Advanced Photographic Science

Photography · Answer Key · 25 Questions

1. What is the primary physical phenomenon that limits the resolution of a lens as the aperture diameter decreases?

A) Chromatic aberration
B) Diffraction
C) Spherical aberration
D) Field curvature

2. In a Bayer filter mosaic, which color component typically occupies 50% of the photosites in a standard RGGB array?

A) Red
B) Blue
C) Green
D) Cyan

3. What is the relationship between the f-number and the illuminance of the image plane in an optical system?

A) Directly proportional to the f-number
B) Inversely proportional to the square of the f-number
C) Inversely proportional to the f-number
D) Directly proportional to the square of the f-number

4. Which phenomenon describes the reduction in light intensity towards the corners of a frame due to the angle of incidence on the sensor?

A) Vignetting
B) Cos4 law
C) Diffraction limit
D) Moire effect

5. In silver halide photography, what is the name of the light-sensitive cluster formed within the crystal lattice during exposure?

A) Latent image speck
B) Photolytic silver
C) Silver halide cluster
D) Spectral sensitizer

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6. What is the Nyquist frequency in the context of digital image sampling?

A) Half the sampling rate
B) Twice the sampling rate
C) Equal to the sampling rate
D) The square root of the sampling rate

7. Which optical aberration is caused by the variation of the refractive index with respect to the wavelength of light?

A) Coma
B) Astigmatism
C) Chromatic aberration
D) Petzval field curvature

8. What is the primary function of a low-pass filter (anti-aliasing filter) placed in front of a digital image sensor?

A) To increase dynamic range
B) To reduce photon noise
C) To prevent moiré patterns
D) To correct white balance

9. In sensor technology, what does the term 'Full Well Capacity' represent?

A) The maximum voltage of the analog-to-digital converter
B) The total number of electrons a pixel can hold before saturation
C) The dark current threshold
D) The quantum efficiency of the sensor

10. Which term defines the ratio of the maximum signal a sensor can capture to the noise floor?

A) Signal-to-noise ratio
B) Dynamic range
C) Bit depth
D) Quantum efficiency

11. What happens to the circle of confusion as the focal length increases while maintaining the same subject distance and aperture?

A) It decreases
B) It remains constant
C) It increases
D) It becomes independent of focal length

12. The Reciprocity Law in photography states that the total exposure is proportional to:

A) Intensity multiplied by time
B) Intensity divided by time
C) Intensity plus time
D) Intensity minus time

13. Which sensor technology uses an 'on-chip' microlens array to improve light collection efficiency?

A) Foveon X3
B) Back-illuminated CMOS
C) CCD
D) Vidicon

14. What is the primary cause of 'purple fringing' in digital photographs?

A) Sensor blooming
B) Lateral chromatic aberration
C) Longitudinal chromatic aberration
D) Lack of an infrared cut filter

15. What is the 'quantum efficiency' of an image sensor a measure of?

A) The percentage of incident photons that are converted into electrons
B) The speed of the processor
C) The total bit depth of the signal
D) The heat dissipation capacity

16. Which type of lens aberration is characterized by a point source of light appearing as a comet-like shape away from the optical axis?

A) Spherical aberration
B) Astigmatism
C) Coma
D) Distortion

17. In the context of film photography, what is the 'Schwarzschild effect'?

A) Reciprocity failure at long exposure times
B) The grain structure of high-speed film
C) The oxidation of developer
D) The hardening of the emulsion

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18. What spectral range does a standard IR-cut filter in a digital camera typically block?

A) Ultraviolet
B) Near-infrared
C) Far-infrared
D) X-ray

19. What is the relationship between the Circle of Confusion (CoC) and depth of field?

A) Smaller CoC decreases depth of field
B) Larger CoC decreases depth of field
C) CoC has no effect on depth of field
D) Smaller CoC increases depth of field

20. Which property of a lens is responsible for the 'pincushion' or 'barrel' distortion?

A) Magnification variation across the field of view
B) The shape of the diaphragm blades
C) The number of lens elements
D) The refractive index of the glass

21. What is the role of the 'photosite' in a CMOS sensor?

A) Converting mechanical motion to digital signals
B) Converting light into an electrical charge
C) Amplifying the analog signal
D) Correcting color accuracy

22. What phenomenon occurs when a sensor pixel accumulates so much charge that it spills over into adjacent pixels?

A) Blooming
B) Dark current
C) Thermal noise
D) Quantization error

23. Which component of the camera controls the duration for which the sensor is exposed to light?

A) Aperture
B) Shutter
C) ISO
D) Lens element

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24. What does the 'ISO' rating in digital photography quantify?

A) The speed of the shutter

B) The light sensitivity of the sensor system

C) The physical size of the lens aperture

D) The focal length of the optical system

25. What is the primary advantage of a 'global shutter' over a 'rolling shutter'?

A) Lower noise floor

B) Reduced power consumption

C) Elimination of motion-induced distortion

D) Increased dynamic range

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