

九十七學年度中山醫學大學二年制醫學影像暨放射科學系在職專班考試試題

科目：放射線技術學

考試時間：八十分鐘

注意事項	一、本科目採電腦閱卷，請依題號順序於答案卡上畫記(作答)，否則不予計分。 二、答案卡限用 2B 鉛筆作答，不得污損，並嚴禁使用立可白之類用品塗抹，否則不予計分。 三、本試題作答時，不得使用電子計算機。 四、本試題需隨同答案卡一併繳回，違者不予計分。 五、本試題共 4 頁，如有缺少，應立即舉手，請監試委員補發。
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選擇題：(單選題，共 40 題，每題 2.5 分，答錯不倒扣)

- 有一張CT影像，其影像之矩陣大小為 512×512 ，影像之灰階範圍為16bits，請問一張沒經過影像壓縮的CT影像，需要多少電腦空間來儲存(1 byte=8 bits; 1 KB=1024 bytes)?
(A) 128 KB (B) 256 KB (C) 512 KB (D) 1024 KB
- 承上題，若其FOV(field of view)為256mm，切面厚度為5mm，請問一個voxel的體積為何?
(A) 0.5 mm^3 (B) 1.25 mm^3 (C) 2.5 mm^3 (D) 5.0 mm^3
- 當內殼層(shell)軌道有電子空洞時，外殼層的電子進入填補內殼層的空洞，但若為低原子序數的元素時，有可能不產生特性輻射而發生以下何種輻射?
(A) 鄂惹電子(Auger electron) (B) 內轉換電子
(C) 制動輻射 (D) 加馬射線(gamma ray)
- 設鎝-99m(^{99m}Tc)之半衰期為6.0小時，請問其平均壽命為何?
(A) 0.16 小時 (B) 6.0 小時 (C) 8.66 小時 (D) 12.0 小時
- 承上題，若有10mCi之 ^{99m}Tc ，請問其約含有 ^{99m}Tc 多少重量?
(A) 1.9 ng (B) 1.9 mg (C) 3.8 ng (D) 3.8 mg
- 請問 ^{99}Mo 經過以下何種衰變轉變成 ^{99m}Tc ?
(A) α 衰變 (B) β^- 衰變 (C) γ 衰變 (D) 電子補獲(EC)
- ^{99m}Tc 與 ^{99}Tc 兩者是互為何種關係?
(A) isotope (B) isotone (C) isobar (D) isomer
- 依現行法規,下列何種輻射之輻射加權因子(Radiation weighting factor)最高?
(A) 10 MV之x光 (B) 10 MeV之電子射束
(C) 100 MeV之質子射束 (D) 0.5 MeV之中子射束
- 依現行法規,下列何種組織器官的組織加權因子(Tissue weighting factor)最高?
(A) 乳房 (B) 胃 (C) 皮膚 (D) 性腺
- 輻射防護之目的為：
(A) 防止機率效應之發生，抑低非機率效應之發生率
(B) 防止非機率效應之發生，抑低機率效應之發生率
(C) 合理抑低(ALARA)
(D) 符合法規之劑量限度
- 某輻射試樣計測得到10000 計數，試求此試樣的68%信賴區間?
(A) 10000 ± 100 計數 (B) 10000 ± 139 計數 (C) 10000 ± 168 計數 (D) 10000 ± 200 計數
- 以下那一種影像格式，使用於PACS(Picture Archiving and Communication Systems)的影像儲存及傳輸?
(A) TIFF (B) BMP (C) JPEG (D) DICOM

