

1. Draw a circuit for a high pass filter. What type of noise is likely to be reduced by a high pass filter? (10)
2. A Michelson interferometer had a mirror velocity of 1.25 cm/s. What would be the frequency of the interferogram for a infrared radiation of 7.5 μm ? (10)
3. Name all types of mass analyzer. (10)
4. Show how a metal oxide semiconductor field-effect transistor (MOS-FET) can be used for selective measurement of a particular ion? (10)
5. Explain the difference between a fluorescence emission spectrum and a fluorescence excitation spectrum. Which more closely resembles an absorption spectrum? (10)
6. Which of the following instrumental methods has higher dynamic range? a) UV-Visible b) FTIR c) AA d) ICP-AES e) X-ray fluorescence f) Raman g) NMR (10)
7. Why does pH affect separation of amino acids by electrophoresis? (10)
8. Describe how it is possible to distinguish between XPS peaks and Auger electron peaks. (10)
9. Calculate the proton concentration of a 0.0400 M sulfuric acid, $K_{a2} = 1.02 \times 10^{-2}$ (10)
10. Which, volumetric or weight titration, has higher precision and accuracy? Why? (10)