

UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualification:–

B.Sc.

ES1060: Technical Skills And Concepts

COURSE CODE : **ENVS1060**

UNIT VALUE : **0.50**

DATE : **03-MAY-05**

TIME : **10.00**

TIME ALLOWED : **3 Hours**

ENVS 1060 Technical Skills and Concepts

Answer all Section 1 questions and one question from each of Sections 2 and 3.

Section 1 is worth 50%. Section 2 is worth 25%. Section 3 is worth 25%.

This is an open book examination.

Diagrams may be used to supplement text in Sections 2 and 3.

Section 1: Multiple choice

Answer all 20 questions by ticking the appropriate box (1 box only per question).

- 1 What range of sound pressure levels would a person most likely be exposed to when the following happens. They wake up in a house in a quiet suburb, travel to work on the Underground, work in an office and go out to a restaurant before returning home by taxi.
 - 50dB to 50dB
 - 0dB to 60dB
 - 20dB to 95dB
 - 60dB to 130dB
 - 80dB to 220dB

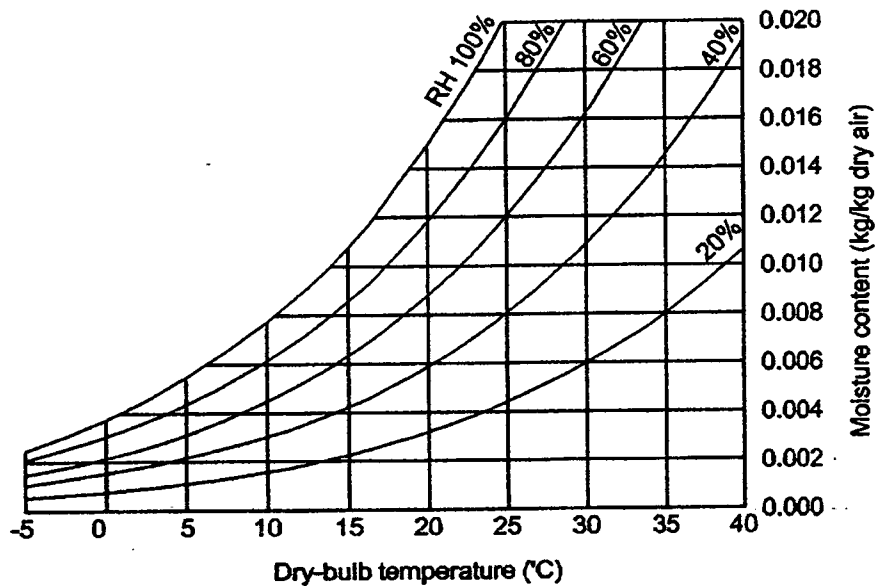
- 2 Which of the following statements is untrue regarding ozone layer depletion?
 - Recent depletion of the stratospheric ozone layer has been identified as being caused by certain man-made gasses.
 - Ozone layer depletion has been more severe in some areas than others, leading to so-called holes in the ozone layer.
 - One of the principal gasses linked to ozone layer depletion is CO₂.
 - Ozone layer reduction leads to increased UV-B levels at ground level.
 - Increased UV-B levels have been linked to increases in the prevalence of skin cancer.

- 3 A studio theatre is 22°C to 24°C inside during performances. The design utilises stack-driven ventilation. When is this alone likely to give inadequate ventilation?
 - During a winter performance when it is 2°C and windy outside.
 - During a spring performance when it is 12°C and still outside.
 - During a summer performance when it is 24°C and still outside.
 - During an autumn performance when it is 16°C and windy outside.
 - Stack-driven ventilation should work well for all of the above noted scenarios.

- 4 Fluorescent lamps are taking over from GLS and tungsten halogen lamps for a range of uses. Which of the following is not one of the reasons why?
 - Longer lamp life.
 - Lower energy costs in use.
 - Higher luminous efficacy.
 - Better colour rendering.
 - Lower heat output.

- 5 On a hot summer's day the temperature at noon is 25°C and the relative humidity is 40%. Referring to the psychrometric chart below, what will the relative humidity be at 6pm, when the temperature has dropped to 15°C and the moisture content of the air has risen by 25%?

- 78%
- 40%
- 100%
- 92%
- 50%



- 6 250 people are sitting in a cafeteria. The volume of the cafeteria is 20m x 30m x 4m. Assuming a fresh air requirement of 8l/s per person, how many air changes per hour are required?

