

Set No. : 1

Question Booklet No.

RET/15/TEST-B

661 Radiotherapy &amp; Radiation Medicine

(To be filled up by the candidate by blue/black ball point pen)

Roll No.

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Roll No. (Write the digits in words) .....

Serial No. of OMR Answer Sheet .....

Day and Date .....

( Signature of Invigilator )

**INSTRUCTIONS TO CANDIDATES***(Use only blue/black ball-point pen in the space above and on both sides of the Answer Sheet)*

1. Within 10 minutes of the issue of the Question Booklet, Please ensure that you have got the correct booklet and it contains all the pages in correct sequence and no page/question is missing. In case of faulty Question Booklet, Bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope.*
3. *A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided.*
4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space provided above.
5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*
6. *No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Question Booklet.*
7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.*
8. *This Booklet contains 40 multiple choice questions followed by 10 short answer questions. For each MCQ, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet. For answering any five short Answer Questions use five Blank pages attached at the end of this Question Booklet.*
9. For each question, darken only **one** circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*
11. For rough work, use the inner back pages of the title cover and the blank page at the end of this Booklet.
12. *Deposit both OMR Answer Sheet and Question Booklet at the end of the Test.*
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

**Total No. of Printed Pages : 20**



661/Radiotherapy & Radiation Medicine

**ROUGH WORK**

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**No. of Questions : 50**

**Time : 2 Hours**

**Full Marks : 200**

- Note: (1)** This Question Booklet contains **40** Multiple Choice Questions followed by **10** Short Answer Questions.
- (2)** Attempt as many MCQs as you can. Each MCQ carries **3 (Three)** marks. **1 (One)** mark will be deducted for each incorrect answer. **Zero** mark will be awarded for each unattempted question. If more than one alternative answers of MCQs seem to be approximate to the correct answer, choose the closest one.
- (3)** Answer only **5** Short Answer Questions. Each question carries **16 (Sixteen)** marks and should be answered in **150-200** words. Blank **5 (Five)** pages attached with this booklet shall only be used for the purpose. Answer each question on separate page, after writing Question No.

- 01.** Which of the following is pluripotent cell
- |                    |                      |
|--------------------|----------------------|
| (1) Stem cell      | (2) Sertoli cells    |
| (3) Memory t cells | (4) Langerhans cells |
- 02.** Which of the following is NOT a lymphoid organ
- |                |             |
|----------------|-------------|
| (1) Lymphnodes | (2) Tonsils |
| (3) Thyroid    | (4) Spleen  |
- 03.** Enzymes for kreb cycle are located in
- |                  |               |
|------------------|---------------|
| (1) Mitochondria | (2) Cytoplasm |
| (3) Peroxisomes  | (4) Nucleus   |
- 04.** Which of the following is a non communicable disease
- |             |                  |
|-------------|------------------|
| (1) HIV     | (2) Tuberculosis |
| (3) Measles | (4) Tetanus      |

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05. Which of the following is NOT a part of immune system of the body ?

- (1) Langerhans cells
- (2) Helper T cells
- (3) Histiocytes
- (4) Reticulocytes

06. Ovulation occurs at

- (1) 5<sup>th</sup> day of menstrual cycle
- (2) 14<sup>th</sup> day of menstrual cycle
- (3) 21<sup>st</sup> day of menstrual cycle
- (4) 28<sup>th</sup> day of menstrual cycle

07. Amount of growth hormone secretion reach its peak by

- (1) 8 am
- (2) 8 pm
- (3) 12 am
- (4) 12 pm

08. Which of the following is false ?

- (1) Bones are attached to other bones by means of tendon
- (2) Bones are attached to muscles by means ligaments
- (3) Bones are joined to other bones by mean of articular cartilage
- (4) Bones are joint to each other by mean of fibrous tissue