13. 下列哪一種動作能提高影像的訊雜比(不會增加影像中散射的比例)?
- (A) 增加KVp (B) 增加mAs (C) 加大照野 (D) 增加攝影部位厚度
14. 下列何種患者作磁振造影檢查會有危險?
- (A) 髖關節置換者 (B) 脊椎固定釘使用者
(C) 有人工植牙者 (D) 顱內有金屬碎片者
15. 選出磁體(Magnet bore)內，各個線圈(coils)由外而內正確的結構：
- (A) Surface coils, RF coils, gradient coils, shim coils, magnet coils.
(B) Magnet coils, shim coils, gradient coils, RF coils, surface coils.
(C) Gradient coils, shim coils, magnet coils, RF coils, surface coils.
(D) RF coils, magnet coils, shim coils, surface coils, gradient
16. 氫原子核的gyromagnetic ratio為42.57MHz/T，置於1.5T均勻主磁場中，請問其Larmor frequency為：
- (A) 63.86MHz (B) 42.57MHz (C) 28.38MHz (D) 21.28MHz
17. 迴旋加速器不能使用下列那種粒子來打靶?
- (A) 質子(proton) (B) 中子(neutron) (C) 氘核(deuteron) (D) 氦核(alpha particle)
18. 超音波掃瞄時，當聲波束遇到下列介質時幾乎完全會被反射(total reflection)，請選出何者錯誤?
- (A) 水(water) (B) 肋骨(ribs) (C) 結石(stones) (D) 空氣(air)
19. 超音波B型掃描器用何者來顯示從人體界面反射回來信號強度?
- (A) 速度(velocity) (B) 頻率(frequency) (C) 亮度(brightness) (D) 幅度(amplitude)
20. 聲音在介質中傳播速率與下列何者無關?
- (A) 頻率 (B) 介質溫度
(C) 介質壓縮性(compressibility) (D) 介質密度
21. 以電腦斷層劑量指引(computed tomography dose index, CTDI)評估度量電腦斷層造成之劑量，請問使用的度量儀器是?
- (A) 熱發光劑量計(TLD) (B) 筆型游離腔(pencil ionization chamber)
(C) NaI(Tl)閃爍偵檢器 (D) 玻璃劑量計
22. 數位血管減贅(subtraction)影像方法中，減贅後的影像何者最常有骨頭組織影像的殘存?
- (A) 面罩減贅 (B) 時間減贅 (C) 能量減贅 (D) 混和減贅
23. 有關腳掌內外旋對股骨之影響，下列何者錯誤?
- (A) 為取得較長之股骨頸，骨盆攝影時腳需內旋
(B) 解剖姿勢時，部分小轉子會出現於股骨內側表面
(C) 腳掌內旋角度約為5-10度即可
(D) 外旋時較多的小轉子會出現於股骨內側表面
24. 下列有關乳房攝影的敘述，以下何者不正確?
- (A) X光管的管電壓在25~32 kVp之間 (B) 一般使用鉬靶和鉬濾器
(C) 一般焦斑約為0.1~0.4mm (D) 多數X光管窗口是以鉛玻璃為材質
25. 在乳房攝影時，常利用足跟效應(heel effect)，來補償光子通率的不足，請問通常將X光管的陰極邊置於靠近以下何者之方向?
- (A) 乳頭 (B) 胸壁 (C) 頭部 (D) 腳部

26. 下列何者放射線攝影"非"為目前臨床牙科常使用的照影方式？
- (A) panoraghy (B) periapical film
(C) occlusal film (D) 以上皆是牙科常用之照影方式
27. Tc-99m pertechnetate可以用來進行下列造影檢查，何者例外？
- (A) 唾液腺造影 (B) 甲狀腺造影
(C) 胃食道逆流造影 (D) 美克爾憩室(Meckel's diverticulum)造影
28. 以某項醫學檢查來診斷100位病人是否罹患某種疾病，結果有75位為真陽性(true positive)，15位真陰性(true negative)，5位偽陽性(false positive)，5位偽陰性(false negative)，則該核醫檢查對於該病診斷之靈敏度(sensitivity)為何？
- (A) 33% (B) 60% (C) 75% (D) 94%
29. 承上題，此檢查對此疾病之專一性(specificity)為何？
- (A) 33% (B) 60% (C) 75% (D) 94%
30. 下列那一種藥物適合用來計算腎絲球過濾率(glomerular filtration rate)？
- (A) $^{99m}\text{Tc-MAG}_3$ (B) $^{131}\text{I-OIH}$ (C) $^{99m}\text{Tc-DTPA}$ (D) $^{99m}\text{Tc-DMSA}$
31. 進行 ^{201}Tl 心肌灌注檢查(Myocardial perfusion study)時，下列何種情況可以懷疑為心肌缺血(ischemia)？
- (A) 運動後之影像有缺損，再分布之影像無缺損
(B) 運動後與再分布影像皆無缺損
(C) 運動後與再分布之影像皆有缺損
(D) 心肌缺血非為其適應症
32. 正常人使用以下何種藥物，可以提高 ^{131}I 甲狀腺攝取率？
- (A) TSH (B) T4 (C) Lugol's solution (D) 過氯酸鹽
33. 在進行 $^{131}\text{I-NP59}$ 腎上腺皮質造影前，需先使用Lugol's solution其目的為何？
- (A) 增加 $^{131}\text{I-NP59}$ 之攝取率 (B) 減少腎皮質吸收 $^{131}\text{I-NP59}$
(C) 減少游離 ^{131}I 之攝取 (D) 減慢 $^{131}\text{I-NP59}$ 的分解速度
34. 放射治療計畫中，需要定義定義GTV(gross tumor volume)，CTV(clinical target volume)，以及PTV(planning target volume)，請問若以其涵蓋的範圍大小排列應為何？
- (A) $\text{GTV} > \text{CTV} > \text{PTV}$ (B) $\text{CTV} > \text{GTV} > \text{PTV}$ (C) $\text{PTV} > \text{GTV} > \text{CTV}$ (D) $\text{PTV} > \text{CTV} > \text{GTV}$
35. 某醫院使用TMR技術計算放射劑量，若照射血袋需要以6MV的射束給予1000 cGy的劑量，假設照野為10 cm × 10 cm ($\text{Scp}=1.0$)，治療深度為3 cm ($\text{TMR}(10\text{ cm} \times 10\text{ cm}, 3\text{ cm})=0.92$)，請問在這條件下，需給予多少的MU (monitor unit)？
- (A) 920 MU (B) 1000 MU (C) 1087 MU (D) 2760 MU
36. 放射治療若使用CT模擬攝影，一般透過何種影像處理技術，將CT的切面影像，變成投影的定位影像？
- (A) DRR (digital reconstructed radiograph) (B) MIP (maximum intensity projection)
(C) surface rendering (D) volume rendering
37. 以下四種輻射束(radiation beam)，在相同大小的照野之下，何者之增建深度(build-up region)最深？
- (A) 500 kVp的x-ray (B) 4 MV的x-ray (C) 10 MV的 x-ray (D) 15 MV 的x-ray

