UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0680 ENVIRONMENTAL MANAGEMENT

0680/23 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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General notes

Symbols used in Environmental Management mark schemes.

/ separates alternatives for a marking point – other valid ways of expressing the same idea are also credited

; separates points for the award of a mark

[3] indicates the number of marks available

[max 3] the number shows the maximum number of marks available for the question where there are more marking points than total marks available

[max 3] when part of the marks of a question must come from part of the mark scheme, this is indicated by non-bold marks showing the internal maxima for different parts of the question
these non-bold marks are also used to show marks for bands where banded mark schemes are used

italic indicates that this is information about the marking points and is not required to gain credit
italic text is also used for comments about alternatives that should be accepted, ignored or rejected

ora or reverse argument – shows that an argument from an alternative viewpoint will be credited

AW alternative wording, sometimes called 'or words to that effect' –
AW is used when there are many different ways of expressing the same idea

( ) the word / phrase in brackets is not required to gain marks but sets the context of the response for credit
e.g. (nuclear) waste – nuclear is not needed but if it was described as a domestic waste then no mark is awarded

<u>volcanic</u> underlined words – the answer must contain exactly this word

ecf error carried forward – if an incorrect answer is given to part of a question, and this answer is subsequently used by a candidate in later parts of the question, this indicates that the candidate's incorrect answer will be used as a starting point for marking the later parts of the question

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1 (a) (i) **A** wind direction;
B wind speed;
C rainfall / precipitation;
D sunshine; **[4]**

(ii) using maximum and minimum thermometers / Six's thermometer;
taking readings from the bottom of the metal indices in both thermometers;
doing this once a day and resetting the indices on top of the mercury and alcohol columns;
placing the thermometers in the shade in the Stevenson's screen / white wooden box;
AVP e.g. further details about the maximum and minimum thermometers and how they work and are read; **[3]**

(b) (i) at least 10 accurate plots;
12 accurate plots centred;
Line used to link the values plotted; **[3]**

(ii) 4 ºC; **[1]**

(iii) *descriptive material* – wet or very wet from May to November / in summer AND (reasonably) dry/much drier from December / January to April / in winter;
clear recognition – of two seasons;
no marks are separately reserved for quoting of monthly rainfall totals, but their inclusion could help confirm recognition of the two seasons **[2]**

(iv) more cloud cover / rainfall so less direct sunlight;
accept a more indirect answer referring to monthly rainfall totals (33 mm compared with 254 mm and 432 mm) **[1]**

(c) (i) all year growing season/high temperatures above 25 ºC all year;
huge amounts of summer rainfall (over 2000 mm);
ref. to storing some of this for crop use during the drier winter;
ref. to the importance of heat and water for crop growth;
ref. to potential for two or three crops a year; **[max 3]**

(ii) *subsistence crops* – rice / corn (maize) AND
commercial crops – coconuts / sugar cane / pineapples;
both needed for the mark. **[1]**

(iii)

subsistence	*commercial*
mainly for own consumption	is for sale;
small-scale / small farms	large-scale / large farms;
more reliance on human and animal power	mechanised;
wider variety of crops / mixed farming with animals	more specialised / perhaps one crop plantations / monoculture;
low inputs / investments	high inputs / large investments;

[max 2]

it is possible that there will be two differences within one full two sided statement

(iv) mainly grow only one crop / monoculture;
two or more examples of typical plantation crops e.g. bananas, sugar cane, pineapples,

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coffee, tea;
large scale / cover big areas of land;
many owned by big companies / examples of foreign companies / multinationals;
ref. to high inputs including mechanisation / irrigation / use of chemical fertilisers / pesticide / insecticide sprays;;
export orientated; **[max 3]**

(d) (i) all form within / around the tropics;
in the Pacific Ocean off the coasts of SE Asia (or some named countries) and Australia / AW;
in the Indian Ocean north of the Equator in Bay of Bengal and Arabian Sea / AW;
more extensive area of formation south of the Equator between Australia and Africa / AW;
in the Atlantic to the east the Caribbean and the south east of the USA / AW; **[max 3]**

