

Chapter 4 · Section 4.4 — Exercises (Mazidi)

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Problems are paraphrased to respect copyright. Answers assume ARM (A32) where most instructions include a **condition field**.

31) Which bits of the ARM instruction are set aside for condition execution?

Answer: bits [31:28] — the 4-bit **cond** field (e.g., EQ/NE/CS/CC/.../AL).

32) True or False. Only ADD and MOV have the conditional execution feature.

Answer: False. In ARM state, **nearly all instructions** (data processing, loads/stores, branches, etc.) have the **cond** field; the default is **AL** (always).

33) True or False. In ARM, the conditional execution is default.

Answer: True. Every instruction encodes a condition; when no suffix is written, it means **AL** (execute **always**).

34) Which flag is examined before the instruction MOVEQ executes?

Answer: The **Z(zero)** flag — EQ means **Z = 1**.

35) Difference between ADDEQ and ADDNE.

Answer: Both add, but **ADDEQ** executes only if **Z = 1** (equal), whereas **ADDNE** executes only if **Z = 0** (not equal).

36) Difference between BAL and B.

Answer: No functional difference in ARM state. **BAL** is just **B** with the explicit **AL** condition (branch **always**).

37) Difference between SUBCC and SUBCS.

Answer: The operation is the same (**SUB**), but the condition differs:

- **CC = C = 0** (carry clear → **borrow occurred**, unsigned <).
- **CS = C = 1** (carry set → **no borrow**, unsigned ≥).

38) Difference between ANDEQ and ANDNE.

Answer: **ANDEQ** executes if **Z = 1**; **ANDNE** executes if **Z = 0**.

39) True or False. The decision to execute SUBCC is based on the Z flag.

Answer: False. **CC** is based on the **C (carry)** flag being 0.

40) True or False. The decision to execute ADDEQ is based on the Z flag.

Answer: True. EQ tests **Z = 1**.

Notes for learners

Common condition suffixes (test on CPSR **N,Z,C,V**):

- EQ $Z=1$, NE $Z=0$
- CS/HS $C=1$, CC/LO $C=0$
- MI $N=1$, PL $N=0$
- VS $V=1$, VC $V=0$
- HI $C=1$ & $Z=0$, LS $C=0$ or $Z=1$
- GE $N=V$, LT $N!=V$, GT $Z=0$ & $N=V$, LE $Z=1$ or $N!=V$
- AL always