

# BFF(CBRT)

## PROVISIONAL ANSWER KEY

Name of the post	Professor, Radiotherapy, General State Service, Class-1
Advertisement No.	13/2023-24
Preliminary Test held	13-09-2023
Question No.	01-200
Publish Date	14-09-2023

Last Date to Send Suggestion(s) 19-09-2023

THE LINK FOR ONLINE OBJECTION SYSTEM WILL START FROM 15-09-2023; 04:00 PM ONWARDS

## Instructions / સૂચન

Candidate must ensure compliance to the instructions mentioned below, else objections shall not be considered: -

- (1) All the suggestion should be submitted through **ONLINE OBJECTION SUBMISSION SYSTEM** only. Physical or submission through E- Mail of suggestions will not be considered.
- (2) Question wise suggestion to be submitted in the prescribed format (proforma) published on the website / online objection submission system.
- (3) All suggestions are to be submitted with reference to the Master Question Paper with provisional answer key (Master Question Paper), published herewith on the website / online objection submission system. Objections should be sent referring to the Question, Question No. & options of the Master Question Paper.
- (4) Suggestions regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.
- (5) Objections and answers suggested by the candidate should be in compliance with the responses given by him in his answer sheet. Objections shall not be considered, in case, if responses given in the answer sheet / response sheet and submitted suggestions are differed.
- (6) Objection for each question should be made on separate sheet. Objection for more than one question in single sheet shall not be considered.

ઉમેદવારે નીચેની સૂચનાઓનું પાલન કરવાની તકેદારી રાખવી, અન્યથા વાંધા-સૂચન અંગે કરેલ રજૂઆતો ધ્યાને લેવાશે નહીં

- (1) ઉમેદવારે વાંધા-સૂચનો ફક્ત ઓનલાઇન ઓબ્જેક્શન સબમીશન સીસ્ટમ દ્વારા જ સબમીટ કરવાના રહેશે. રૂબરૂ અથવા ટપાલ અથવા ઇ-મેઇલ દ્વારા આયોગની કચેરીએ મોકલવા આવેલ વાંધા-સૂચનો ધ્યાને લેવામા આવશે નહીં જેની ખાસ નોંધ લેવી.
- (2) ઉમેદવારે વાંધા-સૂચનો રજૂ કરવા વેબસાઇટ / ઓનલાઇન ઓબ્જેક્શન સબમીશન સીસ્ટમ પર પ્રસિધ્ધ થયેલ નિયત નમૂનાનો જ ઉપયોગ કરવો.
- (3) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ ન કરતા તમામ વાંધા-સૂચનો વેબસાઇટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર)ના પ્રશ્ન ક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા.
- (4) માસ્ટર પ્રશ્નપત્રમાં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા-સૂચનો ધ્યાને લેવામાં આવશે નહીં.
- (5) ઉમેદવારે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉત્તરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉત્તરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા-સૂચનો ધ્યાનમા લેવાશે નહીં.
- (6) એક પ્રશ્ન માટે એક જ વાંધા-સૂચન પત્રક વાપરવું. એક જ વાંધા-સૂચનો પત્રકમાં એકથી વધારે પ્રશ્નોની રજૂઆત કરેલ હશે તો તે અંગેના વાંધા-સૂચનો ધ્યાને લેવાશે નહીં.

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001. 50 years old female underwent a surgery for carcinoma lateral border tongue. Post-op histopathology is suggestive of a maximum tumor dimension of 4.5 cm along with 5 nodes positive along with extracapsular extension in one of them. What is the ideal management of this patient?
- (A) Observation  
 (B) Post -op Radiotherapy -60-66 Gy  
 (C) Post-op Radiotherapy- 70 Gy  
 (D) Post-op Radiotherapy along with Cisplatin
002. What is correct statement about the START-A trial of Breast radiotherapy?
- (A) The test arm contains three fractionations of 40 Gy in 15 # and 39 Gy in 13 fractions  
 (B) Radiotherapy was delivered in 5 weeks in the hypo fractionated arm  
 (C)  $\alpha/\beta$  ratio for breast cancer is between 10  
 (D) There were equal loco-regional recurrences in 39 Gy arm
003. How does geometric penumbra vary with source to surface distance (SSD)?
- (A) Geometric penumbra increases with increase in SSD  
 (B) Geometric penumbra decreases with increase in SSD  
 (C) Geometric penumbra does not change with SSD  
 (D) Geometric penumbra is not clinically relevant
004. In a conventional fractionation pattern, a head and neck cancer is treated to a total of 70 Gy in 35 fractions, given one fraction per day, 5 days a week. What is the BED for the tumor (assuming an alpha/beta of 10 Gy)?
- (A) 55 Gy (B) 60 Gy  
 (C) 80 Gy (D) 84 Gy
005. What is the radiation tolerance of cochlea for fractionated radiotherapy according to QUANTEC
- (A) Mean dose less than or equal to 30 Gy  
 (B) Max dose less than or equal to 30 Gy  
 (C) Mean dose less than or equal to 45 Gy  
 (D) Max dose less than or equal to 45 Gy
006. The head coordinating unit for National cancer Registry programme is at:
- (A) New Delhi (B) Bengaluru  
 (C) Mumbai (D) Chennai
007. Which of the following is a treatment option for Stage I testicular seminoma?
- (A) Scrotal Irradiation (B) 1-2 cycle of Carboplatin (AUC 2)  
 (C) Active Surveillance (D) Three cycles of BEP chemotherapy
008. A patient of Cancer of cervix is complaining of back pain. What anatomical structure is probably involved spreading the tumor to sacral fossa?
- (A) Parametria (B) Uterosacral ligament  
 (C) Round ligament (D) Fallopian tube
009. While considering for adjuvant hormonal therapy with Aromatase inhibitors which patients are NOT considered to be in post-menopausal category-
- (A) FSH- 35mIU/ml, Estradiol- 5 pg/ml  
 (B) Age>50 yrs  
 (C) Age < 50 yrs but amenorrhoeic for 12 months in the absence of drugs  
 (D) Post Bilateral Salpingo -ophorectomy

