Sample Exam Questions – Module 1

1. Describe, very briefly, how an image is obtained using *pinhole photography*. How does *pinhole size* affect the image quality?

2. Define *Depth of Field*. What is its interplay with other optical parameters such as *aperture* and *focal distance*?

3. What are the two types of sensors that we have in our retinas, which allow us to detect light and colour? Discuss their differences.

4. What is the Fourier transform? Why is it very useful for all kinds of signal processing?

5. One of the important properties of the Fourier Transform is often referred to as the *convolution property*. What is this property and why is it useful?

6. Describe the process of converting an analog image to a digital format.

7. Digital images are typically represented as 2D matrices of numbers. Describe two other data structures for representing digital images.

8. Write an algorithm in *pseudo-code* for building an image histogram?

9. What are the main reasons for the popularity of the RGB colour space?

10. Describe the three components of the HSI colour space. How can we geometrically represent this space and its components?

11. What is a *pseudo-colour* image? Why are they useful?

12. Write an algorithm in *pseudo-code* for applying an *intensity to colour transformation* to an image.

13. Briefly describe two popular noise models for digital images.

14. What are the characteristics of an image that has most of its power concentrated in its low spatial frequencies?

15. Why is the Fourier Transform very useful for digital image processing?

16. Write an algorithm in *pseudo-code* for applying a convolution mask to an image.

17. Why are convolution masks a popular and powerful way to filter an image?

18. What is the *border problem* of spatial convolution? Describe three ways to handle it.

19. What is the effect of a *low-pass filter* on an image?

20. What is the effect of a *high-pass filter* on an image?

21. Discuss the trade-off between smoothing and good edge localization when detecting the edges of an image.

22. Write an algorithm in *pseudo-code* for applying a *Canny Edge Operator* to an image.