

放射線機器管理士測驗
Medical Imaging and
Radiologic Systems Manager

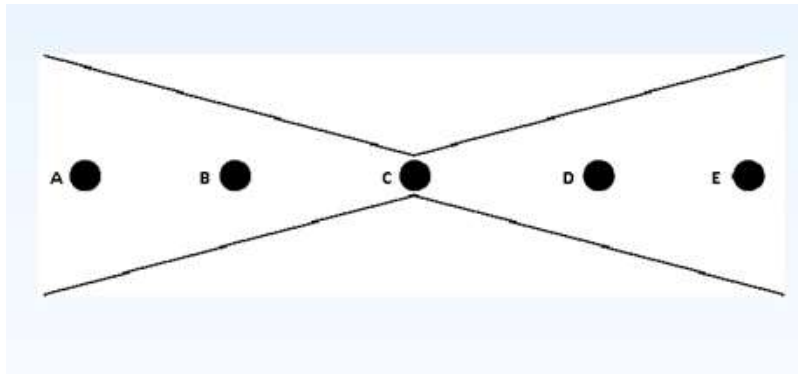
2025 年 8 月 24 日 星期日

1. 除題意不清楚或是圖片有問題，禁止詢問與試題有關的問題。
2. 應答時禁止使用任何文件。
3. 請在電腦答案卡上圈選作答

項目	填寫內容
姓名	您的中文與英文姓名
試題名稱	MRSM Test
項目	不用填寫
科目	不用填寫
受試者識別代碼	您的准考證號碼後五碼：24XXX 將您選定之數字的圓圈塗滿。
科目代碼	不用填寫
地點代碼	不用填寫
作答方式	本測驗共有 90 題問題。請使用 1 到 90 作答欄位。 請將測驗卷 Q1 的答案填入答案卷的答案選擇 1。Q2 = 答案選擇 2，Q3 = 答案選擇 3...Q90 = 答案選擇 90。

1. Using a tissue equivalent phantom, a sonographer adjusts the gain so that reflections on the display change from fully bright to barely visible. What is the sonographer evaluating?
(A) Range Calibration
(B) Dead zone
(C) Sensitivity
(D) All of the above
2. Which of the following is the primary determination of slice thickness?
(A) spacing between detectors
(B) collimators
(C) focal spot size
(D) grid
3. Which of the following is the smallest component of a three-dimensional image?
(A) Pixel
(B) Byte
(C) Voxel
(D) Pic
4. Which of the following describes the change in reflected frequency that occurs with movement of a reflector?
(A) Poson's Law
(B) Doppler shift
(C) Bernoulli's Principle
(D) Lawenence Law
5. What is the imaging depth or penetration in soft tissue with a ultrasound probe of 5 MHz?
(A) 1
(B) 8
(C) 12
(D) 30
6. Which of the following would be an example of a specular reflector?
(A) Renal cortex
(B) Diaphragm
(C) Renal cyst
(D) Bone
7. The Q factor of a transducer refer to:
(A) Coupling efficiency
(B) Minimum intensity
(C) Maximum intensity
(D) Purity of the frequency
8. Which of the following may also be referred to as elasticity?
(A) Particle motion
(B) stiffness
(C) density

- (D) Hardness
9. Lateral resolution in ultrasound imaging would most likely be improved by:
- (A) Increasing transducer focusing
 - (B) Imaging in the Fraunhofer zone
 - (C) Increasing the frequency
 - (D) Increasing baseline
10. The Doppler shift from a moving object depends on all of the following except?
- (A) Frequency
 - (B) Angle between beam and object
 - (C) Object depth
 - (D) Velocity
11. Which of the following angle will general the largest Doppler shift?
- (A) 60°
 - (B) 45°
 - (C) 30°
 - (D) 0°
12. The resonance frequency for ^1H in a 1.5 T magnetic field is:
- (A) 63 Hz
 - (B) 63MHz
 - (C) 63GHz
 - (D) 63THz
13. The FDA limit power deposition in patients undergoing MR does *not* include:
- (A) 3.2 W/kg averaged over the head
 - (B) 8 W/kg peak value
 - (C) Over 4T requires investigational device exemption (IDE)
 - (D) A less than 3°C temperature rise in the heart
14. In tissue harmonic imaging, what is producing the harmonic signal?
- (A) The backing material
 - (B) The patient's soft tissue
 - (C) The PACS
 - (D) Gel
15. Partial volume artifacts in CT are generally reduced by reducing the:
- (A) Section thickness
 - (B) Scanning time
 - (C) Image matrix size
 - (D) mAs
16. Looking at the diagram, which of the following areas has the highest velocity?