010. What is the TNM staging of the thyroid papillary cancer patient (40-year-old) with 3 cm-sized primary tumor without extrathyroidal extension, 2 central lymph nodes metastases, and pulmonary micro metastasis?
- (A) T2N1M1, stage II (B) T2N1M1, stage IV  
(C) T3N1M1, stage II (D) T3N1M1, stage IV
011. A patient has Squamous cell carcinoma of upper 1/3rd of Esophagus which is reaching the cricopharynx, what is the ideal treatment for this patient?
- (A) Definitive Chemo-radiotherapy  
(B) Esophagectomy followed by radiation  
(C) Esophagectomy followed by chemotherapy  
(D) Neoadjuvant Chemoradiation followed by surgery
012. A 50 yrs old male was diagnosed with MGMT methylated Glioblastoma multiforme post incomplete resection. What should be the best treatment option
- (A) Radiotherapy alone  
(B) PCV chemotherapy  
(C) Radiotherapy plus Temozolomide  
(D) Watchful waiting
013. Phase I clinical trial is usually explored to understand which important endpoint?
- (A) Clinical efficacy (B) Objective Response rate  
(C) Dose limiting toxicity (D) Quality of life
014. Which one of them is not included in four 'R's of Radiobiology?
- (A) Re-assortment (B) Repair  
(C) Re-population (D) Regeneration
015. What percentage of Plasmacytoma progresses into multiple myeloma over 10 years?
- (A) 20-40 (B) 40-60  
(C) 60-80 (D) 80-100
016. Accelerated repopulation begins in head and neck cancers after how many days after starting of radiation therapy?
- (A) 7 days (B) 14 days  
(C) 21 days (D) 28 days
017. The External beam radiotherapy dose recommended for Thyroid Ophthalmopathy is-
- (A) 10 Gy in 5 fractions (B) 20 Gy in 10 fractions  
(C) 30 Gy in 15 fractions (D) 45 Gy in 25 fractions
018. Which of the following ionization processes represents the principal interaction with tissue for X-rays used in radiotherapy?
- (A) Pair production (B) Photoelectric effect  
(C) Compton process (D) Photodisintegration
019. Amifostine selectively radioprotects normal tissue by which mechanism (s)?
- (A) Scavenging free radicals  
(B) Stabilizing oxygenated hemoglobin  
(C) Reduction of oxygen tension in normal tissues  
(D) All of the above
020. Which of the following agents acts in a cell cycle specific fashion?
- (A) Cisplatin (B) Daunorubicin  
(C) Vincristin (D) Cyclophosphamide

021. Which molecular subgroup of the medulloblastoma has the WORST prognosis?  
 (A) Type 4 (B) SHH  
 (C) WNT (D) Type 3
022. What material is not used in making Cerrobend shielding blocks?  
 (A) Bismuth (B) Copper  
 (C) Lead (D) Tin
023. Neutron contamination becomes predominant in high energy X- rays produced in linear accelerator after  
 (A) 4 MV X-ray beam (B) 6 MV X-ray beam  
 (C) 10 MV X-ray beam (D) 15 MV X-ray beam
024. The optimal time to deliver heat (relative to radiation) in order to achieve the greatest radiosensitization is  
 (A) Two hours prior to RT  
 (B) One hour prior to RT  
 (C) During RT  
 (D) One hour after RT e. Two hours after RT
025. A patient with stage III colon cancer is day 10 after receiving FOLFIRI chemotherapy and presents with 3 day history of profuse diarrhoea, severe mucositis, and an ANC of zero. Most likely cause of his symptoms is:  
 (A) UGT1A1\*28 homozygosity  
 (B) Irinotecan induced delayed diarrhea  
 (C) DPD Deficiency  
 (D) FOLFIRI induced myelosuppression and GI toxicity
026. A 65 year old female diagnosed with carcinoma right breast, underwent right modified radical mastectomy. Metastatic work up was normal. Post-op histopathology revealed:  
 9 mm tumor in upper outer quadrant not involving chest wall or skin. 2 out of 10 dissected lymph nodes involved by infiltrating ductal carcinoma. Margins free, no LVSI and ER/PR/HER2Neu negative. Based on this, the pathological stage would be:  
 (A) T1b N1b M0 (B) T1b N1a M0  
 (C) T1c N1a M0 (D) T1c N1b M0
027. As attending radiation oncologists, you have been called to review a 3D-CRT plan for carcinoma lung. V30 for heart as per QUANTEC is acceptable, if the mean dose is less than:  
 (A) 26 Gy (B) 36 Gy  
 (C) 46 Gy (D) 56 Gy
028. MARCH meta-analysis by Bourhis et al addressed the issue of fractionation in head and neck cancers. What is the absolute survival benefit reported with hyperfractionation in this analysis as compared to conventional fractionated radiotherapy?  
 (A) 3.5% (B) 5%  
 (C) 6.5% (D) 8 %
029. According to AAPM Task Group TG-76, real time tumor tracking or respiratory gating is warranted, if the magnitude of target motion in any direction is in excess  
 (A) 3 mm (B) 5 mm  
 (C) 7 mm (D) 10 mm

030. As per recent ASCO guideline, adequate surgical margin for a patient undergoing lumpectomy for Infiltrating ductal carcinoma is:
- (A) 2 mm (B) 5 mm  
(C) 10 mm (D) Negative Ink margin
031. Which of the following is correct for Marjolin's ulcer?
- (A) SCC developing on burn scars (B) BCC developing on burn scars  
(C) SCC with extensive PNI (D) BCC with extensive PNI
032. Which of the following descriptions best fits the definition of febrile neutropenia according to ESMO guidelines on febrile neutropenia?
- (A) Oral temperature > 38°C for 2 hours and absolute neutrophil count < 1.0 x 10<sup>9</sup>/l  
(B) Oral temperature > 38.5°C and absolute neutrophil count < 0.5 x 10<sup>9</sup>/l  
(C) Oral temperature with two consecutive readings > 37.5°C and absolute neutrophil count < 0.5 x 10<sup>9</sup>/l  
(D) Oral temperature > 38.5°C and absolute neutrophil count < 1.0 x 10<sup>9</sup>/l
033. Which statement is correct about male breast cancer?
- (A) Aromatase inhibitors are preferred over tamoxifen for the treatment  
(B) Invasive ductal carcinoma is the most common histology  
(C) Hormone receptor positivity rate is high among male breast cancers  
(D) Presents in early stages due to lack of soft tissue
034. When compared to Zoledronic acid for metastatic bone disease, denosumab have the advantage of -
- (A) Delaying the time to first Skeletal related events  
(B) Risk of Osteo-radionecrosis of Jaw is less common with Denosumab  
(C) Electrolyte imbalance (Hypocalcemia) is less frequent with Denosumab  
(D) All of the above
035. Hallmark characteristic of cancer cells is ?
- (A) Apoptosis (B) Controlled cell division  
(C) Angiogenesis (D) Differentiation
036. The half life of Radium-223 is
- (A) 11.5 days (B) 1600 years  
(C) 74 days (D) 1600 days
037. Which of the following are used to calibrate linear accelerators?
- (A) Pocket ionization chambers (B) Cutie pie ionization chambers  
(C) Thimble chambers (D) Geiger-Muller chambers
038. A 38-years-old patient is diagnosed with metastatic, neuroendocrine tumour (NET) of the lung. Ki-67 is 2%. All lesions show avid uptake in somatostatin receptor-based diagnostic imaging. No neuroendocrine symptoms are present.  
What is the most appropriate first-line treatment?
- (A) Everolimus (B) Lutetium-177 dotatate  
(C) Somatostatin analogue (SSA) (D) Cisplatin plus etoposide
039. In Lung cancer radiotherapy, motion management strategies are utilised. Which among is a free breathing motion management solution?
- (A) Automated breath coordinator (B) DIBH  
(C) RPM (D) Abdominal compression

