



SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY

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ROLL NUMBER

WRITTEN TEST FOR THE POST OF - TECHNICAL ASSISTANT (IS & IR) - A

DATE: 10/05/2023

TIME: 10 To 11.30

DURATION: 90 MINUTES

Total Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Write your Roll Number on the top of the Question Booklet and in the answer sheet.
2. Each question carries 1 mark.
3. There will not be any Negative Marking.
4. Darken only the bubble corresponding to the most appropriate answer.
5. Over-writing is not permitted.
6. Candidate should sign in the question paper and answer sheet.
7. No clarifications will be given.
8. Candidate should hand over the answer sheet to the invigilator before leaving the examination hall.

Rupa Sreedhar
10/5/2023

Signature of the Candidate

Technical Assistant (Imaging Sciences & Interventional Radiology) SCTIMST, 10/5/2023

1. In an x-ray tube, when the current is increased-
 1. Bremsstrahlung and characteristic x-rays increase
 2. Bremsstrahlung and characteristic x-rays decrease
 3. Bremsstrahlung x-rays increases and characteristic x-rays decrease
 4. Bremsstrahlung x-rays decrease and characteristic x-rays increase

2. Which of the following effects are primarily utilized in Time-of-flight MR angiography?
 1. Flow-related enhancement
 2. Flow-related dephasing
 3. Flow compensation
 4. Flow voids

3. An uncooperative patient with acute SAH is undergoing DSA. All of the following can be done to reduce motion artefacts **EXCEPT**-
 1. Taking longer mask images
 2. Pixel shift of acquired images
 3. Increasing the distance between X-ray tube and the patient
 4. Physical restraint

4. All of the following can be done in DSA to reduce radiation **EXCEPT**-
 1. Variable acquisition rate
 2. Collimation
 3. Magnification
 4. Filter placement

5. A patient with a giant right ICA aneurysm is undergoing 3D DSA. Which of the following injection technique will give good quality images with aneurysm opacification?
 1. Longer and delayed injection prior to start of acquisition
 2. Early acquisition before start of injection
 3. Iso-osmolar contrast injection
 4. Increase kV

6. The type of RF coil configuration that uses a series of independent coils to create an image is known as a-
 1. Quadrature coil
 2. Phased array coil
 3. Volume coil
 4. Surface coil

7. Retrospective gating (versus prospective gating) would be particularly useful in a patient with-
 1. Large body habitus
 2. Slow heart rate
 3. Irregular heart rate
 4. Anomalous coronary artery origin

Rupa Sreedhar
10/5/2023

8. Which of the following is the advantage of increasing the number of rows in MDCT?
 1. Greater spatial resolution
 2. Greater temporal resolution
 3. Greater axial coverage
 4. Greater contrast resolution

9. Which of the following is the effect of positioning the patient off-center within the CT gantry?
 1. Less noise
 2. Increased dose
 3. Reconstruction artifacts
 4. Incorrect Hounsfield unit numbers

10. Which of the following is the main advantage of iterative reconstruction techniques versus filtered backprojection?
 1. Better depiction of bone detail
 2. Does not require specification of reconstruction kernel or filter
 3. Better handling of noisy images
 4. Faster reconstruction

11. MRI supermagnet is made of:
 1. Niobium-titanium alloy
 2. Copper-iron alloy
 3. Aluminium
 4. Steel

12. In MR imaging, coils which are used to adjust B0 magnetic field inhomogeneities are known as-
 1. RF coils
 2. Shim coils
 3. Gradient coils
 4. Regulator coils

13. The most important parameter regarding quality of MR scanner is its'-
 1. Field homogeneity
 2. Linearity
 3. Distortion
 4. Gradient strength

14. Free induction decay (FID) is indicative of-
 1. Exponential decay of MR signal
 2. Decay of the RF strength over time
 3. Dephasing of the photons after RF pulse
 4. Loss of Larmor frequency of the proton

15. The type of sequence that fills all lines of K space per TR is known as -
 1. Fast spin echo
 2. Steady state free precession
 3. Echoplanar
 4. Spin echo

