

**Subject: ...BIOCHEMISTRY. Code: 2815/02 .....**

**Session: January.... Year: 2003.....**

**Mark Scheme  
post exam 16Feb 2003**

<b>MAXIMUM MARK</b>	<b>45</b>
---------------------	-----------

---

1	(a)	Active site ✓	saturated with substrate ✓	AW	2
	(b)	Curve is less steep ✓ and flattens to maximum at lower activity ✓			2
		Question total			4
		PAPER TOTAL			45

3 (a) (i)	Any COO group or OPO group ✓ Accept -CH <sub>2</sub> OCO-	1
(ii)	Central C on glycerol ✓ and C2 in serine ✓	2
(iii)	-1 ✓	1
(b)	Picture showing bilayer ✓ two hydrocarbon chains each inside ✓ Micelle scores one ✓ only	2
(c)(i)	-NH <sub>3</sub> <sup>+</sup> ✓ -COO <sup>-</sup> ✓	2
(ii)	Ionic attraction ✓ between charged side-chains on protein and charges on surface of membrane ✓/ hydrogen bonding ✓ between suitable groups on protein and surface eg NH and CH <sub>2</sub> OH ✓	2
(iii)	Converts <sup>+</sup> NH <sub>3</sub> to NH <sub>2</sub> /changes ionisation status/charges ✓ ( not COOH becomes COO <sup>-</sup> ) Reducing ionic attractions ✓	2
	<b>Question</b>	<b>12</b>
4	<b>total</b>	
	Look for 8 points from the following . Several can be earned by accurate diagrams. AW throughout.	
	glycosidic links ✓ In starch links are α 1-4 ✓ ( and α1-6 in amylopectin ✓) Amylopectin branched ✓ In cellulose links are β 1-4 ✓ It must be clear that they understand α and β .	
	Resulting helical/coils ✓ in amylose Starch allows ready hydrolysis ✓ to glucose, for energy/ATP production ✓ Starch is insoluble (reason not required) ✓ and does not affect the osmotic prssure within a cell. ✓	
	Parallel strands ✓ connected by hydrogen bonds ✓ in cellulose Therefore fibrous ✓ to provide strength ✓ for plant cell walls	8
	QWC Look for at least two complete sentences with fewer than three SPG errors.	1
	<b>Question total</b>	<b>9</b>

2 (a)	284 (gmol <sup>-1</sup> )	1
(b)	Glucose $-2800/182 = -15.4\text{kJg}^{-1}$ ✓ Accept the correct $-15.6\text{kJg}^{-1}$ . Stearic acid $-11080/284 = -39.0\text{kJg}^{-1}$ ecf ✓ accept bare answers and two or more sig figs. Must be some evidence of negative signs.	2
(c)	Energy produced by formation ✓ of O to H <u>and</u> ✓ C to O bonds  In glucose many of these are formed already ✓  OR glucose is more oxidised than stearic acid ✓ plus further comment on oxidation of CH <sub>2</sub> releasing more energy than that of CHOH. ✓ AW	3
	Question total	6
5 (a)(i)	Presence of U not T	1
(ii)	Any two ✓✓ of DNA uses deoxyribose not ribose RNA molecules smaller DNA usually double helical DNA is found only in nucleus	2
(b)	- Phe-Pro-Lys-Gly- ✓✓ ( with one mistake or reverse TryLysAlaLeu ✓ )	2
(c)	3'-AAGGGCUUCCA-5' ✓ (3' and 5' not essential )	1
	Question total	6
6 (a)(i)	H <sub>2</sub> NCH(CH <sub>3</sub> )CONHCH(CH <sub>3</sub> )COOH ✓ Accept displayed structure and the zwitterion	1
(ii)	+ H <sub>3</sub> NCH(CH <sub>3</sub> )COOH ✓	1
(b)	α-helix/chain in coil or spiral ✓ or diagram	2
(c) (i)	β-pleated sheet/flat or zigzag ✓ or diagram	
(ii)	bind to/carry ✓ oxygen <u>reversibly</u> ✓/allow oxygen to bind ✓ as a ligand ✓	2
	Four separate protein subunits ✓  One ✓ from: Two α and two β units ( Use this to find first mark if necessary but then need further point for second mark). An Fe in each unit Precise fitting to form working protein	2
	Question total	8

(b) (i)	(four) separate protein subunits aggregate to form the working protein	2
(ii)	bind to/carry oxygen <u>reversibly</u>	1
	<b>Question total</b>	<b>8</b>
6 (a)	<b>Active site becomes saturated with substrate</b>	<b>2</b>
(b)	<b>Curve should be less steep</b>	<b>2</b>
	<b>And flatten out well below the original</b>	<b>4</b>
	<b>Question total</b>	<b>45</b>
	<b>PAPER TOTAL</b>	