UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2007 question paper

5014 ENVIRONMENTAL MANAGEMENT

5014/01 Paper 1, maximum raw mark 120

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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UNIVERSITY of CAMBRIDGE
International Examinations

Section A

1 (a) (i) X (1)
dark coloured (1) [2]

(ii) pebbles/rock fragments [1]

(b) (i) the sand has a medium/large grain size [1]

(ii) pH = proportion of hydrogen ions/measure of acidity
4 = the soil is acidic [2]

(iii) the coarser the texture the larger the pore spaces/vv./positive relationship [1]

(c) (i) (coarse texture)
advantage: roots can penetrate easily/well-drained/aerated/easy to till/earthworm movement facilitated [1]

disadvantage: plants can suffer from drought/needs watering/irrigation/infertile/few nutrients/needs fertiliser/manure [1]

(ii) (pH of 4)
too acidic for many crops
fertiliser quickly leached [1]

2 (a) coastal areas
continental shelf
(mainly) temperate/northern hemisphere
ocean currents [3]

(b) shallow water
penetration of light
cool water
large rivers enter sea
nutrients/mineral salts in the water
cold and warm currents meet
cold water up-wells
bring up nutrients
abundant plankton
a.v.p. [3]

(c) 500 km limit/fishermen given control of fisheries had no/little effect as it was not in their interest to control fishing area closed to mobile fishing gear had great impact/fish population rose quickly because fish could breed over a large area without interference [4]

3 **(a)** **(i)** pour water from jar into measuring cylinder
at same time each day
stand cylinder on a horizontal surface/avoid parallax
eye at level of meniscus [2]

(ii) on grass so no splash
part buried to reduce evaporation
part buried for stability [2]

(iii) snow/ice (has to be melted) or very strong winds [1]

(b) low amount
infrequent/irregular
heavy [3]

(c) less danger of salinisation of soil
less water to evaporate (and leave salts) [2]

4 **(a)** **(i)** 18 – 18.4 [1]

(ii) correct plots at 3.2% (male) and 3.8% (female) [1]

(iii) increasing rapidly [1]

(b) large dependent population
burden on the working population
need to increase food supply/food shortages
more housing needed
more schools needed
may lead to unemployment
may lead to overpopulation
a.v.p. [4]

(c) culture
tradition of large families
desire for sons/children as labour/look after parents/etc.
religious beliefs
low GDP
poverty of the individual
difficulty of introducing birth control in rural areas
a.v.p. [3]

Section B

5 (a) (i) B lake/reservoir (dam)
C ice/glacier/snow [2]

(ii)&(iii) dig into the ground to reach the layer of sandstone rock
sandstone is porous/permeable
layer of rock outcrops on surface in mountains
can take in and hold rainwater in an underground store
it is an aquifer
dig a vertical shaft for a well
use a pump to draw water up to the surface

mark both parts as one.
three points made along these lines. [3]

(iv) the best choices are **D** or **C**. **B** is a better choice than **A**.
no mark for choice.

Explanation of choice is likely to be more successful if either **D** or **C** is chosen, because there is less likelihood of the water having been polluted. Particles are filtered out as water passes through pervious rock underground. The snow and ice are high in the mountains where no one lives and are maintained as pure rainwater. Lakes are better than rivers because there is a chance for impurities to settle out, but they are affected by what flows into them. Rivers are almost impossible to justify since they tend to flow through settled areas and are used both deliberately and accidentally as 'sewers'. [2]

(v) **A** or **B** = 1 mark for choice.
Why? See comments above = 2 marks for explanation.
Maximum 2 marks possible for **A** or **B**, but likely max 1 for the others (e.g. pesticides etc. can seep into and affect groundwater supplies, from mineral workings). [3]

(b) (i) Name and locate is used in order to encourage a precise location, especially if a local/national rather than a well-known 'international' example is used. For example, Aswan High Dam in Egypt is an example of name and locate if taken to the letter. Aswan High Dam would be enough because, being 'international', everyone knows it is an appropriate choice. Mark according to the 'spirit' as described here = 1 mark.

(ii) Further information – could be more about location, size, why it was physically possible to build it in that place.

Reasons for building it usually include multi-purpose uses such as water supply for domestic and industry, irrigation water, increased food output, hydro-electric, tourism, navigation, flood control = 4 marks.

