AQA

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme
January 2004

GCE

Environmental Science

Unit ESC2

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Instructions: ; = 1 mark / = alternative response A = accept R = reject

Question 1

(a)

Statement	True	False	
Jointing increases the rate of weathering	✓		;
Igneous rocks cannot be weathered		✓	;
Different minerals in the same rock may weather at different rates	✓		;
Weathering is a purely chemical process		✓	;

4

(b) Regolith/scree;
solutes/cations/anions/minerals/sand/silt/clay/named gas (CO_2/hydrogen/chlorine/radon); 2
[**R** soil/CH_4]

Total marks = 6

Question 2

Mineral	Main use
Granite	Construction/building/roadstone/kerbs/grave stones/statues and monuments/aggregate;
Lime(stone)/chalk/$CaCO_3$;	Cement, glass
China clay/kaolin;	Paper, pottery, pharmaceutical, filler

3

Total marks = 3

Question 3

(a) (i) Silty clay loam; 1

(ii) 40% sand, 40% silt, 20% clay; 1

(b) Dry soil;
weigh (dry) soil;
[no "dry soil" MAX 3]
bunsen/burn/bake sample/desiccate/ref. suitable temp 100 ℃+;
to constant mass;
EITHER
difference = weight of organic matter;
express as %;
OR
$\frac{\text{dry weight - incinerated weight}}{\text{dry weight}} \times 100$;;

MAX 4

Total marks = 6

Question 4

(a) Addition of N/P separately increases growth positive correlation;
[**A** ref. to figures]
N increases growth more than P;
disproportionate growth when applied together/synergism; MAX 2
[**A** dramatically etc]
[**R** ref. to figures]

(b) For each technique: 1 mark for name and 1 mark for explanation of its purpose

Technique	**Purpose**
Liming;	Change the pH/neutralise/increase nutrients;
Add OM;	Improve structure/nutrients/water holding capacity;
Plough/rip/add drains;	Improve structure/ aerate/ improve drainage/ref. waterlogging;
Level/fill holes/demolish/remove tarmac or large objects;	Reduce danger/restricts root growth/clear site/ref. run-off/improve soil;
Plant trees/vegetation;	Add OM/improve scenery/screen/stabilise/reduce noise;
Plant legumes/fertilisers/NPK;	Increase N content/fertility;
Plant pollution tolerant species;	Increase OM/stabilise/decrease contamination therefore take up heavy metals;
Construct lakes;	Vary habitat/economic purpose (recreation);
Replace topsoil;	Improve fertility/remove pollutant;
Add bacteria;	Bioremediation;
Clay cap;	Seal pollutants;

[**A** credible alternatives]

MAX 6

MAX 3 for techniques if no purposes given

Total marks = 8

Question 5

(a) Movement/draining away of ions/minerals/heavy metals/toxins/ nutrients/ chemicals/colloids;
in solution/dissolved; 2

(b) Rocks that contain small percentage/concentration;
of metal/named metallic minerals; 2
[**R** minerals/amounts]

Total marks = 4

Question 6

(a) (i) Relatively insoluble (in inorganic form)/(organic forms) resistant to microbial breakdown; 1

(ii) Phosphate/(ions)/in organic/PO_4^{-3}; 1

(b) (i) Nitrogen converted into ammonia;
ammonia dissolves/converted into ammonium/nitrogen compounds/correct ref. to nitrification;
makes N/ NO_3^- available to plants/nitrates;
soil fertility increased;
N needed for amino acids/proteins/DNA/growth/chlorophyll; MAX 4

(ii) Nitrate/proteins/chlorophyll/plants/nitrogenous compounds converted into nitrogen;
N_2 diffuses away/enters atmosphere;
lost to biota/plants;
reduced fertility/growth;
ref. to occurs in anaerobic/waterlogged soils; MAX 4

Total marks = 10

Question 7

(a) (i) Urban sprawl/building/housing/development would occur/green belt stops development;
habitat destruction/loss of amenity/landscape/damage to historic towns; 2

(ii) Access/people increase;
loss of production/damage to crops/disturbance/erosion/trampling/litter; 2

(b) CP small, NP large/many more CPs than NPs;
CP near urban area, NP remote;
NPs are a planning authority, CPs are not/CPs managed by local authority, NPs by others;
NPs have more owners/are mainly privately owned;
CPs often on reclaimed land/NP natural landscapes;
honeypot/CP concentrate visitors/leaves other sites undisturbed/decreased pressure on NP;
NP 1949 NP&AC Act/CP 1968CA;
CP attracts locals/NP large sphere of influence;
people live in/work in NP; MAX 4
[**A** non-comparative answers]

Total marks = 8

Question 8

(a) Least erosion under forest;
smallest range under forest;
greatest on bare soil;
greatest (range) in Tanzania/smallest (range) in Upper Volta;
in all locations cultivated land intermediate rates of soil erosion; MAX 3

(b)
1 Exceed carrying capacity/overgrazing;
2 irrigation/salinization;
3 deforestation/removal of hedgerows;
4 ploughing/not contour ploughing;
5 using marginal land;
6 using slopes/not terracing;
7 not year round crops/leave soil bare/no organic fertilisers/no soil conditioners;
8 trampling/compaction/heavy machinery;
9 monocultures;
10 increase raindrop impact/rainsplash;
11 decrease interception;
12 decrease infiltration/soil dries out;
13 decrease root binding;
14 leaching/decreased OM/litter/nutrients;
15 damage structure;
16 sheet wash/run-off/rills/gullies;
17 windblow/wind erosion;
18 desertification; MAX 12

Total marks = 15