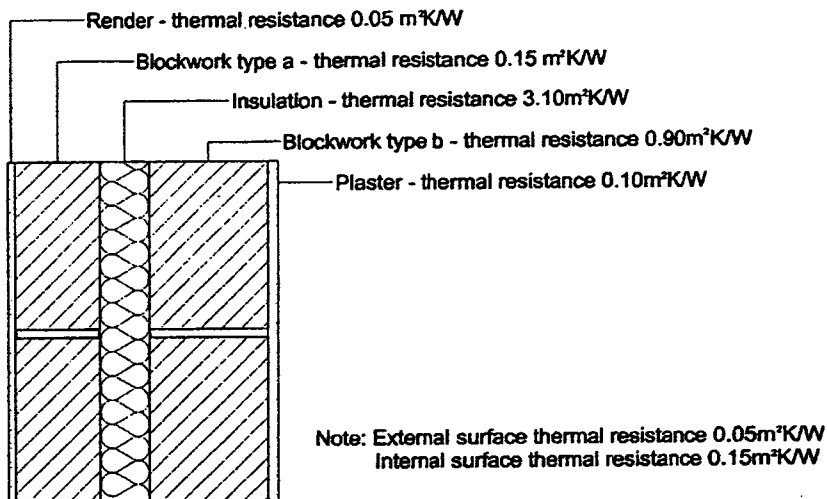
- 3
- 0.83
- 25
- 6
- 0.77

- 7 Which of the following is true regarding energy and power?

- The joule is an S.I. unit whereas the watt is not.
- They are identical.
- Power is energy use per second.
- Energy is power use per second.
- The watt is an S.I. base unit.

8 What is the U-value of the wall pictured in section below?

- 0.04W/m²K
- 0.22W/m²K
- 0.35W/m²K
- 2.15W/m²K
- 4.50W/m²K



9 The air change rate in a book shop is 4 air changes per hour. The volume of the book shop is 200 m³. It is 22°C inside and 12°C outside. What are the ventilation heat losses?

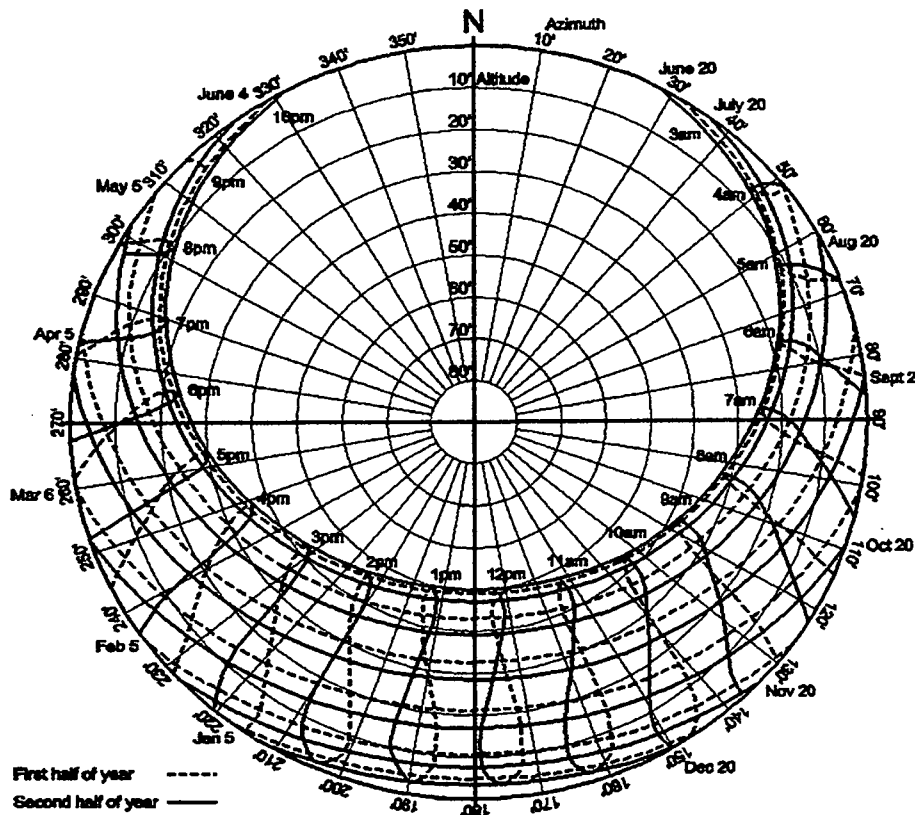
- 8.00kW
- 5.81kW
- 22.25kW
- 3.92kW
- 2.64kW

10 Illuminance of 400 lux is required at the desks in an office building. What daylight factor is required to deliver this illuminance via daylighting when the unobstructed external illuminance is 16000 lux?