09. Regulators of thirst and hunger centre is present in

- (1) Medulla
- (2) Midbrain
- (3) Hypothalamus
- (4) Cortex



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- 15.** With regard to IUdR and BUdR, the correct statement is:
- (1) Their structure is very similar to cytidine
  - (2) Effective as sensitizers only if made available to cells for several generations
  - (3) They make the cell more susceptible to high LET radiations
  - (4) IUdR is a much more efficient sensitizer for fluorescent light and causes rash in some patients
- 16.** The Paterson-parker system of interstitial implants is designed to
- (1) Give uniform distribution of source activity within the implanted area
  - (2) Give dose uniformity of  $\pm 10\%$  to the target area in the plane of implant
  - (3) Give dose uniformity of  $\pm 10\%$  to the target area in parallel planes at 0.5 cm from the implanted plane
  - (4) Higher dose at the center and less dose to the periphery of implant
- 17.** with regard to the ARCON trial, which is incorrect:
- (1) Carbogen breathing – to overcome acute hypoxia
  - (2) Carbogen breathing – to overcome chronic hypoxia
  - (3) Accelerated RT – to overcome proliferation
  - (4) Hyperfractionated RT – spare late responding normal tissue

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- 18.** Difference between an IMRT and 3D CRT delivery typically includes
- (1) Non-uniform (modulated) beam intensities
  - (2) Patient specific beam shaping
  - (3) Inverse planning for dose optimisation
  - (4) Dosimetric or biological objectives with relative weights
- 19.** According to ICR, high dose rate (HDR) brachytherapy is classified as brachytherapy with a prescription dose rate of
- |                          |                          |
|--------------------------|--------------------------|
| (1) 2 cGy/min or higher  | (2) 10 cGy/min or higher |
| (3) 20 cGy/min or higher | (4) 40 cGy/min or higher |
- 20.** Which is TRUE, regarding adjuvant therapy for biliary cancer?
- (1) Although there is no clear evidence from one prospective randomized trial, it appears patients treated in the adjuvant setting have a median survival of approximately 2 years
  - (2) Adjuvant radiation is superior chemotherapy alone
  - (3) Adjuvant therapy can improve overall survival for patients with RO resections.
  - (4) Fluoro pyrimidine-based chemo-radiation is standard because it is superior to radiation alone
- 21.** What is the initial dose rate of a permanent I-125 prostate seed implant designed to deliver a prescription dose of 144 Gy?
- |                 |                |
|-----------------|----------------|
| (1) 0.07 cGy/hr | (2) 0.5 cGy/hr |
| (3) 7 cGy/hr    | (4) 50 cGy/hr  |

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- 22.** Which is CORRECT, regarding mediastinal germ cell tumors?
- (1) The incidence of malignant mediastinal germ cell tumors is the same in men and women
  - (2) Seminoma is the most common mediastinal germ cell tumor.
  - (3) An elevated serum AFP level in a patient with biopsy- proven seminoma indicates the presence of a NSGCT component.
  - (4) Mediastinal NSGCTs are associated with better overall survival than testicular NSGCTs.
- 23.** All are thought to be protective against the development of adenocarcinoma of the esophagus, EXCEPT :
- (1) Smoking cessation
  - (2) Consumption of raw fruits and vegetables
  - (3) Aspirin use
  - (4) H.pylori infection
- 24.** What is the most common type of small bowel malignancy?
- |                    |                |
|--------------------|----------------|
| (1) adenocarcinoma | (2) Lymphoma   |
| (3) Carcinoid      | (4) Schwannoma |
- 25.** For a patient with 3-cm visible tumor confined to the cervix, staged IB1 cancer, the most appropriate therapy is ?
- (1) RT and chemotherapy with weekly cisplatin dosed qat 40 mg/m<sup>2</sup>
  - (2) Simple hysterectomy with removal of fallopian tubes and ovary
  - (3) RT or radical hysterectomy with lymphadenectomy
  - (4) Brachytherapy radiation with a dose of 75 Gy.