(ii) early direction of movement is mostly from east to west;
then curved tracks out of the tropics / towards more temperate latitudes,
all finish by tracking northwards in the northern hemisphere and southwards in the southern hemisphere / towards the poles; **[max 2]**

(iii) Sea water temperatures in areas of formation are at their highest (at least 25ºC);
constantly rising warm moist air in the low pressure is what drives and sustains cyclones / more evaporation of water leading to cyclone formation; **[2]**

(e) (i) Strong and violent winds and heavy rains accompany cyclones / AW;
high winds damage buildings which can injure / kill people;
high winds bring down trees which can injure / kill people
heavy rains cause flooding so people drown;
heavy rains cause landslides on steep slopes so that houses / people are buried by soil / mud / rocks; **[max 3]**

(ii) *answers which go little further than identifying appropriate information given in the boxes*
general answers relying upon just one or two valid points [max 2]

better answers use the information and explain more fully the factors responsible for the differences
some answers may be unbalanced with more written about one of the two countries than the other [max 4]

good answers which are well written covering a range of relevant factors
differences between the two countries made very clear [max 5]

Helpful information in the boxes
Philippines
'flooding largely the result of insufficient and inadequate drainage'
'cyclones create a cycle of poverty' which makes 'it more difficult for them to afford to take preventative measures ready for the next one'
Japan
'after warnings from the Weather Office, many people were evacuated into shelters by the disaster management agency before the cyclone arrived.'
'the threat of natural disasters in developed countries like Japan encourages technological improvement'

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factors, therefore, which help to account for differences in loss of life from cyclones between Philippines and Japan are human and include
poverty and wealth
level of technology
degree of preparedness
administrative efficiency and organisation
all of these are shown to be positive and high in Japan

these can be supported by references to what can be done to alleviate the effects of cyclones; the syllabus mentions
improved forecasting
appropriate settlement patterns and buildings
disaster relief **[max 5]**

(iii) *marks for view explained*

candidate takes the view that this is unlikely / impossible
strength, power and force of very strong cyclones make it highly unlikely humans can ever fully defeat the immense power and fury of nature
unpredictability
cyclones can strike big cities with millions of people, from which a full evacuation would be impossible
some people are always unwilling to leave homes, often from fear of looters

candidate takes the view that this is likely / possible
technology is improving all the time
weather satellites and computer models are becoming more sophisticated at tracking and predicting cyclones
shelters stocked with drinking water and food can prevent all loss of life from cyclones
better built / concrete housing **[max 2]**

[Total: 40]

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2 (a) (i) shading of all three sectors for oil, coal and natural gas only; **[1]**

(ii) they are the top three / three largest;
accounting for about 80 % of the total energy consumption;
allow ecf from (a)(i) for [max 1] **[2]**

(iii) ¼ / quarter / 25–27%; **[1]**

(b) (i) *surface towers* – lifting gear / AW; ventilation pumps / AW; [max 1]
shafts route for miners to reach the coal seam; for coal / waste to be removed / ventilation path; [max 1] **[2]**

(ii) the coal cutter digs the coal from the seam;
the cutter has giant mechanical teeth to bite into the coal / AW;
ref. mechanical / metal pit props to support the tunnel roof;
the loose coal is carried away by train; **[max 3]**

(iii) *the best answers will refer to the characteristics of both old and modern coal mines in order to support the choice of modern mine*
highly mechanised;
details e.g. machinery instead of men doing the work underground / in an old mine men would be cutting into the coal with picks ands shovels;
ref. recent/modern looking buildings on the surface;
mine is not in the middle of a mining settlement / mine is shown in the middle of open countryside; **[max 2]**

(c) (i) flood or equivalent / fire / explosions / safety standards often ignored;;
four [2]
two or three [1] **[2]**

(ii) *opencast mine* – all work is done in the open air / on the surface;
more of the work can be done by machines;
roof collapses do not exist;
not possible to get build-ups of gas leading to explosions and fires;
if there is an accident it is easier for emergency treatment to be provided; **[max 3]**

