Q1: HVS: explain the image formation in the eye. What are the differences in focusing between the ordinary cameras and the human eyes?

Q2. HVS. Explain the fundamentals of color vision. Explain the additive and subtractive color mixings.

Q3. HVS. Explain the CMYK model. Exemplify the reflection of colors. Explain the principles of halftoning. Why “K” is used in CMYK model in practice, while it is enough to have CMY to simulate any color?

Q4. HVS. Explain the chromaticity color diagram. What is the achievable color gamut? Which factors determine the achievable color gamut for the screens and printers?

Q5. Image acquisition. Explain the role of a sensor in imaging. Explain the principle of photon counting? Which size of sensors is of preference in practice? Explain the trade-offs.

Q6. Image acquisition. Explain the design of modern sensors (models and differences).

Q7. Image acquisition. Explain the different types of noise in digital images. How one can reduce the noise in digital images? Main approaches.

Q8. Image acquisition. Explain the principles of modern color imaging. What is a color filter array? What is the demosaicing?

Q9: Histogram transformation. Explain and exemplify the example of contrast stretching and gamma correction. Where do we use these operations in practice?

Q10. Histogram transformation. Explain and exemplify the example of histogram matching.

Q12. Geometrical transformations. Explain what is the affine matrix. Explain the shift, scaling and flipping.

Q13. Geometrical transformations. Explain the affine family of transformations. Explain the rotation and bending.

Q14. Geometrical transformations. Explain the projective transformations. What are the main differences with the affine transforms?

Q15. Spatial filters: Explain the difference between the convolution and correlation. Give examples and explain the practical usage of both.

Q16. Spatial filters: Explain the border effects during the computation of 2D convolution. Define the total size of filtered images. Give examples.

Q17. Spatial filters: Explain the main properties of convolution. Complexity of convolution in 2D.

Q18. Spatial filters: Explain the advantages of separable filters for the computation of 2D convolution. Complexity of separate convolution computation in 2D.

Q19. Spatial filters: Explain the low-pass filtering. Provide the examples of smoothing filters.

Q20. Spatial filters: Explain the high-pass filtering. Provide the examples of sharpening filters. Derivatives.

Q22. Spatial filters: Explain the unsharpened mask and its link to the Laplacian sharpening.

Q23. Spatial filters: Explain the gradients.

Q24. Spatial filters: Explain the variance and median in 2D.