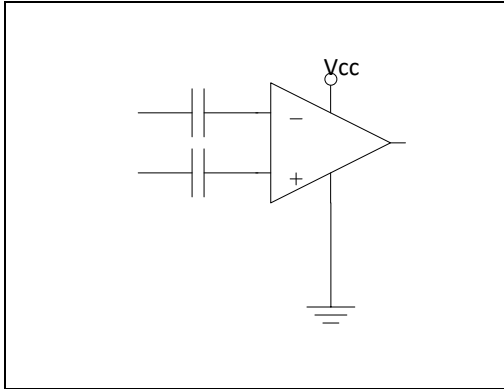


Analog Peripherals of Digital Systems - Problems

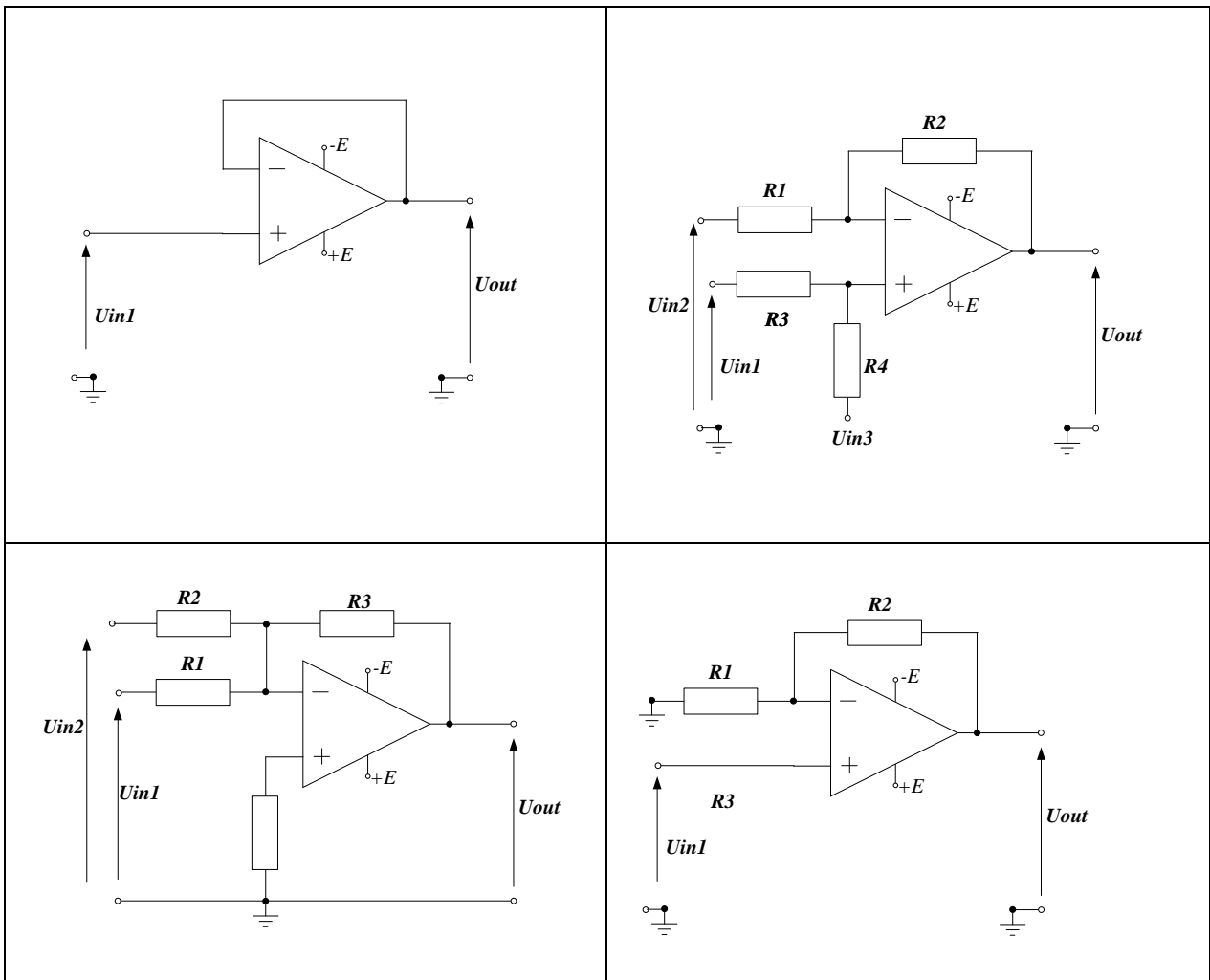
ELECTRONIC Circuits

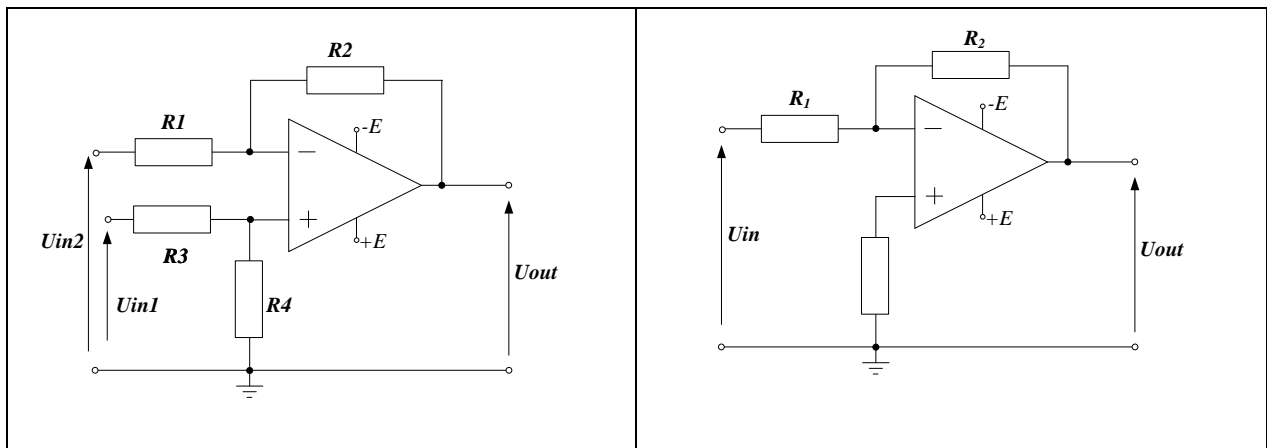
Measurement circuits and systems

1. Draw the two basic diagrams of a instrumentation amplifiers
2. Compare instrumentation vs. operational amplifier
3. What is wrong with the circuit ?



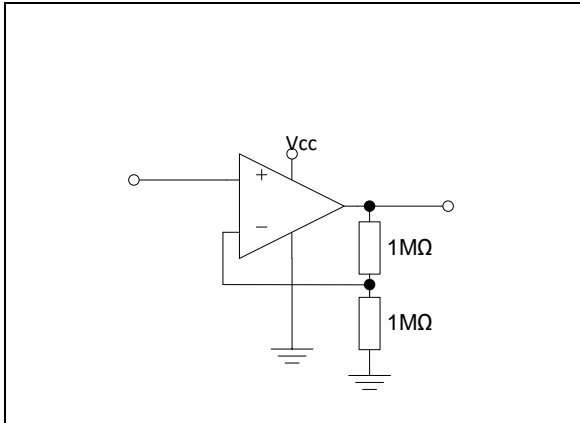
4. Calculate unknown voltage (if other voltages and resistors are specified):





Front-end circuits

5. The amplifier is designed to transmit a video signal using a "current coupled amplifier". What's wrong with that?



6. What are VV, CC, CV, VC operational amplifiers?
7. What is the idea of a charge amplifier?
8. What is the idea of a chopper amplifier?
9. What is the idea behind a parametric modulated amplifier?

PLL

10. Explain the concepts of "hold" and "capture" PLL frequencies.
11. What is the PLL working principle?
12. What is the principle of operation of a PLL as an FM detector?
13. What is the principle of operation of a PLL as a frequency synthesizer?

Actuators

14. What is the role of the protection diode (terminal diode, fly-back diode) in the relay actuator (inductive load)?
15. List a few types of Solid state relays.
16. List several types of electric motors and characterize how they are controlled.

Power factor

17. What is Power Factor (PF)?
18. What are the Basic Power Factor Correction (PFC) methods?
19. Relationship between power factor and total current harmonic distortion.

EMC

Basic Aspects of EMC

20.Noise vs. Interference

21.Describe approaches to EMC engineering – crisis approach vs. system approach.

22.How to understand graphics:

$$CE + CE = \cancel{CE}$$

Electrostatic Discharge

23.Static electricity generation mechanism

24.The human body model for ESD

25.Methods of transient voltage suppression

Sources of Noise, Coupling Mechanisms

26.Typical noise path

27.Noise sources

28.Name elements necessary to produce an interference problem.

29.What are three ways to break the noise path ?

30.What are the three most imported noise characteristics ?

Digital Circuits Radiation

31.Differential-Mode radiation and Common-Mode radiation

32.Methods of controlling the differential-mode (loop) radiation

33.Methods of controlling the common-mode (dipole) radiation

Decoupling. Passive Components

34.Basic method for power decoupling

35.A capacitor, its equivalent circuit and impedance vs. frequency.

36.Definition of the target impedance

Shielding

~~37.Wave impedance as a function of the distance from the source (far field and near field)~~

~~38.Characteristic impedance of a medium~~

~~39.Definition of the shielding effectiveness~~

~~40.The total shielding effectiveness of a solid material with no apertures~~

~~41.Absorption loss (A). Skin depth~~

~~42.Reflection loss (R).~~

~~43.Shielding effectiveness of a solid nonmagnetic shield~~

Shielding. Strainer experiment

44.Shielded enclosure integrity

45.Elimination of noise coupled into a shielded enclosure by the wires that pass through the shield

Cabling

46.Capacitive coupling. Effect of shield on capacitive coupling.

47.Magnetic coupling. Effect of nonmagnetic shield on magnetic coupling.

48.How to avoid magnetic coupling at low frequencies ?

GROUNDING

49. What is common impedance coupling ?

50. How to avoid ground impedance coupling ?