040. How the CT simulator used in radiotherapy is different than the CT used in radiotherapy?
- (A) Laser mounted on the wall  
 (B) It has a flat couch  
 (C) The bore is wider than the one used in CT  
 (D) All of the above
041. What structures are preserved in Type II Modified radical neck dissection?
- (A) Spinal accessory nerve  
 (B) Spinal accessory nerve and Internal Juglar vein  
 (C) Spinal accessory nerve and Sternocleidomastoid  
 (D) Spinal accessory nerve, Internal Juglar vein and Sternocleidomastoid
042. What is Bowen's disease?
- (A) Preinvasive SCC (B) Preinvasive BCC  
 (C) Preinvasive melanoma (D) Preinvasive adenocarcinoma
043. Which mutated gene is associated with HNPCC (hereditary non-polyposis colon cancer)-syndrome?
- (A) BRCA 1 (B) MLH1  
 (C) Rb (D) TP53
044. A 68-year-old man is newly diagnosed with a prostate cancer showing the following features: Cancer in 6 of 12 core biopsies, bilaterally, Gleason score 4+5=9, PSA 10.4 ng/dl, CT and bone scan without evidence of lymphadenopathy or distal metastases. What is the most appropriate treatment plan?
- (A) Active surveillance with yearly biopsies and PSA assessment  
 (B) Brachytherapy  
 (C) External beam radiotherapy and short-term androgen-deprivation therapy (ADT)  
 (D) External beam radiotherapy and long-term ADT
045. Which treatment leads to durable disease control in melanoma patients with multiple asymptomatic brain metastasis?
- (A) Encorafenib/Trametinib (B) Nivolumab plus Ipilimumab  
 (C) Vemurafenib (D) Ipilimumab
046. To which one of the following classes of anticancer agents does nivolumab belong?
- (A) CTLA-4 and PD-L1 co blocker (B) IL-6 blocking antibody  
 (C) LAG-3 Checkpoint inhibitor (D) PD-1 checkpoint inhibitor
047. Which "wonder drug" established the concept of oncogene addiction and revolutionized chronic myelogenous leukemia (CML) therapy?
- (A) Gefitinib (B) Imatinib  
 (C) Bevacizumab (D) Temozolomide
048. Mean dose for lung in a 3D-CRT plan as per QUANTEC, for a rate of symptomatic pneumonitis <20% should be less than:
- (A) 20 Gy (B) 25 Gy  
 (C) 30 Gy (D) 35 Gy
049. 'Mammaprint' for breast cancers is a gene signature test for assessing the benefit of adjuvant chemotherapy. How many genes are assessed in this test:
- (A) 70 (B) 21  
 (C) 76 (D) 50

050. **Oncogenes:**
- (A) Can be activated by epigenetic silencing
  - (B) Are inherited in familial cancers
  - (C) Are induced by gene loss
  - (D) Can be activated by point mutation**
051. A 63-year-old woman is diagnosed with a high-grade, serous adenocarcinoma of the ovary, FIGO stage IIIc. She received optimal debulking and recovered well from surgery. She has no concomitant diseases. ECOG performance status is 1. She is a known carrier of a BRCA-1 mutation.
- What is the best management for this patient to prevent progression?
- (A) Hyperthermic intraperitoneal chemotherapy
  - (B) Six cycles of carboplatin/paclitaxel followed by bevacizumab maintenance
  - (C) Six cycles of carboplatin/paclitaxel followed by olaparib maintenance**
  - (D) Six cycles of carboplatin/paclitaxel
052. Which of the following drugs is associated with the highest risk for infertility in male patients?
- (A) Cyclophosphamide**
  - (B) Methotrexate
  - (C) Bleomycin
  - (D) Etoposide
053. A 35-year-old man presents with large mediastinal lymph nodes, liver metastases and high LDH. Histology reveals undifferentiated tumour not further classifiable. What appropriate investigation should be performed?
- (A) PSA
  - (B) AFP**
  - (C) CEA
  - (D) Beta-2 microglobulin
054. Which of the following drugs blocks the heterodimerization HER-2-HER-3?
- (A) Trastuzumab
  - (B) Pertuzumab**
  - (C) Ribociclib
  - (D) Olaparib
055. As per ICRU 50 Guidelines, Hot spot is defined as an area outside PTV receiving >100% dose in an area of diameter equal to or more than :
- (A) 5 mm diameter
  - (B) 1 cm diameter
  - (C) 1.5 cm diameter**
  - (D) 2 cm diameter
056. The most commonly used biologically active molecule for PET scanning is a fluoridated analog of which of the following:
- (A) Phosphate
  - (B) Glucose**
  - (C) Calcium
  - (D) Sphingomyelin
057. "Oncotype-Dx" for colon cancers is a gene signature test for assessing the benefit of adjuvant chemotherapy. How many genes are assessed in this test:
- (A) 12**
  - (B) 18
  - (C) 21
  - (D) 30
058. What is the peculiar feature of human papilloma virus (HPV) positive SCCHN:
- (A) Most patients are smokers
  - (B) Survival outcomes are better than in patients with tobacco associated SCCHN**
  - (C) Chemotherapy response is unrelated to HPV status
  - (D) HPV causes keratinizing tumors

059. A 66 year old man presented with 4 cm left floor of mouth squamous cell carcinoma. He has a left sided 3 cm lymph node felt on examination and seen on CT. MRI shows that the primary tumor is invading in to the mandible. He has no evidence of distant metastasis on CT chest. What is the most appropriate therapy for this patient?
- (A) Radiation therapy alone  
 (B) Surgery alone  
 (C) Surgery followed by adjuvant radiation or chemo-radiation  
 (D) Concurrent chemoradiation followed by salvage surgery, if required
060. Which one of the following is an adequate treatment for early stage favourable Hodgkins Lymphoma?
- (A) 4 cycles of ABVD  
 (B) 2 cycles of ABVD followed by IFRT 20 Gray  
 (C) 4 cycles of ABVD followed by IFRT 30 Gray  
 (D) 4-6 Cycles of ABVD followed by IFRT 20 Gray
061. A 49 year old woman noted rectal bleeding for 2 months. A colonoscopy revealed a 2 cm low-lying mass 1 cm from the anal verge. Transrectal ultrasound revealed no lymph nodes. Biopsy confirmed basaloid squamous cell carcinoma. The best curative treatment is:
- (A) APR followed by adjuvant chemotherapy or radiotherapy  
 (B) Short course radiation followed by APR  
 (C) Long course concurrent chemo-radiation with 5 Fu followed by APR  
 (D) Chemoradiation alone with 5 FU and Mitomycin
062. A 69 year old male was recently diagnosed with adenocarcinoma of prostate and underwent radical prostatectomy. His baseline PSA was 26 ng/ml. The post-op histopathology revealed 2.5x 2.5 cm tumor in right lobe of the prostate, Gleason's score 8 (4+4), extra prostatic extension with microscopic invasion of bladder neck, seminal vesicles were free and other structures were free of tumor. What would be the pathological T stage of this patients?
- (A) T3a  
 (B) T3b  
 (C) T4  
 (D) T2c
063. A patient is undergoing chemotherapy for an adenocarcinoma of the left lung, 50 mm in its longest diameter, with a single liver metastasis 35 mm in its longest diameter. Following 2 cycles of treatment, the primary tumour shrinks down to 40 mm, and the liver metastasis to 30 mm. How would you categorise the response according to RECIST criteria?
- (A) Major response  
 (B) Stable disease  
 (C) Minor response  
 (D) Not evaluable
064. 25-year-old man presents with cough and thoracic pain. A CT-scan shows a mass involving the pleura and the chest wall. A biopsy reveals small round blue tumour cells. Fluorescence in situ hybridization is positive for translocation of chromosomes 11 and 22. The most likely diagnosis is:
- (A) Small cell lung cancer  
 (B) Ewing Sarcoma  
 (C) Angiosarcoma  
 (D) Liposarcoma
065. Eribulin is approved for treating patients with metastatic breast cancer. Which is the mechanism of action?
- (A) mTOR inhibitor  
 (B) Microtubule inhibitor  
 (C) Topoisomerase inhibitor  
 (D) Antimetabolite



