UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0680 ENVIRONMENTAL MANAGEMENT

0680/21 Paper 2, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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1 (a) (i) Wind vane – wind direction
Anemometer – wind speed
2 @ 1 mark
One correct, or both names without correct measures, or both measures without names = 1 mark [2]

(ii) Work – both have arms rotated by the wind, fixed high up at the top of a long pole

Site – in an open space / on top of buildings, away from the shelter of trees / buildings

At least one similarity for each needed for full marks.
3 @ 1 mark [3]

(b) (i) Axes drawn and labelled (vertical for costs and horizontal for power sources), accurate plots = 2 marks (at least two correct = 1 mark), overall appearance / effectiveness / completeness.

4 @ 1 mark [4]

(ii) Wind power is much cheaper than other renewables (wave, tidal, solar), wave/tidal is about three times more expensive and solar nine times, but more expensive than longer established sources such as fossil fuels and nuclear, although not by large amount with fewer environmental effects.

Conclusion – costs given suggest a greater likelihood of further use than from other renewables in the UK.

Up to two marks for valid points made about relative costs of wind power.
One mark for overall comment relating to the question. [3]

(iii) Costs of obtaining raw materials are different e.g. local oil in the Middle East, so fossil fuel cost of production lower = one approach to answering up to 2 marks.

Renewables listed rely upon nature – other countries will have more sun / less wind than the UK, desert countries / tropics more and hotter sunshine = another approach up to 2 marks.

One mark for each of the two approaches also possible. [2]

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(c) (i) B = 1 mark
Place where surface winds are being drawn in fastest to be sucked up by the strong vertical currents – to replace air that is rising

Minimum 1 mark about B; 2 marks for B possible for a full explanation.

Compared with other sites, C is calm = the eye where air sinks
A is further away from the centre where the cyclone is still in the process of developing and intensifying.
Up to 1 mark.

Incorrect choice; give 1 mark for answers which attempt to explain why winds are so strong in a cyclone. [3]

(ii) Where – over warm ocean surfaces in the tropics / near the Equator in Atlantic, Pacific and Indian Oceans

When – late summer when the sea water temperatures are at their highest (26°C+)

Why – surface heating causes warm air to rise, which draws in air towards it, establishing a moving circulation in the atmosphere capable of developing into a cyclone.

1 mark for each.
4th mark for answers which include greater detail either overall or in one part. [4]

(iii) Falling trees / buildings destroyed so that debris falls on / hits people, in coastal areas strong winds increase wave height and flatten everything.

One of these basic points = 1 mark Elaborated / developed = 2 marks [2]

(iv) Table values +16, +8, +2 (all three needed with or without + sign). [1]

(v) More active / busier than ever previously known not just compared with the average, but it exceeded all previous records, some of them set many years ago.

Basic description = 1 mark
Strong statement as above or good use of values = 2 marks [2]

(d) (i) Social – people dead and homeless (Katrina and Stan), people forced to leave / evacuated from homes / traffic jams (Rita)
evidence that poor people suffered most (Katrina)

Economic – oil and gas fields output disrupted (Katrina)
tourist industry in Mexico badly affected (Wilma)

3 @ 1 mark for examples arranged under correct headings
However, maximum 2 marks in answers that include examples of costs placed under the wrong heading. [3]

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(ii) People – rich people had cars and could use the strategy of moving inland from coastal cities to avoid the worst effects of the storm; poor people left behind
Loss of life in poor / developing countries like Guatemala and El Salvador.

Countries – Bad hurricane disruption in the Gulf States caused little damage to the overall economy of a very rich big country like the USA. Whereas the Mexican economy felt the loss of tourist dollars (foreign exchange income)

Further comment based on the evidence such as cost of repairing damage / infrastructure or poor people more likely to live in places vulnerable to mudslides and avalanches.

Three points made relevant to the question. Reserve 1 mark each for people and countries.
3 @ 1 mark [3]

(iii) Named syllabus strategies to reduce the negative impact of climatic hazards are; improved forecasting, appropriate settlement patterns and buildings and disaster relief. (For this question preparations are more important such as education about what to do when the hazard is forecast, provision of shelters, trained emergency teams.)

One strategy only described or a list of strategies rather than description = 1 or 2 marks

At least two strategies described in relevant ways for the question = 3 or 4 marks [4]

(iv) Positive views might refer to improved weather forecasting, education and organisation and how they are being achieved e.g. with weather forecasting how the satellite study of cyclones has greatly increased the accuracy of forecasting a few days ahead of a coastal hit. Greater wealth and economic development improve education and increase chances of allocating resources to allow preparations / readiness in advance.

Negative views might focus on the strength / intensity of cyclones and other climatic hazards, beyond what is reasonable for even rich countries / people to cope with (e.g. damage caused by hurricanes such as Katrina in USA); some suggest that global warming is making climatic hazards more intense and more frequent.
Limitations imposed by poverty in many countries – what can they do even when they know that it is likely to happen.

Accept single or dual views / approaches to answering.

Some comment related to needs of question but without much development; limited coverage; view to answer question may not be very clear. 1 or 2 marks

Fuller explanation; range of points used. Clear answer given to the question about whether it is going to be possible to stop people dying from the effects of climatic hazards. 3 or 4 marks [4]

[Total: 40]

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2 (a) (i) Essential for plant growth, plants are the producers for humans and other species to consume, human body needs...