Repa Sreedhar
18/5/2023

16. Which one out of the following techniques is most commonly used for DSC perfusion?
1. T1-Weighted image
 2. Echo planer imaging
 3. Time of Flight sequence
 4. T1-FLAIR
17. In MR scanner, 'slew rate' is-
1. How quickly an RF pulse can be switched on and off
 2. Rate of change of gradient amplitude
 3. The same as rise time/ sequence
 4. Strength of the gradient coils
18. What is the minimum number of applied gradient directions required to acquire diffusion tensor imaging data using single-shot echo-planar techniques?
1. 3
 2. 6
 3. 12
 4. 64
19. Deoxy-haemoglobin is -
1. Paramagnetic
 2. Diamagnetic
 3. Gyromagnetic
 4. Polymagnetic
20. Which of the following is a disadvantage of a permanent magnet in MR scanner?
1. Heavy weight
 2. Open architecture
 3. Smaller fringe field
 4. No requirement for cooling system
21. Which of the following MR sequence is most helpful in distinguishing acute from chronic infarct?
1. FLAIR
 2. T2-WI
 3. DWI
 4. CISS
22. Which of the following is most frequently used MR sequence in BOLD Functional MRI?
1. EPI
 2. T1 TSE
 3. MP RAGE
 4. T2 FSE
23. The gradient that is turned on during signal sampling in MRI is known as:
1. Slice selection gradient
 2. Phase encoding gradient
 3. Frequency encoding gradient
 4. Motion sensitive gradient

Rupa Sreedhar
18/5/2023

24. What type of pulse sequence produces maximum RF induced tissue heating?
1. Gradient Echo
 2. Spin Echo
 3. Turbo SE
 4. EPI sequences
25. What is active shielding?
1. Placing metal pieces around the scanner in order to correct (homogenize) the external magnetic field
 2. Use of extra coils to correct (homogenize) the external magnetic field
 3. Placing metal pieces around the scanner in order to reduce the extent of the fringe field
 4. Use of extra coils to reduce the extent of the fringe field
26. 1T (Tesla) is equal to-
1. 100 gauss
 2. 1000 gauss
 3. 10,000 gauss
 4. 100,000 gauss
27. Which of the following is the unit for measuring the strength of the gradients in MR scanners?
1. mT/cm
 2. mT/m
 3. T/cm
 4. T/m
28. What is spoiling?
1. Destruction of residual, unwanted transverse magnetization
 2. The method by which gradients are switched off
 3. The effect of the dephasing lobe of the readout (frequency encoding) gradient
 4. Release of helium from the magnet
29. 'b-value' in DWI imaging depends on all of the below **EXCEPT**-
1. Magnitude of opposing gradients
 2. Duration of opposing gradients
 3. Time interval between opposing gradients
 4. Strength of the scanner
30. Which of the MR imaging sequence is **NOT** effective for fat signal intensity suppression?
1. Chemical shift selection suppression (CHESS)
 2. Short Tau Inversion Recovery (STIR)
 3. 3-point Dixon (3PD) technique
 4. FLASH sequence
31. All of the following are true of 'Specific Absorption Rate' (SAR) **EXCEPT**?
1. SAR is significantly greater in high-field scanners
 2. GRE sequences, using low-flip angles, typically generates high SAR values
 3. SAR will be greater if many RF pulses are inserted in a short time
 4. SAR will be greater if saturation pulses or high duty cycles are used

Rupa Sreedhar
19/5/2023

32. Which of the following material is used in a TLD monitoring device to detect radiation?
1. Lithium Oxide
 2. Lithium Halide
 3. Sodium Fluoride
 4. Lithium Fluoride
33. Film badge monitoring devices are incapable of detecting:
1. Neutrons
 2. Beta particles
 3. X-rays
 4. Gamma rays
34. Radiation exposure is measured in-
1. Roentgen
 2. Gray
 3. Rad
 4. Sievert
35. The permissible Occupational Dose Limits for whole body is-
1. 10 mSv/yr
 2. 20 mSv/yr
 3. 50 mSv/yr
 4. 100 mSv/yr
36. In the Automated exposure compensation, which of the following is determined using the topogram (or scout) image?
1. Bowtie filter
 2. Tube current (mA)
 3. Pitch
 4. Reconstruction filter
37. Worldwide average of effective dose from background natural radiation is about-
1. 2.4 mSv/year
 2. 6.0 mSv/year
 3. 12.0 mSv/year
 4. 24.0 v
38. Ultrasound contrast agents (UCAs) consist of small particles of approximately ___ size.
1. 3-5 nm
 2. 3-5 μ m
 3. 3-5 mm
 4. 3-5 cm
39. What characteristic differentiates microbubble contrast agents from iodinated and gadolinium-based contrast agents?
1. Microbubbles are too large to pass through the vessel endothelium
 2. Microbubbles are small enough to diffuse out into the interstitial space
 3. Microbubbles are excreted by the kidneys
 4. Microbubbles are purely extravascular contrast agents

