

Medical Instrumentation – Exercise #1

Part I. Answer these questions by marking the best answer from the choices given (3 points each):

1. Computed tomography has an advantage over plain x-ray in that ...
 - a. It can reconstruct cross sectional images
 - b. It involves less exposure to x-ray radiation
 - c. It has higher resolution
2. Lateral x-ray tube motion was eliminated starting from ... generation of CT scanners.
 - a. Second
 - b. Third
 - c. Fourth
3. Difference between third and fourth generations of CT scanners is in ...
 - a. Rotational motion of detectors
 - b. Lateral motion of detectors
 - c. Lateral and rotational motion of detectors
4. Spiral CT scanning relies on ...
 - a. Table motion
 - b. Fan beam scanning
 - c. Both of the above
5. To generate CT images of soft tissues and bone in a patient, ... is used.
 - a. Two HU windows are used on the same data
 - b. Two acquisitions are collected at different kV
 - c. Different patient positions are used
6. To collect a 256×256 CT image, at least ... projections are needed.
 - a. 16384
 - b. 65536
 - c. 2097152

Part II. Mark the following statement as either True (T) or False (F) (1 point each):

7. In CT, all x-ray sources and detectors are included in gantry.
8. Cone beam CT is more energy efficient due to the use of beam collimation.
9. Spiral CT is uses fourth generation CT scanning technology with table motion.
10. It is possible to obtain slices at any position and in any direction using spiral CT.

Answer the following questions: (3 points each):

11. To reconstruct an image with a resolution of 128×128 , we need ... independent equations at least.
12. Is ART considered as a method for solving matrix equations? Explain your answer.
13. Solve the following reconstruction from projections problem:

