MDCB Test Specifications Matrix Derived from the 2018 Job Task Analysis	
Domain	**Weight**
I. Radiation Physics	**16%**
1. Radioactive decay	
2. Production of X rays and particle beams	
3.Characteristics of X rays and particle beams	
4. Interaction of radiation with matter	
5. Treatment machine characteristics: (e.g., LINAC, MR, proton, photon, orthovoltage and superficial X rays, gamma source)	
6.Geometric characteristics (e.g., magnification, minification)	
7. Radiation measurement	
8. Imaging modalities (e.g., MRI, PET, CT, ultrasound, SPECT, KV/MV, CBCT)	
9. Hounsfield unit conversion to CT density table in treatment planning systems	
10. Radiation units (e.g., activity, exposure, absorbed dose, and dose equivalent)	
II. Localization	8%
1. Acquisition of patient data	
2. Patient positioning	
3. Patient immobilization and motion management techniques	
4. Treatment simulations, TPS localization of patient	
5. Rigid image registration, deformable registration, image fusion	
6. IGRT (e.g., SGRT, CBCT, ultrasound guidance, KV-KV, MV-MV, infrared, fluoroscopy, CT on rails, fiducials)	
III. Treatment Planning	40%
1. Isodose distributions and dose metrics (photon, electron, proton, plan evaluation including DVH, conformality and other plan indices)	
2. Site specific clinical oncology (e.g., disease, anatomy, modes of spread, common treatment techniques, dose and fractionation schemes)	
3. Radiobiology (e.g., dose tolerances, hypofractionation, time dose fractionation calculation, BED, RBE, LET)	
4. Cross-sectional anatomy	
5. Treatment delivery systems machine differences, limitations, and advantages	
6. Special treatment procedures (e.g., TBI, TSEI/TBE, IORT, SRS, SBRT)	
7. Planning methodologies (e.g., forward, inverse, compensator, robust planning)	
8. DICOM data transfer	
9. Computer systems management (e.g., archiving and backup, routine maintenance, scripting)	
10. Adaptive radiotherapy	
11. Autoplanning	
12. Autocontouring	
13. Implanted devices	
14. The accuracy and limitations of IGRT techniques	

IV. Dose Calculation Methods	15%
1. External beam dose calculation and algorithms	
2. Effects of beam modifying devices (e.g., wedges, bolus, partial transmission blocks, compensators, MLC)	
3. Special calculations (e.g., off axis, re-treatments, gap calculations, entrance/exit dose)	
4. Corrections for tissue inhomogeneities and density overrides	
5. Deformable dose accumulations	
6. Sources of uncertainty and limitations in computer-based treatment planning (e.g., effects of dose grid matrices)	
V. Brachytherapy	6%
1. Radioactive source characteristics	
2. HDR and LDR treatment planning	
3. HDR and LDR delivery systems	
4. Brachytherapy treatment device verification (e.g., seeds applicators)	
5. Secondary/independent calculation	
6. Surveying (e.g., background pre and post implant, shielding, bedside dose)	
7. Regulatory requirements for radioactive sources (e.g., NRC vs state requirements)	
VI. Radiation Protection	7%
1. ALARA and maximum permissible dose equivalent based on NCRP recommendations, regulatory guidelines (e.g., ICRU, NCRP)	
2. Radiation monitoring for personnel and patients	
3. Treatment vault shielding requirements	
VII. Quality Assurance and Standard of Care	8%
1. TPS commissioning and quality assurance	
2. Clinical data: plan checks, chart reviews, image reviews	
3. Measurement equipment (e.g., diodes, ion chambers, TLD, survey meters)	
4. Record and verify systems and EMR	
5. Treatment beam QA measurement and analysis (e.g., IMRT, electron cut out factors)	
6. AAMD Scope of Practice	
7. Incident reporting for patient safety (e.g., quality improvement, RO-ILS, root cause analysis, process improvement)	
8. Factors and limitations of deliverable plans	
9. QA requirements of simulation and treatment equipment	