- (A) E
- (B) B
- (C) C
- (D) A

17. Which of the following is not concerned with receiver function?
 - (A) Rejection
 - (B) Converting to TV signal
 - (C) Amplification (gain)
 - (D) Compensation (T.G.C)
18. Which of the following does not need the regular quality management in ultrasonography?
 - (A) Distance
 - (B) Uniformity
 - (C) Axial resolution
 - (D) Maximum depth of visualization
19. Following are the statement of Gauss line. Which composition that can be effected from MRI equipment is correct?
 - (A) 1 Gauss line – Watch
 - (B) 5 Gauss line – Film developer
 - (C) 5 Gauss line – Pacemaker
 - (D) 10 Gauss line – Each kind of tools
20. This technique was developed in 1930 and be used currently. Which of the following is the gradual approaching method to obtain the goal effectively to set up the goal, facilitate the improvement process, take actions, and evaluate and maintain?
 - (A) DAPC
 - (B) PDCA
 - (C) ACPD
 - (D) CAPD
21. The numeral system used by computers is
 - (A) Pixel
 - (B) ALARA
 - (C) Voxel
 - (D) Binary

22. National Radiological Protection Board(NRPB) had published “Exposure of Electric-magnetic field in MRI imaging for pregnant woman”, and it suggested the period to avoid the examination. Which following period is correct?
(A) Early pregnancy
(B) Early pregnancy – until 3months
(C) 2 weeks
(D) 6 months – Prior to delivery
23. CT number depends on all the following except:
(A) Tissue heterogeneity
(B) mAs
(C) x-ray attenuation
(D) kVp
24. CT fluoroscopy minimizes radiation doses by using lower:
(A) Voltage
(B) Current
(C) Collimator thickness
(D) Patient table
25. theoretically best possible CT resolution for a 512^2 matrix and 25 cm FOV is:
(A) 0.5 lp/mm
(B) 1.0 lp/mm
(C) 2.0 lp/mm
(D) 5.0 lp/mm
26. Radiographic kVp variance should be evaluated:
(A) daily
(B) monthly
(C) semiannually
(D) annually
27. Which is the acceptable limitation of X-ray output constancy for Linac?
(A) 2%
(B) 0.5%
(C) 3%
(D) 1%
28. Ultrasound attenuates an average of _____ dB/cm of travel for each megahertz of frequency?
(A) 0.25
(B) 10
(C) 0.5
(D) 1.5
29. Which is the following is correct about next figure?



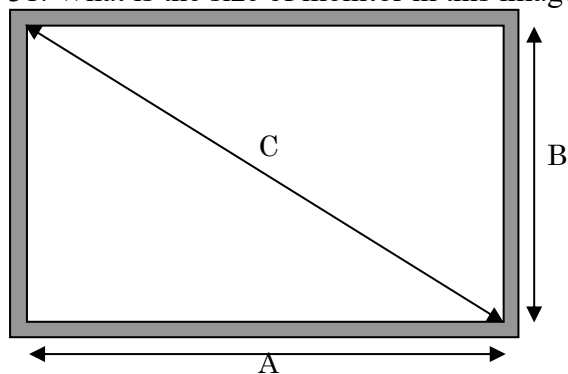
- (A) It is RT QA phantom.
- (B) It is mammography QA phantom.
- (C) It is fluoroscopy QA phantom.
- (D) It is MRI QA phantom.

30. What is the item of Quality Control for radiation treatment devices in this picture?



- (A) PDD
- (B) Symmetry, Flatness
- (C) Radiation isocenter
- (D) TPR

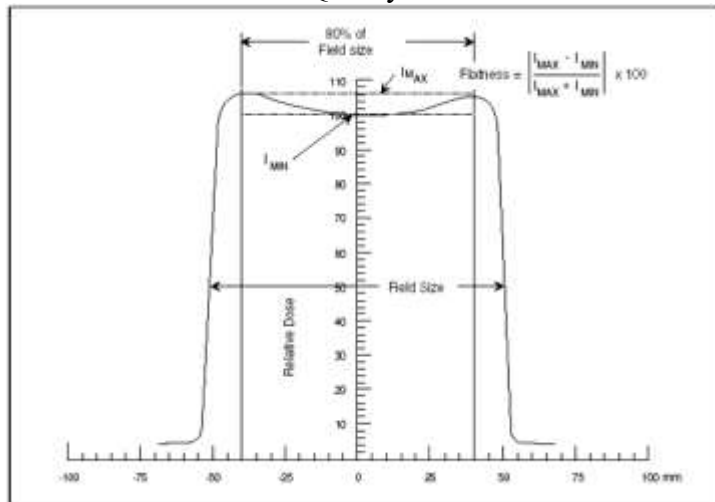
31. What is the size of monitor in this image?