066. Which of the following serum tumor markers is useful to diagnose granulosa cell tumours?  
 (A) AFP (B) CEA  
 (C) Inhibin (D) Enolase
067. A 55-year-old man with newly diagnosed non-small-cell lung cancer (NSCLC) of the left upper lobe reports constant sweating of the left forehead. Which lesion explains this patient's symptom?  
 (A) C7 cervical spinal cord compression  
 (B) Impingement of the left sympathetic trunk  
 (C) Impingement of the left parasympathetic trunk  
 (D) Right cervical ganglion infiltration
068. Which of the following symptom seen in carcinoid syndrome?  
 (A) Broncho dilatation (B) Constipation  
 (C) Bradycardia (D) Flushing
069. What is the gold standard treatment for locally advanced nasopharyngeal cancer?  
 (A) Chemo-radiation (B) NACT followed by CTRT  
 (C) CTRT followed by adjuvant chemo (D) Chemotherapy alone
070. Which cancer may be treated with radioactive iodine?  
 (A) Papillary carcinoma thyroid (B) Hurthle cell cancer  
 (C) A+B (D) Anaplastic thyroid carcinoma
071. Chemotherapy for primary CNS lymphoma comprises of-  
 (A) ABVD (B) MTX  
 (C) PCV (D) BEACOPP
072. Which of the following is an advantage of HDR brachytherapy?  
 (A) Radiobiological advantage (B) Cost effectiveness  
 (C) Special room requirement (D) No Need of hospitalization
073. Many orally administered drugs should not be taken together with grapefruit juice. Which pharmacokinetic process is mainly affected by this interaction?  
 (A) Drug absorption (gastric pH)  
 (B) Drug formulation stability (liberation)  
 (C) Drug distribution  
 (D) Drug metabolism
074. BRCA1 mutations are most commonly associated with:  
 (A) Triple-negative breast cancers.  
 (B) Estrogen receptor (ER)-positive breast cancers.  
 (C) Pancreatic cancer and melanoma.  
 (D) Autosomal recessive inheritance
075. Regarding Immunotherapy related side effect what is NOT correct-  
 (A) Side effects can manifest as skin toxicity, hypothyroidism and other endocrine disorder  
 (B) For grade 3 skin reactions, steroids should be used  
 (C) Immunotherapy should be permanently discontinued for grade 3 or above reactions  
 (D) Generally, occur within 3 months after initiation of ICPI treatment

076. A premenopausal 45-year-old woman underwent breast-sparing surgery with sentinel lymph node biopsy. A grade 1 invasive ductal carcinoma of 7 mm diameter and negative sentinel lymph nodes were found, ER positive/PR positive, HER2-negative.
- Which of the following approaches is most appropriate?
- (A) Adjuvant Aromatase inhibitor and ovarian suppression  
 (B) Follow up only  
 (C) Adjuvant Fulvestrant  
 (D) Adjuvant Tamoxifen
077. Radiation-induced epilation occurs before dermatitis because:
- (A) Basal cells in the epidermis have shorter cell cycle times than the germinal matrix of the hair bulb  
 (B) Cells in the germinal matrix of the hair bulb have shorter cell cycle times than the basal cells of the epidermis  
 (C) Of the exquisite sensitivity of sebaceous glands  
 (D) Of vascular endothelial cell death in the connective tissue at the distal end of the hair follicle
078. Bortezomib inhibits the activity of:
- (A) VEGF (B) Proteasomes  
 (C) Kit (D) m-ToR
079. CTCAE is used to measure toxicity in oncology clinic, what is the full form?
- (A) Common toxicity criteria for adverse events  
 (B) Common terminology criteria for adverse events  
 (C) Comprehensive toxicity criteria for adverse events  
 (D) Comprehensive terminology criteria for adverse events
080. Renal irradiation can lead to the development of radiation nephropathy, which is characterized by proteinuria, anemia, hypertension and a chronic, progressive decrease in renal function. The decline in kidney function characteristic of radiation nephropathy can be:
- (A) Treated with anti-hypertensive agents such as beta blockers  
 (B) Prevented using anti-inflammatory agents  
 (C) Reversed using calcium channel blockers  
 (D) Mitigated using drugs that block the renin-angiotensin system
081. The Quantitative analysis of normal tissue effects in the clinic (QUANTEC) suggested that prevent of severe xerostomia (long term salivary function <25 % of the pre-treatment baseline) requires which of the following dose constraints on the parotid glands:
- (A) At least one parotid gland should receive a mean dose <50 Gy  
 (B) At least one parotid gland should receive a mean dose < 20 Gy  
 (C) Both parotid gland should receive <50 Gy  
 (D) Both parotid gland should receive <20 Gy
082. More monitor units are required in IMRT in comparison to 3D-CRT. Why?
- (A) Dose per fraction is higher for IMRT  
 (B) Higher beam energy is used for IMRT  
 (C) IMRT employs more fields  
 (D) Large portions of the field are blocked in IMRT

083. A woman was diagnosed with Right sided ovarian mass with papillary serous histology. Post-surgery there was a 2.5 cm left ovarian mass with implants on fallopian tube and 2 Rt pelvic lymph nodes and 2 Rt inguinal lymph nodes were positive. What is the stage?
- (A) II (B) I  
(C) IV (D) III
084. Which histology has most favourable outcome in breast cancer?
- (A) Apocrine (B) Pleomorphic lobular  
(C) Medullary (D) Metaplastic
085. According to the RTOG breast cancer contouring atlas, what is included in the chest wall CTV for a patient receiving PMRT?
- (A) Mastectomy scar plus chest wall excluding pectoralis muscles and ribs  
(B) Mastectomy scar plus chest wall including pectoralis muscles and excluding ribs  
(C) Mastectomy scar plus chest wall including pectoralis muscles and ribs and excluding Latissimus dorsi muscle  
(D) Mastectomy scar plus chest wall including pectoralis muscles ribs and latissimus dorsi
086. Which systemic treatment can be used in the treatment of advanced or unresectable desmoid tumor?
- (A) Dasatinib (B) Pazopanib  
(C) Tamoxifen (D) Acetaminophen
087. What is the primary goal of phase IV trial?
- (A) Determine MTD  
(B) Obtain FDA approval  
(C) Post approval assessment of safety and effectiveness  
(D) Investigate off- label indications
088. The highest success rate with nerve blocks is seen in-
- (A) Coeliac plexus block (B) Intrathecal block  
(C) Cryotherapy (D) Brachial block
089. A 72-year-old woman is diagnosed with FIGO IIB epithelial ovarian cancer. Which is the most appropriate management?
- (A) Chemotherapy and surgery at relapse  
(B) Surgery followed by chemotherapy  
(C) Surgery and adjuvant radiation  
(D) Surgery and chemotherapy at relapse
090. A 60-year-old man received 5 R-CHOP courses for a diffuse large B-cell lymphoma. He complains about fatigue and dyspnoea after a short walk. Recent weight gain 1 kg, RR 150/90, heart frequency at rest 90/min, slight crepitations at the lung bases, physical exam otherwise unremarkable. Blood counts normal. Which is the most likely explanation for the complaints?
- (A) Cardiomyopathy due to doxorubicin (B) Fluid retention due to prednisolone  
(C) Nephropathy due to cyclophosphamide (D) Rituximab pneumonitis
091. What is abscopal effect ?
- (A) Localised response following SBRT  
(B) Synergistic effect at the irradiated site  
(C) Systemic effects of immunosuppression  
(D) Therapeutic effect at distance from irradiated site

092. Hot flashes can be induced by all of the following drugs EXCEPT:  
 (A) Anastrozole (B) Exemestane  
 (C) Megestrol acetate (D) Tamoxifen
093. Which organization provides guidelines for facilities to follow in regards to Linear Accelerator Quality Assurance?  
 (A) American Society of Radiologic Technologists  
 (B) American Society of Radiation Oncologists  
 (C) American Registry of Radiologic Technologists  
 (D) American Association of Physicists in Medicine
094. 63 year male, smoker, presented with cough and pain in chest, CT chest showed 4.5cm mass in left lower lobe of lung and contralateral hilar nodes. Biopsy showed adeno carcinoma, no other mets. Ideal management for this patient as per NCCN guidelines would be  
 (A) Induction Chemotherapy followed by chemo radiation  
 (B) Definitive concurrent chemo radiation  
 (C) Definitive concurrent chemo radiation followed by Durvalumab  
 (D) Palliative treatment
095. When treating the vaginal cuff with post operative brachytherapy for early stage endometrial adenocarcinoma, what length of the cuff should be treated?  
 (A) Entire length (B) Apex only  
 (C) Proximal 1-3 cm (D) Proximal 3-5 cm
096. Prostate Specific Membrane Antigen (PSMA) is a product of which of the following gene  
 (A) FOLH1 (B) CDKN2A  
 (C) TP53 (D) MLH1
097. In the lymph node contouring for the pelvic malignancies, the contour of the external iliac nodes are stopped at the:  
 (A) Top of femoral heads (B) Top of Symphysis Pubis  
 (C) Top of Greater trochanter (D) Top of lesser trochanter
098. Concomitant radiochemotherapy after surgery of locally advanced squamous cell carcinoma of the head and neck (SCCHN) is indicated in which of the following situations?  
 (A) pT4 disease (B) Extensive LVI and PNI  
 (C) Extracapsular extension (D) Mandibular involvement
099. The method which is preferred to decrease the V20 of lung during the planning of radiation for locally advanced lung cancer is-  
 (A) Use of Proton beam therapy (B) Treat with induction chemotherapy  
 (C) Treat with respiratory gating (D) Decrease the CTV margin
100. What positioning device is used to move a patient's small bowel out of pelvic treatment fields?  
 (A) Shoulder assistance straps (B) Wing Board  
 (C) Belly Board (D) None of the above
101. What is the relationship between Curie and Becquerel?  
 (A) 1 Curei =  $3.7 \times 10^{10}$  Bq (B) 1 Curei =  $3.7 \times 10^9$  Bq  
 (C) 1 Curei =  $37 \times 10^{10}$  Bq (D) 1 Curei =  $0.37 \times 10^{10}$  Bq

102. Which of the following factors is the most important determinant of lymph node metastasis in gastric cancer?  
 (A) Grade (B) Tumor size  
 (C) Serosal invasion (D) Differentiation
103. What is the primary endpoint of the CROSS trial?  
 (A) Overall survival (B) Response rate to neoadjuvant therapy  
 (C) Quality of life improvement (D) Surgical complication rate
104. Which of the following is the correct order of genetic material?  
 (A) Chromatin>Chromosome>Chromatid>DNA+protein>DNA  
 (B) Chromosome>Chromatid>Chromatin>DNA+protein>DNA  
 (C) Chromatid>Chromosome>Chromatin>DNA+protein>DNA  
 (D) Chromosome>Chromatin>Chromatid>DNA+protein>DNA
105. Which of the following lymphatic involvements is considered a distant metastasis in gastric cancer?  
 (A) Splenic hilum (B) Common hepatic  
 (C) Celiac (D) Portal
106. What is the typical dose constraint for the heart in esophageal radiotherapy to minimize cardiac toxicity?  
 (A) V5 Gy < 30% (B) V30 Gy < 30%  
 (C) V45 Gy < 10% (D) V50 Gy < 2%
107. Which of the following is the most radiosensitive phase of the cell cycle?  
 (A) G1-S (B) G1-M  
 (C) G2-M (D) G1-G0
108. Which of the following is the most common localization for pancreas cancer?  
 (A) Head (B) Corpus  
 (C) Tail (D) Neck
109. What is the region between the skin and the depth at the dose maximum called?  
 (A) Isocenter (B) Build-up region  
 (C) Penumbra (D) D max
110. What is Advantage of Cerrobend over Lead as Shielding Material  
 (A) Low melting Point (B) Light Weight  
 (C) Used in Teletherapy (D) All of Above
111. Which of the following is the unit of the equivalent dose?  
 (A) Gy (B) Sv  
 (C) Rad (D) C/kg
112. What is the lymph node involvement risk in T2N0M0 glottic cancer at presentation?  
 (A) <1% (B) 5%  
 (C) 10% (D) 15%
113. One hundred cells are seeded in a culture, and ten colonies are formed. If the colony number is 5 after a 4.5 Gy dose, what is the surviving fraction?  
 (A) 20 (B) 10  
 (C) 40 (D) 50
114. Long-term adverse effects and efficacy of a new drug can be tested in which of the following phases of a clinical trial?  
 (A) Phase 1 (B) Phase 2  
 (C) Phase 3 (D) Phase 4

115. Which of the following is the 80% isodose line for electrons?  
 (A) E/2 (B) E/3  
 (C) E/4 (D) E/5
116. Which genetic syndrome is associated with a significantly increased risk of developing colorectal cancer at a young age?  
 (A) Down syndrome (B) Turner syndrome  
 (C) Lynch syndrome (D) Klinefelter syndrome
117. What is the block thickness of lead for 6 MV photons?  
 (A) 5 cm (B) 6 cm  
 (C) 7 cm (D) 8 cm
118. Which findings would be MOST consistent with a newly diagnosed thymoma?  
 (A) Ptosis, miosis, and anhidrosis  
 (B) Hyponatremia  
 (C) Hypercalcemia  
 (D) Muscle weakness with activity
119. What is the typical radiation dose and duration used in neoadjuvant short-course radiation therapy for rectal cancer?  
 (A) 50 Gy delivered in 25 fractions over 5 weeks  
 (B) 25 Gy delivered in 5 fractions over 1 week  
 (C) 30 Gy delivered in 10 fractions over 2 weeks  
 (D) 45 Gy delivered in 15 fractions over 3 weeks
120. Which marker is specific for Ewing sarcoma and PNET histologically?  
 (A) MIC2 (B) Vimentin  
 (C) NSE (D) S100
121. What is the 1 HVL lead thickness for Co-60?  
 (A) 0.65 cm (B) 0.72 cm  
 (C) 1.1 cm (D) 1.5 cm
122. Which of the following is a stochastic effect of radiation?  
 (A) Cataract formation (B) Radiation myelitis  
 (C) Genetic mutations (D) Radiation nephropathy
123. What is the relative risk of hormone replacement therapy in breast carcinoma?  
 (A) 1.3 (B) 1.5  
 (C) 1.7 (D) 1.9
124. Bonner et al study in head and neck cancer showed benefit of concurrent chemotherapy with radiotherapy in overall survival. Which Drug was used in that study?  
 (A) Cisplatin (B) Carboplatin  
 (C) Cetuximab (D) Nivolumab
125. Which of the following is the most common malignancy affecting ileum:  
 (A) Adenocarcinoma (B) Lymphoma  
 (C) Carcinoid tumors (D) Melanoma
126. What is the pathological nodal staging of a breast cancer patient with 7 positive axillary lymph node metastasis?  
 (A) N1c (B) N2a  
 (C) N2b (D) N3a

