

私立臺北醫學院 89 學年度第 2 學期 期中 考試 (命 試) 題紙

系 級	科 目	授 課 教 師	考 試 日 期	學 號	姓 名
醫一	普通物理學	方錫經	90年6月20日第1-2節		

※①請注意本試題共 1 張。如發現頁數不足及空白頁或缺印，應當場請求補齊，否則缺少部份概以零分計。
 ②每張試題卷務必填寫(學號)、(姓名)。

Final Examination on Medical Physics

- Define or Explain the following technical terms : (24%)
 - nuclear medicine
 - cryosurgery
 - nerve impulse
 - magnetocardiogram
 - radiopharmaceuticals
 - milking
- Describe the principles and the medical applications the following bioinstrumentations : (16%)
 - magnetic resonance imaging (MRI)
 - scintillation detector.
- Answer the following questions : (16%)
 - what are the principles of ultrasound used for clinical medicine ?
 - What are the characteristics of a computed tomographic scanner ?
- Compare and contrast the following explanations : (16%)
 - The advantages and disadvantages between a medical linear accelerator and betatron used in teletherapy.
 - The chronic effects and genetic damages of radiation in the human body.
- Explain the clinical uses of radionuclides for nuclear medicine. (8%)
- A blood transfusion is given to a patient by placing the container of blood 1.5m above the needle. The needle has a radius of 0.2cm, its length is 2cm. How long will it take to inject 1 liter of blood? (8%)
 The density blood is 1057 kg/m^3 , viscosity is $2 \times 10^{-3} \text{ kg} \cdot \text{m}^{-1} \cdot \text{sec}^{-1}$.
- The following count rates were obtained 24 hr. after ingestion of $10 \mu\text{Ci}$ of ^{131}I to a patient. Calculate the percent thyroid activity. Is the thyroid normal ? If not , explain. If a technician who takes 30 minutes to perform the scan and stays at 1 m away from the patient. Find the skin doses to the technician. (12%)
 For patient's thyroid = 400cpm.
 patient's thyroid shielded by the filter = 150cpm.
 standard = 3000cpm.
 standard shielded by the filter = 160cpm.
 In this case , specific gamma ray constant = $2.2 \text{ R} \cdot \text{cm}^2/\text{mCi} \cdot \text{hr}$.
 Conversional factor = 0.965 rads/R .

Attention : You may use a calculator but can't use the constant tables.