**1.** D

[1]

**2.** A

[1]

**3.** A

[1]

**4.** C

[1]

**5.** B

[1]

**6.** C

[1]

**7.** D

[1]

**8.** C

[1]

**9.** B

[1]

**10.** B

[1]

**11.** (a) *The structures underlined must be labelled.*

(complementary) bases labelled with at least one of each of A, G, T and C
correctly linked to C1;
hydrogen bonds between correct complementary bases;
{*Bond numbers not required.*correct antiparallel orientation shown; *(as seen by shape or
orientation of sugar)* 4 max

(b) (eight) histone (proteins);
DNA wrapped around histones/nucleosome;
further histone holding these together;
*Do not allow histone wrapped around DNA.* 2 max

(c) primary structure is (number and) sequence of amino acids;
joined by peptide bonds;
tertiary structure is the folding of the polypeptide/secondary
structure/alpha helix;
stabilized by disulfide/ionic/hydrogen bonds/hydrophobic
interactions;
tertiary structure gives three dimensional globular shape/shape
of active site; 3 max

[9]

**12.** (a) *Fibrous protein*:
keratin / elastin / fibroin / collagen / myosin / actin / other named
example;

 *Globular protein:*hemoglobin / myoglobin / named enzyme / named peptide hormone /
named antibody / albumin / other named example; 1 max
*Example of both fibrous and globular protein needed to gain the
mark. Check any other answers for validity.*

(b) both are polypeptides / chains of amino acids joined by peptide
bonds / have primary structure;
globular proteins have tertiary structure whereas fibrous proteins
do not (may have extended secondary structure);
globular proteins are rounded in shape while fibrous proteins
are elongated / *OWTTE*;
globular proteins are (generally) soluble while fibrous tend
to be insoluble; 2 max

(c) polar amino acids are soluble/have stable interactions in water/
extracellular fluid/cytoplasm;
non-polar amino acids are soluble/have stable interactions in
the lipid bilayer;
polar amino acids strongly hydrophilic and non-polar amino
acids are repelled by water/are hydrophobic;
(help to) retain protein in position in the membrane;
polar amino acids form hydrophilic channels/protein pores
in membranes;
transmembrane proteins have polar amino acids on either
side of the membrane; 3 max

[6]

**13.** (a) structure — collagen;
transport—transthyretin / hemoglobin;
enzyme/catalyst — lysozyme;
movement — actin / tubulin;
hormones — insulin;
antibodies — immunoglobulin;
storage —albumin;
*Accept any other valid function of proteins with a named example.
For example, sodium potassium pump, but do not accept simply “in
membranes” without a clear function.
To award* ***[4 max]****, responses need a function of protein and a
named example.
Only accept the first four answers.* 4 max

(b) made of protein;
made of rRNA;
large subunit and small subunit;
three tRNA binding sites;
Aminacyl/A, Peptidyl/P and Exit/E;
mRNA binding site (on small subunit);
70S in prokaryotes / 80S in eukaryotes;
can be free / bound to RER (in eukaryotes); 6 max

(c) RNA polymerase; *(polymerase number is not required)*binds to a promoter on the DNA;
unwinding the DNA strands;
binding nucleoside triphosphates;
to the antisense strand of DNA;
as it moves along in a 5′→3′ direction;
using complementary pairing/A-U and C-G;
losing two phosphates to gain the required energy;
until a terminator signal is reached (in prokaryotes);
RNA detaches from the template and DNA rewinds;
RNA polymerase detaches from the DNA;
many RNA polymerases can follow each other;
introns have to be removed in eukaryotes to form mature mRNA; 8 max

 *(Plus up to* ***[2]*** *for quality)*

[20]