

### Lab Practical 2: Practice Questions

The following are some practice questions to facilitate preparation for this week's Lab Practical. The actual Practical may not include all the questions on this practice exam, and it may have additional questions that do not appear on this practice exam. However, these practice questions cover important topics and are designed so that if you understand them well, you should do well on the Practical.

1. You will be given a sum of two signals, one AM and one FM, on Jack A or B. You will then be asked to do the following:
  - a. Identify which signal is AM and which is FM.
  - b. Answer questions about both signals.
  - c. Demodulate the FM signal to recover its message.
2. Understand FM.
  - a. Know how the spectra of FM signals look for different cases of message shape.
  - b. Understand discriminators, their purpose and functioning.
3. Digitization is very important in modern information systems. Understand and be able to apply the following concepts:
  - a. Given a spectrum of an analog waveform, draw the spectrum of a sampled version of this waveform for various choices of sample frequency.
  - b. Be able to predict (mathematically or graphically) the aliased, apparent frequency of a sine wave sampled below the Nyquist rate.
  - c. Understand quantization (relationships between number of bits, voltage resolution, etc.).
4. Understand BPSK and Spread-Spectrum (SS).
  - a. Be able to draw block diagrams of BPSK and SS modulators and demodulators. Know the purpose of each block and how all the signals look in the time- and frequency-domains.
  - b. Be able to build BPSK and SS modulators and demodulators using the TIMS modules in labs. Know how to set bandwidths and other settings on all system components.
5. Understand M-ary modulation and demodulation.
  - a. Understand the basic concept of quadrature modulation, i.e. using a cosine carrier on the in-phase branch and a sine carrier on the quadrature branch to modulate two messages independently.
  - b. Understand signal constellations for amplitude shift keying (ASK) and phase shift keying (PSK).
  - c. Be able to draw block diagrams of M-ary modulators and demodulators. Know the purpose of each block and how all the signals look in the time- and frequency-domains.
  - d. Be able to build M-ary modulators and demodulators using the TIMS modules in labs. Know how to set bandwidths, gains, and other settings on all system components.