Question number	Answer	Notes	Marks
1(a)	1. protect from birds; 2. protect from seals; 3. keep out wild salmon / other fish to avoid competition; 4. keep out wild salmon / other fish to avoid disease;	Ignore reference to terms interspecific / intraspecific predation Protect from predators alone = 0 must be qualified Ignore stop salmon getting out / salmon eating salmon	3
(b)	1. decrease growth; 2. idea that bacteria / decomposers / microorganisms involved; 3. respiration; 4. ess oxygen;	1 Ignore death 2. Ig re pathogens 4. Ig re disease / infection	3
(c)	1. rem e / dispose / eq; 2. prevent spread of fungus/disease /pathogen/infection;		2
(d)	wrasse eat (sea)lice;	Wrasse alone = 0	1

Total 9 marks

Question number	Answer		Marks
2 (a)	temperature recorder / eq; cooling jacket / cooling water / water in if hot / eq;		2
(b)	respiration produces heat; enzymes; denatured / destroyed / eq; optimum; best growth / maximum growth / more product / eq; microorganisms killed / eq;		2
(c)	mixing / distributing oxygen / air; for respiration; mixing / distributing nutrients / microorganisms; for growth; mixing / distributing heat / temperature; for respiration / enzymes;	mix air and heat = 2	2
(d)	pH / acidity / alkalinity; enzymes; oxygen; respiration; (other) microorganisms / sterility; competition / contamination / less product / eq;	mark in discrete pairs ignore air	2
(e)	insulin / penicillin / antibiotic / *Fusarium* / mycoprotein / any named GM product / eq;	ignore bacteria / fungus / cheese / yoghurt / beer / ethanol / medicine	1
		Total	**9**

Question number	Answer	Notes	Marks
3 (a)	1 / stage 1 / pasteurise; 2 / stage 2 / sterilise;	Ignore order	2
(b)	1. prevent killing / prevent enzyme <u>denaturation</u>; 2. acteria / *Lactobacillus* / *Streptococcus*;	Avoid denaturing bacteria = 1 Kill enzyme = 0 Ignore reference to suitable temperature for enzymes	2
(c)	1. les production / product contaminated / spoil taste / eq; 2. (other) bacteria present / bacteria not killed / bacteria would compete / bacteria use lactose / eq;	Contaminated with other bacteria = 2 Allow microorganisms / microbes / fungi	2

(d)	1. less production / take longer / less lactic acid / affect the taste / eq; 2. because bacteria stop growing / bacteria stop reproducing; 3. les enzyme activity / below optimum / less (kinetic) energy / eq;	3. Ignore denature	Max 2
(e)	1. co ains vitamin C; 2. event scurvy;	Allow vitamin C if in list with other vitamins Allow vitamin A	Max 1

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>
<table>
<tr><th>Food product</th><th>Genus of organism used</th><th>Group organism belongs to</th><th>Substrate used</th><th>Type of respiration</th><th>Chemical product</th></tr>
<tr><td>beer / wine / bread / eq;</td><td>Saccharomyces</td><td>fungus</td><td>glucose</td><td>anaerobic</td><td>ethanol</td></tr>
<tr><td>yoghurt</td><td>Lactobacillus / Streptococcus;</td><td>bacteria</td><td>lactose;</td><td>aerobic</td><td>lactic acid / lactate;</td></tr>
</table>
</td><td>Ignore alcohol as food product

Ignore milk as substrate used</td><td>5</td></tr>
<tr><td>(b)</td><td>1. pasteurise / boil / sterilise / heat to high temperature / eq;

2. kill / prevent growth of / remove bacteria / microorganisms / pathogens / eq;</td><td>Mp 1 ignore heat milk alone

Mp 2 reject germs</td><td>2 max</td></tr>
</table>

Total 7 marks

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

Question number	Answer	Notes	Marks
5 (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)