Two points made along these lines. 2 @ 1 mark [2]

(ii) A Transpiration / Evapo-transpiration / Evaporation
B Interception
C Infiltration
3 @ 1 mark [3]

(iii) Rock layer P is permeable / porous rock with spaces to allow water to pass through it, whereas Q is impermeable without empty spaces preventing water passing through.

Difference with use of terms or examples of permeable / impermeable rock types = 2 marks
Difference established in general terms or specific about only one of the rock types = 1 mark [2]

(b) (i) 2 times / twice / double [1]

(ii) 3 times (or its equivalents) [1]

(iii) Answers to previous two questions show that demand for water is increasing faster than growth in population i.e. people are consuming more water per head.

World population has already grown since 2000 and is expected to continue to grow further by 2025.

Economic development means that people consume more water for domestic and industrial purposes. More food needs to be grown for more people with consequent demands for more water for irrigation.

Points made along these lines, drawn from at least two of the three separate sections above for a full mark answer.

3 @ 1 mark [3]

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(c) Areas with existing water shortages include western USA / northern Mexico, Spain and Portugal, northern Middle East (Iraq, Syria etc.), northern China in the northern hemisphere, and Namibia and Australia in the southern hemisphere.

Countries expected to have water shortages by 2025 are concentrated in Africa, Middle East and South Asia, with a a noticeable continuous east-west belt from Morocco to India. Also there is a belt down the eastern side of Africa from the Horn of Africa to South Africa plus some countries in West Africa.

Elsewhere only the occasional country is shown at risk – only Peru in South America and Poland added in Europe, and South Korea in Asia.

One or two points which describe the distribution, while overall coverage remains incomplete and haphazard or vague. The worth of some fuller descriptive answers might be reduced by locational inaccuracies. 1 or 2 marks

Wider range of accurate locational points given, which together provide a more complete picture of the world distribution of water shortages. 3 or 4 marks [4]

(d) (i) Layer of sandstone rock shaded in. [1]

(ii) Rainwater on the high ground / mountain ridge (on the left), where the layer of sandstone rock outcrops on the surface, sandstone rock is trapped between layers of clay, permeable rock surrounded by impermeable rocks.

3 @ 1 mark [3]

(iii) Oasis located where water bearing rock touches or is easy to reach from the surface, whereas a downfold in the rock takes the water well below S, which is in the middle of an area of sand with soils no use for cultivation, other disadvantages of sand dunes such as constantly shifting in the wind.

Three explanatory points like these. 3 @ 1 mark [3]

(iv) Good cases can be made out for both A and B, but definitely not C. Marks awarded for reasons why, not choice of well.

A – all year water supply; not too deep a well making it cheaper to build and to take out water. But, soon at risk if water levels fall lower.

B – all year water supply; cut deeper into the dry season water bearing rock for future use / security. But deeper and more expensive to build; more power needed to draw water up to the surface.

C – only useful in the wet season; how useful is that, even if it is the cheapest method?

Three points made along these lines for a choice of A or B. 3 @ 1 mark [3]

(e) (i) Water is lost from the canal and channels by evaporation, it is also lost into the ground by seepage, so that only a proportion of the water is actually available to crops for growth.

Understood and well explained = 2 marks
Some understanding e.g. reference to one way that the water is lost = 1 mark [2]

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(ii) Order of statements;
moisture in the soil is evaporated
salts are drawn up to the top of the soil
high concentrations of salt accumulate around plant roots
most crops cannot tolerate high levels of salt

All four correct = 3 marks
Two or three correct = 2 marks
One correct = 1 mark [3]

(iii) Syllabus method named is trickle drip irrigation which directs irrigation water towards plant roots and does not water the surroundings; often enclosed pipes laid between the lines of plants with holes for water flow only near plant roots.
Also widely known is clay pot irrigation with water stored in a clay pot protecting it from evaporation and seepage, and small holes controlling the water outflows towards crop plants.

Reserve two marks for the diagram – written text only answers maximum 2 marks.
1 mark for the diagram itself
1 mark for labelling
2 marks for written answer describing how; these can also be claimed by full labelling on the diagram.

For other less suitable methods of irrigation, such as use of sprinklers, credit diagrams up to 2 marks. 2 mark max. for these. [4]

(iv) Explanation for why it is much less likely that salinisation will occur – because a higher proportion of the water provided is being used by the plant; this will reduce water losses from evaporation from the soil, so that fewer salts will be drawn up to the surface where plants are being grown.

Well explained for method of irrigation used in part **(iii)** = 2 marks
Part explanation for method, or a more general explanation = 1 mark [2]

(v) Possibilities:
Developing and using new crop strains which need less water such as drought resistant varieties (e.g. dry rice instead of padi rice) or GM crops modified to grow with less water / withstand risks of drought

Replace traditional varieties of crops with high yielding varieties so that as much or more can be produced from a smaller area of irrigated land

Different farming techniques better adapted to dry environments such as dry land farming

Either one method well elaborated upon, or two or more methods identified with more limited development.

Method identified = 1 mark
Elaboration = up to 2 marks [3]

[Total: 40]

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