Provide Natural Deduction Proofs of the following:

Logic Session - Mon 30th Oct - W6

(Difficulty in yellow)

Q1: Constructive: $((\neg\neg A \lor B) \to (\neg D \lor C)) \to (\neg D \to C) \to A \to C$ — Moderate

Q2: Classical: $(\neg A \to B \lor C) \to \neg B \to \neg C \to A$ — Moderate

Q3: Constructive: $(A \land B \to \neg C) \to C \to A \to \neg B$ — Easy

Q4: Classical: $((A \land \neg B) \to \neg C) \to C \to A \to B$ — Easy

Q5: Constructive: $(A \to B \lor C) \to (B \to D) \to (C \to B \lor D) \to \neg D \to \neg A$ — Hard!

Q6: Constructive: $(D \to A \lor C) \to (A \land B \to C) \to D \land B \to C$ — Moderate

Q7: Constructive: $(C \to B \lor A) \to (B \to A) \to ((C \to A) \lor C)$ — Moderate

Q8: Classical: $(C \to B) \to (B \to A) \to (\neg C \to A) \to A$ — Moderate

Q9: Classical: $(C \to A) \to (A \to B) \to (\neg B \to C) \to B$ — Moderate

Q10: Constructive: $A \to (B \to D) \to (\neg B \to C) \to (A \lor C)$ — Easy

Q11: Constructive: $(D \to A \lor C) \to (A \land B \to C) \to (D \land B) \to C$ — Moderate