- (A) Length of $A \times B$
- (B) Length of $C + B$

- (C) Length of A + B + C
- (D) Length of C

32. What is the item of Quality Control for radiation treatment devices in this picture?



- (A) Flatness
- (B) Energy
- (C) Symmetry,
- (D) TPR

33. Which of the following is the right answer about Exposure Dose in SI unit (International system of units)?

- (A) R (Roentgen)
- (B) v (Sivert)
- (C) rem(roentgen equivalent man)
- (D) C/kg (Coulomb/kilogram)

34. How much is the absorber thickness for resolution pattern using in fluoroscope?

- (A) 0.03 mmPb
- (B) 0.05 mmPb
- (C) 0.1 mmPb
- (D) 0.2 mmPb

35. Which of the following is included in the development of hypothesis among 4 steps of Quality Improvement?

- (A) The step to know discovered problems or understand improve opportunity in detail
- (B) The step to find that which changes will connect improvement
- (C) The step to verify hypothesis to assure solution presented whether improve expected results.
- (D) The step to decided which tool is better for Quality improvement.

36. Which of the following is not concerned with Quality Assurance?

- (A) Continuous Quality Improvement
- (B) Total Quality Management
- (C) Quality Plane Treatment
- (D) None of above

37. Choose the answer that correctly describes image intensifiers.
- (A) Output luminance increases with the decreasing size of the field of view.
 - (B) The conversion factor is given as the ratio between output luminance and X-ray dose at the center of the incident field.
 - (C) In a view-variable tube, the field of view is controlled by changing the current of the acceleration electrode.
 - (D) Used collimator to restrict the exposure field.
38. How much is the limitation of leakage dose of X-ray tube in the distance of 1 m?
- (A) 10mR/min
 - (B) 100mR/min
 - (C) 100mR/hr
 - (D) 10mR/hr
39. What is the filtration that absorption of radiation at collimator, X-ray tube, tube housing, filter assembled X-ray tube, and insulating oil? [express lowest aluminum equivalent for highest kVp]
- (A) characteristic filtration
 - (B) duplicate filtration
 - (C) load filtration
 - (D) scatter filtration
40. Which is right as the CT dose index of a patient's CT radiation exposure?
- (A) mGy/100mAs
 - (B) mSv/100mAs
 - (C) kV×mA
 - (D) kVp×mAs
41. Each step on the density selector switch on an AEC system should change the exposure by this range:
- (A) 5% to 10%
 - (B) 10% to 20%
 - (C) 25% to 30%
 - (D) 35% to 40%
42. Which of the following device is not a part of quality assurance in ultrasound system?
- (A) Tissue Equivalent Phantom
 - (B) Biopsy Phantom
 - (C) Doppler Phantom
 - (D) Slice sickness Phantom
43. As a supervisor, what should you do in response to complaints of poor clinical image quality by a single sonographer?
- (A) Investigate if the problem is associated with a particular transducer or sonographer?
 - (B) Ignore them
 - (C) Call for the service
 - (D) Purchase a new scanner