127. Recommended dose of definitive radiation for unresectable thymoma  
 (A) 60 to 70 Gy (B) 45 to 50 Gy  
 (C) 50 to 60 Gy (D) 40 to 45 Gy
128. Irradiation dose for Post OP in Wilms' tumor is  
 (A) 10.8 gy in 6 fractions (B) 12 gy in 8 fractions  
 (C) 10.5 gy in 7 fractions (D) 19.8 gy in 11 fractions
129. Which of the following parameters is not used in the Van Nuys Prognostic Index?  
 (A) Size (B) Grade  
 (C) Surgical margin (D) Hormone receptor status
130. Which trial in head and neck cancer showed more toxicity without survival benefit with induction chemotherapy followed by definitive radiotherapy versus definitive radiotherapy?  
 (A) TAX 323 study (B) GORTEC 94-01 trial  
 (C) Bonner et al study (D) PARADIGM study
131. What does "total Neoadjuvant therapy" refer to in the context of rectal cancer treatment?  
 (A) Using multiple types of surgery for tumor removal  
 (B) Administering chemotherapy after surgery  
 (C) Administering chemotherapy and radiation therapy before surgery  
 (D) Focusing on postoperative rehabilitation
132. Reese–Ellsworth grouping system used for which malignancy?  
 (A) Neuroblastoma (B) Ewings sarcoma  
 (C) Wilms tumor (D) Retinoblastoma
133. What is the MOST conventional dose and fractionation for a 7 year-old patient undergoing whole lung irradiation for lung metastases in rhabdomyosarcoma?  
 (A) 10.5 Gy in 7 Fx (B) 10.8 Gy in 6 Fx  
 (C) 15 Gy in 10 Fx (D) 12 Gy in 8 Fx
134. Which of the following detectors is a gas-filled type of detector?  
 (A) Geiger-Muller counter (B) TLD  
 (C) Calorimetry (D) ESR dosimeter
135. What isotopes is used in episcleral brachytherapy for retinoblastoma?  
 (A) I131 (B) Ru106  
 (C) Pd103 (D) Cs131
136. Which DNA repair pathway repairs double-strand breaks (DSBs) by rejoining broken ends without the need for significant homology?  
 (A) Homologous recombination (HR) (B) Non-homologous end joining (NHEJ)  
 (C) Mismatch repair (MMR) (D) Base excision repair (BER)
137. In addition to 5-Fluorouracil (5-FU), which other chemotherapy drug is commonly used in the Nigro regimen?  
 (A) Methotrexate (B) Etoposide  
 (C) Mitomycin C (D) Gemcitabine
138. What is the recommended schedule for SCLC prophylactic cranial radiotherapy?  
 (A) 25 Gy by 2.5 Gy per fraction (B) 36 Gy by 3 Gy per fraction  
 (C) 30 Gy by 3 Gy per fraction (D) 20 Gy by 4 Gy per fraction

139. What was the approximate rate of vaginal stenosis in the EMBRACE study after cervical cancer chemoRT resulting in rectovaginal reference point dose of 85 Gy?  
 (A) 10% (B) 15%  
 (C) 25% (D) 35%
140. A 55-year-old patient with a history of abnormal Pap smears presents for evaluation of a 3-cm vulvar mass. The mass is located 1 cm lateral to the clitoris on the right and has an ulcerated appearance. She states she noticed it 2 years ago and has tried many different ointments to help control the itching and irritation. This was recently biopsied to reveal invasive squamous cell carcinoma. What treatment would you recommend?  
 (A) Neoadjuvant chemoradiation followed by local resection  
 (B) Concurrent chemoradiation  
 (C) Radical vulvectomy with bilateral inguinal lymphadenectomy  
 (D) Local resection followed by radiation and/or chemotherapy
141. What was the single fraction lung SBRT dose in the RTOG 0915 randomized phase II trial?  
 (A) 18 Gy (B) 24 Gy  
 (C) 34 Gy (D) 38 Gy
142. Which of the following is the optimal management in stage II anal cancer?  
 (A) Concurrent chemoradiotherapy  
 (B) Abdominoperineal resection (APR)  
 (C) APR + adjuvant radiotherapy  
 (D) Neoadjuvant chemotherapy + APR
143. A p-value less than 0.05 in a hypothesis test indicates:  
 (A) The null hypothesis is true  
 (B) The null hypothesis is rejected  
 (C) There is a significant difference between groups  
 (D) The sample size is too small
144. The PORTEC-2 trial made what conclusions regarding the use of vaginal brachytherapy (VBT) compared to whole pelvis radiation therapy (WPRT) in the adjuvant setting?  
 (A) VBT significantly improved vaginal cuff recurrence.  
 (B) Patient reported quality of life was better in the VBT arm.  
 (C) There was no difference in the rates of pelvic recurrence between the two arms.  
 (D) Both progression-free survival and overall survival were significantly improved in the WPRT arm.
145. An 8-year-old child has classic medulloblastoma status post GTR with no radiographic evidence of metastatic disease and no tumor cells in the CSF. What is the recommended RT dose and volume?  
 (A) 59.4 Gy to the resection cavity + margin  
 (B) 54 Gy to the resection cavity + margin  
 (C) 23.4 Gy CSI, then 30.6 Gy boost to the resection cavity + margin  
 (D) 36 Gy CSI, then 18 Gy boost to the posterior fossa



