<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>pH of amylase solution</th><th>diameter in mm</th></tr>
<tr><td>2</td><td>10 ± 1</td></tr>
<tr><td>4</td><td>(15)</td></tr>
<tr><td>7</td><td>20 ± 1</td></tr>
<tr><td>9</td><td>14 ± 1;</td></tr>
<tr><td>13</td><td>(10)</td></tr>
</table>
</td><td></td><td>1</td></tr>
<tr><td>(b) (i)</td><td>1. digestion / break down;
2. no starch;</td><td>Breaks down all the starch = 2
Breaks down starch = 1</td><td>2 max</td></tr>
<tr><td>(ii)</td><td>1. (amylase/enzyme) denatured at pH 2 or 13 / low or high pH;
2. optimum / works best at pH 7;
3. enzymes work less well at pH 9 or pH 4;</td><td></td><td>2 max</td></tr>
<tr><td>(c)</td><td>pH;</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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(d))	1. <u>volume</u> of amylase; 2. concentration of amylase; 3. same amylase / source of amylase; 4. depth of agar; 5. time;	Mp 1 ignore amount Ignore concentration of starch / agar / iodine	3 max
(ii)	1. 0 for pH 2 and pH 13; 2. wider for pH 7 than at 20 ^{O}C;	Check position of wells	2

Total 11 marks

Question number	Answer	Notes	Marks
2 (a) (i)	length of egg white;		1
(ii)	1. repeated / five tubes used / eq; 2. similar pattern / no anomalies / small range / eq;		2
(iii)	ruler / scale / eq;	must state apparatus	1
(b) (i)	1. no enzyme / no protease / no named protease; 2. no digestion / no break down;	ignore no change in length allow converse	2
(ii)	1. enzyme denatured / changed active site / enzyme destroyed; 2. high temperature / heat / eq;	2. ignore boiled	2
(c)	1. acid and alkali / range of pH / different pHs / change pH; 2. no boiling of pancreas juice; 3. same volume of juice/enzyme / same concentration of juice/enzyme;	3. ignore amount	2

(Total for Question = 10 marks)

Question number	Answer	Notes	Marks
3 (a)	37;	units not required	1
(b)	1 (further) away from optimum temp; 2 low (kinetic) energy / less movement / eq; 3 few collisions / enzyme substrate complexes / eq;	allow converse for each marking point	max 2
(c)	1 denatured; 2 active site; 3 no longer fit / no longer bind / changes shape / deformed / eq:	ignore enzyme destroyed reject enzyme killed	2 max
(d)	1 (less) oxygen; 2 (less) glucose; 3 (less) (aerobic) respiration / anaerobic respiration; 4 lactic acid / acidic; 5 low pH; 6 inhibits enzymes / affect enzymes / eq;		4 max
		Total	9

Question number	Answer	Notes	Marks
4(a)	1. smoking; 2. dust asbestos / working in mines; 3. umes; 4. enetic / lack of A1T; 5. bronchitis;	Ignore infection	2
(b)	1. digest / breakdown / kill / destroy; 2. acteria / pathogens / viruses/ microorganisms; 3. prevent infection/disease/reproduction;		2
(c)	2 268 000;;	1 mark for 0.80 / 80% / 80 ÷ 100 / divide by 10 multiply by 8	2
(d) (i) (ii)	alveoli / alveolus; 1. le surface area; 2. diffusion / gas exchange; 3. (insufficie) oxygen;	Mark first answer in a list	1 2

Question number		Answer	Notes	Marks
(e)		1. memory cells; 2. an bodies; 3. (production nd response) sooner / quickly / faster / more / last longer / eq;	 2. Allow if production by incorrect cell 3. Ignore more robust / more powerful	2
(f)	(i)	1. le mucus / digests mucus / breaks down mucus / thinner mucus / runny mucus; 2. wider airways/tubes / more space / less blockage / open up / eq; 3. ore air / more oxygen;	 2. Ignore easier to breath 3. Allow more oxygen into blood	2 2
	(ii)	1. increases concentration of oxygen / increases concentration gradient / more oxygen; 2. (more) diffusion / (faster) diffusion / (more) gas exchange;	Greater diffusion gradient = 2	

Total 15 marks

Question number	Answer	Notes	Marks
5(a) (i)	amino acids / protein / DNA / RNA / nucleic acid;		1
(ii)	nitrogen-fixing;	Allow *Rhizobium*	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. denatured; 2. ctive site; 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
6(a)	respiration / aerobic respiration / anaerobic respiration;		1
(b)	pollination / transfer pollen / eq;	Ignore reproduction / collect nectar	1
(c)	1. producer; 2. secondary consumer 3. tertiary consumer;	 Reject primary consumer Ignore carnivore	2
(d)	1. avoids closing unnecessarily / by accident / due to wind / debris / when no insect is present / only closes with an insect / must be a big insect / eq; 2. avoids wasting energy / enzymes / digestive fluid;		2
(e)	1. solution (more) concentrated / reduced water potential / less water in cell / more ions / minerals / solutes / high salt concentration / eq; 2. water enters by osmosis;	Allow converse for Mp1 Ignore water concentration	2

(f)	1. prevent infection / disease / may be pathogenic; 2. prevent competition (for food) / prevent loss of energy from insect / prey;	Ignore harm / illness / produce toxins Eg. prevent decomposition of insect / feeding on insect / taking nutrients from insect / digesting insect Ignore digesting / decomposing / feeding on plant	2
(g))	(slower rate) 1. no/less mechanical digestion / mechanical breakdown / not broken into pieces / eq; 2. less surface area / small SA:VOL; 3. (for) enzymes;	Allow converse Ignore crush / chew	Max 2
(ii)	protease / carbohydrase / lipase / eq;	Allow any named digestive enzyme	1

(h)	1. temperature; 2. (kinetic) energy / collisions / <u>movement</u> of molecules / enzymes / substrates / more enzyme substrate complexes; OR 3. size / shape / mass of insect; 4. (surface area for) enzyme contact / eq; OR 5. composition of insect / type of insect; 6. exoskeleton / indigestible; OR 7. amount of enzyme / enzyme concentration; 8. collisions / more enzyme substrate complexes / eq;	Pairs of Mps are linked Ignore enzymes work faster / denature Ignore pH Ignore shell	Max 4

Total 17