44. Ultrasound quality testing indicates that the distance measurements in the horizontal direction are not accurate. What is the most likely cause?
- (A) Velocity calibration is not 1540 m/s
 - (B) High-frequency components associated with broadband transducer
 - (C) Highly attenuation
 - (D) Problems with beam steering
45. Ultrasound tissue-mimicking phantoms are unable to evaluate:
- (A) Axial resolution
 - (B) Temporal resolution
 - (C) Lateral resolution
 - (D) Direction of flow
46. Describes the system's ability to display similar reflectors in the ultrasound phantom with echoes of equal brightness called:
- (A) Uniformity
 - (B) Dynamic range
 - (C) Axial resolution
 - (D) Focal zone
47. Common MR angiography techniques are based on:
- (A) Phase contrast
 - (B) Phase encoding
 - (C) T1 contrast
 - (D) Spatial encoding
48. The image parameter that primarily affects T2 weighting is known as what?
- (A) TI
 - (B) Flip angle
 - (C) TE
 - (D) All of above
49. Ultrasound signals are converted from digital data to a video monitor display using a:
- (A) Photomultiplier tube
 - (B) Photocathode
 - (C) Scan converter
 - (D) Wi-Fi
50. Which of the following is correct about the pixel size?
- (A) Pixel size = phase encoding number/matrix
 - (B) Pixel size = frequency encoding number/matrix
 - (C) Pixel size = matrix/FOV
 - (D) Pixel size = phase encoding number/matrix
51. According to the Radiation Medical Exposure Quality Assurance Standard for Computed Tomography Simulation and Positioning Scanners, the accuracy of CT values and CT values of scanning electronic density prostheses should include five test substances and should include at least one of the following? ①Air

- ②Water ③Bone ④Participants with a CT value above 800 undergoing testing.
- (A) ①②③④
 (B) only①②④
 (C) only①②③
 (D) only①④
52. Which is the kind of material for passive magnetic shielding?
 (A) Cu
 (B) Fe
 (C) Al
 (D) Gd
53. Which method could not be used to remedy the aliased artifact?
 (A) Parallel imaging
 (B) Using pre-saturation bands on areas outside the FOV
 (C) Switching the phase and frequency directions
 (D) All of the above
54. Which of the following method is unable remove the artifact of the following imaging?
 (A) Increased FOV
 (B) Oversampling at phase direction
 (C) Increased slice thickness
 (D) All of the above
55. The Larmor frequency is the frequency of:
 (A) Pulse repetition
 (B) Nuclear precession
 (C) Phase encoding
 (D) Spatial encoding
56. In spin-echo imaging, the echo signal normally is measured:
 (A) Immediately ($t = 0$)
 (B) After time TE
 (C) After time $4 \times T1$
 (D) After $T2^*$
57. MR SNR cannot be improved by increasing the:
 (A) Matrix size
 (B) Number of acquisitions
 (C) Section thickness
 (D) Spatial resolution
58. In MR, motion results in ghost images that appear in which direction?
 (A) Read encode
 (B) Phase encode
 (C) Slice selection axis
 (D) Lateral
59. Contrast in MR can be due to all the following differences except:

- (A) Proton density
 - (B) T1
 - (C) Atomic number
 - (D) T2
60. What is the purpose of these tools in quality measurement of diagnostic X-ray generator?
- (A) Timer accuracy
 - (B) Focal spot test
 - (C) Resolution test
 - (D) light indicator test
61. Methods of reducing CT image noise include:
- (A) increases x-ray dose
 - (B) decreases x-ray dose
 - (C) decreases scan time
 - (D) none of the above
62. If a CT detector has an offset or gain difference of 0.1% with neighboring detectors, which type of artifact will be depicted ?
- (A) beam hardening
 - (B) partial volume
 - (C) ring
 - (D) all of the above
63. Acceptance testing is not be performed at the time of
- (A) initial installation
 - (B) replacing light localizers
 - (C) replacing the X-ray tube
 - (D) none of the above
64. Which of the following is incorrect for the quality management of device?
- (A) It is the activity for maintenance the uniformity of image quality always.
 - (B) It can reduce additional scatter radiation dose from device.
 - (C) It can find the changes from the deterioration of the device quality and general aging.
 - (D) The measuring activity is needed for optimization of capacity of the device when breakdown or some problem is occurred only.
65. Choose the correct range of total filtration for X-ray equipment with a nominal maximum tube voltage of 150 kV or less.
- (A) 2.0 mmAl or more
 - (B) 2.5 mmAl or more
 - (C) 3.0 mmAl or more
 - (D) 3.5 mmAl or more
66. What is used as the reference material for CT number calibration?
- (A) bone
 - (B) liver
 - (C) water

