Mark schemes

Q1.

(a) 1. Changes tertiary structure;
Reject change in tertiary structure of receptor.

2. No longer complementary (to receptor);
Reject 'active site' or reference to enzyme or substrate.

2

(b) 1. Less/no AKT activated;

2. Fewer/no vesicles move to membrane

OR

Fewer/no (channel) proteins in membrane;
Accept 'fuse with membrane'.

3. Less/no glucose diffuses into cell (so high blood glucose);

3

(c) 1. High concentration of glucose in blood/filtrate;
Accept tubule for filtrate.

2. Not all the glucose is (re)absorbed at the proximal convoluted tubule;
Reject no glucose is (re)absorbed.

3. Carrier/co-transport proteins are working at maximum rate

OR

Carrier/co-transport proteins/ are saturated;
Accept all carrier/co-transport proteins are 'in use' but reject all carriers are 'used up'.
Accept symport for carrier protein.
Accept not enough carrier proteins to absorb all the glucose.

3

[8]

Q2.

(a) 1. (Attaches to receptors on target cells and) activates/stimulates enzymes;
Reject 'produces enzymes'.

2. Glycerol/amino acids/fatty acids into glucose;
Reject 'glucagon converts' as context suggests enzyme action.

Ignore lipids/fats/proteins but reject glycogen.

Reject occurs in pancreas.

2

(b) 1. Correct answer of 3.24 = **2 marks**;;

2. Incorrect but multiplies by 34 (with decimal point in any position) = **1 mark**
OR
Incorrect but shows sequence 324 = **1 mark**
OR
3.2 = **1 mark**;

2

(c) 1. (More) insulin binds to receptors;

2. (Stimulates) uptake of glucose by channel/transport <u>proteins</u>
OR
Activates enzymes which convert glucose to glycogen;

Accept activates enzymes for glycogenesis.

Reject active transport.

Accept carrier proteins or GLUT 4 for channel proteins.

Accept insulin stimulates addition of channel proteins in membranes.

2

(d) 1. Less/no ATP is converted to cyclic AMP/cAMP;

2. Less/no kinase is activated;

3. Less/no glycogen is converted to glucose
OR
Less/no glycogenolysis;

*If no indication of less/no for any of the mark points award **max 2 marks**.*

Accept all marks in context of adrenaline.

Ignore gluconeogenesis.

3

[9]

Q3.

(a) 1. (Usually)Type II produce insulin;
2. Cells / receptors less sensitive / responsive (to insulin)
OR
Faulty (insulin) receptors;
3. (Treated / controlled by) diet / exercise;

2. Accept: cells / receptors do not respond.

2. Accept: 'fewer receptors'

3. Accept: (Treated / controlled by) weight loss / medication / drugs.

3. Ignore: diabetes is caused by diet / exercise.

2 max

(b) Tick in box 4

1

Q4.

(a) 1. Treat with insulin (injection/infusion);
2. (Control) diet/control sugar intake;

2. Accept '(regular) exercise'

2

(b) 1. Damage to <u>autonomic</u> (nervous) system in diabetic rats;
2. (Could be) pressure receptors/baroreceptors (in arteries/aorta/carotid body) don't work as well;
3. Damage to medulla

OR

Change in (number of) impulses to/from medulla;
4. (When pressure drops damage to) sympathetic system, so doesn't speed up (enough);
5. (When pressure rises damage to) parasympathetic system, so doesn't slow down (enough);

*Accept answers in terms of what happens in healthy rats **only** if then qualified by statement these things don't happen/happen less in rats with diabetes*

1. Accept damage to ANS

2. Ignore reference to chemoreceptors

4 and 5. Appropriate system and effect on heart rate both needed

4 max

[6]