146. What is the primary advantage of proton beam therapy over traditional photon radiation therapy?
- (A) Proton beams are less expensive to produce.  
 (B) Proton beams deposit more energy in healthy tissues.  
 (C) Proton beams deliver a higher radiation dose to the tumor.  
 (D) Proton beams deposit less energy in healthy tissues.
147. The International Commission on Radiation Units and Measurements (ICRU) defines the high-risk clinical target volume (HR-CTV) as the area:
- (A) Receiving the highest dose during treatment.  
 (B) Surrounding the tumor with low radiation sensitivity.  
 (C) Surrounding the tumor with high radiation sensitivity.  
 (D) Encompassing the gross tumor visible on imaging.
148. Flash radiotherapy is characterized by:
- (A) Delivering radiation at a low dose rate over an extended period.  
 (B) Delivering radiation at an ultra-high dose rate in a short burst.  
 (C) Delivering radiation using a linear accelerator.  
 (D) Delivering radiation with minimal penetration depth.
149. Clonogenic repopulation during radiotherapy refers to the:
- (A) Formation of new blood vessels in the tumor.  
 (B) Reduction in tumor volume due to radiation-induced cell death.  
 (C) Proliferation of surviving tumor cells during the course of treatment.  
 (D) Migration of tumor cells to distant organs
150. For locally advanced nasopharyngeal cancer, Intergroup 0099 trial showed how much benefit of 3 year overall survival with chemo-radiotherapy than radiotherapy alone?
- (A) 20% (B) 30%  
 (C) 40% (D) 50%
151. For esophageal cancer, which lymph node station is considered nonregional or distant?
- (A) Lower paratracheal nodes (level 4)  
 (B) Celiac nodes (level 20)  
 (C) Pulmonary hilar nodes (level 10)  
 (D) Lower cervical/supraclavicular nodes (level 1)
152. The correct order of mitosis is:
- (A) Prometaphase, metaphase, anaphase, telophase, prophase  
 (B) Prometaphase, metaphase, prophase, anaphase, telophase  
 (C) Prophase, prometaphase, metaphase, anaphase, telophase  
 (D) Telophase, anaphase, prophase, metaphase, prometaphase
153. In what percentage of gastric cancer patients HER2 is overexpressed or amplified
- (A) 20% (B) 50%  
 (C) 30% (D) 10%
154. What is the predominant pattern of failure in patients with MIBC  $\geq$  pT3 status post radical cystectomy with negative margins?
- (A) Inguinal lymph nodes (B) Presacral nodes  
 (C) Cystectomy bed (D) Iliac/obturator nodes

155. Which of the following is not a high-risk feature for primary tumors in squamous cell cancer?  
 (A) >2 mm thickness (B) Perineural invasion  
 (C) Clark level IV (D) Nasal location
156. Drug which is used in RCC can cause hand foot syndrome  
 (A) Bevacizumab (B) Sunitinib  
 (C) Sorafenib (D) Temsirolimus
157. What is the drug of choice of radiation pneumonitis?  
 (A) Glucocorticoids (B) Amifostine  
 (C) Pentoxifylline (D) Captopril
158. Which brachytherapy apparatus is the LEAST suitable in newly diagnosed, medically inoperable endometrial cancer?  
 (A) Tandem and ring (B) Multichannel vaginal cylinder  
 (C) Heyman packing (D) Tandem and ovoids
159. A researcher is interested in studying the incidence of a rare disease in a population. Which type of study design would be most appropriate?  
 (A) Randomized controlled trial (B) Case-control study  
 (C) Cross-sectional study (D) Cohort study
160. What is Bremsstrahlung radiation?  
 (A) Radiation emitted by radioactive materials.  
 (B) Radiation produced by electrons decaying into neutrinos.  
 (C) Radiation generated when charged particles are accelerated or decelerated by an electric field.  
 (D) Radiation caused by the annihilation of matter and antimatter.
161. Which of the following beam-modifying devices is used to shape the radiation beam to match the shape of the tumor?  
 (A) Wedge filter (B) Compensator  
 (C) Multileaf collimator (D) Bolus
162. The energy of the treatment beam in a medical linear accelerator is determined by the:  
 (A) Number of treatment sessions.  
 (B) Speed of the moving parts within the machine.  
 (C) Radiation dose required for the patient.  
 (D) Voltage applied to the accelerating waveguide
163. What is the primary function of a compensator in radiation therapy?  
 (A) To scatter radiation uniformly around the treatment area.  
 (B) To absorb excess radiation and protect healthy tissues.  
 (C) To increase the energy of the radiation beam.  
 (D) To modify the radiation beam to account for tissue inhomogeneities.
164. What was one of the key findings of the MAGIC trial?  
 (A) Perioperative chemotherapy had no impact on survival rates.  
 (B) Surgery alone was more effective than surgery with chemotherapy.  
 (C) Perioperative chemotherapy improved overall survival in resectable gastric cancer.  
 (D) Perioperative chemotherapy led to higher rates of surgical complications.

165. What is the primary curative treatment option for early-stage hepatocellular carcinoma?  
 (A) Chemotherapy (B) Liver transplantation  
 (C) Radiotherapy (D) Palliative care
166. What is Ohngren's line?  
 (A) A virtual line between the lateral canthus and the mandibular angle.  
 (B) A virtual line between the medial canthus and the mandibular angle.  
 (C) A virtual line between the lateral canthus and the tragus.  
 (D) A virtual line between the medial canthus and the tragus.
167. EORTC 22791 trial on oropharyngeal cancer compares hyper-fractionated radiotherapy versus conventional radiotherapy and showed better local control in hyper-fractionated arm. What radiotherapy schedule was used for hyper-fractionated arm?  
 (A) 81.6 Gy/ 68# bid (B) 72 Gy/ 60# bid  
 (C) 80.5 Gy/ 70# bid (D) 84 Gy/ 70# bid
168. What is the purpose of a flattening filter in a medical linear accelerator?  
 (A) To increase the energy of the treatment beam.  
 (B) To remove low-energy photons from the treatment beam.  
 (C) To shape the treatment beam to match the tumor's size and shape.  
 (D) To reduce the scatter radiation around the treatment area.
169. What histologic subtypes in DCIS is worse?  
 (A) Comedo (B) Cribriform  
 (C) Solid (D) Medullary
170. What does 'C' stands for in TCH regimen of chemotherapy in Her 2 + breast carcinoma?  
 (A) Cyclophosphamide (B) Cisplatin  
 (C) Carboplatin (D) Cetuximab
171. What was the main objective of the RAPIDO trial?  
 (A) To compare surgery alone with surgery and radiotherapy for rectal cancer  
 (B) To investigate the role of targeted therapy in advanced rectal cancer  
 (C) To evaluate the effectiveness of short-course radiotherapy followed by delayed surgery in locally advanced rectal cancer  
 (D) To compare different types of chemotherapy for rectal cancer
172. What is Major difference between SIOP trial group and COG group treatment paradigm for Wilm's?  
 (A) SIOP group uses preop CRT  
 (B) COG group uses preop CRT  
 (C) SIOP group uses postop CRT  
 (D) COG group use post op CRT in all histology
173. All of the following are associated with unfavorable outcomes in neuroblastoma except:  
 (A) MYCN amplification  
 (B) Near-diploid or pseudodiploid tumors  
 (C) Hyperdiploid or near-triploid tumors  
 (D) Deletion of 1p

