MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF BUSINESS, ECONOMICS AND HOSPITALITY AND TOURISM MANAGEMENT

DEPARTMENT OF ECONOMICS

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ELECTRICAL ENGINEERING)

BACHELOR OF SCIENCE (MECHANICAL 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 (3 marks)

b) List the elements of engineering economics analysis procedure (3 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. (4 marks)

e) Given $Q=100_K{}^{0.5}L^{0.5}$, C=Ksh 1200, w=Ksh 30 and r=40.

i. Determine the quantify of labor and capital that the firm should use in order minimize the cost (5 marks)

ii. What is the level of output produced at this level? (4 marks)

iii. Highlight the properties of well-behaved isoquant (5 marks)

QUESTION TWO (20 MARKS)

a) Distinguish between a monopoly market and an oligopoly market. Provide an example for each. (4 marks)

b) Explain any two determinants of elasticity of demand. (2 marks)

c) A company has purchased equipment whose first cost is KES 1,000,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of various years using the straight line method of depreciation. (6 marks)

d) What would be the consequence in the Oil and motor vehicle market when Oil producing and Export Countries (OPEC) decide to increase the price of fuel? (4 marks)

e) With the help of a well labeled diagram, explain the effect(s) of each of the following factors on the market prices;

   i. Adoption of better technology in production process. (2 marks)

   ii. A decrease in the price of a substitute good. (2 marks)

QUESTION THREE (20 MARKS)

a) Miracle Company Ltd projects good things for their new weight loss pill, Loselt. Revenues this year are expected to be KES 1.1 billion, and the company believes they will increase 15% per year for the next 5 years. What are the present value and equivalent annual amount for the anticipated revenues? The company uses an interest rate of 20%. (7 marks)

b) ARKO Oil Company purchased two large compressors for KES 12,500,000 each. One compressor was installed in the firm's Mombasa refinery and is being depreciated by double declaiming depreciation method. The other compressor was placed in the Lamu refinery, where it is being depreciated by straight-line depreciation method with zero salvage value. Assume the company pays corporate income taxes each year and the tax rate is constant. The corporate accounting department noted that the two compressors are being depreciated differently and wonders whether the corporation will wind up paying more income taxes over the life of the equipment as a result of this. What do you tell them? Illustrate and explain. (7 marks)

c) Venus Computer can produce 23,000 personal computers a year on its daytime shift. The fixed manufacturing costs per year are KES 200,000,000 million and the total labour cost is KES 910,900,000. To increase its production to 46,000 computers per year, Venus is considering adding a second shift. The unit labour cost for the second shift would be 25% higher than the day shift, but the total manufacturing costs would increase only to KES 240,000,000.

i) Compute the unit manufacturing cost for the daytime shift. (3 marks)

ii) Would adding a second shift increase or decrease the unit manufacturing cost at the plant? (3 marks)

QUESTION FOUR (20 MARKS)

a) Distinguish between a monopoly market and an oligopoly market. Provide an example for each. (4 marks)

b) Explain any two determinants of elasticity of demand (2 marks)

c) A company has purchased equipment whose first cost is KES 1,000,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of its lifetime is 20,000. Determine the depreciation charge and book value at the end of various years using the straight line method of depreciation. (6 marks)

d) What would be the consequence in the Oil and motor vehicle market when Oil Producing and Export Countries (OPEC) decide to increase the price of fuel? (4 marks)

e) With the help of a well labeled diagram, explain the effect(s) of each of the following factors on the market prices;

i. Adoption of better technology in production process (2 marks)

ii. A decrease in the price of a substitute good. (2 marks)

QUESTION FIVE (20 MARKS)

a) Steamer purchased a new pump for KES 750,000. They borrowed the money for the pump from their bank at an interest rate of 15% per month and will make a total of 24 equal, monthly payments. How much will Steamer's monthly payments be? (6 marks)

b) A certain engineering firm borrowed KES 10,000,000 form a local bank, which charges them an interest rate of 7% per year. If the firm pays the bank KES 800,000 per year, how many years will it take to pay off the loan? (6 marks)

c) The cash flows (in KES) for three alternatives are as follows:

Year	A	B	C
0	-500	-600	-900
1	-400	-300	0
2	200	350	200
3	250	300	200
4	300	250	200
5	350	200	200
6	400	150	200

Based on payback, which alternative should be selected? (8 marks)