

Question number	Answer	Notes	Marks
1(a) (i)	amino acids / protein / DNA / RNA / nucleic acid;		1
(ii)	nitrogen-fixing;	Allow <i>Rhizobium</i>	1
(b)	1. nitrifying (bacteria) / nitrification; 2. nitrite (to nitrate);		2
(c) (i)	1. re movement / more (kinetic) energy / eq; 2. re collisions / more enzyme substrate complexes / eq;		2
(ii)	1. <u>denatured</u> ; 2. <u>ctive site</u> ; 3. shape altered / bonds broken / eq; 4. substrate no longer fits / eq;	1. Ig re inactive / destroyed 1. Reject death	3

Total 9 marks

Question number	Answer	Notes	Marks
2 (a)	cell membrane; cytoplasm; plasmid; nucleoid / chromosome / DNA once;	reject nucleus / nucleolus ignore vacuole / ribosomes / mitochondria	3
(b) (i)	enzymes; <u>optimum</u> ; denatured / destroyed / eq;	ignore references to low pH and high pH	2
(ii)	amino acids; protein / DNA;		2
(iii)	active transport / active uptake; low to high conc. / against conc. gradient / eq; respiration / energy / ATP; root <u>hair</u> (cells); large surface area / eq;		3
(c) (i)	X at 100;	allow any indication at 100	1
(ii)	11.1%; ; allow one mark for 8000 or 7200 or 800 in working		2
(iii)	nitrate (already) in soil / <u>nitrogen fixing</u> bacteria / nitrification / organic material in soil / eq;		1
		Total	14

Question number	Answer	Notes	Marks
3 (a)	different diet / different species / eq;	<p>Ignore nitrogen</p> <p>Eg. eat different food / eat more food / different amounts of protein / different amounts of nitrogenous food / different amounts of nitrogen compounds in food / one is carnivorous</p> <p>Eg. type of fish / breed of fish / strains of fish / genes in fish / metabolism of fish</p>	1
(b)	28.9 / 28.92;	<p>Allow one for 0.4 / 0.0723 / 2.5 in working</p> <p>Allow 28.9 / 28.92 in working for 2 marks if 29 on answer line</p>	2

	<p>(c)</p> <ol style="list-style-type: none">1. plant / algae growth / algal bloom / eq;2. algae block light;3. less photosynthesis;4. decomposers / decomposition / bacteria / microbes / <u>microorganisms</u> / fungi;5. respiration; ONCE6. oxygen depletion / anoxic; ONCE7. death of plants / fish / organisms;		Max 5
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<p>(d)</p>	<ol style="list-style-type: none"> 1. dead / attenuated / harmless / inactive / weakened / modified / pathogen / bacteria / microbe / microorganism / virus / eq; 2. antigens; 3. memory cells; 4. secondary immune response / <u>faster immune response</u> / antibody produced <u>faster / sooner / quicker / more</u> ; 	<p>Dead form of the disease = 0 Dead strain = 0 Ignore dead virus</p> <p>Ignore antibody production in primary immune response</p>	<p>4</p>
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Question number	Answer	Notes	Marks
4 (a)	A evaporation; B transpiration; C precipitation / rain / snow / eq;		3
(b)(i)	1. less transpiration / less water loss from plants / eq; 2. less cloud formation / condensation; 3. less precipitation / rain / less water falls on the ground / eq;	1. Ig re water remains in soil 2. Ig re humidity	Max 2
(ii)	1. (less) photosynthesis; 2. less <u>carbon dioxide</u> in air / less <u>carbon dioxide</u> absorbed; 3. less consumption of plants / eq; 4. less <u>decomposition</u> / <u>decay</u> ; 5. burning of trees produces <u>carbon dioxide</u> ;		Max 4

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5 (a)	<table border="1"> <thead> <tr> <th>Stage</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>absorption</td> <td>8</td> </tr> <tr> <td>denitrification</td> <td>6 / 7;</td> </tr> <tr> <td>nitrogen fixation</td> <td>1;</td> </tr> <tr> <td>excretion</td> <td>3;</td> </tr> <tr> <td>decomposition</td> <td>2;</td> </tr> </tbody> </table>	Stage	Number	absorption	8	denitrification	6 / 7;	nitrogen fixation	1;	excretion	3;	decomposition	2;		4
Stage	Number														
absorption	8														
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(b)	<p>1 active transport / active uptake;</p> <p>2 low concentration to high concentration / against concentration gradient / eq;</p> <p>3 energy / ATP;</p> <p>4 root <u>hair</u> (cell);</p>	ignore diffusion ignore along concentration gradient	3 max												
		Total	7												

Question number	Answer	Notes	Marks
6 (a)	<p>A nitrogen fixation / nitrogen fixing;</p> <p>B decomposition / decomposing / decay;</p> <p>C <u>nitrification</u> / <u>nitrifying</u>;</p> <p>D <u>denitrification</u> / <u>denitrifying</u>;</p>	<p>No mark if list given</p> <p>A. allow nitrogen fixing bacteria</p> <p>B. ignore decomposers / rotting / breakdown</p> <p>C. allow nitrifying bacteria</p> <p>D. allow denitrifying bacteria</p>	4
(b)	<p>1. bacteria;</p> <p>2. fungi;</p>	<p>ignore nitrogen fixing / nitrifying bacteria / denitrifying bacteria / mushroom / toadstool / protists / detritivores / worms</p>	2
(c)	<p>1. absorption by roots / root hair cell;</p> <p>2. active transport / active uptake;</p> <p>3. (make) amino acids / (plant) protein;</p> <p>4. <u>assimilation</u> / <u>assimilate</u>; ONCE</p> <p>5. eaten / ingested by animal / herbivore;</p> <p>6. <u>digestion</u> / <u>digests</u> / <u>digested</u> / <u>eg</u>;</p> <p>7. protease / named protease;</p>	<p>1. ignore root nodules</p> <p>7. ignore enzyme</p>	4

Question number	Answer	Notes	Marks
6 (d)	1. cheaper / readily available / less transport needed / renewable / sustainable / recycles / eq; 2. ess <u>eutrophication</u> / leaching / run off / <u>pollution</u> / slow release of ions / less soluble / eq; 3. improves soil structure / holds water / stops erosion / eq;	allow converse ignore less harm to environment / damage to wildlife / more natural / idea that chemicals harm humans	2

(Total for Question = 12 marks)