MACHAKOS UNIVERSITY

University Examinations for 2021/2022 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: 16/12/2021 **TIME: 8.30-10.30 AM**

INSTRUCTIONS:

(i) Answer question ONE and any other two questions

(ii) Show ALL your workings clearly

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Discuss the following concepts as used in Economics (Use well labeled diagrams where necessary):

   i) Benefit Cost Ratio (2 marks)

   ii) Marginal Rate of Substitution (2 marks)

   iii) Net Present Value (2 marks)

   iv) Average Cost (2 marks)

   v) Returns to Scale (2 marks)

b) The county government of Machakos is very serious about drugs. Possession of drugs is illegal and is severely penalized. However, a black market exists which the county government has failed to dismantle despite serious attempts. The county's health minister is worried about the situation. In early 2018, a consultant working with health ministry suggested that the government should increase the price of a pack of cigarettes from Kshs 200 to Ksh 600. A survey conducted in December 2018 suggested that over the year, the quantity demanded of marijuana decreased from 2000 kgs per day to just 800kgs.

   Calculate the cross-price elasticity of demand and discuss why the policy has proved so effective. (5 marks)

c) Discuss any two methods that can be used to calculate depreciation. For each method, highlight one advantage and limitation of using the said method. (5 marks)

d) Discuss four monetary tools that the Central authorities can use to control inflation in a Country. (5 marks)

e) Explain any two determinants of elasticity of demand. (5 marks)

QUESTION TWO (20 MARKS)

a) An investment has infinite life and makes annual payments of $3000 for the first 5 years and $ 1600 per year thereafter. Using 6% interest per annum, compute the present worth of the annual disbursements. (10 marks)

b) An asset is purchased for $100,000. The estimated life is 7 years and the salvage value is $15,000. Assuming the item is depreciated via straight-line method; find the book value of the asset at the end of 3 years. (10 marks)

QUESTION THREE (20 MARKS)

a) The following data has been developed for Crown Company, the manufacturer of an advanced line of adhesive:

State of nature	**Probability**	**Market Return** $\mathbf{R_m}$	**Return for the firm** $\mathbf{R_j}$
1	0.1	-0.15	-0.30
2	0.3	0.05	0.00
3	0.4	0.15	0.20
4	0.2	0.20	0.50

The risk-free rate is 6%. Find:

i) The expected market return $E(R_m)$ (3 marks)

ii) The variance of the market return $\sigma^2 (R_m)$ (3 marks)

iii) The expected return for Crown Company E (R_1) (3 marks)

iv) Given that cov (R_j, Rm)= 0.0215, find B_j (3 marks)

v) Using the above information state the CAPM (3 marks)

vi) What is required for Crown Company? How does it compare with its expected return? (3 marks)

b) Clearly distinguish between ordinary annuity and annuity due (2 marks)

QUESTION FOUR (20 MARKS)

a) Interest on a debt is 12% per year compounded monthly. Compute the effective annual interest rate. (5 marks)

b) If a one-time amount of $500 is invested at an annual interest rate of 8% (compounded annually), find its future worth at the end of 30 years. (5 marks)

c) A new sander costs $3,600 and has an annual maintenance cost of $400. The salvage value after 7 years is $600. Assuming an annual interest rate of 10%, what is the present worth? (5 marks)

d) A solar heating system costs $10,000, has an estimated life of 10 years and a scrap value of $1500. Assuming no inflation and an interest rate of 4%, what uniform annual amount must be invested at the end of each of the 10 years in order to replace the machine? (5 marks)

QUESTION FIVE (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)