



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS**

**2013/2014 ACADEMIC YEAR**

**SECOND YEAR, FIRST SEMESTER FOR THE DEGREE OF BACHELOR OF  
SCIENCE IN CONSTRUCTION MANAGEMENT**

**TCM- 3214 BUILDING SCIENCE**

**August 2013**

**TIME: 2 HOUR**

**INSTRUCTIONS**

1. This paper contains FIVE (5) questions
2. Answer any THREE (3) questions
3. Write all answers in the booklet provided.

## QUESTION ONE

- a) Explain any FOUR (4) reasons for ventilating a building
- b) A large hall 25 m in length and 20 m width has a ceiling of 9 m the building requires mechanical ventilator. Determine the air flow rate in the system?

Use the following data:

Occupancy: 600 seats

Supply air ventilation rate: 10 air changes per hour.

Recommended outdoor rate for room with some smoking 8 l/s/p (7marks)

- c) Outline the THREE advantages of natural ventilation system (3 marks)
- d) With the aid of diagrams explain:-
  - i) Cross flow ventilation
  - ii) Single sided ventilation (6 marks)

## QUESTION TWO

- a) Define the following terms:-
  - i) Specific heat
  - ii) Latent heat (2 marks)
- b) Given 0.5l of water at 20°C in an electrical jug with an immersion heater element, how long will it take to bring the water to boiling point?  
(take specific heat capacity of water as 4176j/Kg) (5 marks)
- c) Given the outside temperature as 10°C and the required internal temperature as 22°C in a 10m<sup>2</sup> brick wall. Calculate the heat flow rate in the room ( take U = 1.5w/m<sup>2</sup> k) (5marks)
- d) Outline the THREE factors of thermal comfort in a building (6 marks)
- e) Explain the green house effect (2 marks)

### QUESTION THREE

- a) Explain the FOUR basic principles of noise control. (10 marks)
- b) Explain sound proofing in building giving at least TWO approaches of sound proofing in a building (10 marks)
- c) Outline any TWO “good acoustic” conditions in a room as used in sound (4 marks)

### QUESTION FOUR

- a) Using a suitable sketch, illustrate heat exchange processes between a building and the external environment (6 marks)
- b) Describe TWO techniques which are used to provide natural ventilation in a building (6 marks)
- c) An opal diffuser luminaire is mounted at 1.75m above the work plane, with its axis vertical and the illuminance at 1m to one side of the aiming point is to be found.  
 $I = 230\text{cd}$  (6 marks)

### QUESTION FIVE

- a) Describe a “free field” as applied to sound propagation (5 marks)
- b) Outline TWO sound insulating properties of a partitioning or a dividing wall in a building (5 marks)
- c) List THREE main sources of environmental noise (3 marks)
- d) List any TWO sound absorbers used in a building. (2 marks)