

25

BTB 441



*(University of Choice)*

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

**MAIN CAMPUS**

**UNIVERSITY SPECIAL / SUPPLEMENTARY  
EXAMINATIONS  
2021 / 2022 ACADEMIC YEAR**

**FOURTH YEAR FIRST SEMESTER EXAMINATIONS**

**FOR THE DEGREE  
OF  
BACHELOR OF TECHNOLOGY  
IN  
BUILDING CONSTRUCTION**

**COURSE CODE: BTB 441  
COURSE TITLE: ENVIRONMENTAL IMPACT AUDIT**

**DATE: 4<sup>TH</sup> OCTOBER 2022 TIME: 3 – 5 P.M**

---

**INSTRUCTIONS:**

1. This paper contains FIVE Questions
2. Answer FOUR Questions only
3. Marks for each question are indicated in the parenthesis.
4. It is in the best interest of the candidate to write legibly
5. Examination duration is **2 Hours**

MMST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

---

**QUESTION ONE**

**(17½ Marks)**

Explain the relevance of Environmental Impact Assessment (EIA) in achieving sustainable development

**QUESTION TWO**

**(17½ Marks)**

Describe the legal and institutional framework for EIA in Kenya and how it is related to other critical sectors of the economy

**QUESTION THREE**

**(17½ Marks)**

The building and construction industry in Kenya is complex. Explain the interaction of this industry with the environment

**QUESTION FOUR**

**(17½ Marks)**

Describe the tools used in conducting EIA

**QUESTION FIVE**

**(17½ Marks)**

- a) Explain the relationship between EIA and Environmental Audit using relevant examples/case studies [10 marks]
- b) Describe how computer applications can aid in conducting EIA [7½ marks]

----END----

30

CSE 421



(University of Choice)

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

MAIN CAMPUS

**UNIVERSITY SEPCIAL/SUPPLEMENTARY EXAMINATIONS  
2021/2022 ACADEMIC YEAR**

**FOURTH YEAR FIRST SEMESTER EXAMINATIONS  
FOR THE DEGREE  
OF  
BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL  
ENGINEERING**

**COURSE CODE: CSE 421**

**COURSE TITLE: FOUNDATION ENGINEERING**

**DATE: 4<sup>TH</sup> OCTOBER 2022**

**TIME: 12- 2 P.M**

**INSTRUCTIONS:**

1. This paper consists of **FIVE** questions
2. Answer question **ONE** and **ANY** other **THREE** questions
3. All symbols have their usual meaning unless otherwise stated

MMUST observes **ZERO** tolerance to examination cheating

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

**Question ONE {COMPULSORY (25 marks)}**

- a) Give 2 scenarios in which it might be economical to use pile foundations (2 marks)
- b) In soil sampling, describe the Standard Penetration and Static Cone Penetration test as used in sub-surface exploration (2 marks)
- c) With respect to foundation settlement, explain the following considerations in foundation design
- Foundation in sand and silt (2 Marks)
  - Collapsible soils (2 Marks)
- d) Give two limitations of Prandtl's analysis of soil bearing pressure and two correction factors in Meyerhof model (4 Marks)
- e) Give 3 disadvantages of use of piles in construction (3 Marks)
- f) A 250 mm square column carries a dead load ( $G_k$ ) of 950 kN and imposed load ( $Q_k$ ) of 250 kN. The weight of the footing is estimated at 100kN and the safe bearing capacity of the soil is 180 kN/m<sup>2</sup>. Determine the size of the footing and the maximum moment at the face of the column assuming the following material strengths:
- $f_{cu}=25\text{N/mm}^2$
  - $f_y=460\text{N/mm}^2$
- (10 marks)

**Question TWO (15 marks)**

- a) Describe the stability conditions to be considered in the design of retaining walls (3 marks)
- b) With reference to foundation design, explain the following;
- i. Considerations when designing foundations in sand and silt (2 Marks)
  - ii. Corrosion protection of the foundation works (2 Marks)
- c) Design a cantilever retaining wall (T type) to retain earth for a height of 4m. The backfill is horizontal. The density of soil is 18kN/m<sup>3</sup>. Safe bearing capacity of soil is 200 kN/m<sup>2</sup>. Take the Co-efficient of friction between concrete and soil as 0.6. The angle of repose is 30°.
- Check the stability of the wall against overturning and sliding (8 marks)

**Question THREE (15 marks)**

- a) While executing foundation works, explain how the following may cause environmental pollution (2 marks)
1. Soil boring through sanitary landfills (2 marks)
  2. River and marine structures (2 marks)
  3. Pile installation (2 marks)
- b) Classify pile foundations based on the method of installation (2 marks)
- c) Give two assumptions in the Terzaqui model of analysis of soil bearing capacity (2 Marks)
- d) A column 300 mm×200 mm carries a dead load of 600 kN and an imposed load of 280 kN. The safe bearing pressure is 200 kN/m<sup>2</sup>. Assume the weight of the base to be 100kN. Determine the base dimensions. (5 marks)

**Question FOUR (15 marks)**

- a) Describe two likely consequences of a raised water table on a structure. Suggest two possible remedial action to mitigate the effects of the raised water table. (4 Marks)
- b) Give 3 advantages of the use of vinyl sheet piles as a retaining wall (3 Marks)
- c) With the aid of a sketch, explain the source of stability for an L-Shaped cantilever retaining wall (3 Marks)
- d) A structure has two columns each 350 mm square and are spaced at 2.5 m centers. The width of the base is not to exceed 2.0 m and the safe bearing pressure of the foundation soil is 180 kN/m<sup>2</sup>. The materials are grade 35 concrete and grade 460 reinforcement. The loading conditions on the two columns are as follows;

Column 1 Dead load 300 kN, imposed load 200 kN

Column 2 Dead load 400 kN, imposed load 200 kN

Assuming the weight of the base is 100kN and the thickness is 500mm, determine the size of the base (5 marks)

**Question FIVE (15 marks)**

- a) In soil sampling, describe how the following uncertainties can be minimized;
1. Random nature of materials
  2. Equipment system processes (4 Marks)
- b) Outline the importance of site reconnaissance in subsurface exploration (3 Marks)

c) A 2 meter square footing is to be placed at distance of 2m below the surface of a saturated clay soil. The water table is located a distance of 1.0m below the ground surface. The Soil properties are as follows:

- saturated density = 1.65Mg/m<sup>3</sup>
- undrained cohesion  $c_u$  = 100kN/m<sup>2</sup>
- undrained friction angle  $\phi_u$  = 0°
- drained cohesion  $c_d$  = 15kN/m<sup>2</sup>
- drained friction angle  $\phi_d$  = 35°

Determine the allowable bearing capacity for the footing for long term conditions. (8 marks)

Terzaghi's Bearing Capacity Factors.

$\phi$	$N_c$	$N_q$	$N_\gamma$
0	5.7	1	0
5	7.3	1.6	0.5
10	9.6	2.7	1.2
15	12.9	4.4	2.5
20	17.7	7.4	5
25	25.1	12.7	9.7
30	37.2	22.5	19.7
35	57.8	41.4	42.4
40	95.7	81.3	100.4
45	172.3	173.3	297.5
48	258.3	287.9	780.1