



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN ENGINEERING AND ELECTRICAL ENGINEERING

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECU 402: ENGINEERING ECONOMICS

DATE: 10/11/2020

TIME: 8:30 – 10:30 AM

---

## INSTRUCTIONS:

Answer Question ONE and Any Other Two Questions

### QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Outline the fundamental principles of engineering economics. (7 marks)
- b) Graphically represent how to determine optimal bundles for goods and services for a rational consumer. (7 marks)
- c) Distinguish between the following pairs:
  - i) Fixed cost and variable cost. (2 marks)
  - ii) Cash cost and book cost. (2 marks)
  - iii) Sunk cost and opportunity cost. (2 marks)
- d) Contrast and compare present worth (PW) and internal rate of return (IRR) as methods of evaluating engineering projects for investment. (10 marks)

### QUESTION TWO (20 MARKS)

- a) If you were in charge of a large multinational firm, under what conditions would you build or operate a manufacturing facility in an underdeveloped country? Explain in details (4 marks)
- b) Discuss in detail the legal and political foundation of Global Business management (4 marks)

c) Explain how expanding globally allows firms to increase its profitability (4 marks)

d) There are two alternatives to perform a job as follows;

	A	B
Initial cost	15000	25000
Salvage value	2500	5000
Service life	4	6
Annual operating and maintenance	3000	1500

Minimum rate of return is 15% before taxes.

- a) Which do you recommend using equivalent uniform annual cost? (2 marks)
- b) At what salvage value for A are two alternatives equal? (2 marks)
- c) At what maintenance and operating cost per year for B are the two equal? (2 marks)
- d) At what service life for B are the two alternatives equal? (2 marks)

### QUESTION THREE (20 MARKS)

- a) Discuss the different methods used to evaluate alternative projects. (10 marks)
- b) A cell phone company has a fixed cost of \$1,500,000 per month and a variable cost of \$20 per month per subscriber. The company charges \$39.95 per month to its cell phone customers.
- i) What is the breakeven point for this company? (3 marks)
- ii) The company currently has 73,000 subscribers and proposes to raise its monthly fees to \$49.95 to cover add-on features such as text messaging, song downloads, game playing and video watching. What is the new breakeven point if the variable cost increases to \$25 per customer per month? (3 marks)
- iii) If 10,000 subscribers will drop their service because of the monthly fee increase in Part (b), will the company still be profitable? (4 marks)

#### QUESTION FOUR (20 MARKS)

Assume a project costs shs 30,000 and yields the following uncertain cash flows:

Year	Cash flow
1	12,000
2	14,000
3	10,000
4	6,000

Assume also that the certainty equivalent co-efficient have been estimated as follows

$a_0$	=	1.00
$a_1$	=	0.90
$a_2$	=	0.70
$a_3$	=	0.50
$a_4$	=	0.30

The risk-free discount rate is given as 10%

#### Required:

Compute the NPV of the project

#### QUESTION FIVE (20 MARKS)

a) Given that  $i = 10\%$  Show that

$$FVIF_{AND_{i,4}} = [FVIF_{i,3} + FVIF_{i,2} + FVIF_{i,1} + FVIF_{i,0}] (1+i) \text{ without using tables.}$$

(10 marks)

b) When valuing a firm, it's important to describe the business entity under consideration.

Discuss the three important aspects that help describe a business entity (10 marks)