



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

MAIN CAMPUS

**SUPPLEMENTARY UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

**FIFTH YEAR SECOND SEMESTER SUPPLEMENTARY
EXAMINATIONS**

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL
ENGINEERING**

COURSE CODE: CSE 552

**COURSE TITLE: GROUNDWATER ABSTRACTION AND
RECHARGE**

DATE: FRIDAY 22ND JANUARY 2021 TIME: 8.00 – 10.00 AM

INSTRUCTIONS:

1. This paper contains **FOUR** questions
2. Answer question **ONE** (compulsory) and any other **TWO** question
3. Marks for each question are indicated in the parenthesis.
4. Examination duration is **2 Hour**

MMUST observes **ZERO** tolerance to examination cheating

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

QUESTION 1 [30Marks]

- (a) Discuss the effects of groundwater recharge on the natural groundwater system and its environment [15 marks]
- (b) Highlight the factors to be considered for groundwater artificial recharge [10 Marks]
- (c) A well having a static water level 12m below the ground level is to be pumped at a discharge of $65\text{m}^3/\text{h}$ for a drawdown of 8.0m. Water has to be delivered direct to a point 30m above ground level. Friction losses through the pipes and bends are estimated to be 18% of static water level. Determine the H.P of the pump required, assume an overall efficiency of 65% (motor, pump and system) and peak hour demand of 1.5 times the average. [5 Marks]

QUESTION 2 [20 Marks]

- (a) Discuss the direct circulation hydraulic rotary method in drilling a well and highlight its advantages [10 marks]
- (b) Discuss induced-recharge method as an artificial recharge to groundwater [10 marks]

QUESTION 3 [20Marks]

Discuss the Screen sizing and role played by gravel in coarse-textured unconsolidated aquifer to enhance screening [20 Marks]

QUESTION 4 [20Marks]

- (a) Differentiate between Test drill logging and geological log [6 Marks]
- (b) Discuss in detail the well completion operations that must be undertaken [14 marks]