



# MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY  
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIRST YEAR SEMESTER TWO EXAMINATION FOR

CERTIFICATE IN PLUMBING

1305/312: PLUMBING THEORY

DATE: 17/4/2019

TIME: 8:30 – 11:30 AM

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## INSTRUCTIONS:

ANSWER THE FOLLOWING FIVE QUESTIONS

1.
  - a)
    - i) List Three types of water impurities (3 marks)
    - ii) With the aid of a neat sketch explain the operation of a rapid sand filter (5 marks)
  - b)
    - i) Define the following terms as used in the chlorination of water
      - Super chlorination
      - De-chlorination (4 marks)
    - ii) State Four advantages of break point chlorination (4 marks)
  - c) Sketch one type of joint used in each of the following pipe materials
    - i) PVC
    - ii) GI (4 marks)
2.
  - a) Using a single line diagram show a labeled direct system of domestic cold water for a two storey house with a kitchen sink, bath, WC and hot water cylinder on the ground floor and a WC, wash hand basin and a bath tub on the first floor. (12 marks)
  - b)
    - i) Give the chemical equations for each of the following reactions:-
      - Removal of temporary hardness from water by addition of lime
      - Removal of permanent hardness from water by addition of soda ash (4 marks)

- ii) Briefly explain the base exchange method of softening water (4 marks)
3. a) Explain the following terms
- i) -back siphonage
  - ii) -nominal capacity
  - iii) -actual capacity
  - iv) -service pipe
  - v) -main (10 marks)
- b) i) With the aid of a labeled sketch illustrate the layout of water supply pipe from the main to the water meter. (5 marks)
- ii) sketch a typical section of a storage tank and label all the parts and indicating all relevant dimensions. (5 marks)
4. a) i) Illustrate the following
- Shallow well
  - Deep well
  - Artesian well (6 marks)
- ii) Give Six installation requirement for a cold water cistern (6 marks)
- b).Sketch and label the following
- A centralized indirect water system fort a three storey building
  - A section through a cistern type hot water heater (8 marks)
5. a). Sketch a detailed section to show
- A standing seam
  - battern roll covered with sheet metal (8 marks)
- b) i) State three functions of a felt underlay in sheet metal roof covering
- ii) state four safety precautions to be observed when using a ladder (4 marks)
- c) Name and sketch the three types of urinals and give one advantage of each (8 marks)