Max. 3 marks for general answers about dams (if full of detail).
Max. 4 marks for a named dam, but without any information that is precise to it. [5]

(c) (i) 135 [1]

(ii) 4 times [1]

(iii) Cooking and Drinking [1]

(iv) Idea conveyed, however expressed, that they are essential for life/survival; they are not 'luxuries' or 'comforts' like some of the others. [1]

(v) * In developed countries, people are richer/have a better quality of life so that washing machines and dishwashers do more of the work than people; in developing countries hand washing uses less water and it is often done in rivers/streams instead of houses.

* Sanitation is almost 100% in homes in developed countries, whereas in developing countries sanitation/flushing water is in much less than 50% of homes, especially in rural areas.

* Piped water reaches houses in developed countries by the taps, whereas water supply from pumps and wells is more commonly located in public places in developing countries.

Two or more ideas such as these stated in a two-sided manner (i.e. with positive references to different levels of development) = 3 or 4 marks.

One idea well stated for developed and developing, or two ideas stated only for developed or developing = 1 or 2 marks. [4]

(d) (i) Frame labelled and bars drawn = 1 mark.
All four accurately plotted = 2 marks.
(Two correct (e.g. for one country or for one type of area) = 1 mark).
Key to match way in which differences between rural and urban shown = 1 mark. [4]

(ii) more wealthy people live in urban areas
places where administrators/politicians with powers live
cities have higher levels of economic development than in the countryside
more need to improve to stop spread of disease with high densities of population
more engineers/people with necessary skills live in towns

Positive points like these for urban areas can in general be reversed for negative points for countryside. These are just suggestions – many different approaches are possible. In a three mark answer, there must be at least one definite point made for both rural and urban areas. [3]

(e) (i) cartoon suggests lack of will among some people/the men to improve
walking miles to collect water is seen as a normal (female) activity
why change?

View expressed with some understanding = 1 mark.
Understood that maintenance of the status-quo is suggested = 2 marks. [2]

(ii) dirty water is a major cause of water related diseases
examples of diseases and how they spread
many millions of people in developing countries are affected
reduces ability to work and produce
constant bouts of illness reduce quality of life
particularly severe for infants and elderly resulting in high death rates
women can engage in productive economic activities without water to collect
examples crafts, textiles, taking produce to market etc.
children are more healthy/have more time for education and study
greatly improves their future prospects/chances of employment

These are just some of the ideas that are relevant to the answer.
Mark according to the worth of the answer overall.

* One or two relevant ideas, but little developed towards the main question theme. Some will be about disease and nothing else. [1–2 marks]

* Wider range of points, with fuller statements about them, but without complete coverage of all aspects of the question. [3–4 marks]

* Good coverage including some reference to why women and children may be the ones to benefit most. [5 marks]
[5]

(iii) money and expertise are needed for sinking a proper well
it may need to be lined with cement/pump needed to bring water to the surface
most communities in rural areas lack both the resources and expertise,
also they need an infusion of new ideas/modern technology from outside
work often left to charities because governments are too poor/only interested in urban areas

Three points which hold together made along these lines. [3]

[Total: 40]

6 (a) (i) **A** moving together/converging
B moving apart/diverging [2]

(ii) **A** magma is formed from melting rock in the subduction zone
due to the great pressure created as the oceanic and continental plate meet

B magma is formed in/comes from the mantle
this is new material that reaches the surface where the plates move apart

minimum 1 for each of **A** and **B** [3]

(iii) fractures/weaknesses are formed that enable the magma to reach the surface
pressure from Earth movements forces magma out of the vent [2]

(iv) shape of cone – tall and steep in **A**, gentle sides and wide base in **B**
materials erupted – mixture of lava and rocks, ash and dust in **A**, lava only in **B**
– lava is sticky in **A** but runny in **B**
– granite a common rock in **A**, basalt in **B**
activity – can be violent/often occasional in **A**, continuous non-violent lava flows in **B**
land volcanoes or island arcs in **A**, volcanoes rise from sea bed in **B** to form occasional islands

any one difference
1 sided = 1 mark 2 sided = 2 marks [2]

(v) * Type of activity (see above); some volcanoes erupt occasionally and with violence, resulting in more deaths than those from which lava flows semi-permanently. Usually people have plenty of time to get out of the way of lava flows, less easy to escape when solid materials are being violently thrown out.

