

On admission to the examination room, you should acquaint yourself with the instructions below. You must listen carefully to all instructions given by the invigilators. You may read the question paper, but must not write anything until the invigilator informs you that you may start the examination.

You will be given five minutes at the end of the examination to complete the front of any answer books used.

DO NOT REMOVE THIS QUESTION PAPER FROM THE EXAM ROOM.

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MTMG44 2014 / 2014/15 A001

Answer Book

UNIVERSITY OF READING

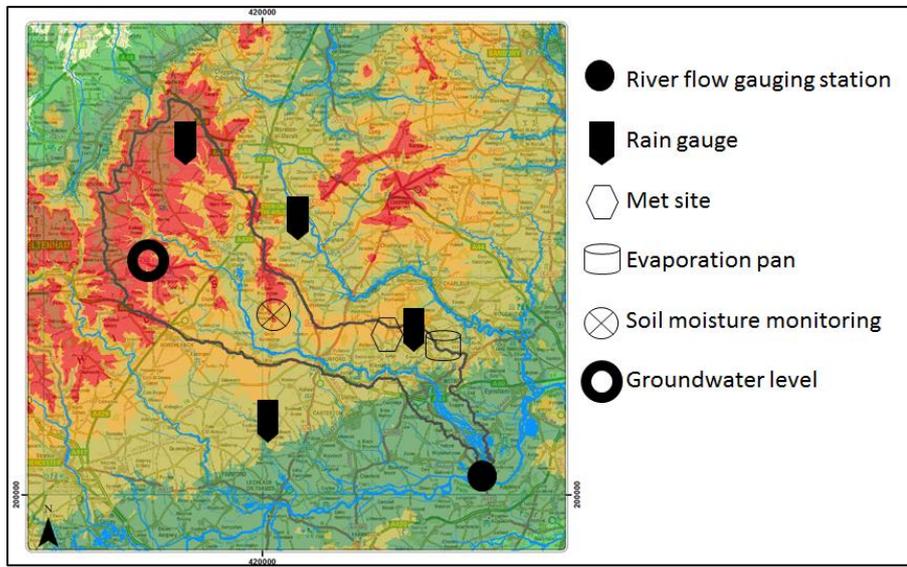
Hydrology and global environmental change (MTMG44)

Two hours

Answer **ANY TWO** questions

The marks for the individual components of each question are given in [] brackets. The total mark for the paper is 100

1. The map below shows the monitoring sites located within a catchment in southern England, with an area of 360 km². The catchment is also covered by a weather radar. The met site measures temperature, vapour pressure, net radiation and windspeed.



- a) You are asked by a water company to estimate the catchment annual water balance. What are the three components of the annual water balance, and how can you estimate them from the data available? **[20 marks]**
- b) Which of the three components of the catchment water balance is estimated most accurately, and why? **[10 marks]**
- c) You are asked to construct a time series of daily data to calibrate, validate and run a hydrological model simulating river flows at the catchment outlet. What data do you need to calibrate and run the model, and what data do you need for validation? How can you construct the time series you need from the data available? **[20 marks]**

2. The catchments of the River Loddon and River Kennet in Berkshire both have the same weather and climate, but the Kennet is largely underlain by chalk and the Loddon is largely underlain by clay.
- a) How is streamflow generated in a temperate-zone catchment?
[20 marks]
- b) How and why do the streamflow generation processes differ between the Kennet and the Loddon?
[15 marks]
- c) How do river flow regimes differ between two catchments. Illustrate this with a sketched example annual streamflow hydrograph and a flow duration curve.
[15 marks]
3. In recent years the frequency of flooding along rivers in some British catchments appears to have increased.
- a) What are the possible reasons for this apparent increase, and how plausible are these explanations?
[20 marks]
- b) How could you determine which of these reasons explain the trend in a specific catchment (such as the Thames), and what are the advantages and disadvantages of each approach?
[20 marks]
- c) How might the relative importance of the factors that affect flooding change over the next few decades?
[10 marks]

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(End of Question Paper)