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- 26.** Which is associated with the highest risk of breast cancer ?
- (1) Postmenopausal obesity
  - (2) Dense breast on mammogram
  - (3) Postmenopausal estrogen plus progestin therapy
  - (4) Nulliparity
- 27.** Which site of soft tissue sarcomas carries the best prognosis ?
- (1) Head and neck
  - (2) Extremity
  - (3) Visceral
  - (4) Retroperitoneal
- 28.** Regular consumption of red meat is associated with an increased risk of which of the following cancers ?
- (1) Larynx
  - (2) Colo-rectal
  - (3) Liver
  - (4) Esophagus
- 29.** Potential problems with CT screening for lung cancer include :
- (1) Lead-time bias
  - (2) Length-time bias
  - (3) Neither of the above
  - (4) Both of the above
- 30.** Which is NOT true regarding modulation of radiation by Hyperthermia ?
- (1) Localized heat treatment can be delivered with microwaves, ultrasound, or radio frequency sources of energy
  - (2) The lethality of hyperthermia is thought to be in part from denaturation of proteins
  - (3) Similar to radiation induced kill, lethality from heat is most pronounced when cells are in the G2/M Phase
  - (4) The temperature 42.5 0 C seems critical, with small increment above this leads to a steep increase in lethality

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- 31.** Neoadjuvant chemotherapy can be utilized in all of the following cancers, EXCEPT
- (1) Head and neck cancer
  - (2) Non-small cell lung cancer
  - (3) Haematologic malignancies
  - (4) Pancreatic cancers
- 32.** What is the best measurement for nicotine dependence?
- (1) Number of cigarettes smoked per day
  - (2) Age of smoking initiation
  - (3) Time from waking up to the first cigarette smoking
  - (4) All of the above
- 33.** Which is TRUE about theoretic model of radiation interaction?
- (1) Linear and linear-quadratic models have been described
  - (2) Cancer risk is directly proportional to radiation dose in the linear model
  - (3) Cancer risk is directly proportional to radiation dose at low dose and a function of square of the dose at higher dose in the linear quadratic model
  - (4) All of the above
- 34.** In interaction of Chemotherapy with radiotherapy, there is no interaction if
- (1) The cell survival curve becomes steeper
  - (2) The cell survival curve becomes shallower
  - (3) The shape remains the same but the curve shifts
  - (4) The curve become extremely shallow

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35. Strategies for the combination of Chemotherapy and Radiotherapy as given by Peckham and Steel, include all of the following except :
- (1) Spatial cooperation
  - (2) Cell synchronization / Redistribution
  - (3) Independent Cell Kill
  - (4) Protection of Normal Tissues
36. For CNS preventive therapy in management of Leukaemia, which of the following is not correct:
- (1) Take care to spare the entire globe of the eye and lens
  - (2) The Cribriform plate is a key margin at the skull base
  - (3) Lower limit of temporal fossa is included
  - (4) Lower border at inferior margin of 2<sup>nd</sup> cervical vertebra
37. Of the following what is true of free radicals:
- (1) They are charged
  - (2) They have odd number of electrons in the outer cell
  - (3) They have even number of electrons in the outer cell
  - (4) They are less reactive than ion radicals
38. Direct action damage by radiotherapy:
- (1) Can be modified using Halogenated pyrimidines
  - (2) Can be modified using Hypoxic cell sensitizers
  - (3) Can be modified using Hypoxic cytotoxins
  - (4) Can not be modified by chemical means
39. For Oxygen effect to manifest, Oxygen has to be present:
- (1) A short while before irradiation
  - (2) During or within microseconds after radiation exposure
  - (3) 5 minutes after irradiation
  - (4) 10 minutes after irradiation

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- 40.** What is incorrect about the general structure of radioprotectors:
- (1) A free SH or a potential SH group at one end
  - (2) Strong basic function, i.e. an amine or guanidine at other
  - (3) A methyl group at one end
  - (4) A straight chain of 2 or 3 atoms

***Short Answer Questions***

**Note :** Attempt any **five** questions. Write answer in **150-200** words. Each question carries **16** marks. Answer each question on separate page after writing Question Number.

- 01.** causes of cancer
- 02.** Stochastic and Non-stochastic effect of Radiation
- 03.** Early detection of cancer
- 04.** Precision Radiotherapy
- 05.** Radiation Protection
- 06.** Use of Telemedicine in Radiotherapy
- 07.** Combined Modality treatment of Cancer
- 08.** Geriatric Oncology
- 09.** Psycho-Social aspects of Cancer in women
- 10.** Cancer Education



**Question No.**

**Page for Short Answer**

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Question No.

Page for Short Answer

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## अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 10 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में लिफाफा रहित प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।
5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त केवल ओ एम आर उत्तर-पत्र परीक्षा भवन में जमा कर दें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।