

Examination, April 18th, 2011

*Use of non-programmable calculator allowed*

1. Explain shortly (max. in two written lines and one figure) each of the following image quality parameters:
  - a. temporal resolution
  - b. noise
  - c. artefact
  - d. distortion
  
2. Describe the structure, principle of operation and medical imaging application of the following instruments:
  - a. image intensifier
  - b. photomultiplier tube
  
3. What kind of indirect and direct methods are used for image formation in digital radiography?
  
4. What is the role of the coils in magnetic resonance imaging? What kind of shapes do they have in clinical imaging?
  
5. What is the percentage of the reflected ultrasound beam at a chest-lung (muscle-air) and at a kidney-blood interface? What is the amount of transmission of an ultrasound beam in a skull-brain interface?

$$Z_{\text{muscle}} = 1.70 \cdot 10^{-5} \text{ g/(cm}^2\text{s)}$$

$$Z_{\text{air}} = 0.0004 \cdot 10^{-5} \text{ g/(cm}^2\text{s)}$$

$$Z_{\text{kidney}} = 1.62 \cdot 10^{-5} \text{ g/(cm}^2\text{s)}$$

$$Z_{\text{blood}} = 1.61 \cdot 10^{-5} \text{ g/(cm}^2\text{s)}$$

$$Z_{\text{skull}} = 7.8 \cdot 10^{-5} \text{ g/(cm}^2\text{s)}$$

$$Z_{\text{brain}} = 1.5 \cdot 10^{-5} \text{ g/(cm}^2\text{s)}$$