Reya Sreedhar
18/5/2023

40. Which of the following action will result in increasing radiation dose in multislice CT scan?
1. Reducing the Milliampere-Seconds Value
 2. Reducing pitch
 3. Varying the Milliampere-Seconds Value by Patient Size
 4. Reducing Beam Energy
41. Which of the following is the primary role of CT scan in patients with acute ischaemic stroke?
1. To exclude parenchymal haemorrhage
 2. To confirm subarachnoid haemorrhage
 3. To confirm tumour with bleed
 4. To prognosticate the outcome
42. What is an essential element of the radiation dose sheet that has been adopted by most CT scanner manufacturers as a standard specified by the International Electrotechnical Commission?
1. Effective dose
 2. Scan description
 3. Volume CT dose index (CTDIvol)
 4. Scan range
43. Which of the following parameter adjustments (assuming other factors constant) can reduce the radiation dose in CT?
1. Increasing kV
 2. Increasing mAs
 3. Increasing Pitch
 4. Increasing scan length
44. Which of the following MR contrast agent has maximum relaxivity?
1. Gadodiamide
 2. Gadoteridol
 3. Gadopentate dimeglumine
 4. Gadobenate dimeglumine
45. In vertebroplasty, which of the following is injected?
1. Polymethyl methacrylate
 2. Isomethyl methacrylate
 3. Polyethyl methacrylate
 4. Isoethyl methacrylate
46. Commonly used T2 contrast agents in MR examination is -
1. Gadolinium DTPA
 2. HMPAO
 3. Iron-oxide dextran
 4. Methylgluconate

Rupa Sreedhar
19/5/2023

47. What is the recommended dose of gadolinium in MRI?
1. 1.0 mmol/kg
 2. 0.1 mmol/kg
 3. 100 mmol/kg
 4. 20 mmol/kg
48. Which of the following is true of Gadolinium?
1. It shortens longitudinal magnetization only
 2. It shortens transverse magnetization only
 3. It shortens both longitudinal & transverse magnetization
 4. It shortens longitudinal or transverse magnetization depending on field strength
49. The inner envelope of an X-ray tube is usually made from -
1. Perspex
 2. Lead
 3. Borosilicate glass
 4. Aluminium
50. The added filtration of a diagnostic X-ray tube typically consists of
1. Copper / bronze
 2. Aluminium / beryllium
 3. Aluminium / copper
 4. Titanium / lead
51. With everything else held constant, what is the effect of increasing the tube potential from 80 kVp to 120 kVp?
1. No effect on radiation dose
 2. A 50% increase in radiation dose
 3. A 100% increase in radiation dose.
 4. A greater than 100% in radiation dose
52. The tube current value is multiplied by what parameter to yield the tube current-time product?
1. Total scanning time
 2. Tube rotation time
 3. Pitch
 4. CTDIvol
53. What two parameters are used to calculate the dose-length product (DLP)?
1. CTDIvol and scan length
 2. Tube current-time product and CTDIvol.
 3. Pitch and tube current-time product.
 4. Tube current-time product and tube potential
54. The primary x-ray beam penetration through a patient can be increased by increasing the -
1. kV
 2. mAs
 3. Film-focus distance
 4. Beam area

Rupa Sreedhar
18/5/2023

55. The maximum field of view which can be obtained with a specific radiographic system is generally limited by the:
1. Focal spot size
 2. Anode size
 3. Anode angle
 4. Focal Length
56. In a helical CT, a single transverse slice is represented by-
1. A plane through the body perpendicular to the scan axis
 2. A plane through the body oblique to the scan axis
 3. A reconstruction made from projections at neighboring scan axis positions
 4. A plane through the body parallel to the scan axis
57. Decreasing kV in CT is advantageous because
1. X-ray penetration improves
 2. Tissue contrast improves
 3. Scan times are reduced
 4. Metal streak artifacts are less
58. Which of the following is the goal of automated exposure compensation?
1. To generate images of similar noise characteristics regardless of patient size
 2. To scan patients of different sizes with the same kV and mAs settings
 3. To obtain pretty, low-noise images
 4. To eliminate the radiation risks from CT examinations
59. Collimation directly reduces-
1. Resolution
 2. Dose-area product
 3. Tube voltage
 4. Magnification
60. The CT number (Hounsfield unit) of fat depends on-
1. X-ray energy
 2. mAs
 3. Reconstruction algorithm
 4. Nothing - it is constant
61. Which of the following is a most important dose reduction strategy in retrospectively gated cardiac CT?
1. Give beta-blockers to decrease heart rate
 2. ECG dose modulation
 3. Multi-segment reconstruction
 4. Increasing kV
62. Beam hardening in x-ray imaging refers to
1. Decreasing x-ray beam strength as it passes through a dense material
 2. Decrease in a photon's energy as it is scattered by a dense material
 3. Increase in a photon's energy as it is scattered by a dense material
 4. Increased average x-ray energy as a beam passes through a dense material

