



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

FOURTH YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL
MECHANICAL AND INDUSTRIAL ENGINEERING AND
ELECTRICAL AND COMMUNICATION
ENGINEERING**

COURSE CODE: ECC 404

COURSE TITLE: ECONOMICS FOR ENGINEERS

DATE: TUESDAY 3RD NOVEMBER 2020 TIME: 9.00 – 11.00 AM

INSTRUCTIONS:

1. This paper contains FIVE questions
2. QUESTION ONE IS COMPULSORY
3. Attempt any TWO questions from the remaining.
4. Question ONE carries 30 marks and the REST 20 marks each.
5. Examination duration is 2 (TWO) HOURS

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE (30Marks)

- a) A publishing company plans to publish a book. It finds from the sales data of other publishers of similar books that the demand function for the book can be expressed as $Q = 5000 - 5P$; where Q is good demanded and P is the price of the good. Find out:
- Number of books sold when $P = \text{Kshs. } 25$ **(2 Marks)**
 - Price for selling 2,500 copies **(2 Marks)**
 - Price for zero sales **(2 Marks)**
- b) Suppose a short – run production function is given by:
 $Q = 10L + 15L^2 - L^3$, where Q is good produced and L is the labour employed. Tabulate number of workers employed, total product produced, marginal product and average product from zero to twelve workers. Show regions of increasing returns, diminishing returns and negative returns **(24 Marks)**

QUESTION TWO (20Marks)

The chief engineer of refinery operations is not satisfied with the preliminary design for storage tanks to be used as part of a plant expansion programme. The engineer who submitted the design was called in and asked to reconsider the overall dimensions in the light of an article in the *Chemical Engineer*, entitled “How to size future process vessels?” The original design submitted called for 4 tanks, 5.2 m diameter and 7 m in height. From a graph of the article, the engineer found that the present ratio of height to diameter of 1.35 is 111% of the minimum cost and that the minimum cost for a tank was when the ratio of height to diameter was 4:1. The cost for the tank as originally submitted was estimated to be Kshs. 900,000. What are the optimum tank dimensions if the volume remains the same as for the original design? What total savings may be expected through the redesign?

QUESTION THREE (20Marks)

- a) A person received Kshs.100, 000 from the bank after ten years which had been compounded annually. Determine the amount he deposited in the bank. Interest rate offered was 15% per annum **(6 Marks)**.
- b) An engineer has two bids for an elevator to be installed in a new building. The details of the bids for the elevators are as follows:

Bid	Engineer’s estimates		
	Initial cost (Kshs)	Service life(years)	Annual operations(Kshs)
Alpha Elevator Inc.	4,000,000	15	580,000
Beta Elevator Inc.	5,000,000	15	360,000

Determine which bid should be accepted, based on the present worth method of comparison assuming 25% interest rate, compounded annually **(14 Marks)**

QUESTION FOUR (20Marks)

- a) A manufacturer of TV buys TV cabinet at Kshs. 5,000 each. In case the company makes it within the factory, the fixed and variable costs would be Kshs. 4,000,000 and Kshs. 3,000 per cabinet respectively. Should the manufacturer make or buy the cabinet if the demand is 1,500 TV cabinets? Use Break – even Analysis method to solve the problem. **(5 Marks)**
- b) A company has purchased equipment whose first cost is Kshs. 1,000,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of its lifetime is Kshs. 200,000. Determine the depreciation charge and book value at the end of various years using the sum of the year's digits depreciation method.
(15 Marks)

QUESTION FIVE (20Marks)

- a) List and discuss the Macroeconomic policies affecting the overall performance of the economy of a country **(12Marks)**
- b) Explain the following terms in relation to economics
- i. Market Price **(2 Marks)**
 - ii. Factor Cost **(2 Marks)**
 - iii. Define and distinguish the following terms **(4 Marks)**
 - i. A good
 - ii. A service

Compound Interest Factors

25%

Single Payment		Uniform Payment Series				Arithmetic Gradient		n
Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Capital Recovery Factor	Compound Amount Factor	Present Worth Factor	Gradient Uniform Series	Gradient Present Worth	
Find <i>F</i> Given <i>P</i> <i>F/P</i>	Find <i>P</i> Given <i>F</i> <i>P/F</i>	Find <i>A</i> Given <i>F</i> <i>A/F</i>	Find <i>A</i> Given <i>P</i> <i>A/P</i>	Find <i>F</i> Given <i>A</i> <i>F/A</i>	Find <i>P</i> Given <i>A</i> <i>P/A</i>	Find <i>A</i> Given <i>G</i> <i>A/G</i>	Find <i>P</i> Given <i>G</i> <i>P/G</i>	
1.2500	0.8000	1.0000	1.2500	1.000	0.800	0.000	0.000	1
1.5625	0.6400	0.4444	0.6944	2.250	1.440	0.444	0.640	2
1.9531	0.5120	0.2623	0.5123	3.813	1.952	0.852	1.664	3
2.4414	0.4096	0.1734	0.4234	5.766	2.362	1.225	2.893	4
3.0518	0.3277	0.1218	0.3718	8.207	2.689	1.563	4.204	5
3.8147	0.2621	0.0888	0.3388	11.259	2.951	1.868	5.514	6
4.7684	0.2097	0.0663	0.3163	15.073	3.161	2.142	6.773	7
5.9605	0.1678	0.0504	0.3004	19.842	3.329	2.387	7.947	8
7.4506	0.1342	0.0388	0.2888	25.802	3.463	2.605	9.021	9
9.3132	0.1074	0.0301	0.2801	33.253	3.571	2.797	9.987	10
11.642	0.0859	0.0235	0.2735	42.566	3.656	2.966	10.846	11
14.552	0.0687	0.0184	0.2684	54.208	3.725	3.115	11.602	12
18.190	0.0550	0.0145	0.2645	68.760	3.780	3.244	12.262	13
22.737	0.0440	0.0115	0.2615	86.949	3.824	3.356	12.833	14
28.422	0.0352	0.0091	0.2591	109.687	3.859	3.453	13.326	15
35.527	0.0281	0.0072	0.2572	138.109	3.887	3.537	13.748	16
44.409	0.0225	0.0058	0.2558	173.636	3.910	3.608	14.108	17
55.511	0.0180	0.0046	0.2546	218.045	3.928	3.670	14.415	18
69.389	0.0144	0.0037	0.2537	273.556	3.942	3.722	14.674	19