

## New thermal questions

### Question 1

- a) Explain why active systems might be needed to provide comfortable thermal conditions within a building.
- b) Describe three different ways of providing heating to a building and discuss the factors that might lead the designer to choose one or another of the systems.
- c) Describe the principle behind the condensing boiler and discuss the merits of such boilers.
- d) Discuss the factors that would need to be considered when choosing the location of a plant room in a building.

### Question 2

- a) Describe the range of building services systems within a building and discuss how the designer might decide upon which systems will need the most attention at an early stage of design.
- b) Discuss the ways in which the building structure and the building system providing the thermal comfort might interact with one another.
- c) Describe the difference between a stratified and a mixed ventilation system. Discuss the consequences for the structure of choosing a particular system.

### Question 3

- a) Heavily serviced buildings such as laboratories may be designed to be either flexible or adaptable. Describe what you understand by these terms and discuss the consequences of adopting either of these different approaches.
- b) Briefly discuss the notion that,  
  
‘Good design of building services should ensure the maximum degree of integration between the architectural, structural and services space’
- c) Describe the factors that might determine the location of a plant room.

#### Question 4

- a) Describe and discuss the properties of the following distribution systems,
  - i) Radial distribution,
  - ii) Ring distribution,
  - iii) Tree distribution,
  - iv) Networks.
- b) Describe two forms of electrical overload and illustrate the difference in magnitude between them using a simple example.
- c) Describe what you understand by the following terms,
  - i) Installed demand
  - ii) Simultaneous demand
  - iii) Fault Discrimination

#### Question 5

- a) Explain the purpose of a water storage tank.
- b) Describe what is meant by a combined and a separate sewage system and discuss the suitability of each for different circumstances.
- c) Describe the main features of a 'Single stack' drainage system within a building.
- d) When planning toilet and washing facilities within a multi storey building, describe the factors that might help determine their location.

#### Question 6

- a) Describe what you understand by the term 'Air Conditioning'.
- b) Describe the principal items of plant needed for an air conditioning system and discuss the need for early decisions upon their location within the building.
- c) What factors might decide a designer to employ an air conditioning system within a building.

### Question 7

- a) Explain the principles of a refrigeration machine.
- b) Describe some of the ways in which a refrigeration machine when used as a heat pump might be employed to reduce energy consumption in buildings.
- c) What have refrigeration machines got to do with the hole in the ozone layer above the arctic regions.

### Question 8

- a) Plot on a psychrometric chart the changes in the state of the air passing through the following apparatus within an air handling unit,
  - i) heating coil
  - ii) cooling coil
  - iii) chilled water spray
  - iv) adiabatic water spray
  - v) heated water spray
  - vi) fan
- b) Describe the factors that might determine the rate at which air is introduced into a room by a mechanical ventilation system.

### Question 9

- a) In order to prevent heat loss through infiltration, buildings are now required to be fairly airtight. Discuss the consequences of sealed buildings and describe how designers may overcome any adverse consequences of sealing a building.
- b) Describe the difference between displacement ventilation and mixed ventilation and discuss the merits of the two methods.

#### Question 10

- a) Describe in your own words what you understand by the term exergy, and explain its relevance to the design of buildings and their services.
- b) Why might it be believed that using gas for the central heating of buildings is a waste.
- c) Suggest methods of radically reducing the energy consumption of buildings and describe what the consequences of adopting them would be for the design of buildings.

#### Question 11

- a) Define and comment upon the following terms,
  - i) Primary energy equivalent
  - ii) High grade energy source
  - iii) Embodied energy
  - iv) Sick building syndrome
- b) Describe how control systems may be used to save energy in thermal systems within buildings and discuss the factors that can affect their effectiveness.

#### Question 12

- a) Describe how buildings are designed to cope with rain.
- b) Describe some of the implications of designing for surface water to be drained away as quickly and effectively as possible.
- c) The fall of a drain is designed to use gravity to drive the water flow. What are the factors that might determine the appropriate fall of a drain.