**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]