## 1. Question 1

Image and video processing has applications in (you can select more than one correct answer.)

**Solution:**

Outer-space images

Consumer images

Medical images

**2. Question 2**

Images exist only in the visual spectrum.

**Solution:**

False – Images can be captured in a wide range of spectrum.

Ex: x-ray images.

**3. Question 3**

When you enter dark room in a bright day, it takes some time before you can see

reasonable well in the room. Which visual process explains this phenomena?

**Solution:**

Brightness adaption

Ex: It takes time for us to observe the headlamps of our bike being turned on in sunlight.

**4. Question 4**

Consider an image with 100 lines and 1000 pixels per line. Each pixel can take 256 different values. The total amount of bits needed to store that image is

**Solution:**

100 \* 1000 \* 8 bits (i.e. 256 values) = 800,000 bits

**5. Question 5**

Sampling refers to

**Solution:**

Discretization of the spatial image domain.

**6. Question 6**

Quantization refers to

**Solution:**

Discretization of the values an image pixel can take.

**7. Question 7**

Going from a pixel with coordinate (1,1) to a pixel with coordinate (0,0) takes

**Solution:**

One step for 8 adjacency and 2 steps for 4 adjacency.

8 adjacency can move diagonal wise aswell

4 adjacency has to move either north south east or west and not diagonal.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| (0,0) | (0,1) |  | (0,0) | (0,1) |
| (1,0) | (1,0) | (1,0) | (1,1) |

**8. Question 8**

The determinant of a scaling matrix is equal to 1.

**Solution:**

False

Determinant of scaling matrix (x, y) = s(x) \* s(y), where s(x) & s(y) are the scaling factors.

**9. Question 9**

The determinant of a rotation matrix is

**Solution:**

1

Determinant of a rotation matrix = (cos(theta))^2 + (sin(theta))^2 = 1.

**10. Question 10**

When we quantize an image, the amount of memory needed to store it

**Solution:**

Decreases

Quantization is one of the major Image compression techniques.

**11. Question 11**

A video has 30 frames (images) per second. Considering that each image has 1000 \times 10001000×1000 pixels, an hour of video will occupy

**Solution:**

We can't know.

The data is not enough as we also require the no. of bits in which the values at every pixel is represented.

**12. Question 12**

If we quantize an image with double resolution (meaning we use twice the number of bits per pixel) and sample it with half the resolution in each direction, then

**Solution:**

The total storage needed is reduced by half.

Sampling an image with half the resolution in both the directions reduces it by a factor of 4, and again when we quantize the image with double resolution we increase the factor by 2. Hence the total storage can only be reduced by a factor of 2 i.e. half of the original size.