KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2019/2020

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF

BACHELOR OF SCIENCE IN CONSTRUCTION MANAGEMENT

BCM 209: MECHANICAL AND ELECTRICAL SYSTEMS

DATE: Friday, 13th December 2019 **TIME: 2.00p.m-4.00p.m**

INSTRUCTIONS:

This paper consists of TWO sections.

Section A: Question 1 (**Compulsory**) shall carry 30 marks.

Section B: Answer any TWO questions. Each question carries 20 marks.

The candidates shall answer THREE questions in two hours.

SECTION A

Question 1 (30 Marks) - Compulsory

(a) Define the following terms: (4 marks)

(i) Mechanical ventilation

(ii) Permanent vents

(iii) Sprinkler water systems

(iv) Portable Fire Extinguishers

(b) Differentiate the following:

(i) Ventilation and Air Conditioning systems giving THREE advantages and TWO disadvantages of each system. (12 marks)

(ii) Surface and underground water sources giving THREE outlets for each source. (5 marks)

(iii) Direct and Indirect cold water supply systems. (2 marks)

(iv) Natural and Mechanical Ventilation systems. (2 marks)

(v) Heat and Smoke fire detectors. (2 marks)

(c) Describe the following mechanical conveyors: (3 marks)

(i) Hoists

(ii) Lifts

(iii) Escalators

SECTION B: Answer any TWO questions (40 marks)

Question 2 (20 marks)

(a) Discuss wet and dry sprinkler systems as applied in buildings settings. (10 marks)

(b) Show and label a schematic installation of a Wet Sprinkler system. (5 marks)

(c) State FIVE items that a well-functioning fire detection and alarm systems may contain. (5 marks)

Question 3 (20 Marks)

(a) State FIVE reasons for ventilating an enclosed space. (5 marks)

(b) A building has a floor area of 5m by 10m and 5 window openings. Using the $1/20^{th}$ formula for natural ventilation design, design a suitable Permanent Vent with a depth of 0.2m for each window. (2 marks)

(c) State THREE factors that are considered to achieve simultaneous control in Air conditioning process so as to maintain the health and comfort of the building occupants. (3 marks)

(d0 Show and label a sectional plan and a vertical section of an electric lift installed in a lift shaft of a five storey building. Include the car and all necessary attachments required for a safe installation. (10 marks)

Question 4 (20 Marks)

(a) Electrical installations must be tested on completion to verify that the system will operate efficiently and safely. State and explain THREE tests that are carried out for inspection. (6 marks)

(b) Describe the following electrical installation methods in a residential building: i) Lighting circuit, ii) Ring main circuit, and iii) Cooker circuit. (9 marks)

(c) The Building Regulations require that reasonable installation of electrical fixtures be provided at areas and locations in a building where they can be safely operated without causing danger or harm to people. Using the interior wall of a dwelling having an open able door as an example show the installation location (height measurements) of the

following electrical fixtures from the floor level: i) Telephone socket, ii) TV socket, iii) Power socket, iv) Light switch and v) Heating thermostat. (5 marks)

Question 5 (20 Marks)

(a) State FIVE requirements for water supply as stipulated in the Kenya Building Code. (5 marks)

(b) With the aid of neat drawings show the difference between direct cold and indirect cold water supply in a two storey building, indicating the location and size of pipes. (10 marks)

(c) Using Thomas Boxformula and given the following information: q=flow rate as (one) 1/s, H=Head or pressure as 3m, L-effective length of pipe as 20m, constants are 25×10^5, calculate the diameter of the pipe to the nearest commercial size (Fig. 1). (5 marks)

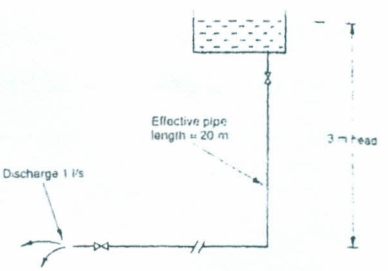

Fig. 1