	23	2	17	29	5	18	6	32	3	26	14

(10 marks)

QUESTION TWO (15 MARKS)

a) Highlight Five elements of a good forecast. (5 marks)

b) How much must be invested now to realise Kshs.14 000 five years from now if the money is invested at: (4 marks)

i). 12% p.a. compounded semi-annually

ii). 11% p.a. compounded quarterly

c) Digital Ltd. Manufactures and sells floppy disks at Nairobi Industrial Area. The average cost (AC) and Average Revenue (AR) (in thousands of shillings) of producing x floppy disks are given by the following functions:

$$AC = \frac{1}{2}x^2 - \frac{5}{2}x + 50 + \frac{500}{x}$$

and

$$AR = 800 - 2x^2$$

Where x is the number of floppy disks produced

Required:

i) The profit function. (2 marks)

ii) The number of floppy disks required to maximize profit. (2 marks)

iii) The maximum profit. (2 marks)

QUESTION THREE (15 MARKS)

a) A group of consultants have estimated the demand curve of a clients firm to be;

$$AR = 200 - 8Q$$

Where AR is average revenue in millions of shillings and Q is the output in units. Investigation of the client firm's cost profile shows that marginal cost (MC) is given by:

$$MC = Q^2 - 28Q + 211 (\text{In million shillings})$$

Further investigations have shown that the firm's cost when not producing output is sh.10 million.

Required:

i) The equation of total cost.

ii) The equation of total revenue.

iii) An expression for profit.

iv) The level of output that maximizes profit.

v) The equation of marginal revenue. (10 marks)

b) XYZ Ltd has a four year project which is expected to generate the following cash flows.

Year	1	2	3	4
Cash Flows	20000	60000	50000	3000

The cost of capital is 10% compute the present value of the cash flow. (5 marks)

plain the components of a time series.

The following set of data represents the quarterly number of overdrawn accounts in a branch f a bank over three years.

Year	Quarter	Over drawn Accounts
2012	1	200
	2	80
	3	50
	4	100
2013	1	220
	2	100
	3	60
	4	130
2014	1	250
	2	110
	3	70
	4	40

i) Calculate four quarterly moving average trend values.

ii) Forecast the number of overdrawn accounts in each quarter of the year 2015.

(11 Marks)

QUESTION FIVE (15 MARKS)

a) A firm borrows Kshs. 200,000 to be repaid in five equal installments at the end of the next Five years. The bank is to receive 18% interest on the loan balance that is outstanding at the beginning of the year. Prepare a loan amortization schedule. **(6 marks)**

b) Evaluate

i). $\int_1^3 (3x^2 + 3)dx$

ii). $\int_0^5 (x + 15)dx$

(4 marks)

c) An employee earns a basic monthly salary of Ksh. 55,000. He is also entitled to a house allowance of Ksh. 25,000. His income is taxed as per the table below.

Annual Income	Tax Rate (%)
First Kshs. 121,968	10
Next Kshs. 114,912	15
Next Kshs. 114,912	20
Next Kshs. 114,912	25
Over Kshs. 466,704	30

Personal relief is Kshs. 1162 per month.

Determine:

i) Total tax payable

ii) Net monthly pay.   **(5 marks)**

QUESTION SIX (15 MARKS)   **(4 Marks)**

a) Differentiate between regression and correlation.

b) In the following set of data, Y represents the number of annual claims for food damage received b an insurance company (in thousands) and X represents the annual rainfall (in centimeters) over a period of 10 years.

X	Y
0.0	110
2.5	250
2.2	250
0.0	150
19.5	450
2.5	200
2.0	210
2.0	230
3.1	290
0.0	100

i).   Find the equation of the least squares regression line.   **(8 Marks)**

ii).   Use your equation above to determine the insurance claims in a year 350 cm of rainfall.
                                                                              (3 Marks)

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