174. Which of the following is the new volume introduced in ICRU report 78?  
 (A) ITV (B) RVR  
 (C) OAR (D) IM
175. Isobars are atoms that have the same:  
 (A) Number of protons (B) Number of electrons  
 (C) Atomic mass number (D) Number of neutrons
176. Which of the following is the most common type of rectal cancer?  
 (A) Squamous cell cancer (B) Adenocarcinoma  
 (C) Undifferentiated cancer (D) Adenosquamous cancer
177. A patient treated for a lung tumor using protons experiences fluid filling around the tumor. Assuming the tumor location does not change, how will the location of the Bragg peaks for each treatment field change relative to their original positions?  
 (A) Peaks will be more distal  
 (B) Peaks will be more proximal  
 (C) Peaks will not change location  
 (D) Peaks will change selectively based on beam energy
178. Which diagnosis has the poorest survival outcomes in children?  
 (A) Diffuse intrinsic pontine glioma (B) Intracranial germinoma  
 (C) Juvenile pilocytic astrocytoma (D) Medulloblastoma
179. The Follicular Lymphoma International Prognostic Index (FLIPI) predicts progression-free survival based on all of the following except:  
 (A) Age  $\geq 60$  (B) Hemoglobin  $< 12$  g/dL  
 (C) Number of nodal sites  $> 4$  (D) Ann Arbor Stage  $\geq$  II
180. Which of the following systems is used for nasal vestibule staging?  
 (A) Chang staging (B) Wang staging  
 (C) Shimada staging (D) Kadish staging
181. What are the signs of malignancy in salivary gland tumours?  
 (A) Painless retromandibular mass (B) Xerostomia  
 (C) Facial pain and facial paresis (D) Lymphoid tissue microscopically
182. Which trial demonstrated benefit of consolidative thoracic RT in patient of ES-SCLC with good response to systemic therapy, with residual thoracic disease  
 (A) INT 0096 (B) European CONVERT  
 (C) CALGB30610 (D) Dutch CREST
183. Which of the following is not indication of elective neck RT in salivary gland tumours?  
 (A) Size of tumour  $>4$  cm (B) High grade tumours  
 (C) Recurrent tumours (D) Positive neck nodes
184. Surveillance recommendations for locally advanced ca esophagus treated with definitive chemoradiation without esophagectomy  
 (A) Imaging every 3-6 month for 1 year and annually upto 5 year  
 (B) Imaging every 3-6 month upto 2 year and annually upto 5 year  
 (C) Imaging every 3-6 months upto 1 year and annually upto 5 year; EGD every 3-6 months for first 1 year then annually for 3 more years.  
 (D) Imaging every 3-6 months upto 2 year and annually upto 5 year; EGD every 3-6 months for first 2 year then annually for 3 more years

185. What are the absolute contraindications of breast conserving therapy in early stage breast carcinoma?
- (A) Positive family history of breast carcinoma  
 (B) BRCA mutation positive patients  
 (C) 3rd trimester of pregnancy  
 (D) Diffuse microcalcifications
186. NSABP B-18 trial compared neo-adjuvant and adjuvant chemotherapy in operable locally advanced breast carcinoma and showed improved overall survival and disease free survival in young patients when treated with pre-operative chemotherapy. What was the conversion rate from mastectomy to breast conserving surgery in this trial?
- (A) 17% (B) 27%  
 (C) 37% (D) 47%
187. The principle of "Repair" in radiobiology implies that:
- (A) Cells can repair radiation-induced damage completely.  
 (B) Repair processes in cells are faster after higher radiation doses.  
 (C) The repair of DNA damage can lead to increased cell survival.  
 (D) Repair processes are more efficient in hypoxic cells.
188. The linear-quadratic model is particularly useful in predicting the response of tumors to:
- (A) High-dose single-fraction radiation therapy.  
 (B) Fractionated radiation therapy.  
 (C) Brachytherapy treatments.  
 (D) Proton beam therapy.
189. The use of hypofractionation in radiation therapy is particularly suitable for tumors that:
- (A) Have a high growth rate.  
 (B) Are located in deep-seated tissues.  
 (C) Have a low  $\alpha/\beta$  ratio.  
 (D) Exhibit resistance to chemotherapy.
190. A 82 years old female with c T2 N0 breast carcinoma, ER/PR positive and Her 2 negative undergone mastectomy. Her final histopathological report showed p T2 N1a stage, grade 1 invasive breast carcinoma with negative margins, negative lympho-vascular invasion, negative peri-neural region and no extra nodal extension. Her Can Assist score was 10. What will be next line of treatment?
- (A) Aromatase inhibitor only.  
 (B) Adjuvant chemotherapy followed by adjuvant radiotherapy with aromatase inhibitor.  
 (C) Adjuvant radiotherapy with aromatase inhibitor.  
 (D) Adjuvant radiotherapy with tamoxifen.
191. What is cut off dimension of solitary pulmonary nodule (SPN):
- (A) < 3 mm (B) < 3 cm  
 (C) < 5 mm (D) < 5 cm
192. Which of the following types of radiation has the highest linear energy transfer (LET)?
- (A) X-rays (B) Gamma rays  
 (C) Protons (D) Neutrons

193. NSABP B-17 trial was done for DCIS patients and compared lumpectomy alone versus lumpectomy followed by post op radiotherapy. Addition of radiotherapy reduces ipsilateral breast tumour recurrence rate from 30% to \_\_\_\_\_ ?  
 (A) 10% (B) 15%  
 (C) 20% (D) 25%
194. In SOFT and TEXT trials, which drug used for ovarian suppression?  
 (A) Goserelin (B) Leuprolide  
 (C) Degarelix (D) Triptorelin
195. A pregnant 33 years old woman at 11 weeks gestation presents with a 6 cm fixed, left breast mass with left axillary lymphadenopathy. Biopsy of mass demonstrates a grade 3 invasive ductal carcinoma which is ER/ PR/ Her2 positive with Ki-67 of 75%. Which of the following is advisable regarding the subsequent staging of her disease?  
 (A) She should have a mammogram, breast ultrasound, CT scan and bone scan.  
 (B) She should have a mammogram, breast ultrasound, axillary lymph node FNAC, chest X ray, labwork and abdominal ultrasound.  
 (C) She should have a mammogram, breast ultrasound and a PET-CT scan.  
 (D) She should have a breast MRI with contrast, lab work and abdominal ultrasound.
196. Olaparib was approved by FDA in:  
 (A) Germline BRCA-positive, HER2 negative metastatic breast cancer in patients who previously received chemotherapy in the neoadjuvant, adjuvant or metastatic settings.  
 (B) Germline BRCA-negative, HER2-negative metastatic breast cancer in patients who previously received chemotherapy in the neo-adjuvant, adjuvant or metastatic settings.  
 (C) Germline or somatic BRCA-positive, HER2-negative metastatic breast cancer in patients who previously received chemotherapy in the neo-adjuvant, adjuvant or metastatic settings.  
 (D) Germline BRCA-positive, HER2-negative metastatic breast cancer in patients who have never previously received chemotherapy in the neo-adjuvant, adjuvant or metastatic settings.
197. What is the main cause of death in the hematopoietic syndrome of ARS?  
 (A) Neurological complications. (B) Gastrointestinal failure.  
 (C) Bone marrow failure and infection. (D) Cardiovascular collapse.
198. Which of the following is not a laboratory feature of tumor lysis syndrome?  
 (A) Hyperkalemia (B) Hyper-phosphataemia  
 (C) Hyper-uricaemia (D) Hyper-calcemia
199. Involvement of para-aortic LNs in case of carcinoma cervix is considered as which of the following stage?  
 (A) IIIC (B) IVB  
 (C) IVA (D) IIIB
200. Which of the following nerve is responsible for otalgia in cancers of larynx/hypopharynx?  
 (A) Auriculotemporal nerve (B) Jacobson nerve  
 (C) Arnold nerve (D) Hypoglossal nerve