UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0680 ENVIRONMENTAL MANAGEMENT

0680/21 Paper 21, maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

1 (a) (i) Africa [1]

(ii) Continent is wider in tropical latitudes where the desert climate occurs, or desert goes right across the continent from west to east coasts. [1]

(iii) From the direction of flow – all from high to low latitudes, from cold towards warm ocean waters, and therefore carry cold water. [1]

(iv) Becomes wetter,
warm Pacific current replaces the cold Peruvian current off the coast,
winds blow from sea to land/wet and warm winds from the sea.

How = 1 mark
Why = 1 mark [2]

(v) The two similarities are:
western sides of the continents,
across the tropics/sub-tropics/20–30° North and South of Equator.

1 mark for each similarity. [2]

(b) (i) Most conclusive evidence is low total annual precipitation/less than 250mm
= 1 mark

e.g. only 29mm in Cairo/81mm in Riyadh,
also very hot summer temperatures (especially in Riyadh),
30 °C plus is higher than at the Equator.

Any one of these for the 2nd mark. [2]

(ii) Riyadh is hotter in summer (5 months with 30°C+), and has a larger annual range of temperature (19 compared with14). Cairo is drier (29mm total against 81mm in Riyadh), although Riyadh has more months with zero precipitation (7 against 5). Riyadh has a more distinct wet period in late winter/spring (Feb-Apr).

Two marks for a two-sided difference with supporting values/months.
One mark for a heavily one-sided difference or a comparative without support.
Reserve 1 mark each for temperature and precipitation; otherwise any route to three marks. [3]

(iii) High temperatures lead to high rates of transpiration/evaporation/great water loss, fierce sun from cloudless skies bakes the land and burns off green vegetation, total rainfall is low and unreliable, limited effectiveness because of dry ground and high temperatures.

Points made along these lines for one mark each.
A well developed point may be worth two marks.
Any route to three marks.
[Note – no credit here for plant adaptations against these climatic problems.] [3]

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(c) (i) Possible labels:
tap root of date palm,
large branching root system of the scrub,
both have deep roots reaching water table,
shallow surface rooting system of cactus,
succulent stem of cactus,
tough/thick bark of the date palm,
thorny nature of cactus and scrub plant,
only a small part of the scrub plant above the surface.

Four labels correctly placed = 4 marks [4]

(ii) Cactus only has surface roots to trap water after occasional desert rains, its main adaptations are above the surface storing moisture in its fleshy stem, whereas the other plants rely more upon greatest possible use of underground water, either down to the water table or extensive coverage.

Two points made along these lines. [2]

(d) (i) Wandering the desert for new pastures with their herds = nomadism
Reliance on animals for all their needs = pastoral

Stating only from the passage = 1 mark
Explaining how this makes it pastoral nomadism = 2nd mark [2]

(ii) Main reason is that the camel is the beast of burden to transport their belongings as they move around the desert searching for fresh pastures.
Other acceptable reasons are:
has the greatest number of uses food and drink plus others,
best adapted of the animals to living in desert conditions,
useful for other aspects of their lives such as trading.

Two reasons sufficiently distinct. [2]

(iii) Still carried out after having been followed for centuries, changing pastures means that grazing takes place only where vegetation exists, group moves on before overgrazing occurs, have an extra income from trading, way of life is self sustaining/does not depend on large inputs from outside.

Some understanding = 1 mark
Understanding with some support = 2 marks
Well understood and supported by relevant references to ways of life = 3 marks [3]

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(iv) Effects can be positive/beneficial, or negative/disadvantages.
Positive effects – mainly economic; they include work on the oil wells and in the refineries, likely to be much better paid; can live in one place instead of the nomadic desert existence. Urban living with all the modern conveniences and less exposed to natural conditions and changes.

Negative effects – some economic because land traditionally used and crossed over by them is being taken away for irrigated farming and oil. Migration with animals made more difficult by pipelines crossing the desert. Social – disruption caused by migrations of young folk, likely in future to be short of people to carry on the traditions, and do the work as their parents get older. Once disrupted, their way of life is in danger of being lost for ever.

Effects mentioned, but not really explained; mainly one effect, or all negative or positive leading to a narrow answer. [1–2 marks]

Both social and economic effects covered, including both good and bad.
Reasonable breadth of coverage. [3–4 marks]

(e) (i) Overgrazing or over cultivation; allow deforestation/very intensive farming. [1]

(ii) The underlying/basic cause = 1 mark
Elaborated upon/emphasised = 2nd mark [2]

(iii) Background about why rates are high i.e. high birth rates compared with low and declining death rates, resulting in high rates of natural increase.
The explanation can be for both of these, but it is most likely that answers will be about why birth rates remain high with references to social and economic factors such as family planning availability, social customs, role of certain religions, lack of female education, limited career opportunities for women.
The slow progress element can bring in the role of governments and the existence or otherwise of population policies. Opportunities for case study use e.g. 1 child policy in China showing what could be done, but what has not been done elsewhere in developing countries.
National economic factors also play a part – the poverty of many African countries which can't afford population policies even if the will exists.

