



MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ELECTRICAL AND ELECTRONICS ENGINEERING)

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECU 402: ENGINEERING ECONOMICS

DATE: _____ **TIME:** _____

INSTRUCTIONS

Answer question ONE and any other two questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Outline the fundamental principles of engineering economy (7 marks)
- b) List the elements of engineering economics analysis procedure (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) Optimizing a design with respect to cost is a four-step process. Outline the steps. (7 marks)
- b) Mrs. Mwangi will need KES 1,500,000 in five years to pay for a major overhaul on her tractor engine. She has found an investment that will provide a 7% return on her invested funds. How much does Betty need to invest today so she will have her overhaul funds in five years? (5 marks)
- c) Enumerate various situations in which engineering economics can play a role. (8 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

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

(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)