(D) lung

67. Which term describes the ability of a CT scanner to differentiate objects with minimal differences in attenuation coefficients?
- (A) spatial resolution
 - (B) contrast resolution
 - (C) linearity
 - (D) speed
68. Which of the following adequately describes the Nyquist limit?
- (A) Two times the pulse repetition frequency
 - (B) One-half the pulse repetition frequency
 - (C) One-half the Doppler shift
 - (D) the pulse repetition period
69. Which of the following factors can affect the accuracy of a density (Hounsfield) measurement in a CT image?
- (A) system calibration
 - (B) window width setting
 - (C) display field of view
 - (D) all of the above
70. Spatial resolution can be improved by increasing the:
- (A) FOV
 - (B) matrix
 - (C) pixel size
 - (D) slice thickness
71. The main limiting factor for contrast resolution is:
- (A) noise
 - (B) pixel depth
 - (C) voxel volume
 - (D) none of the above
72. The modulation transfer function is one method of measuring:
- (A) low-contrast resolution
 - (B) high-contrast spatial resolution
 - (C) attenuation
 - (D) none of the above
73. A contemporary CT system should be able to detect 3 mm objects with density differences of:
- (A) 0.05%
 - (B) 0.5%
 - (C) 1.0%
 - (D) 1.5%
74. What is the tolerance limit for noise in a CT image?

- (A) ± 3
- (B) ± 5
- (C) ± 10
- (D) ± 15

75. The CT accreditation phantom from the American College of Radiology contains four modules to evaluate the CT scanner performance. This phantom provides parameters or functions for CT acceptance and annual testing, but excluding
- (A) uniformity and noise
 - (B) slice thickness
 - (C) dose profile
 - (D) all of the above
76. A department performs a total of 1720 views per month; 146 views must be repeated. What is the repeat rate of this department?
- (A) 4.2%
 - (B) 5.7%
 - (C) 8.5%
 - (D) 11.1%
77. A quality management program should encourage:
- (A) staff innovation and participate
 - (B) staff diversity
 - (C) A and B
 - (D) A,B, and C
78. The repeat rate for mammographic departments should not be greater than %
- (A) 2%
 - (B) 5%
 - (C) 8%
 - (D) 12%
79. Which order are the following coils placed in relationship to the patient?
- (A) Shim coils, RF probe, Gradient coils
 - (B) RF probe, RF coils, Shim coils
 - (C) Gradient coils, RF probe, Shim coils
 - (D) RF coils , Shim coils, Gradient coils
80. With regard to ultrasonic image systems, which of the following is not reduced by the effects of damping?
- (A) Pulse duration
 - (B) Refraction
 - (C) Space pulse length (SPL)
 - (D) Sensitivity
81. Which of the following instruments has the highest spatial resolution (lp/mm) value in routine clinical use?
- (A) CR (computed radiography)
 - (B) MRI
 - (C) DBT (digital breast tomosynthesis)

(D) CT

82. Which of the following is NOT an artifact of CT imaging?
- (A) beam hardening artifact
 - (B) partial volume artifact
 - (C) motion artifact
 - (D) zipper artifact
83. Which of the following statements is correct about the changes in blood flow and pressure at the site of vascular stenosis in an ultrasound scan?
- (A) The blood flow rate is faster and the pressure is reduced
 - (B) The blood flow velocity becomes faster and the pressure increases
 - (C) Slowing down of blood flow and increasing pressure
 - (D) Slowing down of blood flow and decreasing pressure
84. Which of following is not included in radiation survey about acceptance test of Linear accelerator?
- (A) outside of the treatment room
 - (B) the outside wall of the treatment room
 - (C) inside of the treatment room
 - (D) None of above
85. When multiple Doppler shift frequencies are present in the spectral waveform, it is termed:
- (A) Nyquist limit
 - (B) Aliasing
 - (C) Spectral broadening
 - (D) Mechanical index
86. The main advantage of helical CT over conventional (axial) CT is improved:
- (A) Spatial resolution
 - (B) Low contrast detection
 - (C) Data acquisition rate
 - (D) Patient dose
87. In PACS, large-matrix display stations(for DR or CR) have all of the following except:
- (A) A magnification function
 - (B) Interactive window and level function
 - (C) Ability to measure the linear attenuation coefficient accurately
 - (D) Ability to invert the gray scale value of the image
88. To store images with 256 shades of gray, each pixel in the image will require:
- (A) 1 byte
 - (B) 6 bytes
 - (C) 1 bit
 - (D) 6 bits
89. For a similar RF coil, 3T MRI always has which than 1.5T MRI?
- (A) Higher resolution

- (B) Higher SNR
- (C) A shorter scan time
- (D) Less artifacts

90. The effective energy of an x-ray beam?
- (A) linearly increase with the atomic number
 - (B) affects subject contrast
 - (C) is equal to the kVp
 - (D) is proportional to the mAs