38. 以下何者不屬於放射治療每日品質保證(Daily QA)的項目？

- (A) 光子的輸出劑量(photon beam output) (B) 深度劑量曲線(percent depth dose)
(C) 光學距離指示器(optical distance indicator) (D) 定位雷射

39. 在子宮頸癌的近接治療中常使用定義的A點與B點來作治療的標準點，治療時一般亦會設定參考點，這些參考點是以下列何器官為主？

- (A) 膀胱與骨盆 (B) 直腸與骨盆 (C) 膀胱與直腸 (D) 子宮與輸尿管

40. 下列何種射源適合作為攝護腺永久插種治療使用？

- (A) ^{60}Co (B) ^{137}Cs (C) ^{226}Ra (D) ^{125}I

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科目：英文

考試時間：六十分鐘

注 意 事 項	一、本科目採電腦閱卷，請依題號順序於答案卡上畫記（作答），否則不予計分。 二、答案卡限用 2B 鉛筆作答，不得污損，並嚴禁使用立可白之類用品塗抹，否則不予計分。 三、本試題作答時，不得使用電子計算機。 四、本試題需隨同答案卡一併繳回，違者不予計分。 五、本試題共 4 頁，如有缺少，應立即舉手，請監試委員補發。
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選擇題：(單選題，共 40 題，每題 2.5 分，答錯不倒扣)

一、字彙：選出最適當的答案

1. They have no children of their own, but they're hoping to _____.
(A) adopt (B) adapt (C) adult (D) addict
2. I hadn't seen her for 20 years, but I _____ her immediately.
(A) reserved (B) restored (C) restricted (D) recognized
3. We can now _____ instantly with people on the other side of the world.
(A) communicate (B) common (C) community (D) commute
4. There is growing _____ that people whose diets are rich in vitamins are less likely to develop some types of cancer.
(A) evolution (B) evidence (C) evil (D) event
5. The United Nations has used its _____ to restore peace in the area.
(A) automobile (B) authenticity (C) authority (D) autography
6. Mail is _____ to our office twice a day.
(A) delayed (B) delivered (C) destroyed (D) deleted
7. I had to _____ my voice to make myself heard over the noise.
(A) rose (B) risen (C) arise (D) raise
8. They have published a lot of new books on international _____.
(A) insures (B) assures (C) issues (D) tissues
9. She has _____ all her life to the care of homeless people.
(A) deducted (B) duplicated (C) decanted (D) devoted
10. It is very difficult to define the _____ of beauty.
(A) receipt (B) accept (C) concept (D) except
11. The _____ of the veins is to carry blood to the heart.
(A) function (B) location (C) cooperation (D) instruction
12. Even the smallest baby can _____ its mother by her voice.
(A) idle (B) identify (C) ideal (D) idol
13. I'm not making much _____ with my Spanish.
(A) progress (B) process (C) proceed (D) procedure

