1 **(a)** burning wood produces carbon dioxide [1]
less photosynthesis **or** trees take up carbon dioxide [1]

(b) (i) fats **or** lipids [1]

(ii) -O- linkage, no other atoms in linkage [1]
COND same monomer [1]
COND continuation bonds at each end -A- [1]

(iii) **same** linkage **or** amide linkage **or** peptide **or** –CONH- [1]

differences
synthetic polyamide usually two monomers
protein many monomers
protein monomers are amino acids **or** proteins hydrolyse to amino acids **or** a protein monomer has one – NH_2 and one –COOH group
synthetic polyamide each monomer has 2 –NH_2 **or** 2COOH groups **or** monomers are dioic acid and diamine
accept diagrams **or** comments that are equivalent to the above
ANY **TWO** [2]

[Total: 9]

2 **(a)** butanol [1]
no number needed but if one is given it has to be 1

structural formula (all bonds shown) [1]
accept –OH **NOT** –HO

ethanoic acid [1]
structural formula (all bonds shown) [1]
accept –OH **NOT** –HO
no conseq marking
if all bonds are not shown (CH_3–CH_2–), penalise once

(b) **(i)** must have correct ester linkage [1]
COND continuation and a group on either side of the ester group [1]

Accept –COO–

(ii) accept any sensible suggestion
ropes, clothing, bottles, packaging, bags [1]

(c) **(i)** 8 [1]

(ii) double bond becomes single and 4 bonds per carbon atom [1]
COND a bromine atom on each carbon [1]
$C_2H_4Br_2$ ONLY [1]
accept a structural formula with hydrogen atoms

(iii) corn oil [1]

(d) 100g of fat react with 86.2g of iodine
884g of fat react with **762** g of iodine [1]
limit 762 x 2
one mole of fat reacts with 762/254 moles of iodine molecules
one mole of fat reacts with **3** moles of iodine molecules [1]

number of double bonds in one molecule of fat is **3** [1]
limit 6
consequential marking allowed provided the number of double bonds is an integer.

[Total: 14]

3 **(a)** **(i)** biological catalyst [1]

(ii) linkage ----O----
same unit as in glucose as on question paper that is rectangles [1]

(iii) chromatography [1]

(b) **(i)** --NHCO—linkage
different units
-NH and -CO on same monomer unit
All three [2] two points [1] [2]

(ii) amino acids [1]

(c) **(i)** propanol + ethanoic acid = propyl ethanoate + water [2]
reactants [1] products [1]

(ii) ester linkage correct [1]
rest of molecule correct [1]

(iii) bromine water [1]
fat 1 orange **or** yellow **or** brown to colourless [1]
fat 2 remains orange **or** yellow **or** brown [1]
Accept Potassium Manganate(VII) with corresponding colour changes

(iv) soap or sodium salts (of carboxylic acids)/sodium stearate [1]
alcohol/glycerol [1]

[TOTAL = 15]

4 **(a) (i)** CH_3-CH==CH_2 **[1]**

(ii) **conseq** to **(i)**
correct repeat unit **[1]**
COND evidence of continuation **[1]**

(iii) monomer **[1]**
COND because it has a double bond **or** unsaturated **or** alkene **[1]**
NOT addition

(b) to remove fibres **or** remove solid
NOT precipitate, **NOT** impurities, **NOT** to obtain a filtrate **[1]**

(ii) because silver atoms have lost electrons **[1]**
OR oxidation number increased

(iii) silver chloride **[1]**

(c) name of an ester **[1]**
formula of an ester **[1]**
if they do not correspond MAX [1]
Accept name - terylene
for formula ester linkage and continuation
If a 'fat' complete structure must be correct e.g. $C_{17}H_{35}$ etc.
Mark for formula only - [1]

(ii) alcohol **or** alkanol **[1]**
NOT a named alcohol

(d) acid loses a proton **[2]**
base accepts a proton **[1]**

OR same explanation but acid loses a hydrogen ion (1)
and base gains hydrogen ion (1)

(ii) only partially ionised **or** poor hydrogen ion donor **or** poor proton donor **[1]**
NOT does not form many hydrogen ions in water **or** low concentration of hydrogen ions
NOT pH

TOTAL = 15

5 **(a)** **(i)** A is glutamic acid **[1]**
B is alanine **[1]**
Accept names only, **NOT** R_f values

(ii) because acids are colourless **or** to make them visible **[1]**
or to show positions of the samples **or** distance travelled

(iii) compare with known acids **or** reference samples **or** standards **[1]**
Accept from colours of samples

(iv) amide linkage **[1]**
COND different monomers **[1]**
continuation **[1]**
Accept hydrocarbon part of chain as boxes
If nylon 6 then only one monomer [1] **NOT** different monomers

(b) correct structure as syllabus (box representation)
correct linkage --O-- **[1]**
continuation **[1]**

(c) $C_6H_{12}O_6 = 2C_2H_5OH + 2CO_2$ **[2]**
not balanced [1]
Accept C_2H_6O

(ii) gives out <u>energy</u> **or** equivalent **[1]**
NOT heat
N.B. a total of [1] not [2]

(iii) glucose used up **or** yeast 'killed' by ethanol **[1]**
NOT yeast used up **NOT** reactant used up

(iv) oxidise alcohol to acid **or** to ethanoic acid **[1]**
or to carbon dioxide and water
or if oxygen present aerobic respiration
or cannot have anaerobic respiration in presence of oxygen
NOT it is anaerobic respiration, must be additional comment

(v) <u>fractional distillation</u> **[1]**

TOTAL = 15