

1.0 INTRODUCTION – RADIOGRAPHY LEVEL II COURSE (40 HOURS)

- 1.1 Electromagnetic Energy
- 1.2 Wavelength
- 1.3 Photon Energy (Electron volt)
- 1.4 Sources of radiation
- 1.5 Isotope types
- 1.6 Ionization
- 1.7 Responsibilities for the inspection process
- 1.8 Radiation safety regulations

2.0 BASIC ATOMIC PHYSICS

- 2.1 Parts of an atom
- 2.2 Energy within the atom
- 2.3 Atomic number (Z number)
- 2.4 Mass number (A number)
- 2.5 Isotopes

3.0 RADIOACTIVITY

- 3.1 Types of radiation from Isotopes
 - 3.1.1 Alpha Radiation (α)
 - 3.1.2 Beta Radiation (β)
 - 3.1.3 Neutron Radiation (η)
 - 3.1.4 Gamma Radiation (γ)
- 3.2 Making Isotopes
- 3.3 Properties of commonly used Isotopes

4.0 INDUSTRIAL GAMMA RAY EQUIPMENT

- 4.1 The Isotope capsule
- 4.2 The Isotope camera

5.0 RADIATION UNITS FOR MEASUREMENT OF RADIOISOTOPES

- 5.1 Radiation Activity
- 5.2 Half-Life definition
- 5.3 Half life values
- 5.4 Half-Life Formula
- 5.5 Radiation Intensity
- 5.6 Specific Emission Constants
- 5.7 Specific Activity

6.0 X-RAY EQUIPMENT AND PRODUCTION

- 6.1 Heat dissipation
- 6.2 Kilo-voltage
- 6.3 Production of X-RAYS
- 6.4 Characteristic Radiation
- 6.5 Line-Focus Principle
- 6.6 Warm-Up Cycle
- 6.7 Duty Cycle
- 6.8 Time / Intensity relationship

- 6.9 Penetrating power
- 6.10 Minimum wavelength
- 6.11 X-ray Transformers and Electrical Circuits
 - 6.11.1 Step up transformers.
 - 6.11.2 Step down transformers.
 - 6.11.3 Auto transformers.
- 6.12 Self rectified tube heads
- 6.13 Constant potential tube heads
- 6.14 High Energy X-RAY Sources
 - 6.14.1 Betatron (20-50 MeV).
 - 6.14.2 Van de Graaf Generator (1-8 MeV).
 - 6.14.3 Linear Accelerator, commonly referred to as a LINAC (1-30 MeV).

7.0 REAL TIME RADIOGRAPHY

- 7.1 Fluoroscopy
- 7.2 Image Intensifiers
- 7.3 Modern Digital Radiographic Techniques
- 7.4 Linear diode arrays
- 7.5 Computed Radiography
- 7.6 Flat Panel Detectors
- 7.7 Amorphous Silicon
- 7.8 Amorphous Selenium
- 7.9 Summary of digital radiography

8.0 PRACTICAL EXPOSURE CALCULATIONS

- 8.1 Use of a Gamma ray exposure calculator
 - 8.1.1 To perform Gamma ray exposure calculations using the AGFA Gamma ray calculator
- 8.2 Use of an X-Ray Exposure Chart
- 8.3 Radiographic Equivalency Factors
- 8.4 Characteristic Curves

9.0 MATHEMATICAL CALCULATIONS INVOLVING DISTANCE

- 9.1 Inverse square law
- 9.2 Time-Distance Relationship

10.0 FILM PROCESSING AND THE DARKROOM

- 10.1 Entrances
- 10.2 Dry Side
- 10.3 Wet Side
- 10.4 Safelights
- 10.5 Chemical Processing
- 10.6 Developer
- 10.7 Stop Bath
- 10.8 Fixer
- 10.9 Washing
- 10.10 Wetting Agent
- 10.11 Automatic Film Processing
- 10.12 Handling of Unexposed film

- 10.13 Storage of Unexposed Radiographic Film
- 10.14 Storage of Exposed Radiographic Film
- 10.14.1 The Silver Nitrate test for keeping properties

11.0 RADIOGRAPHIC FILM IMAGE

- 11.1 Image Quality Indicators (IQI's)
 - 11.1.1 ASTM (Plaque) style of IQI's
 - 11.1.2 Wire type IQIs
- 11.2 Radiographic Definition
- 11.3 Geometric Un-sharpness (Ug)
- 11.4 Scattered radiation
- 11.5 Side scatter
- 11.6 Internal scatter
- 11.7 Back Scatter

12.0 RADIOGRAPHIC FILM

- 12.1 Metal Foil Screens
- 12.2 Fluorescent Salt Screens
- 12.3 Radiographic Image
- 12.4 Subject Contrast
- 12.5 Film Contrast
- 12.6 Latitude
- 12.7 Definition
- 12.8 Graininess
- 12.9 Film Speed

13.0 RADIATION UNITS FOR MEASUREMENT OF IONIZING RADIATION

- 13.1 Radiation Absorption
- 13.2 Relative Biological Effectiveness (RBE)
- 13.3 Roentgen Equivalent Man (REM)

14.0 PERSONAL MAXIMUM PERMISSIBLE DOSES

15.0 BASIC PRINCIPLES OF RADIATION PROTECTION

- 15.1 Time
- 15.2 Distance
- 15.3 Interaction of Ionizing Radiation With Matter
- 15.4 Photoelectric Effect
- 15.5 Compton Effect (Compton Scattering)
- 15.6 Pair Production
- 15.7 Shielding
 - 15.7.1 Half Value Layer
 - 15.7.2 Tenth Value Layer
 - 15.7.3 Half Value Layer (HVL) Formula

Practical Exercises

RADIOGRAPHY LEVEL II FORMULA SHEET



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