系所組別 地球科學系 甲、乙組
考試科目：科學英文 考試日期：0306、節次：1

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1. Comprehension: (30% ; 3% each)

Almost anywhere we travel over the land surface, we can see evidence of the work of running water. Even in places where no rivers flow today, we are likely to find deposits and landforms that tell us water has been instrumental in shaping the landscape. Most of these features can be related to the activity of streams that are part of complex drainage systems.

A stream is a body of water that flows downslope along a clearly defined natural passageway, in the process transporting detrital particles and dissolved substances. The passageway is called the stream's channel, and for most streams the detritus constitutes the bulk of its load, which is the sediment and dissolved matter the stream transports. The quantity of water passing by a point on the stream-bank in a given interval of time is the stream's discharge. As a stream moves sediment from place to place, its channel is continually being altered. A stream and its channel are closely related and form an ever-changing, interrelated system. A stream's channel is an efficient conduit for running water. The discharge varies both along the channel and through time, mainly because of changes in precipitation. In response to varying discharge and load, the channel continuously adjusts its shape and orientation. Therefore, a stream and its channel are dynamic elements of the landscape. Several basic factors control the way a stream behaves: (1) gradient; (2) stream cross-sectional area; (3) average velocity of water flow; (4) discharge; and (5) load. Unlike the sediment of a stream's load, dissolved matter generally does not affect stream behavior.

The average annual rainfall on the area of an area is equivalent to a layer of water covering this same land surface. An amount equivalent to 59% return to the atmosphere by evaporation and transpiration, and 2% infiltrates the ground; the remaining 39% forms runoff, the portion of precipitation that flows over the land surface. By standing outside during a heavy rain, you can see that water initially tends to move down slopes in broad, thin sheets, a process called overland flow. You will also notice, however, that after traveling a short distance overland flow begins to concentrate into well-defined channels, thereby becoming streamflow. Runoff is a combination of overland flow and streamflow.

Q1. What can tell us the water has been the tools shaping the landscape?

Q2. What causes the stream water to flow?

Q3. What constitutes the stream's bulk load?

Q4. What other terms can also be used to describe the stream's discharge?

Q5. What is the main element that differentiates the stream's discharge?

Q6. How does the stream respond to varying discharge and load?

Q7. What are the dynamic elements of the landscape?

Q8. How will the anions and cations control the stream behavior?

Q9. How to estimate the total amount of the average annual rainfall of an area?

Q10. What is the main cause of the land surface erosion?

(背面仍有題目,請繼續作答)

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2. Translation: (45%)

(1) **Hydrogeology** (like most earth sciences) is an interdisciplinary subject; it can be difficult to account fully for the chemical, physical, biological and even legal interactions between soil, water, nature and society. The study of the interaction between groundwater movement and geology can be quite complex. Groundwater does not always flow in the subsurface down-hill following the surface topography; groundwater follows pressure gradients (flow from high pressure to low) often following fractures and conduits in circuitous paths. Taking into account the interplay of the different facets of a multi-component system often requires knowledge in several diverse fields at both the experimental and theoretical levels. This being said, the following is a more traditional (reductionist viewpoint) introduction to the methods and nomenclature of saturated subsurface hydrology, or simply hydrogeology. (15%)

(2) **Greenhouse gases** are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The main greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. In our solar system, the atmospheres of Venus, Mars and Titan also contain gases that cause greenhouse effects. Greenhouse gases greatly affect the temperature of the Earth; without them, Earth's surface would be on average about 33°C (59°F) colder than at present. Human activities since the start of the industrial era around 1750 have greatly increased the levels of greenhouse gases in the atmosphere. (15%)

(3) 學而不思則罔，思而不學則殆。(10%)

(4) 上面那句話的翻譯，難道你（妳）連試都不試一下嗎？ (5%)

3. Composition: (25%)

Please write in English a short paragraph to indicate the difference among the words of:
"INCONVENIENT, RISKY, DANGEROUS, HAZARDOUS, DISASTROUS,* and *CATASTROPHIC"