Rupa Sreedhar
18/5/2023

63. All of the following are the advantages of dual-energy CT **EXCEPT-**
1. Virtual non-contrast images
 2. Separation of dozens of different materials
 3. Metal implant imaging
 4. Calcium subtraction
64. Which of the following is a major disadvantage of using grids?
1. Worse resolution
 2. Increased dose
 3. Worse contrast
 4. Longer imaging time
65. Magnification (geometric or electronic) always results in-
1. Increase in Dose
 2. Increase in DAP
 3. Decrease in Dose
 4. Decrease in DAP
66. In a helical CT scanner, a low-pitch technique might be most helpful for-
1. Scanning a tachypneic patient
 2. Detecting a non-displaced fracture
 3. Detecting a subtle liver lesion
 4. Scanning a young child
67. All of the following is the effect of using collimation **EXCEPT-**
1. Decreased radiation exposure to the patient
 2. Decreased scatter within the patient
 3. Improved tissue contrast
 4. Improved quantum mottle
68. X-ray dose is deposited
1. Preferentially near the skin
 2. Preferentially in the middle of the patient
 3. Preferentially towards the detector
 4. Relatively uniformly throughout
69. Which of the following is the primary goal of parallel imaging?
1. Decrease scan time
 2. Increase signal-to-noise
 3. Remove motion artifacts
 4. Perform 3D acquisitions
70. Which of the following multienergy CT technique has field of view (FOV) restrictions?
1. Dual-source CT
 2. Dual-spin CT
 3. Split-beam CT
 4. Dual-layer CT

Reepa Sreedhar
18/5/2023

71. Which of the following numbers reported by the scanner best reflects the total amount of radiation delivered to the patient?
1. Dose
 2. Dose-length product (DLP)
 3. CT Dose Index (CTDI)
 4. Effective mAs
72. What is the k edge of iodine?
1. 21.3 keV.
 2. 33.2 keV.
 3. 44.4 keV.
 4. 55.6 keV.
73. In a spin echo pulse sequence, the time between the first and second RF-pulses is-
1. TR
 2. TE
 3. TE/2
 4. TI
74. Which of the following is a major technical challenge in cardiac CT?
1. Three-dimensional reconstruction
 2. Spatial resolution
 3. Contrast resolution
 4. Temporal resolution
75. The B_0 field of an MR scanner is most homogeneous at-
1. At bore level about 1 meter directly in front of the magnet
 2. At the opening (gantry) of the magnet
 3. In the middle of the bore at isocenter
 4. On the outside of the magnet immediately against its wall
76. Compared with SE, GRE sequences use
1. Longer TR and longer TE
 2. Shorter TR and longer TE
 3. Longer TR and shorter TE
 4. Shorter TR and shorter TE
77. In MR imaging, matrix size determines-
1. Field of view
 2. Aliasing
 3. Resolution
 4. Bandwidth
78. The center of K-space contains
1. Frequency information
 2. Degree of T2 weighting
 3. Tissue contrast
 4. Spatial resolution

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15/5/2023

79. "False-positive" findings on DWI are often attributed to
1. T1 effects
 2. T2 effects
 3. Anisotropy
 4. Poor signal to noise
80. The most common pulse sequence used for DWI is
1. Half-Fourier fast spin echo
 2. Gradient echo (GRE)
 3. Steady-state free precession (SSFP)
 4. Echo-planar imaging (EPI)
81. The ultrasound transducer operates on the principle of-
1. Photoelectric effect
 2. Crystalline effect
 3. Piezoelectric effect
 4. Snell's Law
82. Which of the following statement is TRUE about ultrasound?
1. Propagation velocity of ultrasound waves is directly proportional to tissue density.
 2. Propagation velocity of ultrasound waves is directly proportional to stiffness of tissue.
 3. The average Propagation velocity of ultrasound waves through soft tissue is 1450 m/s.
 4. The brightness of signal in ultrasound imaging is not dependent on propagation velocity of ultrasound.
83. Which of the following is **NOT** correct regarding deterministic effects of radiation?
1. It has a minimum threshold below which it does not occur
 2. The severity of the effect increases with dose
 3. The probability of the effect occurring increases with dose
 4. Breast cancer is a type of deterministic effect
84. Doppler shift is defined as:
1. The frequency difference between emitted and received signals for observers at relative motion
 2. The difference in acoustic impedance between two transmitting mediums
 3. The intensity difference between emitted and reflected waves
 4. The frequency change in the waves when they traverse from one medium to another
85. Which of the following is not bright on T1-weighted image?
1. Fat
 2. Subacute blood
 3. Cortical bone
 4. Melanin
86. Which of the following is **NOT** a branch of basilar artery?
1. Posterior cerebral artery
 2. Superior cerebellar artery
 3. Posterior communicating artery
 4. Anterior inferior cerebellar artery