* Amount of warning; either not monitored, or suddenly erupts after many years without activity (some were thought to be dead volcanoes).

* Massive size and scale of the eruption

* What is caused by the eruption e.g. mudflows, tsunamis can cause even greater loss of life

* Density of population in surrounding area

Two or more reasons need to be referred to and explained for full marks. Credit references to valid examples as well. [4]

(b) (i) diagram shows that cold water is heated by the hot mass of igneous rocks
hot water goes into generating station/power station
it is the energy source to drive the turbines that produce electricity

(ii) only in volcanic areas is the heat sufficient to drive the turbines/is it sufficiently close to the surface
it is a constant source of heat for non-stop electricity production

Four points made – there is likely to be some natural overlap between the two parts. [4]

(c) (i) one of the cheaper sources/third cheapest energy source for electricity
still more than double the cost of using fossil fuels
but cheaper than all the other alternatives except hydro
a fraction of the price of some of the others (e.g. solar is 7 times more expensive)

Recognises relative cheapness (however expressed) = 1 mark.
Two other comparative statements = 2 marks. [3]

(ii) Cost might suggest that they are good, but the problem is that it needs particular physical conditions, which exist only in certain areas of the world.
Examples could be quoted to illustrate this e.g. Iceland and New Zealand.

Some understanding = 1 mark
Good understanding and effectively expressed = 2 marks [2]

(d) (i) Steep rise from around 5 to 20 billion barrels from 1955 to 1975
more gentle rise with some fluctuations from 1975
however clear overall/persistent increase to 25 billion barrels by 2005

Description supported by use of values needed for full marks [3]

(ii) Mark both parts together

* 1000 billion barrels already used, but only 750 billion in reserves/only 900 billion barrels thought to exist to be used (i.e. a non-renewable resource is being over-consumed).

* Demand for oil exceeded discovery by 1975 and the gap in 2005 is wider than ever before.

* Statement summarises current state of non-sustainability that in 2002 25billion barrels were used and new reserves were only 8 billion (i.e. about one third of the demand). Even wider if value for 2005 is taken from the graph (discovery approx. one fifth of demand/use).

Two statements needed = 2 marks.
At least one relevant quote using values = 1 or 2 marks.
If all 4 marks not claimed, allow one mark for clear comment about non-sustainability. [4]

(iii) All the evidence suggests that it will go on rising (even if it is at a more moderate rate than from 1955 to 75) = 1 mark.

history shows that cutbacks in demand have never lasted for long
increased use of oil is associated with economic development
especially growth in car and air transport
particular references such as growing demand in China

Explanation = 2 marks

If the alternative suggestion of demand falling is made, there is 0 mark for describing what is likely to happen, but up to 2 marks can be claimed for explanation in terms of greater use of alternatives, technological breakthroughs in their development and increased energy efficiency. [3]

(e) (i) About view **A**

* Much less air pollution than from fossil fuels power stations, virtually no carbon dioxide/greenhouse gas emissions.

* Known technology not dependent on new technological breakthroughs as needed for many renewables.

* Reasonably cheap (see graph in part (c) above).

* Uses only small amounts of uranium/low raw material needs compared with amount of energy released.

* Not restricted by high physical demands as for hydro for example.

Points made along these lines with references to at least two for all three marks [3]

(ii) About view **B**

* There may be no air pollution, but any radio-activity released is much more dangerous for life on Earth responsible for leukaemia and cancers in people.

* Contaminated nuclear waste dangerous for thousands of years with no satisfactory means of storage.

* Dangerous if used irresponsibly by nations/terrorist threats.

* Some disasters such as Chernobyl which shows that it is not as safe as scientists claim.

* Many leaks into nearby seas/water courses.

Points made along these lines with references to at least two for all three marks. [3]

(iii) Mark according to the strength with which the chosen view is supported (not for the view expressed). Candidates need to give some idea of relative strengths of arguments referred to in (i) and (ii).

Some idea of candidate's own view with sound reasoning = 1 mark
Clear view supported by strength of argument (irrespective of view taken) = 2 marks [2]

[Total: 40]