|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. The first camera type device was the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | daguerreotype camera | |  | b. | pinhole camera | |  | c. | CRT | |  | d. | image dissector | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2. Who invented the CCD, which was made up of pixels constructed of metal oxide semiconductor capacitors?   |  |  |  | | --- | --- | --- | |  | a. | C.T. Sah and Frank Wanlass | |  | b. | James J. Gibson | |  | c. | Willard S. Boyle and George E. Smith | |  | d. | Larry Roberts | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3. Who created the first industrial optical character recognition system?   |  |  |  | | --- | --- | --- | |  | a. | Bryce E. Bayer | |  | b. | Robert J. Shillman | |  | c. | Thomas B. McCord and James A. Westphal | |  | d. | Stanley R. Sternberg | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4. Which part of the camera focuses the incoming light directly on the CCD or CMOS elements of the camera?   |  |  |  | | --- | --- | --- | |  | a. | Imaging device | |  | b. | Processor | |  | c. | Lens | |  | d. | Light source | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5. Which part of the vision system takes the raw data from the sensors and converts it into a digital signal that other controllers can use one frame or picture at a time?   |  |  |  | | --- | --- | --- | |  | a. | Imaging device | |  | b. | Processor | |  | c. | Lens | |  | d. | Communication | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6. Which part recognition method sorts data by finding elements that have similar values and grows outward from there?   |  |  |  | | --- | --- | --- | |  | a. | Edge detection | |  | b. | Template matching | |  | c. | Clustering | |  | d. | Algorithm method | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7. Which part recognition method sorts data by using a specific mathematical formula to analyze the sample part and then compare newly processed image data to this initial calculation result?   |  |  |  | | --- | --- | --- | |  | a. | Edge detection | |  | b. | Template matching | |  | c. | Clustering | |  | d. | Algorithm method | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8. Which of the following lighting types might explode if you touch the bulb?   |  |  |  | | --- | --- | --- | |  | a. | Incandescent | |  | b. | Halogen | |  | c. | High-intensity discharge | |  | d. | Xenon | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9. Which of the following lighting types consists of a special type of semiconductor that emits light when current is applied via energy released as photons when electrons cross the boundary from between the n-type and p-type materials?   |  |  |  | | --- | --- | --- | |  | a. | Xenon | |  | b. | Fluorescent | |  | c. | LED | |  | d. | Laser | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10. Which lighting system uses one or two light sources set at a greater-than-45 degree angle to the object so that most of the light transmitted is reflected into the camera lens?   |  |  |  | | --- | --- | --- | |  | a. | Partial bright field lighting | |  | b. | Full bright field lighting | |  | c. | Axial diffuse lighting | |  | d. | Diffuse dome lighting | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11. Which lighting method has most of the light from the light source reflected away from the camera, with the light usually at an angle of less than 45 degrees or focused off the object?   |  |  |  | | --- | --- | --- | |  | a. | Structured lighting | |  | b. | Backlighting | |  | c. | Dark field lighting | |  | d. | Diffuse dome lighting | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12. Which lighting method has a light source placed inside the surface of a partially reflective dome, with the camera focused on the object through a hole in the middle?   |  |  |  | | --- | --- | --- | |  | a. | Structured lighting | |  | b. | Backlighting | |  | c. | Dark field lighting | |  | d. | Diffuse dome lighting | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 13. Which lighting system is good at looking for missing material?   |  |  |  | | --- | --- | --- | |  | a. | Partial bright field lighting | |  | b. | Full bright field lighting | |  | c. | Axial diffuse lighting | |  | d. | Diffuse dome lighting | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 14. Which lighting system is good for looking inside blister or other clear packaging?   |  |  |  | | --- | --- | --- | |  | a. | Partial bright field lighting | |  | b. | Full bright field lighting | |  | c. | Backlighting | |  | d. | Diffuse dome lighting | |

|  |
| --- |
| 15. What is the difference between line scanning and area scanning? |

|  |
| --- |
| 16. How does dark field lighting work? |

|  |
| --- |
| 17. How does backlighting work and what is this technique good for? |

|  |
| --- |
| 18. How can we take measurements using a laser with a vision system? |

|  |
| --- |
| 19. How can vision systems create 3D images? |