Section B

Clarity of communication: [1]

The candidate's answers are clear enough to be understood without re-reading. The candidate has answered the question succinctly with little or no repetition or irrelevant material.

Question			Answers	Notes	Total
5.	a		a. translation converts a sequence of mRNA nucleotides/codons to a sequence of amino acids/polypeptide/protein ✓ b. «triplets of» nucleotides/bases on «activated» tRNAs pair with complementary «triplets of» nucleotides/bases on mRNA / *vice versa* ✓ c. base pairing occurs when adenine/A pairs with uracil/U and guanine/G pairs with cytosine/C ✓ d. specific amino acids are attached to specific of tRNA ✓ e. mRNA has codons ***AND*** tRNA has anticodons ✓		3 max
	b		a. PCR is process by which a small sample of DNA can be amplified/copied many times ✓ b. PCR involves repeated cycling through high and lower temperatures «to promote melting and annealing of DNA strands» ✓ c. «mixture» is heated to high temperatures to break «hydrogen» bonds between strands of DNA/to separate the double-stranded DNA ✓ d. Taq DNA polymerase can withstand high temperatures without denaturing ✓ e. primers bind to «targeted» DNA sequences at lower temp ✓ f. Taq DNA polymerase forms new «double-stranded» DNA by adding «complementary» bases/nucleotides ✓		4 max

Question			Answers	Notes	Total
5.	c		*Environment benefits:* a. pest-resistant crops can be made ✓ b. so less spraying of insecticides/pesticides ✓ c. less fuel burned in management of crops✓ d. longer shelf-life for fruits and vegetables so less spoilage ✓ e. greater quantity/shorter growing time/less land needed ✓ f. increase variety of growing locations / can grow in threatened conditions ✓ *Environment risks:* g. non-target organisms can be affected ✓ h. genes transferred to crop plants to make them herbicide resistant could spread to wild plants making super-weeds ✓ i. GMOs (encourage monoculture which) reduces biodiversity ✓ j. GM crops encourage overuse of herbicides ✓ *Health benefits:* k. nutritional value of food improved by increasing nutrient content ✓ l. crops could be produced that lack toxins or allergens ✓ m. crops could be produced to contain edible vaccines to provide natural disease resistance ✓		**8 max**

(continued…)

(Question 5c continued)

Question			Answers	Notes	Total
5	c		*Health risks:* n. proteins from transferred genes could be toxic or cause allergic reactions ✓ o. antibiotic resistance genes used as markers during gene transfer could spread to «pathogenic» bacteria ✓ p. transferred genes could cause unexpected/not anticipated problems ***OR*** health effects of exposure to GMO unclear ✓		

Section B

Clarity of communication: [1]

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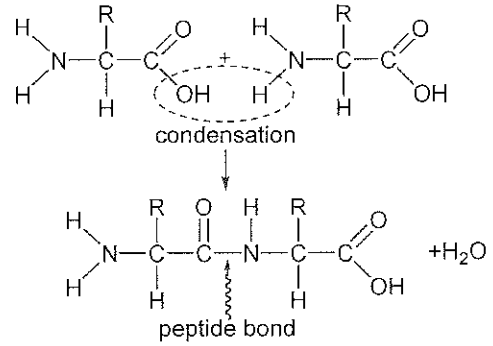
Question			Answers	Notes	Total
6.	a		a. each amino acid with a COO^-/COOH group at one end ***AND*** a NH_2/NH_3^+ at the other ✓	*Both needed.* *mp a requires the double bond to be shown between the C and O.*	**4 max**
			b. CH in middle with H or R group attached ✓		
			c. peptide bond correctly drawn between N and C=0 ✓		
			d. COO^-/COOH group at one end of dipeptide ***AND*** NH_2/NH_3^+ at other end ✓	*Both needed.*	
			e. loss of water ✓		
			eg: 		

(continued…)

(Question 6 continued)

Question			Answers	Notes	Total
	b		a. A, P and E binding sites are on the large subunit of the ribosome ✓ b. initiation of translation starts with binding of met-tRNA to the start codon ✓ c. large sub-unit binds with «start» tRNA in the P site ✓ d. A binding site holds the tRNA with the next amino acid to be added ✓ e. peptide bond is formed between the amino acids of the A site and the polypeptide at the P site ✓ f. polypeptide is transferred to the tRNA in the A site ✓ g. the tRNA «with polypeptide» in A site then moves to P site ***OR*** P binding site holds the tRNA attached to the growing polypeptide ✓ h. E binding site «exit» is where the tRNA «from P site without amino acid» leaves the ribosome ✓	*Accept annotated diagrams of the sites.*	**4 max**

(continued…)