

RADIOTHERAPY

PAPER-IV

RTH/J/18/41/IV

Time: 3 hours

Max. Marks:100

Important Instructions:

- Attempt all questions in order.
- Each question carries 10 marks.
- Read the question carefully and answer to the point neatly and legibly.
- Do not leave any blank pages between two answers.
- Indicate the question number correctly for the answer in the margin space
- Answer all the parts of a single question together.
- Start the answer to a question on a fresh page or leave adequate space between two answers.
- Draw table/diagrams/flowcharts wherever appropriate.

Write short notes on:

- Describe the phases of cell cycle. 2+2+3+3
  - What is the effect of X-rays on synchronously dividing cells with regard to the cell cycle?
  - What is the effect of oxygen at various phases of the cell cycle?
  - Molecular checkpoint genes and cell cycle.
- Name the three interactions of X-rays with matter. 3+4+3
  - What is Compton effect?
  - Why Compton effect is preferred in radiotherapy and not in Radiodiagnosis?
- ICRU target volumes in external beam radiotherapy. 6+4
  - ICRU-89 volumes for image based brachytherapy in cancer cervix.
- What are the quantities and units used for radiation protection purposes? 3+3+4
  - Compare stochastic effects and non-stochastic effects.
  - Radiation dose limits for radiation workers, pregnant women and lay public.
- Distinguish between radio sensitivity, radio responsiveness and radio curability. 3+2+5
  - What factors can modulate radio sensitivity?
  - How is radiation induced damage measured in the cellular and organ systems?
- What are Radio sensitizers? 1+5+2+2
  - Describe the types of radio-sensitizers that have found practical use in clinical radiotherapy.
  - Results of Meta-analysis of trials addressing problem of hypoxia.
  - ARCON trial

**P.T.O.**

7. Discuss hyperthermia with regard to: 2+2+2+2+2  
a) Methods of local heating  
b) Mechanism of hyperthermia  
c) Thermotolerance  
d) Hyperthermia and its interaction with chemotherapeutic agents  
e) Human applications – any 2 sites.
8. a) What are the radionuclides and their properties that are used for diagnosis and imaging? 3+7  
b) What is the role of radionuclides that are used for the diagnosis and management of multiple bone metastases?
9. With regard to proton therapy: 2+1+1+3+3  
a) Rationale and radiobiological basis for proton beam therapy.  
b) Name the two ways in which the beam spreading is done.  
c) What are the dose calculation algorithms used?  
d) What are the potential application of Proton Beam Therapy in clinical practice?  
e) Clinical evidence for Proton Therapy with regard to efficacy and toxicity and comparative effectiveness.
10. a) What is meant by conventional fractionation in Radiotherapy? 2+4+4  
b) Outline various altered fractionation schedules that are used in head and neck cancers.  
c) Outline evidence for altered fractionation schedules in head and neck cancers.

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