General points without development, or over-concentration on only one. [1–2 marks]

Useful range of relevant points made, with supporting detail. [3–4 marks]

As before, but with a reference to the African and other developing countries part of the question. [5 marks]

[Total: 40]

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2 (a) (i) Formed where there used to be dense forests (e.g. TRF), these die, decay and decompose, covered over by new surface deposits, compressed over millions of years into layers of coal.

Understood and compete = 3 marks
Some or partial explanation = 1–2 marks [3]

(ii) Fossil fuel – living matter from millions of years ago preserved in rocks.
Fossil fuel in the sense of time taken to form – up to 300 million years.

1 mark for each reason. [2]

(iii) Plants absorb carbon dioxide from the air as part of photosynthesis, some of it remains stored and is released when burnt, carbon in plants when burnt combines with oxygen in the air.

Understood = 2 marks
Some understanding = 1 mark [2]

(b) (i) All plots accurate = 3 marks
Key completed in agreement with graph = 1 mark

If not, 1 or 2 correct plots = 1 mark
3 or 4 correct plots = 2 marks [4]

(ii) The gap between ten year periods has increased = 1 mark
supported by values read off graph 1.2 for 1987–97 and 2.0 for 1997–2007.

2 marks [2]

(iii) Oil, coal and natural gas identified as being the fossil fuels,
total of 9.7 billion out of 11 billion,
estimate or calculation of the percentage for emphasis (88%),
comment on the low contribution from alternatives.

Three statements along these lines. [3]

(c) (i) Oil can be brought to surface using drilling machinery, whereas underground seams of coal need men and mines, oil can be obtained both offshore and onshore.

(ii) Oil is transported by pipelines and tankers over long distances, since it is a liquid rather than a solid it flows and is more easily transferred between different forms of transport, coal is bulkier to load and unload.

(iii) Oil, being a liquid, is easier to control in use – amount can be measured easily and it can be switched on and off, coal, being a solid, involves more mechanical and human work, heating up and reducing heat are slower/less finely tuned processes with coal.

Entirely or heavily one sided statements = 1 mark max. for each
Two sides comparative statements = up to 2 marks each
Reserve a minimum of 1 mark for each part.
Unclaimed marks can be topped up by any second comparative statements, within any of the headings.
Any mixture of 1 and 2 mark statements; maximum three marks per part. [6]

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(d) (i) 25% [1]

(ii) Two aspects to this; the basic statements are:
– a lot of wind turbines are needed to match the output from one coal fired power station (1000 at best, in reality 4000 of them)
– reliability because the coal fired station can deliver a consistently high output close to full, whereas the wind turbine is only 25% efficient.

Fuller development of these statements can include:
great areas of land would need to be covered to give the same output as one compact power station,
wind farms must have greater costs of construction and operation, there are days without wind (why the wind turbine is only 25% efficient), on these days another source like a coal fired station is needed.

Part answer – 1 or 2 marks
Fuller answer showing more understanding – 3 or 4 marks [4]

(iii) Sulphur dioxide and nitrogen oxides are released, these cause acid rain which destroys forests/kills trees, lakes and water courses become too acid for plant/water life.

Two points made along these lines. [2]

(iv) Local problem:
greatest concentration of pollution emissions in area around chimney,
washed down to surface when raining (wet acid rain),
damage around power stations includes rotting stonework and dead trees.

International problem:
winds are capable of carrying pollutants in the atmosphere long distances to other countries,
example of where this is a problem such as UK to Scandinavia.

Points made along these lines – minimum 1 mark for each of local and international. Otherwise 3 marks for 3 for explanatory points. [3]

(e) (i) Producers are concentrated in three continents (North America, Europe and Asia),
all are in the northern hemisphere,
mostly developed world countries,
none of them are from southern hemisphere continents dominated by developing countries,
nuclear power is rich world energy source/beyond the means and technology of poor countries.

Three points made along these lines, including some reference to both continents 'with' and 'without' nuclear power stations. [3]

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(ii) Arguments for nuclear power include clean in the sense of giving no carbon emissions, not contributing to global warming, source uses relatively little raw material (uranium) compared with the amount of energy produced, known technology which has been made more efficient.

Arguments against nuclear power include generates wastes that are radioactive without satisfactory means of storage, remain dangerously radioactive for many years, radioactive leaks are highly dangerous to living things, causing cancers, explosion of Chernobyl contaminated a wide area, known world reserves of uranium are running down.

Some arguments for or against, but simple/shallow/unsupported statements. May be very unbalanced e.g. dominated by arguments against. [1–2 marks]

More substantial arguments, with something for both sides, even if not in perfect balance. More understanding shown. View may be explained no better than in an earlier statement. [3–4 marks]

Arguments made for both sides. The view expressed is an overview and is supported by the explanation. [5 marks]

[Total: 40]

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