



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF BUSINESS AND ECONOMICS**  
**UNIVERSITY EXAMINATION FOR DIPLOMA IN BUSINESS ADMINISTRATION**  
**1<sup>ST</sup> YEAR 1<sup>ST</sup> SEMESTER 2016/2017 ACADEMIC YEAR (PART-TIME)**

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**COURSE CODE: BBM 2112**

**COURSE TITLE: BUSINESS MATHEMATICS**

**EXAM VENUE: LR**

**STREAM: (DBA)**

**DATE:**

**EXAM SESSION:**

**TIME: 1 ½ HOURS**

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**Instructions:**

1. Answer **Question ONE (COMPULSORY)** and **ANY other 2** questions.
2. Candidates are advised not to write on the question paper.
3. Candidates must hand in their answer booklets to the invigilator while in the examination room.

## QUESTION ONE

- a) The first term of an Arithmetic progression is -12 and the last term is 40. If the sum of the progression is 196, find the number of terms and the common difference (6marks).
- b) Find the 3<sup>rd</sup>, 10<sup>th</sup> and 21<sup>st</sup> terms of a geometric progression which begins 3+6+..... (4 marks).
- c) With relevant illustrations, differentiate between the following:
- Simple interest and compound interest. (4marks)
  - Ordinary annuity, annuity due and perpetuity. (4marks)
- d) Erick expects to receive kshs.400, 000.00 from a bank at the end of 4years from now. The amount is compounded quarterly at an interest rate of **10%** per annum. What is the present value of this amount? (4marks)
- e) i) Differentiate the equation:  $Y = (x^2 + 1)(x^2 - 3)$  (5marks)
- ii) Evaluate:

$$\int_0^3 (2x^3 + 3x^2 - 4x) dx \quad (3\text{marks})$$

## QUESTION TWO

- a) Company XYZ estimates its Total Cost (TC) and Total Revenue ((TR) functions to be:  
 $TC = 4q^2 + 400q + 1000$   
 $TR = 600q - 3q^2$
- Required:
- Obtain the marginal cost (MC) and the marginal revenue (MR) functions of the company (2marks)
  - Obtain the profit maximizing output function (2marks)
  - Find the maximum profit the company should expect. (6marks)
- b) Njenga firm manufactures large scale units .Its marginal cost curve,  $MC = 92 - 2x$ , while it's marginal revenue curve,  $MR = 112 - 2x$ . Where;  $x$ =number of units of output. The total costs are kshs.800 per annum.

### Required

- Find the equation of the Total Cost (TC) curve (2marks)
- Find the equation of the Total Revenue (TR) curve (2marks)
- Establish the break-even point of the company (4marks)
- Determine the number of units of output that will maximize total revenue (2marks)

### QUESTION THREE

a) Briefly explain the meaning of the term Internal Rate of Return (IRR) and how it is computed. (5marks)

b) A firm's cost of capital is 10% and its cash flow estimates for two projects B and C are given below:-

YEAR	PROJECT B	PROJECT C
0	(2,240,000)	(2,400,000)
1	1,600,000	1,600,000
2	400,000	880,000
3	640,000	480,000
4	1,040,000	320,000
5	1,576,000	80,000

The projects are expected to have a lifespan of 5 years.

#### Required :

a) Calculate the Net Present Values (NPVs) for the two projects

b) Advise the firm on the project it should accept and justify your choice of the project if they are:

i) Mutually exclusive projects

ii) Independent projects (15marks)

### QUESTION FOUR

Arnold recently acquired a piece of land in Narok. A property Development Company has offered him **kshs. 300,000** for the piece of land. He has to make a decision on whether to cultivate the piece of land or to sell it to the property development company. If he decides to cultivate the land, there is a probability of getting a high, medium or low harvest. The expected net income for each of the above states of harvest is shown below:-

State of harvest	Net income ( Kshs)
High	500,000
Medium	100,000
Low	(20,000)

From past experience, there is a 10% probability that the harvest will be low, a 30% probability that the harvest will be medium and 60% probability that the harvest will be high.

Arnold can engage an agricultural expert to carry out a survey on the productivity of the land which will cost him Kshs. 30,000. The agricultural expert has given the following information as to the reliability of such surveys.

Results of the survey

	States of harvest			Total
	High	Medium	Low	
Accurate	0.35	0.10	0.05	0.5
Not accurate	0.25	0.10	0.15	0.5
	0.6	0.2	0.2	0.1

Required:

- i) Construct a decision tree for the above problem
- ii) Calculate the Expected Monetary Value (EMV) for each decision
- iii) Which decision do you recommend Arnold to take and why? (20 marks)

### QUESTION FIVE

The following information regards two securities and return of the market portfolio

Probability	Return of security M	Return of security N	Return of market portfolio
0.7	20%	10%	22%
0.2	16%	8%	18%
0.3	14%	6%	16%

**Note** that the risk free rate of return is 5%.

Required

- a) Calculate the Beta of each security and the portfolio beta based on equal investment.
- b) Determine the required rate of return of each security and that of the portfolio. (20marks)

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