(iii) safety rules vary from country to country;
variable degree to which safety standards are enforced;
greater health and safety culture in some countries;
safety costs countries money;
richer / developed countries can better afford the safety supervision;
if a country depends on minerals for export, the emphasis can be on production rather than safety;

age and condition of the mines;
extent to which they have been modernised;

type of mining / physical conditions;
how deep underground the mines extend;
named example e.g. gold mines in South Africa are the world's deepest;
extent of underground geological problems;
whether the mining is official or unofficial;
named example e.g. illegal mining in frontier regions of Brazil; **[max 4]**

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(d) (i) sulphur dioxide;
oxides of nitrogen; (accept named i.e. nitric / nitrous oxide / nitrogen dioxide) **[2]**

(ii) pollution from the UK / Germany / one group of countries, being carried by the wind to other countries / Norway / Sweden / Scandinavia, making it an international problem / AW; **[1]**

(iii) main wind direction is south west / from south west to north east;
pollution from coal fired stations is carried away from the UK;
so trees in northern UK unaffected by the acid rain;
acid rain (in Sweden) increases soil acidity;
causes faster leaching of soil nutrients / calcium / potassium;
manganese / aluminium released from soils and harm roots;
long-term causes trees shed their leaves / needles and die / AW; **[max 3]**

(e) (i) flue gases from chimneys can be 'scrubbed' / ref. filters / AW;
ref. flue gas desulphurisation / FGD;
details of FGD e.g. removing sulphur by using a mixture of limestone and water;
nitrogen oxides removed by catalytic reaction with ammonia / equivalent; **[max 2]**

(ii) problems are less in the producing country;
reducing gas emissions costs money and increases the cost of electricity;
reaching agreements between countries is difficult because each has its own national agenda / AW;
illustrated by the limited success of recent climate change world summits;
many countries in Asia wish to develop economically leading to an increase in air pollution emissions;
objections of developing countries to being restricted because of pollution already caused by developed countries;
developed countries like the US need to reduce their high emissions but there is a lot of public and political opposition; **[max 3]**

(f) (i) 100 % / all of it; **[1]**

(ii) *Explanation of the theme of much greater importance in the three northern countries compared with world consumption*

renewables made up only about 4% of world energy consumption / a tiny percentage compared with fossil fuels;
in these three north European countries the situation is reversed with renewables dominating and fossil fuels making up a tiny percentage / AW;
use of comparative figures e.g. ratios between renewables : fossil fuels
Iceland 100 : 0 Norway 97 : 3 Sweden 53 : 4 / other comparatives e.g. percentages;
Sweden, (of the three, the country that uses least renewables) has a much higher nuclear sector than the world average, instead of using fossil fuels / AW;

total energy consumption and electricity consumption are not quite the same thing;
[max 3]

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(iii) *One or two relevant reasoned comments, but limited progress towards answering both elements in the question* [max 2]
Fuller coverage; wider range of points; likely to touch on both amount and types, but may be unbalanced between the two elements [max 4]
Good range of reasons, perhaps supported by use of named examples [5]

ref. relationship to a country's own national resources
countries with plentiful deposits of oil / coal / gas, amount likely to be dominated by fossil fuels – these are cheaper to use – the technology is more developed / traditional than renewables – so there is less incentive to look for alternatives – ora for countries without fossil fuels
ref. examples such as coal use in China and India, or oil use in the Middle East

ref. related factors e.g. degree of economic development and economic needs
type of renewables depends a lot on physical possibilities
renewables are not necessarily able to be afforded by all countries with favourable natural conditions

potential examples of renewables for discussion might include

mountainous countries with good rainfall have the best prospects for HEP – e.g. Norway in the example used here / alternative – HEP is most widely used renewable technology

geothermal power most available in areas of volcanic activity – e.g. Iceland in this example – on the plate boundary in the middle of the Atlantic Ocean / alternative

flat or mountainous and windy countries, especially islands, lend themselves to wind power – e.g. Netherlands / alternative – but technology expensive and therefore mostly used in developed countries

tropical and subtropical countries / named example, are best for solar power – but the technology is still developing to make solar more economically competitive – therefore mostly used in developed countries despite their relative lack of insolation

biomass should be globally available but requires investment and large land area – conflict with food production – Brazil has currently made most progress

[max 5]

[Total: 40]

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