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. less oxygen;	1 Ignore death 2. Ignore pathogens 4. Ignore disease / infection	3
(c)	1. remove / 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; <u>enzymes</u>; oxygen; <u>respiration</u>; (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. bacteria / *Lactobacillus* / *Streptococcus*;	Avoid denaturing bacteria = 1 Kill enzyme = 0 Ignore reference to suitable temperature for enzymes	2
	(c)	1. less 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. less enzyme activity / below <u>optimum</u> /less (kinetic) energy / eq;	3. Ignore denature	Max 2
(e)	1. contains vitamin C;	Allow vitamin C if in list with other vitamins	Max 1
	2. prevent scurvy;	Allow vitamin A	

Question number	Answer						Notes	Marks
4(a)							Ignore alcohol as food product Ignore milk as substrate used	5

Food product	Genus of organism used	Group organism belongs to	Substrate used	Type of respiration	Chemical product
beer / wine / bread / eq;	*Saccharomyces*	fungus	glucose	**anaerobic**	ethanol
yoghurt	***Lactobacillus / Streptococcus*;**	bacteria	**lactose;**	aerobic	**lactic acid / lactate;**

Question number	Answer	Notes	Marks
(b)	1. pasteurise / boil / sterilise / heat to high temperature / eq; 2. kill / prevent growth of / remove bacteria / microorganisms / pathogens / eq;	Mp 1 ignore heat milk alone Mp 2 reject germs	2 max

Total 7 marks

Question number	Answer	Notes	Marks
5 (a)	A nitrogen fixation / nitrogen fixing; B decomposition / decomposing / decay; C <u>nitrification</u> / <u>nitrifying</u>; D <u>denitrification</u> / <u>denitrifying</u>;	No mark if list given A. allow nitrogen fixing bacteria B. ignore 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. <u>assimilation</u> / <u>assimilate</u>; ONCE 5. eaten / ingested by animal / herbivore; 6. <u>digestion</u> / <u>digests</u> / <u>digested</u> / <u>eq</u>; 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. less <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)