1) Discuss the significance of sampling and quantization in processing of digital images (4)

2) Discuss the importance of image pre-processing in understanding the digital image data (4)

3) Justify 'image analysis & understanding is an useful task for better society building' (4)

4) Discuss the importance of biometric considering the current applications (4)

5. Explain 'Image representation'. (4)

1) In order to create digital image, we need to convert continuous data into digital form. This process involves Sampling & quantization processes. Here, in digital image processing, it mathematically represents that, Processing of two dimensional picture by computer is termed to be an image processing. Image function $f(x, y)$ where x & y are the co-ordinates representing horizontally and vertically.
The value of $f(x, y)$ at any point gives the pixel value of an image. In order to process images, an image function $f(x, y)$ must be digitized both spatially & in amplitude. A digitizer is used to sample & quantize the analogous video signal. In order to convert this there are processes are involved, they are Sampling & Quantization.
The sampling rate governs the spatial resolution, while the quantization level fixes the number of grey levels in the digitized image. A magnitude of the sampled image is expressed as a digital value in image processing. The conversion between continuous values of the image function & its digital equivalent is called 'quantizations". The number of quantization levels should be high enough for fine shading.

2) Pre processing involves operations on images at the lowest level of abstraction, where both input and output images are intensity images. The aim of pre-processing is an improvement of the image data, which include elimination of distortions, enhancement of some image features, noise correction, scaling suitable for further processing. Basically, the idea behind enhancement technique is to highlight certain features of an image such as changing brightness & contrast.

Digital image processing is the use of a digital computer to process digital images through an algorithms. Digital image processing has many advantages over analog image processing. It allows much wider range of algorithms to be applied to the input data & can avoid problems such as the build up of noise & distortion during processing. Images are defined over 2 dimensions digital image processing may be modeled in the form of multidimensional syetems.

3) There are some applications in image processing

- Agriculture
  1. Harvesting
  2. Quality detection
  3. Cleaning
  4. Disease identification

- Banking
  1. Document verification
  2. Person authentication
  3. Bankers cheque analysis.

- Remote sensing

Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object.

- Security & Surviellance

Surveillance camaras such as these are installed by the millions in many countries, and are nowadays monitored by automated computer programs instead of humans.

- Traffic management

These are some of the applications that are better for building society.

4. Biometrics are one of the applications in image processing

It used for

- Authentication of a person
- Banking
- Airport
- Electronic voting
- Defense sectors

- Secured transactions
- The image is used to extract the hidden information in an obliterated image. Using suitable pre-processing techniques, it is possible to extract the hidden information in an image which is commonly used in forensic applications.
- Image enhancement is used to detect & localize the fingerprint on the knife so that it is possible to identify the victim.

Crime investigation

This eg depicts the quality inspection of tiles in an industry. In a continuous production process, all dried roof are automatically inspected for cracks & color.

5) Representation follows the output of a segmentation stage, which usually is raw pixel data, consituting either the boundary of a region or all the points in the region itself. choosing a representation is only part of the solution for transforming raw data into a form suitable for subsequent computer processing. Description deals with extracting attributes that result in some quantitative information of interest or basic for differentiating one class of objects from another. They describe the format of image files, the algorithms of image files, encoding such as compression as well as the format of additional information called metadata.