二、語法與用法：選出最適當的答案

14. Research now proves that eating fish and chips is healthier than _____.
(A) when eating hamburgers (B) eating hamburgers
(C) to eat hamburgers (D) hamburgers should eat
15. _____ his illness, John continued to play rugby.
(A) Despite (B) Although (C) Even though (D) Because
16. Walking under a ladder _____ be unlucky.
(A) is suppose to (B) should (C) out to (D) is supposed to
17. My brother Bill does not like reading science fiction, and neither _____ I.
(A) does (B) do (C) did (D) had
18. I notified _____ I had changed my address.
(A) with the bank that (B) the bank that (C) that (D) to the bank that
19. _____ or not you come to class, you need to take the final exam.
(A) Weather (B) Which (C) Whether (D) Believe
20. What's the chance _____ five heads when you toss a coin five times?
(A) of throwing (B) to throw (C) of throw (D) throw
21. He was busy _____ his homework.
(A) to do (B) doing (C) that he was doing (D) he was doing
22. "Wait a minute," said Frank, _____.
(A) running through the door (B) run through the door
(C) ran through the door (D) runs through the door
23. Many American tea kettles whistle when the _____ starts to boil.
(A) containing water inside (B) water contained inside
(C) water containing inside (D) contain water
24. _____ I accept that he's not perfect in many respects, I do actually quite like the man.
(A) That (B) Why (C) While (D) It is
25. The team consists _____ four Europeans and two Americans.
(A) from (B) for (C) of (D) by
26. She's been suffering _____ cancer for two years.
(A) of (B) to (C) under (D) from
27. _____ we get to the meeting, the presentation will have started.
(A) As soon as (B) By the time (C) Whenever (D) Until
28. Have you finished your homework _____?
(A) yet (B) already (C) still (D) just
29. He has _____ friends in Chicago.
(A) few (B) few of (C) a lot (D) much
30. She _____ lunch by the time we arrived.
(A) had finished (B) finished (C) have finished (D) finishing

三、會話：選出最適當的答案

31. A: I thought that movie was too _____.

B: I agree. I cried for an hour after it ended.

- (A) silly (B) depressing (C) interesting (D) slow-moving

32. A: _____?

B: I think there's an Internet café next to that tall building.

- (A) I got ketchup on my pants. (B) I have the worst headache.
(C) Where can I mail this package? (D) Can you tell me where I can check my e-mail?

33. A: I'd like to make a reservation, please.

B: _____.

- (A) For what dates? (B) Here's your room key.
(C) What are you interested in seeing? (D) I hope you enjoyed your stay.

34. A: I saw my girlfriend holding someone else's hand. I'm so upset.

B: _____, I'd break up with her right away.

- (A) If you were me (B) If I were you (C) If you was me (D) If I are you

35. A: _____.

B: Steve Jackson is the host of *The National News*.

- (A) How is Steve Jackson? (B) Do you know Steve Jackson personally?
(C) Is Steve Jackson over there? (D) Who is Steve Jackson?

四、閱讀測驗：選出最適當的答案

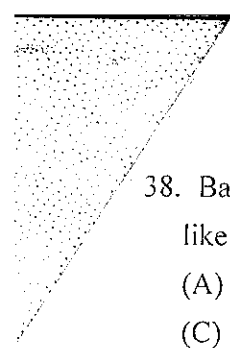
For the normal emotional and physical development of infants, stimulation is necessary. Healthy babies experience this stimulation while in contact with the mother or other adults who feed or wash the infant. However, infants who are born prematurely or are sick miss these experiences during the early weeks of their lives when they live in incubators, an artificial environment **devoid** of normal stimuli. These babies tend to become listless and seem uninterested in their surroundings. However, when they are stimulated by being handled and spoken to and by being provided with bright objects, they begin to respond by smiling, becoming more active physically, and gaining weight more rapidly.

36. What is the main idea expressed in the passage?

- (A) The importance of incubators for sick infants (B) The importance of stimulation for newborn infants
(C) The functions of incubators (D) The normal development of babies

37. According to the passage, which of the following is a correct statement about infants and their stimulation needs?

- (A) Healthy infants fail to receive sufficient stimulation.
(B) Stimulation is harmful especially for premature infants.
(C) Healthy infants don't need stimulation.
(D) Incubators do not provide adequate infant stimulation.

- 
38. Based the passage, premature infants cared for in incubators, when compared with full-term infants, are likely to
- (A) be less active physically
 - (B) gain weight more rapidly
 - (C) receive more natural stimulation
 - (D) respond more to bright objects
39. The word “devoid” could be best replaced by which of the following?
- (A) need
 - (B) lack
 - (C) provide
 - (D) receive
40. Infants whose environment has been stimulated will do all of the following EXCEPT
- (A) smile more
 - (B) move around more
 - (C) gain weight more quickly
 - (D) be unaware of their surroundings