



**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 22<sup>ND</sup> JANUARY 2021 TIME: 8.00 – 10.00 AM**

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**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]