

Question 36 (Answer: **D**)

- Adding HCN across a C=O adds exactly one carbon atom.
- R has four carbons, so Q must have three.
- Q also needs a carbonyl group for nucleophilic addition, so it is the three-carbon aldehyde or ketone.

Question 38 (Answer: **C**)

- The iodoform test gives a yellow precipitate only for a CH₃CO– group.
- Among the seven carbonyls with four or fewer carbons, that is ethanal, propanone and butanone.
- Methanal, propanal, butanal and 2-methylpropanal all lack it, so three react.

Question 34 (Answer: **B**)

- The ethyl carbanion attacks the δ^+ carbon of the C=O.
- Protonating the resulting alkoxide gives an alcohol.
- That carbon ends up bonded to two original alkyl chains plus the new ethyl group, so the product is a *tertiary* alcohol.

Question 34 (Answer: **B**)

- The orange precipitate with 2,4-DNPH shows a carbonyl group is present.
- No reaction with Tollens' rules out an aldehyde, so it must be a ketone.
- The yellow precipitate with alkaline iodine needs a CH₃CO– group, so it is a methyl ketone.

Question 35 (Answer: **D**)

- The nucleophile is the cyanide ion, and it attacks using its lone pair on carbon – not a π bond.
- It attacks the δ^+ carbon of the C=O, pushing the π electrons onto the oxygen.
- The negatively charged oxygen then takes a proton from HCN.

7(a)	M1: Q CH ₃ CH ₂ CH(CH ₃)CHO M2:
7(b)(i)	T CH ₃ CH ₂ CH ₂ COCH ₃ AND V (CH ₃) ₂ CHCOCH ₃
7(b)(ii)	• yellow solid • CH₃CH₂CH₂COOH OR (CH₃)₂CHCOOH • CHI₃ Any two [1], all three [2]
7(c)(i)	S (CH ₃) ₃ CCHO

7(c)(ii)	U CH ₃ CH ₂ COCH ₂ CH ₃
7(c)(iii)	triplet AND two hydrogen atoms on neighbouring carbon atoms
7(c)(iv)	TMS / tetramethylsilane / Si(CH ₃) ₄
7(d)	4 3 5 3 Any two [1], all four [2]