



प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्
पदपूर्ति समिति
सानोठिमी, भक्तपुरको

रेडियोग्राफी प्रशिक्षक
अधिकृतस्तर तृतीय श्रेणी प्राविधिक पदको
खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : सेवा सम्बन्धी प्राविधिक विषय

पूर्णाङ्क - १००

Section A

1. CLINICAL ONCOLOGY

1.1 TUMORS

- 1.1.1 Tumor definition
- 1.1.2 Benign tumors and malignant tumors
- 1.1.3 Spread of tumors

1.2 CLINICAL PRESENTATION

- 1.2.1 Symptoms & signs
- 1.2.2 Diagnostic procedure
 - 1.2.2.1 Hemogram
 - 1.2.2.2 Biochemical
 - 1.2.2.3 Tumor marker
 - 1.2.2.4 Radiological- X-ray, U.S.G., C.T, M.R.I
 - 1.2.2.5 Pathological – FNAC, FNAB, Incision biopsy, excision biopsy
 - 1.2.2.6 Surgery

1.3 STAGING

- 1.3.1 TNM Classification

1.4 MALIGNANCIES & TREATMENT

- 1.4.1 Ca- Brain
- 1.4.2 Ca-Larynx
- 1.4.3 Ca-Tongue
- 1.4.4 Ca-Breast
- 1.4.5 Ca-Lung
- 1.4.6 Ca-Cervix
- 1.4.7 Ca-Oesophagus

Section B

2. RADIOTHERAPY TECHNIQUE

2.1 PRINCIPALS OF RADIOTHERAPY

- 2.1.1 Tumor histology
- 2.1.2 Grade, sensitivity,
- 2.1.3 Anatomical site, critical organs
- 2.1.4 General condition of the patient, extent of tumor, previous treatments
- 2.1.5 Radical/Palliative and prophylaxis.

2.2 TYPES AND METHODS OF RADIOTHERAPY

- 2.2.1 Tele-therapy Technique
- 2.2.2 Brachytherapy Technique

2.3 RADIOTHERAPY RESOURCES

- 2.3.1 Low energy beams
- 2.3.2 High energy beams
- 2.3.3 Electron beams

2.4 TREATMENT PLANNING

- 2.4.1 Tumor localization and verification
- 2.4.2 Isodose Curves

- 2.4.3 Single field, parallel opposed field, multiple field.
- 2.4.4 Rotation therapy
- 2.4.5 Beam Modification

Section C

3. RADIOTHERAPY PHYSICS

3.1 ATOMIC STRUCTURE

- 3.1.1 General introduction
- 3.1.2 Electron shells & energy levels
- 3.1.3 Excitation and ionization.
- 3.1.4 Mass number, atomic number, atomic mass unit, binding energy
- 3.1.5 Emission of electromagnetic waves, spectra.
- 3.1.6 Properties of electromagnetic waves.
- 3.1.7 Properties of electromagnetic waves.
- 3.1.8 Concept of photon and quanta.
- 3.1.9 Nuclear fission and fusion.

3.2 RADIOACTIVITY

- 3.2.1 Radioactive elements.
- 3.2.2 Radioactive series, different types of radioactive disintegration.
- 3.2.3 Properties of radioactive particles.
- 3.2.4 Radioactive decay law.
- 3.2.5 Half-life, mean life.
- 3.2.6 Nuclear stability.
- 3.2.7 Alpha, beta and gamma disintegration

3.3 X-RAYS & GAMMA RAYS

- 3.3.1 Historical background of x-rays.
- 3.3.2 Mechanism & production of x-rays.
- 3.3.3 Properties of x-rays.
- 3.3.4 Continuous and characteristic spectra.
- 3.3.5 Gamma rays
- 3.3.6 Properties of gamma rays.

3.4 INTERACTION OF RADIATION WITH MATTER

- 3.4.1 Classical scattering.
- 3.4.2 Photoelectric interaction.
- 3.4.3 Compton scattering.
- 3.4.4 Pair production.
- 3.4.5 Transmission of a homogenous and heterogeneous beam through matter.

3.5 CLINICAL DOSIMETRY

- 3.5.1 Radiation absorbed dose.
- 3.5.2 Relationship between Kerma, Exposure and absorbed dose.
- 3.5.3 Cavity theory.
- 3.5.4 Measurement of absorbed dose.
- 3.5.5 Phantom.
- 3.5.6 Dose calibration parameters.
- 3.5.7 Depth dose distribution.
 - 3.5.7.1 Percentage depth dose.

- 3.5.7.2 Tissue-air ratio.
- 3.5.7.3 Tissue maximum ratio.
- 3.5.8 Principle of ionization chamber & electrometer.

3.6 RADIATION BIOLOGY

- 3.6.1 Cell cycle,
- 3.6.2 Effect of radiation on the normal cell, tissue and organs.
- 3.6.3 Radiation sensitivity.
- 3.6.4 Physical and biological factors affecting radiation sensitivity
 - 3.6.4.1 LET
 - 3.6.4.2 RBE
 - 3.6.4.3 OER
- 3.6.5 Cell survival curves
- 3.6.6 4Rs of radiobiology.

Section D

4. RADIOTHERAPY EQUIPMENT& QUALITY ASSURANCE 4.1 TELETHERAPY EQUIPMENTS

- 4.1.1 Superficial and orthovoltage equipment.
- 4.1.2 Cobalt-60 tele therapy equipment.
- 4.1.3 Linear accelerator.
- 4.1.4 Simulator.
- 4.1.5 Brachytherapy equipment
 - 4.1.5.1 Low dose rate (LDR)
 - 4.1.5.2 Medium dose rate (MDR)
 - 4.1.5.3 High dose rate (HDR)

4.2 QUALITY CONTROL

- 4.2.1 Cobalt-60.
- 4.2.2 Linear Accelerator.
- 4.2.3 Brachytherapy.
- 4.2.4 Simulator.

4.3 RADIATION PROTECTION

- 4.3.1 Concept of radiation protection.
 - 4.3.2 Justification, Optimization and Limitation.
 - 4.3.3 Units.
 - 4.3.4 Maximum Permissible dose.
 - 4.3.5 Personnel monitoring.
 - 4.3.6 Protective materials.
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