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87. Which of the following MR technique is used to study white matter anisotropy?
1. Diffusion imaging
 2. Perfusion imaging
 3. Spectroscopy
 4. Magnetisation transfer imaging
88. Which of the following is true about STEAM technique for MR Spectroscopy?
1. It provides more effective water suppression
 2. It provides better SNR
 3. It provides greater number of metabolic peaks
 4. It has increased sensitivity to motion
89. In MRS, creatinine peaks are located at-
1. 1.32 ppm
 2. 2.6 ppm.
 3. 3.03 ppm
 4. 3.2 ppm
90. Which of the following is location of CSF flow study in MRI in a case of Normal Pressure hydrocephalus?
1. Foramen of Monroe
 2. Foramen Magnum
 3. Third ventricle
 4. Aqueduct of Sylvius
91. What are magnetophosphenes?
1. Magnetically active bacteria
 2. Substances which glow in a magnetic field
 3. The sensation of flashes of light
 4. Protons which do not respond to phase encoding
92. Which of the following is TE value of MRS to evaluate myoinositol level?
1. Short TE
 2. Intermediate TE
 3. Long TE
 4. Short or Long TE
93. Which of the following is **NOT** currently acceptable terminology for the safety of a device in MRI?
1. MR Unsafe
 2. MR Conditional
 3. MR Compatible
 4. MR Safe
94. In assessing a patient with a presumed ferromagnetic bullet or shrapnel, which factor is the most important in assessing risk of performing an MRI?
1. Location of the fragment
 2. Shape of the fragment
 3. Length of time since implantation
 4. Whether it was acquired in a military setting

Rupa Sreedhar
20/5/2023

95. An implant made of which of the following materials could pose a safety risk because of ferromagnetic properties:
1. Gold
 2. Platinum
 3. Nitinol (Ni-Titanium alloy)
 4. Silicon steel
96. Which of the following is **NOT True** about chemical-shift artifact?
1. Spatial mismatching of MR signal
 2. Typically seen in the frequency-encoding direction
 3. It occurs only between water and fat
 4. It may occur not only within a plane of imaging, but also between slices (i.e., in the slice-select direction).
97. Which scanner is the heaviest and would require the most floor support?
1. 0.3 T Permanent magnet system
 2. 0.8 T Resistive magnet system
 3. 1.5 T Superconductive system
 4. 3.0 T Superconductive system
98. Which of the following statement about ACR Safety Zone 4 is true?
1. All areas freely accessible to the general public without supervision
 2. MR safety screening typically occurs here under supervision
 3. An area near the magnet room where the fringe, gradient, or RF magnetic fields are sufficiently strong to present a physical hazard to unscreened patients and personnel
 4. Synonymous with the MR magnet room itself
99. Which of the following MRI sequences produces loudest acoustic noise?
1. SE
 2. TSE
 3. GRE
 4. EPI
100. Another name for a gradient echo is a-
1. Field echo
 2. RF echo
 3. Spin echo
 4. Stimulated echo

Rupa Sreedhar
20/5/2023

Technical Assistant (Imaging Sciences & Interventional Radiology)
Answer Key

1	1	21	3	41	1	61	2	81	3
2	1	22	1	42	3	62	4	82	2
3	3	23	3	43	3	63	2	83	4
4	3	24	3	44	4	64	2	84	1
5	1	25	4	45	1	65	1	85	3
6	2	26	3	46	3	66	2	86	3
7	3	27	2	47	2	67	4	87	1
8	3	28	1	48	3	68	1	88	2
9	2	29	4	49	3	69	1	89	3
10	3	30	4	50	3	70	1	90	4
11	1	31	2	51	4	71	3	91	3
12	2	32	4	52	2	72	2	92	1
13	1	33	1	53	1	73	3	93	3
14	1	34	1	54	1	74	4	94	1
15	4	35	2	55	3	75	3	95	4
16	2	36	2	56	3	76	4	96	3
17	2	37	1	57	2	77	3	97	1
18	2	38	2	58	1	78	3	98	4
19	1	39	1	59	2	79	2	99	4
20	1	40	2	60	1	80	4	100	1

Rupa Sreedhar
10/5/2023