- 5%
- 25%
- 2.5%
- 40%
- 4%

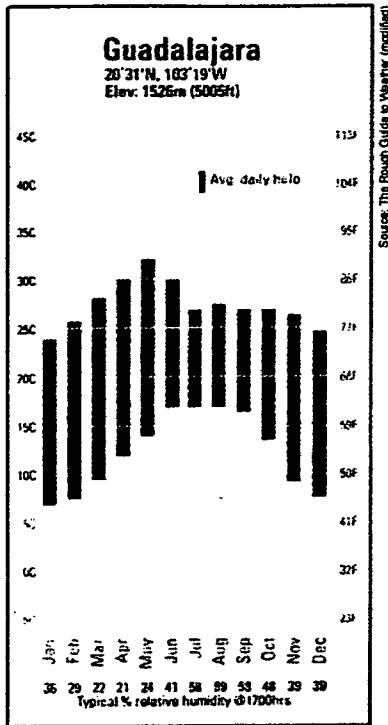
11 What time does the sun set on 20 October for the location represented in the sun path diagram below?

- 4.50pm
- 6.40pm
- 4.00pm
- 6.20am
- 5.50pm



12 Which of the following statements is untrue regarding reverberation?

- Reverberation in a room occurs due to the reflection of sounds within the room.
- Reverberation time is the time taken for a sound to decay by 60dB from its original level.
- The sound absorption qualities of walls and ceilings within a room affect its reverberation time.
- A typical concert hall reverberation time is 0.5 seconds.
- A long reverberation time can cause speech to become inaudible.



13 Which of the following would be most appropriate for a low energy dwelling in Guadalajara (see weather data pictured left)?

- High levels of stack-driven ventilation throughout the year.
- The use of high levels of thermal mass in the building envelope.
- Large areas of unshaded skylights in the roof.
- Air conditioning to avoid summertime overheating.
- The use of a lightweight frame to lift the building 3m off of the ground.

14 Which of the following is untrue about a window containing a double glazed unit utilising low-E coatings when compared to one containing a single sheet of standard float glass?

- It is more expensive – a higher capital cost.
- It has a lower u-value.
- It has a higher sound reduction index.
- It has a higher level of light transmission.
- It is more reflective to infra-red radiation.

15 Which point below would not form an appropriate part of a sustainability strategy for an office development?

- Avoid using land of high ecological value.
- Avoid using contaminated land.
- Build in a way that does not destroy existing site ecology.
- Encourage the use of bicycles by providing secure storage.
- Provide good, close access to public transport.

16 Comparing the use of electricity and gas heating for a house, which has better overall efficiency and how much more efficient is it? Assume delivery via conventional means.

- Electricity, around 2 times more efficient.
- Electricity, around 10 times more efficient.
- Gas, around 2 times more efficient.
- Gas, around 10 times more efficient.
- Both options are similarly fuel efficient

- 17 On a mid-winter's day at 5pm the weather is windy and overcast. Which of the following statements is likely to be true regarding a location on the street in central London and one in the middle of open countryside near London?
- London will be warmer and less windy.
 - The countryside will be warmer and less windy.
 - London will be warmer and windier.
 - The countryside will be warmer and windier.
 - London will be cooler and as windy.
- 18 Which one option below best describes the role or roles that a double façade could play in regulating the internal environment of an office building in central London?
- Sound attenuation – reducing the amount of external noise entering the interior.
 - Thermal buffer – varying the level of solar gain entering the interior.
 - Control of daylighting – varying the level of daylighting entering the interior.
 - Fresh air plenum – bringing air from relatively unpolluted areas of the site to the interior.
 - All of the above.
- 19 Which of the following statements is untrue regarding human metabolism and thermal comfort?
- The clo is a unit of measure used to state the level of thermal insulation provided by clothing.
 - Core body temperature in living humans is in the region of $36^{\circ}\text{C} \pm 3^{\circ}\text{C}$.
 - Thermal comfort is affected by humidity.
 - The temperature at which people are comfortable inside varies with the climate and season outside.
 - People are comfortable at lower air temperatures when there is higher air movement.
- 20 A school in the UK has been designed to make good use of daylighting and operates between the hours of 9am and 5pm. What is the main advantage of using light sensitive dimming controls on the artificial lighting.
- It minimises glare.
 - It saves energy.
 - It makes design for daylighting easier.
 - It makes the lighting installation cheaper – lower capital cost.
 - It reduces the number of luminaires required.

Section 2: Essay question

Answer 1 of the 2 questions listed below.

- 21 Set out appropriate summer and winter airflow and thermal strategies for a low energy house. The site is a windy location on the Shetland Islands off the north coast of Scotland.
- 22 Describe an appropriate environmental strategy for a naturally ventilated office building on the seafront in Brighton, Southern England. The office faces south looking on to the sea over a busy main road.

Section 3: Essay question

Answer 1 of the 2 questions listed below

- 23 Set out a sustainability strategy for a single-family house with associated office space on a rural site in Wales.
- 24 Explain why fossil fuels will become less widely used in future, and how energy sourcing and building design may change as a result.

END OF PAPER