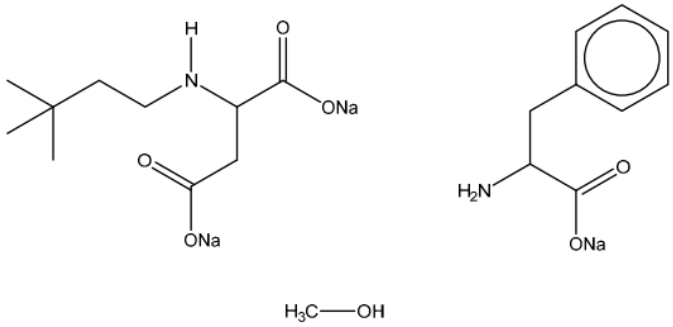
34. Nitrogen compounds

34.3 Amides

Paper 4

Marking Scheme

Q1.

(b)(i)	**M1** hydrolysis **M2** acid–base	**2**
(b)(ii)	 one mark for each structure	**3**

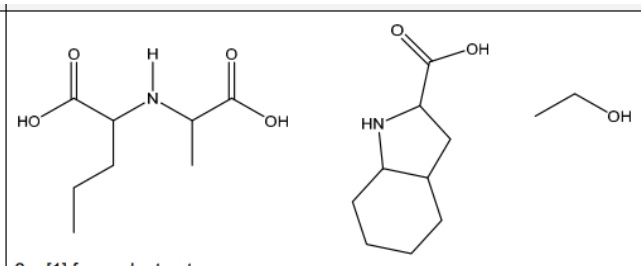
Q2.

(c)	lone pair / p-orbital on N is delocalised **AND** into C=O group / across the two electronegative O and N	**1**

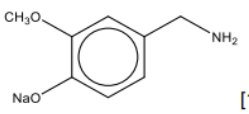
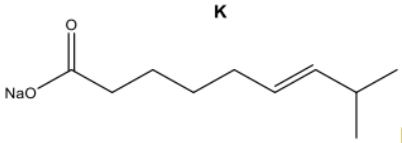
Q3.

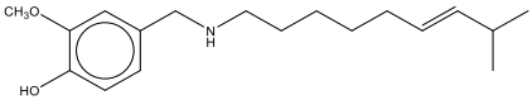
(a)	**M1** diethylamine > ethylamine > ethanamide explanation **M2** basicity linked to ability of lone pair on N to accept a proton / H^+ **M3** electron donating ethyl group increases electron density on N / makes lone pair more available for donation **M4** lone pair of electrons on N is delocalised into C=O group	**4**

Q4.

(b)(ii)	 3 × [1] for each structure	**3**

Q5.

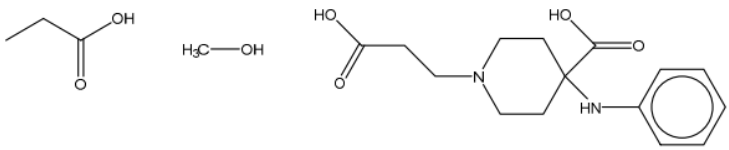
(e)(i)	**H**  [1] **K**  [1]	**2**
(e)(ii)	hydrolysis AND neutralisation / acid-base[1]	**1**

(f)	**L**  [1]	**1**

Q6.

(b)(iii)	Q < phenylamine < P [1] <u>any three from:</u> ability of N to **accept** a proton **OR donate** its lone pair to a proton phenylamine **lone pair of N** delocalised into ring **OR p-orbital on N** overlaps with π cloud of ring (and decreases electron density on N) compound P (2° amine) alkyl group has a positive inductive effect (and increases electron density on N) compound Q (amide) **lone pair of N** (in amide) delocalised by C=O **OR** overlap of **lone pair of N** with C=O (and decreases electron density on N)	**3**

Q7.

(b)	 **ALLOW** amine salt for the third structure – mono or di ion	**3**

Q8.

(c)(i)	$LiAlH_4$ [1]	**1**
(c)(ii)	reduction [1]	**1**

Q9.

(b)(i)	reaction 1 $LiAlH_4$ reaction 2 heat NH_3 under pressure/ heat NH_3 in a sealed tube	**2**
(b)(ii)	reaction 1 reduction reaction 2 nucleophilic substitution	**2**

Q10.

(d)(i)	$LiAlH_4$	**1**
(d)(ii)	**M1:** most basic: X > phenylamine > nicotinamide :least basic **M2:** LP in X cannot be delocalised **M3:** LP in phenylamine <u>delocalised</u> over the benzene ring **or** LP in amide <u>delocalised</u> (more effectively) by C=O	**3**